TROPICALS... KOI... COLDWATER... MARINES... REPTILES...

AQUARIST & POND KEEPER

JUNE 1995

£2.00

FREE SUPPLEMENT

POND FILTRATION

CHOOSING THE *RIGHT* POND PUMP

APPLES & CUCUMBERS TANK CARE TIPS

MORE VIEWS ON FISH SHOWS

KEEPING & BREEDING: THE RED-EYED TETRA

EXCITING

INTERPET/A&P CHALLENGE TROPHY COMPETITION

AMAZING LIVEBEARER... OR EGGLAYER!

9 770003 727051 06

AMPHIBIANS... EXPEDITIONS... CONSERVATION... COMPETITIONS

Contents

JUNE 1995
VOL. 60 NO 6

EDITOR John Dawes

ART EDITOR Adam Turner

SENIOR ADVERTISEMENT MANAGER
Lesley Anderson

ADVERTISEMENT MANAGER John Young
Tel: 081 804 6866.

ADVERTISEMENT SALES
Rosemary Brookman

ADVERTISEMENT PRODUCTION
Pauline Philpott

PUBLISHED BY Dog World Publications,
9 Tufton Street, Ashford,
Kent TN23 1QN.

TELEPHONE: ADVERTISING AND PRODUCTION/ CLASSIFIEDS & BUYERS GUIDE
0233 621877

FAX NUMBER
0233 645668

SUBSCRIPTIONS £22.50 per annum post paid. Overseas rates on application. All subscriptions payable in advance to: Aquarist & Pondkeeper, 9 Tufton Street, Ashford, Kent TN23 1QN.

Origination by Wishpark Ltd/Ashford Composition Ltd. Printed by Headley Brothers Ltd, The Invicta Press, all of Ashford, Kent.

Distributed to the Newstrade by: Seymour International Press Distributors Ltd, Windsor House, 1270 London Road, Norbury, London, SW16 4DH.

ISSN 0003-7273

features

SUPPLEMENT: POND FILTRATION
See page 44 for all the details

Also in this issue

editorial

THE FLUORESCENT ALTERNATIVE

We've all heard of fluorescent 'painted' fish: Disco Glassfish, Corydoras, Glass Cats and the like... and we all have an opinion about them. Now comes news via reader and contributor **Dr. Peter Burgess,** of genuinely fluorescent fish that could eventually provide the perfect alternative.

He's kindly sent me details of an article published in *New Scientist* (4 March '95) cleverly entitled **Bright Future for Glowing Gene.**

It turns out that work being carried out at the Palo Alto Institute of Molecular Medicine in California and by Clontech — a company also based in Palo Alto — has already resulted in a viral gene that can produce 'Green Fluorescent Protein' (GFP). This gene has been (quote) "scrambled" and spliced into the bacterium *Escherichia coli*, resulting in colonies of *E. coli* that glow.

Using the same technique, researchers at the Massachusetts Institute of Technology have taken things a significant stage further (from the aquatic point of view) and have actually produced 'glowing' Zebra Danios. It is not clear, though, if these Zebras glow in daylight or under aquarium lights, or if they require to be subjected (as the *E. coli*) to blue/green light.

Whatever the case, experimentation is well under way to develop both the techniques and the range of fluorescing proteins further, so the day when we might be able to buy aquarium fish that glow in different colours may not be that far off.

The mind boggles!

John Dawes

KEEPING & BREEDING:

THE RED-EYED TETRA

BILLY WHITESIDE

Chris Spencer has kept and bred this delightful tetra with great success. Follow his recipe and you, too, could enjoy the delights of having your own home-produced shoal of Red-Eyes

The Red-Eyed Tetra should, perhaps, be known as the Half Red-Eyed Tetra, as on close inspection, it will be revealed (especially though a camera lens) that only the top half of the eye possesses a striking blood red colour. Indeed, this red stands out in sharp contrast against the fish's body, which is somewhat bland in appearance.

The Red-Eyed Tetra was first introduced to aquaria in the 1950s. In general, the overall body colour is silvery, its back being an iridescent light greenish or brownish. The scales have dark edges to them, which are more pronounced on the peduncle, while a broad black bar transverses the base of its tail. All the fins are virtually devoid of colour, or have a slight smokey-grey appearance about them. The exceptions to this are the dorsal and anal fins which carry white tips. As I mentioned earlier, the upper half of the eye is a superb blood red.

In common with other species, this tetra possesses teeth, and the body is typically scaled, these being absent on the head. A small adipose fin is also present. The Red-Eye is a fairly deep-bodied fish, and, like other characins, lives in shoals, preferring to swim in midwater. When ready to spawn, the female's belly becomes noticeably more rounded.

Tank set-up

At present I am keeping a group of Red-Eyed Tetras in a tank which measures 24 x 12 x 18in (60 x 30 x 45cm). As these fishes are midwater feeders, I find that the extra height gives them more swimming space; it also allows me greater freedom for observation and photography, eliminating the top edge of the tank from within the viewfinder. You can, of course, use a larger tank, but please bear in mind that when stocking with small fishes, such as the tetras, a greater number will be required for effect and this will add extra cost to the initial outlay. But, if you can, do it (I do); the family will understand. The bigger the aquarium, the greater the impact to the beholder.

When I set up a tank, I always try to emulate my intended occupants' natural environment. As will be appreciated, the Red-Eyed Tetra will thrive best if kept in the right water conditions, in this case soft water, or at least, soft to medium-hard. This will also increase their chances of spawning.

My soft water supply comes from a large rain barrel standing against a shed in the garden. A hole in the lid gives access for a fallpipe and this, in turn, takes the rainwater from the shed gutters. Whatever your source of rainwater, make sure that it is free from contamination, especially when it comes off a roof. This risk, although not eliminated, is reduced after a heavy downpour, common in temperate climates.

I always fill a plastic five-gallon drum, and with the lid left off, leave it to stand for a day or so. This water is then used to do a water change, about once a month, and is brought up to the required temperature with tapwater. Old fashioned? Yes, but if your water is not right, it will have a detrimental effect on your fishes.

Some of the gravels commercially available for aquaria release calcium into the water, which soon becomes hard. With fishes such as this tetra, I try to make sure of using a gravel that will not alter the composition of the water.

Red-Eyed Tetras should be kept in a reasonable sized tank, well planted to provide shelter from hostilities, but leaving ample open water to swim in. Whatever type of plants are used, they need to be fairly robust, as these fishes have a tendency to nibble at the softer varieties. They also seem quite partial to fin nipping, all too obvious through my camera lens.

Lighting in the aquarium should be subdued, using low voltage bulbs. A darkened background and some floating plants will help to shade the lighting and so give the required effect.

The water temperature can be anywhere within the range of between 24-27°C (75-80°F). I find that a pH of around 6.8 is best.

Filtration for my main aquariums, including the tank which I use to rear fry in, is provided by undergravel filters, with at least two uplifts. For the Red-Eyed Tetra, I prefer to keep the flow of bubbles rising to the water's surface, small and fairly steady. If a tank starts to become overloaded with sediment, a power filter placed in one corner and left running for a day or so, will help to being the clarity back.

Foods and feeding

In their wild state, these tetras, as most characins, are carnivorous. However, in the aquarium they can be persuaded to accept most foods which are offered. I will say, at this stage, that as the fishes' natural diet consists of larvae and small aquatic insects, especially on the water's surface if they are to thrive, an attempt should be made to feed live foods whenever possible. Supplies of *Daphnia* or *Tubifex* can be obtained commercially, or — dare I say it — during the summer months, you may wish to collect your own.

Now and again, I take a trip to my local pond and harvest an ample supply of mosquito larvae, bloodworms and sometimes glassworms. Even an open water butt in the garden, or next door(!), can yield such delicacies. A ready source of live food is, of course, the garden worm. Although a little on the large size for characins, if you're not too squeamish, these worms can be chopped up. I am relieved to some extent of this task, having a compost heap at my disposal, from which small red worms and brandlings can easily be dug out.

One way of ensuring a fairly steady supply of earthworms throughout the year is by placing a pile of leaves and vegetable material in a secluded corner, away from the sun and covering it with a piece of sacking. Frequent sprayings will keep the heap damp, encouraging red worms and earthworms to congregate among the decomposing matter. As this supply becomes depleted, just repeat the procedure in another spot.

Scrapings of beef heart and liver will be readily accepted with relish by most fishes. Don't forget the usual dried foods, of course.

Although carnivorous by nature, some species of characins take green matter in their diet, and the Red-Eyed Tetra is no exception, hence their liking for soft plants. A small piece of shredded lettuce placed in the tank should satisfy their needs. However, as with all foods, this must be removed when showing signs of rotting.

In addition to these foods, my fishes willingly accept tiny bits of fish and cereals, especially porridge oats.

M-P & C PEDNOR

The Red-Eyed Tetra is a shoaling species, so always keep it in groups.

Breeding

The spawning of many species of characin in the wild is timed to coincide with the rainy season. However, in aquaria, they will spawn throughout the year. Spawning appears to be a somewhat haphazard affair, but normally, the male pursues the female relentlessly, with the eggs and sperm being released simultaneously over the spawning medium.

The best way to obtain a breeding pair of Red-Eyed Tetras is to purchase half a dozen, immature, healthy fishes from more than one source and raise these to sexual maturity yourself, thus increasing your chances of acquiring unrelated specimens. This is the method I prefer, and my main local supplier never fails to offer advice and encouragement in all my fishy endeavours.

In an attempt to breed these fishes I set up a tank of the same size as the housing tank, first making sure that it was thoroughly cleaned in a solution of salt water.

Following this, I filled the tank with rainwater to a depth of about 8in (20cm). This water, which had been left standing on peat for a time, was now coloured a pale brown. Having raised the temperature to 80°F (27°C), my next step was to introduce the spawning medium, sterilising it first. Although plants can be used for this purpose, plastic mop heads, a layer of marbles, or peat placed on the base of the tank are more usual, so as to prevent the introduction of parasites. I opted for a number of mop heads lining the bottom.

With the pH around 6.8, similar to my main tank, and all sides of the tank shaded with pieces of card, I left it during the day to settle down. In the evening, I planned to introduce my selected pair of Red-Eyed Tetras, well fed on live food, to the breeding tank. Viewed from above, as with the majority of characin species, the female's profile shows an obvious bulge when she is ripe with roe.

Having decided on the parents to be, I placed these prolific egglayers in their new quarters around dusk. With the tank being situated in my kitchen-cum-studio, I did not want any extraneous light to disturb the happy couple. Therefore, I also shaded the top and front of the tank with card.

Bright and early the next morning, I gingerly lifted the top covering, but there was no sign of any eggs. Disappointed, I raised the temperature a couple of degrees, changed some of the water, and curbed my impatience. On the third morning: success!

Egg & fry care

The only interest the parents will show in their possible offspring now is as a potential food. Making sure that spawning had ceased, without further ado, I checked the pH on my main set-up and returned the adults to their original home, replacing the card back over the brood tank.

The fertile eggs are very tiny and almost transparent, making them extremely difficult to detect. Any that are opaque have not been fertilised. Most species in this family lay semi-adhesive eggs, but it seems that, with this tetra, this was not the case, as the eggs in my breeding tank had all fallen into the mop heads without adhering to anything.

Following the happy event, I waited till dark, and again raised the cover to the spawning tank. Shining a torch directed overhead, I observed some of the fry which had hatched out and were darting for cover to avoid the light. With the tank darkened once more, I resisted all temptation to take another peek for at least 24 hours.

After a few days, the yolk sac which sustains the fry during their early development, was used up, and the babies were swimming freely, requiring to be fed on very small foods. An infusoria culture made up for this purpose can be time-consuming and may be rather messy. Other foods, such as microworms, tiny nauplii (young brine shrimp) and rotifers are easier options. I find that the most reliable way of ensuring my fry are taking food is by checking them for full bellies.

This brood of fry was started off feeding on infusoria and then offered one of the foods just mentioned, first making sure that I had ample supplies well in advance.

Inevitably, some of the brood will be lost, but nevertheless, the ones that survive soon increase in size, and two to three weeks later, require larger quarters. As they mature, larger foods like *Daphnia* or mosquito larvae can be offered. If you have collected these from the local pond, make sure that there are no predatory creatures among them, such as dragonfly larvae, which kill fry. One predator, in particular, which I always watch out for, is a small freshwater polyp called *Hydra*, armed with long stinging tentacles. A large powerful magnifying glass is most helpful in rooting out any suspected beasties.

Small is beautiful

Some people spurn the keeping of small fishes, such as the characins, owing to their diminutive size, relative to the cichlids, for example. But, when kept in shoals, small species can bring an aquarium to life, quickly transforming it into the focal point of any room.

The Red-Eyed Tetra may be outshone by some of its more colourful cousins, but nevertheless, it is still a spectacle to behold. So, lights dimmed, sit back, and watch the display of colour, as your fishes dart to and fro rapidly changing direction and casting you under their spell. AKP

Tomorrow's Aquarist

BY GINA SANDFORD

Emergency measures

Sometimes you get caught out. This time I thought I'd got a spare O-seal for my Eheim filter. I had, but the wrong one!

Meanwhile, out in the fish house, the air was turning a dark shade of blue as water poured out of our large-bucket power filter all over Mike's legs and feet! He had cleaned out the filter, put everything back together again, but it wouldn't seal; the O-seal needed replacing.

In sheer desperation we tried a smear of vaseline all round the offending O-seal and pushed the top back onto the filter. It sealed and held for the four days it took to get a replacement.

In fact, it held for about four weeks — we thought we'd test it out just to see how long it would last for. I don't recommend that you leave things for this long but, at least, vaseline could get you out of trouble in the short term.

The fish have come to no harm. Indeed, I think the Shovel-nose Catfish has a smile on his face in anticipation of the antics that went on being repeated the next time the filter needs maintenance.

Food for thought

Dietwise, fish usually fall within one of four main categories:

1 Omnivorous — These creatures eat most things: vegetable matter (so they may nibble plants if you don't give them something else, such as peas and lettuce), small aquatic invertebrates such as *Daphnia*, flake foods, frozen foods, chopped prawns/meat, etc.

2 Herbivorous — These are the vegetarians of the fish world. They may graze on algae or eat plant leaves. Feed with substitute foods, such as lettuce, courgettes, slices of potato and peas.

3 Carnivorous — This one speaks for itself. Such creatures eat meaty foods, either live or dead. Most of the fishes we keep will accept dead foods, such as pieces of meat, fish or shrimp cut to a suitable size for the fish in question.

4 Piscivorous — Such feeders prey on fish, either live or dead. Use substitute foods as for the carnivores.

On a more specialised front, we have:

1 Limnivorous — These fish are mud eaters. They sift through the soft, silty substrate in search of small worms, micro-organisms etc.

2 Detritivorous — These could be determined as the clean-up squad, because they feed for the most part on waste matter.

3 Ichthyophagous — This is a more technical term for a fish eater (piscivore).

Whatever the feeding habits of your fish, be sure to offer suitable foods of a size that they can eat, and don't forget to remove uneaten food before it starts to decompose.

Name Check

Siamese Fighting Fish
Climbing Perch
Dwarf Gouramis
Burmese
Croaking
Kissing Gourami
Three-spot Gourami
Croaking Gourami

Betta splendens
Anabas testudineus
Colisa lalia
Ctenopoma
Belontia signata
Helostoma temmincki
Trichogaster trichopterus
Trichogaster leerii

Tetra TA COMPETITION

40th Anniversary for TetraMin

When the **Tetra** research and development team invented flaked fish food back in the 1950's, they can hardly have dared hope just how incredibly successful the product would turn out to be.

TetraMin became the world's best selling food for tropical fish, a position that it still holds in the marketplace today. That does not stop further research and development taking place, however, and now, 40 years on, fish are in for an even greater treat.

Now prepared by the new **'Primex'** process, the flakes are the same size as before, but the components are finer. Computer-controlled milling of the premium raw materials enures the flakes are of the highest quality, which makes the digestion of the food even easier.

You should see improved growth rates for your fish, and there will be less waste to pollute the water. **TetraMin** is enhanced with stabilised Vitamin C to provide extra vitality for your fish.

We have **12 tubs** of **TetraMin** 52g to give away (rsp £4.39) to readers of **Tomorrow's Aquarist**. If you can solve the following anagrams of tropical fish, put the answers on a postcard (or the back of an envelope) with your own name and address and send to **Dept TM, Tetra Competition, PO Box 2162, Bournemouth BH2 5ZA** to arrive no later than **30 June 1995**. The first 12 correct entries to be drawn will each receive a tub of **TetraMin**.

For detailed advice on any problems associated with fish or ponds, contact the **Tetra Information Centre, Lambert Court, Chestnut Avenue, Eastleigh, Hants SO5 3ZQ.**

Anagrams:
ACROSS
LEWEJ DILCCIS
THINBRAYL
PUGPY
BRAZE ANDOIS

TETRA

Recent sightings

Most people think of characins as unassuming little fish that swim about the aquarium minding their own business. Recently, I came across three that do not fit this bill, offered for sale at various establishments. All are large, predatory and pike-like in appearance, and are certainly not for the community aquarium. The Cachorro comes from South America and grows to about 30cm (12in.). The other two come from Africa. The Pike Characin reaches some 36cm (14in) in length and the Giant Tigerfish, as its name suggests, is the largest of the three, reaching 1.8m (6ft). They all have large mouths and appetites to match.

So if you are tempted to buy one of these nice 'little fish' (the specimens I saw were only about 10cm (4in) long), be prepared for it to grow ... and grow!

JOHN DAINES

A four-inch Brazilian Cachorro. On a good diet, this species can attain some 12 inches in a remarkably short time.

Namecheck
Cachorro — *Acestrorhynchus microlepis.*
Pike Characin — *Hepsetus odoe.*
Giant Tigerfish — *Hydrocynus goliath.*

Bug of the month

Mike Langford

Summer is a time for sitting by the pool watching the dragonflies dart hither and thither. Adult dragonflies are territorial and males will have regular resting places within their patch.

It is easy to tell an adult dragonfly from the closely related damselflies because, when at rest, the wings are held out art right angles to the body; damselflies fold theirs along the length of their body.

Highly predatory, dragonflies catch insects on the wing.

If you are lucky, you will see a pair mating. Their bodies are divided into segments and in the second to last segment of male's are his reproductive organs. From here he transfers sperm to the second segment where there are special pairing organs.

Using his tail claspers, he holds the female at the back of her head, or thorax (chest) depending on species, and the pair fly together. She bends her tail forward to contact the sperm on the male and thus fertilises her eggs. Some species scatter their eggs in the water, while others place them on plant stems or lay them mud.

This is all very well but it is the bit that happens next that really affects us as aquarists and pondkeepers. The eggs hatch into nymphs which are highly predatory and spend up to three years in their aquatic domain.

Lurking among the water weeds, these brown creatures are often overlooked. They have a formidable set of jaws which are hinged so that they can be shot forward to grab passing prey. When not in use, the jaws are folded back against the head as a mask. The form this takes is indicative of the genus.

As far as we are concerned, the problem arises because large nymphs will feed on small (and not so small) fry. Anyone breeding their fish and transferring weed from the pond to a tank may, inadvertently, transfer a dragonfly nymph. The creature shown in the photograph was taken from a dealer's tank. He had been losing a few young twintailed Goldfish everyday for about a week before the culprit was apprehended.

Much as you may wish to dash the offending beastie to the ground and squash it — please don't. These creatures are finding it harder and harder to find suitable breeding sites in the wild, so the garden pool may be their only salvation. Personally, I'd rather have a few less fry and a few more dragonflies.

MARINE WATER SKINS

Marie-Paule and **Christian Piednoir** dive into the silent world of colourful sea squirts, some species of which are available within the marine hobby.

Man has always been fascinated by the animal kingdom. Whether it be the lion or the elephant, the eagle, the shark or the dolphin, we envy them their strength, their cunning and, above all, their freedom. But the majority of animals are far from free: the sea, in large part populated by invertebrates, is home to all sorts of creatures which are permanently 'rooted' to the spot, with no possibility of ever moving. Rocks, sediments, seaweeds, even other animals, act as their points of anchorage.

Despite their primitive appearance, these creatures, sometimes known as the "rubbish of the sea", are actually highly evolved. Perfectly adapted to their sedentary existence, they await the fine particles on which they feed, borne to them by the ever-changing currents. These creatures are diverse in type: they are found – to take only the best known branches of the underwater invertebrates – among the sponges, the segmented worms (Annelida), the sea anemones, corals etc. (Cnidaria), the 'moss' animals (Bryozoa) and the Urochordata (= Tunicates) or sea squirts, sometimes referred to in our country (France) as 'Water Skins'.

Pseudo-tadpoles

The Urochordata includes, among others, the class of the Ascidians, with which we will be dealing here. This class consists of static marine invertebrates without a differentiated 'brain' (although they have a primitive equivalent: a ganglion). Despite their extremely primitive appearance, the Ascidians are, in fact, the final link in the invertebrate chain, just before the vertebrates. They have a mobile stage, the larva, which possesses a powerful tail supported by the notochord (which is, actually, a primitive vertebral column) in the form of a gelatinous axis that gives the larva a tadpole-like appearance. But the "almost vertebrate" status ends there, as once the larva has settled onto a firm substrate, it proceeds gradually to lose its tail, which virtually disappears by the time adulthood is attained.

The Ascidians are, thus, more closely related to us than is the octopus, whose capacity for learning and memory is well known.

Coats with holes

The Ascidians form part of the Tunicata: their bodies are enveloped in a 'tunic' which can take a variety of forms or colours. The delicate crystal bells of *Clavelina* have nothing in common with the rough and granular, dirty-looking coats of the 'Violets' (*Microcosmus*).

An Ascidian stripped of its tunic is able to regenerate rapidly, and this phenomenon is not the only thing to have mystified the zoologists and chemists who have studied these creatures. The tunic is actually composed of cellulose material, whose constituents are entirely vegetable. If evolution had been just a trifle more unorthodox, the Ascidians might have become vegetable vertebrates!

Externally, sea squirts exhibit a tunic pierced by two apertures. The first, at the top of the creature, is termed the **buccal** or **inhalant** siphon. The second, at the side, is the **cloacal** or **exhalant** siphon.

Ascidians are passive internal filter-feeders: seawater, drawn in with the aid of beating cilia, passes through the inhalant siphon into the pharynx, which occupies

N. GENETIAUX / AQUA PRESS

M.P. & C. PIEDNOIR

Microcosmus sulcatus – a microcosm of marine life (see text).

9/10 of the volume of the creature. This pharynx contains a kind of lattice (or grille) formed by the gill openings which increase in size as the animal grows, eventually occupying the entire surface of the pharynx.

Water is filtered through a channel of mucus, which retains the tiny particles on which the animal feeds, as well as oxygen. This filter is extremely efficient, with any particle larger than one micron (0.001 mm) being captured. The tiny stomach, situated in the foot, beneath the pharynx, digests the food and then expels the residues in the direction of the anus. The exhalant siphon, which is also the outlet for the sex cells, ejects the lot back into the sea.

Reproduction may be either sexual or asexual, depending on whether we are dealing with simple or complex organisms. By far the majority of species are hermaphroditic (male *and* female) especially in the case of the simple Ascidians (*Halocynthia, Microcosmus, Polycarpa,* and certain *Clavelina*), which live a solitary existence. The larvae are expelled from the cloacal siphon. By contrast, the composite or colonial Ascidians (*Synascidia, Botryllus, Didemnum*) reproduce by budding, the juveniles increasing the size of the colony.

Ascidians or sponges?

Some Ascidians lead a very close-linked family life: each individual (in such cases termed a zooid) has its own inhalant siphon, but the entire group shares a single tunic. Water and, thus, food and oxygen, is circulated through all the individuals and expelled by several exhalant orifices positioned here are there.

In some respects – their carpeting of the substrate (as in *Polycyncrotus*), their variable shape, and the distribution of the two types of siphon – they might easily be confused with the encrusting sponges of the genera *Petrosia* and *Halichona*. Moreover, their ecological niche is similar, and it is quite normal for these two types of filter-feeders to compete with each other. Without dissecting the animal, the only method of differentiating them is by examining the siphons, which are regularly arranged in sea squirts, while the pores of sponges are distributed less evenly.

Selected squirts

The commonest, and also the largest, species are the simple Ascidians such as *Ciona, Halocynthia, Polycarpa,* and *Microcosmus*.

The Red Ascidian, *Halocynthia papillosa*, is the easiest to recognise. Endemic to the Mediterranean, it catches the eye with its beautiful bright red coloration. The shaded sides are always the most brightly coloured. It attaches itself by means of its large foot to hard substrates, such as rocks and wrecks. It is found down to depths to which divers are unable to descend, sometimes as deep as 100 metres (330 ft).

As their generic name suggests, the 'Violets' – *Microcosmus sabatieri* and *M. sulcatus* are the best known – provide a home for a whole host of other organisms which attach themselves to the tunic – a universe in miniature (a microcosm)!

This is not a case of commensalism, simply the colonisation of an unoccupied surface: the battle for habitat is fiercely fought among the invertebrates. Seaweeds, sponges, Anthozoa (e.g. anemones) and even other sea squirts attach themselves to the rough tunics of these creatures. Were it not that the siphons are striped with dark red and white, the violet would be rendered totally invisible by its coating of fauna.

But this trace of frippery costs the Ascidian its life, as Mediterranean peoples regard it as a delicacy. Populations have diminished very rapidly in recent years, and have now reached critical levels.

Other Ascidians lead a more sociable existence, being found in groups – but without being interdependent like the colonial species mentioned earlier. *Diazona* and *Clavelina* form pretty clumps of translucent bells connected by stolons. They are found in water as shallow as 50 cm (20 in), attached to substrates close to the seabed, at the foot of *Laminaria* (Kelp) growths or on rocks. The network of gill openings is clearly visible in *Clavelina nana*.

The final type of sea squirt is colonial. These look just like 'water skins' consisting of a bag and two tubes. They form an encrusting carpet about a centimetre thick, with the individuals involved contained in a single tunic. They come in all

LEFT – Mediterranean underwater scene. Competition for space, for both sea squirts and other invertebrates, is intense.

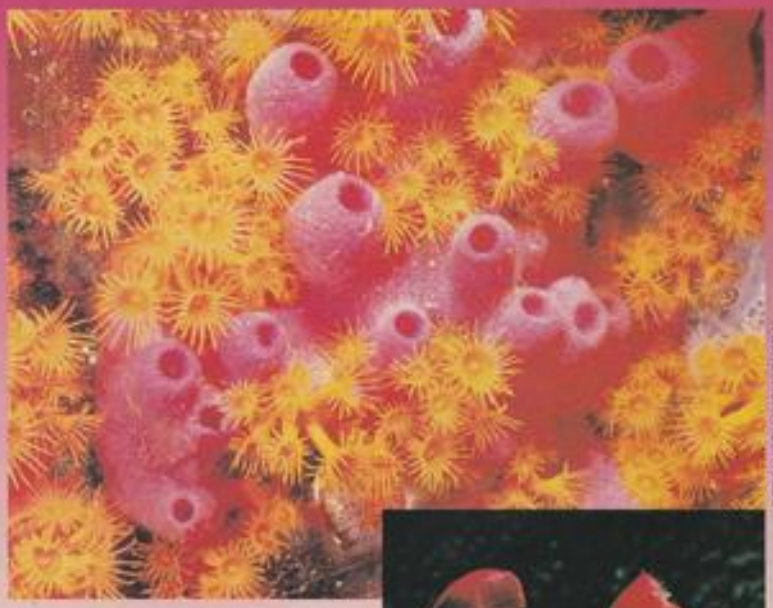
BELOW – A bouquet of the incredibly transparent Diazona violacea.

shapes and sizes, because their mode of reproduction (budding) leads to juveniles settling on older specimens.

The Red Synascidian, *Polysyncraton lacazei*, consists of numerous tiny zooids (0.25 mm in diameter) surrounding an exhalant siphon a millimetre wide. The structure of the tunic is different in *Didemnum tematatum*, a very common species of tropical waters: the tiny buccal siphons are embedded together in the mantle, which also surround the cloacal orifice. In consequence, the entire colony looks just like a single Ascidian.

The *Botryllus*, for their part, form gelatinous masses whose colour may range from yellow to green to black. They can be found after stormy weather, attached to the thalli (fronds) of seaweeds washed up on the shore. They also live on stones. The orifices are arranged such that groups of individuals form star shapes barely 5 mm. across.

These creatures frequently go unnoticed, not just by divers, but also in public auaria. They usually colonise otherwise unoccupied surfaces such as rocks or the sides of the tank. But the tiny *Diazona* and *Clavelina*, just a few millimetres high and transparent to book, are not always easily detected, unless one is endowed with very sharp eyesight. Their presence is the sign of a balanced and healthy environment. And we should not forget that they are, at least to some extent, our ancestors and, as such, deserve a little of our attention. AAP



N. GENETIAUX / AQUA PRESS

M.P. & C. PIENOIR

M.P. & C. PIENOIR

N. GENETIAUX / AQUA PRESS

TOP **– Some sponges like *Haliclona* (seen here in pink) can be easily confused with sea squirts. Only close examination will reveal the differences.**

MIDDLE RIGHT **– A group of bright red *Halocynthia papillosa*.**

MIDDLE LEFT **– A solitary yellow/black *Polycarpa* sea squirt from the Philippines, surrounded by a mass of *Xenia* coral.**

RIGHT **– The Red Synascidian (*Polysynchraton lacazei*) showing the single exhalant siphon (see text for details).**

KOI TALK

by Alan Rogers

Photographs by the author

Increased activity problems

During the summer months, our ponds will be full of activity, with our Koi eagerly accepting food several times each day. Pond temperatures will be approaching their summer high levels and this will be responded to by greater activity from the fish, subsequently showing excellent appetites and further benefiting from these warmer periods of growth.

Although not quite so apparent as the increased activity from the fish during this time, the filter bacterial colony will also be rehabilitating at a beneficial rate. It is therefore satisfying to know that the additional level of ammonia and nitrite resulting from higher levels of fish activity will be appropriately taken care of.

It might also be worth remembering that warmer water brings with it greater activity from any residual parasites, which could become a real problem at this time, so observe your Koi's behaviour patterns a little more diligently during these periods. The occasional flicking or scratching of the odd fish is not the time to hit the 'panic button' and wage chemical warfare on your Koi and water quality.

We have already established that the *Nitrosomonas* and *Nitrobacter* bacteria colonies are busy multiplying to maximum efficiency. However, this level of essential activity in our filter media is very easily disrupted and sometimes totally destroyed, by needless pond treatments.

KOI FACT: What is Hiroshimanishiki?

Hiroshimanishiki is an old Koi description which is seldom heard these days. It refers to a Gin Rin variety displaying immense Gin Rin scaling, portraying an impression of fine silver tinsel artistically brushed on to the skin and reflecting many highlights.

Don't panic!

Spare yourself the anxieties that arise when you care for something living; avoid the impulse to fret and adjust constantly. Most textbooks enunciate acceptable 'environmental' figures, but fish and plants in an established pond tolerate a wide range of readings when it comes to most water parameters.

One of the greatest forms of stress that can affect our Koi is a **rapid change** in water chemistry, a condition often created by the Koi keeper, simply because a specific reading does not fall within the textbook parameters. Adjustment of such readings must **always** be carried out in a manner to which the fish can comfortably adjust. Failure to do so will induce unnecessary stress in the ostensible panic against time, and these sudden changes can be more detrimental than the original problem.

Observing the fish and recognising any early warning signs is always your best guide for unacceptable changes to the environment. Remember always to respond with patience to any adjustments that need to be made.

Need for caution

Talking to hobbyists at this time of year one can sense that the early spring and summer months restore fresh enthusiasm to us all, leaving the hobby fired up with new passion. A trip to the local dealers with the intention of purchasing a new acquisition is therefore commonplace at this time.

Most Koi dealers are helpful and knowledgeable people, offering valuable advice whenever called upon. Many hobbyists stick with one, or possibly two, dealers for their needs and, often, this is based upon the satisfactory service they have experienced in the past.

Buying fever usually runs high at this time of year. Choosing from an excellent batch such as this one can pose quite a challenge, though.

The entertaining duo at Selective Koi Sales. (see next page)

Buying good, healthy Koi is of paramount importance in maintaining your pond and existing Koi in healthy conditions, without the risk of introducing disease or parasitic infection to your collection from a newly purchased fish.

Koi offered for sale which, allegedly, have been treated and quarantined for a month or so, should be viewed with some caution. Such statements can be taken by some beginners as meaning that the fish are guaranteed to be disease- and parasite-free. This is not the case and should never be taken as a reason to 'clinch a deal'!

It has never been established that there is a safe duration of time to quarantine fish **before** they can be certified disease-free; it is also virtually impossible to do so in a four-week period!

Usually, in cases such as this, the dealer is stating that he or she has put the newly imported Koi through a standard pond treatment of malachite and formalin mixture and, during this short duration, has seen no **visual signs** of parasites appearing. Some may have put all the Koi through a short-term parasitic bath on arrival, subsequently declaring them safe after such a treatment.

The first signs of induced stress, and that could be treated merely by 'bagging up' the Koi and taking it home, could trigger off any problems that may just be 'lingering' under the surface of that very fine definitive example of a comparatively happy and healthy Koi. Always err on the side of caution and, whenever possible, continue a period of isolation if you are fortunate enough to have a quarantine facility set-up. (See **Barry Goodwin's** article on quarantine in a forthcoming issue of *A&P*).

A more realistic period of satisfactory quarantine has been suggested as 3 to 6 months in ideal conditions before releasing new acquisitions to an already established collection. Some hobbyists have suggested **9 months** to, possibly, **a full year** before such release is considered safe, but maybe this duration is impractical in most cases.

A healthy and active Koi does have the capability to fight off most infections and parasites it is likely to encounter, given ideal conditions, experience and constant monitoring.

Buying tips

Choosing a healthy and active Koi from the start is a great step to successful Koi keeping.

Observe all the Koi for sale in the dealer's ponds for some time before making a decision

Koi Fact: What is "Hagoromo"?

Hagoromo resemble **Algoromo** very closely, in so far as the blue or grey reticulated patterns appear over the areas of red (*Hi*) only, but with the exception that the cheeks, gill plates and pectoral fins are all red. It was produced originally from female Asagi lineage and male Ogon, hence the colour on the gill plate areas.

to purchase. A healthy Koi will take an active interest in the total area of the pond, exploring every aspect of its home. Often, such fish will take great interest in their observers, swimming close to the surface or even daring to seek food from you. The brazen ones will even permit physical contact from complete strangers, and these are all encouraging signs of healthy and happy stock.

If you can see the Koi being fed, observe any fish that appear uninterested in food, those that appear exceptionally thin and wasted, or those displaying large protruding gill plates. If this area also happens to be the widest part of the fish, it should be avoided at all times.

Observe the gill plate (operculum) respiratory rate of movement as being normal and not laboured. Raised scales and red lesions need to be taken note of; often, these can lead to bacterial infections which can be transmitted to healthy stocks.

All fins should be open and fully displayed; any finnage 'clamped up' is a positive sign of an unhappy Koi.

By carefully observing your own healthy Koi for normal behaviour patterns, you can soon recognise abnormal behaviour in those Koi you possibly intend to purchase.

Top marks for Selective Koi

A few weeks ago I was invited to speak to the members of **The Norwich Section of the BKKS** on a Sunday afternoon and decided to make a full weekend of it, travelling up on the Saturday evening with my wife.

Having spent a most enjoyable evening with a few close friends from that club, arrangements were made to visit a couple of hobbyists' ponds early Sunday morning, plus a local dealer's establishment known as **Selective Koi Sales** in Norwich.

This was my first visit to this dealer, although Selective Koi have been known to me for a number of years previously from their regular support and presence at the Koi shows up and down the country. On arrival, we were greeted by **Kath Pye** and **Andrew Chatten**, joint partners in the business which has been firmly established for over 10 years now and to which progressive improvements have been made each year.

A number of formal ponds were displayed outside in very pleasant surroundings in a rural atmosphere. The quality of Koi on display were of high-to-excellent grades, and I was impressed with the healthy condition of all the stocks. Prices were also encouraging and very competitive compared to prices recently quoted by other dealers.

The main pond, which was heated, well stocked with excellent-grade Koi and, paraded water quality *par excellence*. Unquestionably, the star attraction of the pond was a 27in female Ochiba-Shigure that delighted everyone with its performances and friendly antics, with a 34in female Chagoi combining to make up an entertaining duo.

Another aspect that was most impressive was the range of dry goods on display. Ranging from pipe fittings to food, equipment to books, microscopes to floating baskets. I am not usually accustomed to plugging commercial dealers or their premises, but I was impressed with all the aspects on offer, to say nothing about the warm friendly welcome we received on arrival.

No, this Hi-Showa's *hi* (red) in the head region is not fading. This is an example of the early stages of a growth known as *Hikkui*, only encountered in pedigree stock ... and only on the *hi*. Watch out for a full feature on this problem in a future issue of *A&P*

Selective Koi Sales can be located at **Waterloo Road, Hainford, Norwich,** where you can expect a similar welcome, whatever your reason for visiting.

Talk to you soon!

Entrance to World of the Sea Aquarium

Out & About

AUSTRALIAN DELIGHTS

Part 1: Sea World

Ray Hocking relives the delights of two of Queensland's great aquatic attractions.

Photographs by the author

A dream was becoming a reality; a date had been fixed and the tickets booked. My wife was going home to Queensland — her first trip back to Australia for 22 years. It was to be the opportunity for me to meet family that I had, for so long, known only from letters and photographs.

It would also be a great chance to see some of Queensland's unique flora and fauna. We had four weeks and we planned to make the most of it. The superb Currumbin Sanctuary, among others, gave our two sons the opportunity to see and touch some of Australia's amazing animals.

Seaworld and Underwater World would, I hoped, enable me to see and write about my aquatic experiences. It was worth a try. Seaworld promptly replied that "they would be delighted to feature in *Aquarist and Pondkeeper*". Great! But nothing from Underwater World. Well... as they say in Australia: "no worries". I would explain when I got there; perhaps the letter had gone astray.

Ideally situated some 3km. from Surfer's Paradise in Queensland, Sea World is one of Australia's top tourist attractions. An area of mangrove swamp and sand dunes has been developed into an area of exciting rides and other attractions around a man-made lake system which accounts for almost one third of Sea World's 60 acres.

A recognised sea mammal research centre with an active role in marine rescues, Sea World has, in addition to whales, dolphins and seals, treated five of the seven known species of turtle and, at the time of my visit, was home for three young suspected Green/Loggerhead hybrids found stranded on the Great Barrier Reef.

With a million visitors a year, a great opportunity exists to educate and encourage consideration and respect for the marine environment, and Sea World has recognised and invested in just that.

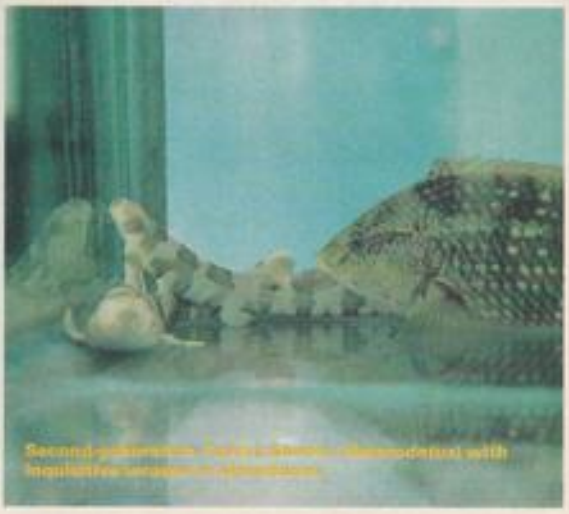
An educational programme, **Project Neptune,** has been developed for school students to assist in biology studies and an understanding of the marine environment. Some 600 Australian primary and secondary schools recently took part in the scheme, together with some overseas schools. Project Neptune's illustrated booklets on specific subjects range widely from sharks and bony fishes, to turtles and dolphins. One on Marine Aquaria by Sea World's Curator of Fishes, **Mark Smith** and their aquarist **Allan Marshall,** I found particularly interesting.

Organised visits through Sea World's marine education division, offer an opportunity to study the differing habitats displayed in '**The World of the Sea Aquarium**' and the famous '**Shark Encounter**'. Within the 'World of the Sea Aquarium' 19 display tanks, each with a volume between 1,000 and 1,400 litres, show habitats from reef to mangrove, allowing closer study of that environment and its creatures.

Although linked to a main system, which brings in seawater, each tank has its own filtration system equal to one-sixth of the tank volume. Comprising wool, coral rubble and shell grit, this filters about 6,000 litres per hour.

An amusing improvisation is the installation of an artificial wave action in one reef tank by Allan Marshall utilising an automatic urinal! It works well and Common Clownfish spawn often. Lionfish have also spawned in

One of the centre's superb reef tanks.



One of the turtles in the man-made lake.

the "Aquarium" complex, but only once and that, unsuccessfully.

Behind the scenes, in holding tanks, are some second-generation Tawny Sharks, raised from egg cases collected from the Shark Encounter tank. A high degree of daily maintenance and monitoring ensure good conditions, and very few fish are obtained from professional collectors at Cairns.

Also involved in Sea World's educational sessions, Allan is but one of an enthusiastic group of marine experts active in Project Neptune's programmes. He also dons his wetsuit to handfeed the sharks. I consider that a somewhat dubious perk!

Sea World's 'Shark Encounter' presents both video and live presentations. With a volume of 351,000 litres, a filtration system of 250,000 litres in volume ensures a tank turnover rate once every 1 to 1½hours. This is also linked to the main system of huge sand filters and a large ozone generator. This system has been running for some 20 years and the sand filters are back-washed, dependent on conditions, between 2 and 5 weeks.

Divers daily feed the whales, Grey Nurse, Leopard and Tawny Sharks which share their home with groupers, Wobbegongs, Eagle Rays, large Trevally and puffers. Such presentations, hopefully, go some way towards increasing our understanding and respect for these much-maligned creatures. With some species of shark now endangered, conservation is overdue for these unique creatures that have existed unchanged for 350 million years.

Sea World's approach can be best summed up in a quote used in their literature by African naturalist Baba Dioun, who said, *"In the end, we will conserve only what we love, we will love only what we understand and we will understand only what we are taught"*.

If you would like further information, please contact: **Inge Burke (Publicity Officer), Sea World, PO Box 190, Surfer's Paradise, Queensland 4217, Australia.**

The huge man-made lake is filled naturally by the incoming tide twice daily. As a result, many fish, including puffers and bream have come in and decided to stay. Note the shark warning notice on the left!

1995 YORKSHIRE AQUARIST FESTIVAL

'BEST EXHIBIT OF THE YEAR'

with AQUARIAN

LES GASH — TOP AQUARIST

Top aquarist Les Gash, winner of 'Best Exhibit of the Year' at YAF '95, with his group of breeding *Rasbora heteromorpha*. Les has previously won Best Exhibit at YAF in 1992, 1993, and 1994

"I've been breeding fish for over 10 years and I've always fed AQUARIAN Flake and Fry Food to all my fish"

RECOMMENDED BY TOP AQUARISTS

SHORE WATCH

BY ANDY HORTON

With the days getting longer and the arrival of the warmer weather, even the less committed rockpooler may venture down to the shore, thus reviving an interest which might have laid dormant during the winter months.

With the smaller summer variations in the tidal range, it is vital to consult the local Tide Tables (see "below). Plan your visit to arrive an hour before a low spring tide. Follow the tide out and look under rocks for the small blennies and other fish hiding away in the short period that the shore is exposed.

Rockpool Fish

By this month, all the fry and juvenile fish of the earlier months of the year will have grown. Young blennies are likely to be abundant on rocky shores the length of the British Isles in pools, under rocks and in crevices at about the mid-tide zone.

Common Gobies end their breeding season in June. In a short lifespan of just over one year, the female will lay her last batch of eggs on the underside of a shell and then die. Consequently, the shallow sandy pools on the shore will contain only young gobies less than 25mm (1 inch) long.

The adults attain only 64mm, and are one of seven species of goby that are found on British shores. It takes an experienced rockpooler to identify each species. Common Goble will breed in home aquaria.

In pools on rocky shores without sand, an attractive small fish hanging motionless in mid-water is likely to be the Two-spotted Goby. At the approach of a net, it will quickly dart into the shelter of the weed. The other common shore gobies rest on the bottom.

Prawns and scorpions

Engrossed in observing the fascinating world of the rockpool with its sponges, seaweeds and molluscs on the rocks, be careful not to get cut off when the tide turns.

Because of the warmer weather, many of the small fish may be residing in the shallow sea below the low tide level. Productive catches can therefore result from netting when the tide comes in. A large prawn net at this time of year can quickly fill up with small prawns, with dozens of them large enough for human consumption.

Following the prawns inshore will be an ugly squat fish that goes by the name of Bullhead or Sea Scorpion. It is a rapacious predator that swallows anything that it can get in its expandable mouth. And it will not wait until you get home to gobble up any small fish in the aquarium. It will start eating them in the bucket!

Viewed from above, it could be mistaken for a rock. It captures its prey by stealth, camouflaged among the rocks and weed, waiting in ambush for a passing prawn or small fish.

Its readiness to feed means that it is quite a popular aquarium fish. It will consume the staple foods like boiled mussel, worms and cockle flesh. There are drawbacks, though. Obviously, it needs to be kept in a separate tank away from other small fish. It grows quickly and, within one year, it will have outgrown the average 20-gallon (90-litre) home aquarium. The adult fish reaches 17cm (6.7in) and requires high oxygen levels. The temperatures in the aquarium should not exceed 24°C (75°F).

ANDY HORTON

Bullhead or Clobberhead. Note the two white lappets at the edge of the large mouth. The pair of spines on each gill cover are not venomous.

ANDY HORTON

Male Common Goby with extended dorsal fin and breeding coloration.

Blooming seas

Blooms in the sea refer to the explosion of plant plankton that occur in spring and autumn. These microscopic organisms (diatoms and dinoflagellates) reproduce at a phenomenal rate by dividing into two.

Unfortunately, when placed in a bucket or in aquaria, they will die and cause the seawater to deteriorate so rapidly that it is often unable to support the higher forms of life. This can take place in only 20 minutes. The result is a rapid shortfall of dissolved oxygen in the water; fish can suffocate as soon as they are placed in such toxic water.

Awareness of the existence of these blooms is important for the aquarist rockpooler wishing to take home fish from the shore. The safe method is to use freshly mixed artificial seawater. For short journeys, most rockpoolers will stock their buckets on the low side and use a battery operated diaphragm air pump, or water pump, to aerate the water.

Temperatures can also get too high. The best way to minimise this rise is to use polystyrene boxes.

Crabs

Seven species of true crabs can be commonly discovered on most British shores. All of them could be present in June.

In estuaries, small brown Shore Crabs can be found in hundreds of thousands. They can be so numerous that their numbers will exceed the availability of rocks to hide under.

Take care when placing your hands into a murky pool. A nip form the sharp claws of the Velvet Swimming Crab could well prove to be a painful reminder! This brown crab sports bright red eyes and purple-lined claws and legs.

Small red Edible Crabs can be common under rocks near where the sea laps against the shore.

Native aquaria

By now, the home aquarium temperature could rise above 21°C (70°F). Fish like the Butterfish and young Lumpsuckers are intolerant of temperatures above this and the Dahlia Anemone and Purple-tipped Shore Urchin are near the limit of their tolerance.

It is therefore time to test the cooler (chiller) and replace the siphon tubing that may be gummed with algae from the previous year.

I have used the filter plates that fit together like a jig-saw in my new 50-gallon (c230-litre) aquarium. I am very pleased with them, although the larger slots mean that I have to use a coarser medium (dead maerl) as the first layer, with a 'Gravel Tidy' in use to separate the upper layer of coral sand.

A 900-litre per hour (200gph) powerhead is used to circulate the water through the 'Beer Cooler'. The pump outlet is square and the surplus water that is not pumped through the cooler is used to provide a supplementary current in the aquarium.

JUNE CHECKLIST

On shores with a large tidal range, the upper pools may not be refreshed by the neap tides. They will therefore heat up quickly and will only be able to support the hardiest forms of life like Beadlet Anemones and Shore Crabs. This the reason why, on many shores, it is essential to plan your visit for the time that the tide has gone out a long way to observe a much greater variety of marine life. Only the very common species have been included in the following list.

Adult Bony Fish (Teleosts)

Blenny (or Shanny)	*Lipophrys pholis*
Bullhead (Sea Scorpion)	*Taurulus bubalis*
Rock Goby	*Gobius paganellus* (south and west only)
Sand Goby	*Pomatoschistus minutus*
Cornish Sucker	*Lepadogaster lepadogaster* (south and west only)
2-spotted Goby	*Gobiusculus flavescens*

Fish Fry

Blenny (or Shanny)	*Lipophrys pholis*
Common Goby	*Pomatoschistus microps*
Bullhead (Sea Scorpion)	*Taurulus bubalis*
5-Bearded Rocking	*Ciliata mustela* (Fry are called Mackerel-midges)
Garfish	*Belone belone*

Crustaceans

1 True Crabs (Brachyurans)

Shore Crab	*Carcinus maenas*
Edible Crab	*Cancer pagurus*
Velvet Swimming Crab	*Liocarcinus puber*
Hairy Crab	*Pilumnus hirtellus*
Short-legged Spider Crab	*Pisa tetraodon*
Pea Crab	*Pinnotheres pisum*

2 Hermit Crabs and their ilk (Anomurans)

Hairy Porcelain Crab	*Porcellana platycheles*
Long-clawed Porcelain Crab	*Pisidia longicornis*
Common Squat Lobster	*Galathea squamifera*
Common Hermit Crab	*Pagurus bernhardus*

3 Prawns

Common Prawn	*Palaemon serratus*
Other Prawns	*P. elegans* and *longirostris* (mostly south-east)

Other species of prawn and prawn-like crustaceans occur, with different species found on different shores. Young Brown Shrimp, *Crangon crangon*, only occur during June. The last adults release their eggs and die at the beginning of the month (Sussex).

Molluscs, Sea Anemones, Echinoderms
The assortment is very much as in previous months.

Please write to me for the list of the other invertebrate animals likely to be found on the shore in June.

I would be interested in receiving reports of the species found by readers on the shore during June. Reports could be published in *Glaucus*, the quarterly journal of the **British Marine Life Study Society**. All letters will be replied to.

Please write to **Andy Horton; c/o *A&P*** for further details.

British Sea Temperatures (Surface, inshore)

	°C	°F
Thurso, North Scotland	10.0	50
Newcastle	11.1	52
Donegal	13.3	56
Brighton	13.3	55
Plymouth	13.9	56
Gibraltar	18.9	64

TIDE TABLES

Tide tables are available from newsagents, ship's chandlers and angling shops in seaside resort towns. In many Tide Tables, only the high tide is marked. When the tide rises the highest, it also recedes the furthest, just over 6 hours later. These are the spring tides.

The Summer Solstice occurs on 21 June 1995. The tides do not go out so far at this time of year. June is not as rich in shore fauna as the months around the equinoxes.

DAVID TWIGG'S

KOI CALENDAR

SHOW CALENDAR

MAY

26/29 **Merseyside Section BKKS.** Open Show. Campbell Woollon. Contact **Phil Adamson** 0151 220 2975.
South Hants Section BKKS. Open Show. South Downs College. Contact **George Rooney**, 01420 473169.

29 **Avon Section BKKS.** Closed Show. Part of The South Somerset Show, Ashton Court, Bristol. Contact **Dave Knowles**, 01454 774678.

JUNE

3/4 **Yorkshire Section BKKS.** Open Show. Lotherton Hall. Contact **Phil Swallow**, 01422 340674.

4 **Middlesex and Surrey Borders Section BKKS.** Contact **Peter Saul**, 0181 979 9117.

17/18 **Inter Klan 95.** International European Championships for Nishikigoi with Tabia Koi Club e.V. Rhein-Ruhr-Halle, Duisburg, Germany. Contact **Willy Quillmann**, Tel/Fax 0049 2162 2149.
London Section BKKS. Open Show. Ruskin House, 23 Coombe Road, Croydon. Contact **Keith Nind**, 0181 673 3574.

18 **Crouch Valley Section BKKS.** Open Show. Contact **Ron Parlour**, 01277 840863.

24/25 **East Pennine Section BKKS.** Open Show. Wentworth, South Yorkshire. Contact **John Timmis**, 01226 299507.

25 **Suffolk & North Essex Section BKKS.** Closed Show. Langham Community Centre. This is a real family event, with not only Koi, but also craft stands, side shows including wild birds of prey, fair, refreshments, etc. Opening to the public, 10am. The organisers are predicting that last year's 1,000 visitors will be exceeded, to make it their best show yet. Contact **Alan Carter**, 01206 866011.

JULY

9 **Lower Thames-Side Section BKKS.** Open Show. Contact **Barry Hales**, 01268 562700.

15/16 **East Riding Section BKKS.** Open Show. Exhibition Centre, Paragon Road, Hull. This show will include not only Koi dealers, but a craft fair and numerous children's entertainments as well. Contact **Tim Goodyear**, 01964 542762.

16 **South Wales Section BKKS.** Closed Show. Pugha Garden Centre, Morganstown, nr Cardiff. Contact **Keith Harwood**, 0122 540775.

23 **Essex Section BKKS.** Open Show. Aveley Sports Ground. Contact **Bobbie Barton**, 01708 611758.

AUGUST

12/13 **BKKS** KOI '95. Billing Aquadrome, Northampton.

19/20 **Lea Valley & Harlow Section BKKS.** Closed Show. Harlow Carnival Centre. Contact **Mick Fahey**, 0181 508 5155 or **Alan Burnall**, 01279 814638.

27 **Peterborough & Cambridgeshire Section BKKS.** Closed Show. Avenue Fisheries. Contact **Gary Found**, 01733 573178 or **Alan Peppercorn**, 01733 349472.

OPEN INVITATION

I would like to invite all Koi club secretaries or PROs to send me their latest calendar for inclusion in my column, and to thank all those who have kept me in touch to date.

Although I do my best to ensure all events are mentioned, it may be that some information, which arrives a little late, misses my deadline. Ideally, I need to have information at least *10 weeks* before the date of the event to guarantee publication. You may, of course, ring me direct on *01926 495213*, which will allow a little leeway.

This request also applies to dealers with special events, auctions, etc. I look forward to hearing from you.

All Koi keepers are welcomed to the events mentioned in this Calendar (an entry fee may be payable). Further details can be obtained from the contract telephone number quoted alongside the diary entry.

Please write to me at your earliest convenience via the *Editor, 9 Tufton Street, Ashford, Kent TN23 1ON*. Thank you.

Jobs for the month

Mid-summer is almost with us and it doesn't seem long since I was writing about exercising caution when feeding at the lower temperatures as we came out of winter.

Caution should still be exercised now, but for a different reason. At the higher water temperatures, less oxygen can be held in the water and, therefore, there is less of this vital gas available for our Koi when they are feeding and using energy.

A wide range of air pumps are on the market and investment in one of these highly reliable units, if you have not already got one, would be well worthwhile and could save the life of one or more of your favourite Koi. I have a Hagen HiBlow 40 that has just failed for the first time after having run almost continuously for 6 years. One of the diaphragms has split and needs to be replaced before I can use it again; not bad for a six-year-old pump, is it?

Test kits that include a Dissolved Oxygen test are readily available in aquatic outlets and should be used regularly to check the major parameters of pond water to ensure that quality does not slip unnoticed into the danger zones.

No Koi Show at Aquarama

Koi keepers please note that the **Singapore Koi Club** will not be holding a Koi Show under the banner of Aquarama '95 as mentioned in April *A&P* **News desk** feature. My thanks to **Lim Chong Hock** of the Singapore Koi Club for advising us of this.

WHAT'S ON IN JUNE

1 — Suffolk & North Essex Section BKKS. *Monthly meeting. Stairway Rovers Football Club.* Contact **Alan Carter**, 01206 866011.
4 — Lea Valley & Harlow Section BKKS. *Auction.* Contact **Mick Fahey**, 0181 508 5155 or **Alan Burnall**, 01279 814638.
— Northern Koi Club. *Pond Open Day.* Contact **Tony McCann**, 0161 794 1958.
7 — Leicestershire Koi Society. *Koi Appreciation, B.S.C. Social club, Soulsmoor Road, Leicester.* Contact **Pip Ostell**, 01530 609787 or **Kevin Luckman**, 01455 250413.
8 — East Pennine Section BKKS. *Getting ready for the Show.* Contact **John Timmis**, 01226 299507.
11 — Mid-Somerset Section BKKS. *Members of Plymouth Section BKKS visit Mid-Somerset ponds.* Contact **Alan Purnell**, 01458 272132.
— Northern Koi Club. *A.G.M.*, Clifton Park Hotel, Clifton, Swinton. Contact **Tony McCann**, 0161 794 1958.
— South Hants Section BKKS. *Trip to see Crouch Valley Section ponds.* Contact **George Rooney**, 01420 473169.
12 — Northampton Section BKKS. *Monthly meeting.* Contact **me**, 01926 495213.
13 — Nottingham & District Section BKKS. *Monthly meeting.* The Western Club, Nottingham, 8pm. Contact **Shirley Hind**, 0115 981 0923.
14 — South Hants Section BKKS meet, 8 pm, Denmead Church Hall. Guest speaker this month is **Barry Goodwin.** Contact **George Rooney**, 01420 473169.
— Lea Valley & Harlow Section BKKS. *Visit by: South Kent BKKS members.* Contact **Mick Fahey**, 0181 508 5155 or **Alan Burnall**, 01279 814638.
— Merseyside Section BKKS. *Monthly meeting.* Contact **Robbie**, 0151 549 2001.
— Peterborough & Cambridgeshire Section BKKS. *Visit to local pond.* Contact **Gary Found** 01733 573178 or **Alan Peppercorn**, 01733 349472.
16 — Merseyside Section BKKS. *Pond Open Day.* Contact **Robbie**, 0151 549 2001.
18 — Northampton Section BKKS *Closed Show.* Contact **me**, 01926 495213.
24/25 — Mid-Somerset Section BKKS. *Trip to East Pennine Show, Wentworth.* Contact **Alan Purnell**, 01458 272132.
25 — South Hants Section BKKS. *Wessex Section BKKS visit South Hants ponds.* Contact **George Rooney**, 01420 473169.
28 — London Section BKKS. *Speaker is* **Keith Nind** *with Video of Koi '94, Ruskin House, Croydon.* Contact **Keith**, 0181 673 3574.

DAVID TWIGG

Shirley Aquatics' staff hard at work during the extremely succesaful Japanese Weekend.

Shows and events

The last weekend in March was the **Shirley Aquatics'** Japanese Weekend. On show were the latest shipment of Koi imported from Japan and while I was there, they were being snapped up like hot cakes. Shirley staff were dressed in Japanese clothing to add flavour to the weekend and this certainly added a splash of colour!

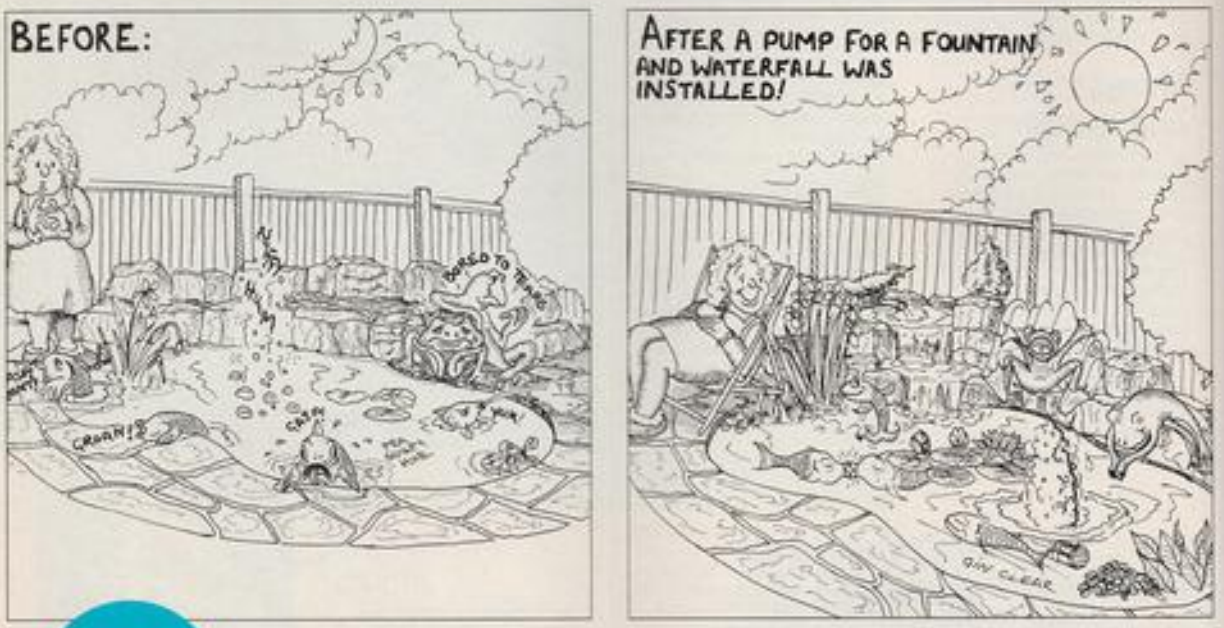
We are now into the show season and I hope to get to many more this year as my lifestyle has changed a little i.e. I am no longer working weekends! If any reader spots me and feels inclined to a chat, please introduce yourself to me, as you are more likely to recognise my face than me yours.

One of the best things about writing this column is getting to know people the length and breadth of the U.K. This has now extended to mainland Europe with the growth of the hobby over there and, all things being equal, I hope to report on those shows, too.

Good luck to all those of you who exhibit your Koi this year. Without you, we would all miss out on some terrific sights. Thanks.

"Excuse me, but does 'All my worldly goods I thee endow' have to include my superb collection of Koi?"

Pond Pump Ponderings



PART ONE

Sorting Out the Basics

Garden designer **Peter May** takes the mystery and confusion out of choosing a pond pump ... and throws in a valuable bit of technical know-how for good measure.

Illustrations by the author

Back in my youthful days of motorcycling, my poor pathetic British blahblah motorcycle spluttered itself to a halt more than once. It then meant an hour-long bus ride with two changes to the local parts shop. I knew roughly what was wrong and what I needed to get, but that wasn't the problem.

I'd arrive at the shop that would be bristling with Hells Angels and hairy leather-clad Trolls roaring and guffawing in their own fallout area of smoke and beer fumes. I'd creep in meekly and wait for my turn to be served. Picture the scene:

"Next! Yeah?", comes a yell in my direction from a face of hair, a dominant red eyeball and a fat lower lip.

"I-I want a blahblah dis for a blahblah dat!" (*technical jargon I thought would be understood by the initiated.*)

Total silence; all eyes rivet themselves on me.

"A WHAT?" The eyeball throbs in my direction.

"A blahblah dis for a blahblah dat." A roar of laughter goes up.

"Blahblah dats didn't have blahblah diss's, only blahblah dems, and only after '65." More laughter. "And THEY weren't much good either!" The hairy eyeball is going for a solo spot.

"You know what they said about them don't you! Idjiots designed 'em. Idjiots made 'em!" The whole hairy ensemble is going to join in the chorus. "And even bigger idjiots bought 'em!!"

Never fear, the earth has opened up and swallowed so many customers over the years that shopkeepers have learned to protect your sensibilities in order to preserve your valued custom. After all, you

This tower at Goldney Hall in Clifton (Bristol) once supported an enormous beam engine or primitive steam engine that pumped water up from a well 300ft down to a fountain in a mock canal. Today's pumps are somewhat less obtrusive!

can always go elsewhere. Anyway, the water garden specialist retailers have never been as intimidating as that. Although they might have felt like tearing somebody's head off on occasion, they have probably avoided it so far.

But it would help retailers to help you if you can tell them exactly what you want; not necessarily in technical terms, but in the effect and performance you require. After that, the price is generally dictated by the quality of the product and its reliability.

Daunting world

There is no doubt that the world of pond pumps can seem just as daunting to the uninitiated as the world of cars or motorbikes and spare parts. What does all the jargon mean and why does one pump that seems to do the same thing cost twice as much as another?

With a car or motorcycle, you turn it on, put it into gear and away you go. With a pond pump for a fountain or a waterfall, you connect it up to the pipe or jet and put it into water, plug it into the electric supply, switch on and 'Hey pluma-fuente!'.

But what is going on in that blob of plastic or metal casing? Would that help in trying to decide which pump would suit you for your particular water garden, fountain, filter or whatever? Or would it make life even more confusing? Maybe. Suck it and see!

Why a pump?

Gone are the days when our fountains and waterfalls depended upon a reservoir of 11 million gallons 5,000 feet up in the mountains two miles away, or a gigantic beam engine using half a ton of coal a day, with a staff of two supervising it, pumping water 380 feet from the subterranean depths.

We have, at the turn of a wrist, taps flooding us with dead contaminated liquid once endearingly called the "Staff of Life" that would kill our little self-sufficent world of water more quickly than it got established.

We may be lucky enough to have a natural stream coming through our water garden, and even luckier if the local farmers don't pollute it when they go 'fertiliser frenzied' in late spring.

For most of us, if we want to move water, we do it with an electrical pump. But why do we want to move water?

All articles on pumps, and even books on water gardens, start something like ... "*If you enjoy the sight and sound of moving water while you relax by your pool and forget ...*" etc.

There you go, **Reason Number 1,** straight off: lazing by the pool doing nothing but forgetting about all that "*trench digging to get the electrical supply from the house to the pond and the extortionate cost of the armoured cable and the trip switch and the junction boxes ... both ends; twice as much as the cost of the pump itself.*"

This reason for relaxing, though, has its exponents. Hugh Johnson in his coffee table book *The Principles of Gardening*, espouses that flowing water neutralises the negative (-ve) ions that waft up from Africa, making all the southern Europeans feel so torpid in the long summers. Wouldn't that be nice!

In the late sixties I can remember coming across people sitting around listening to TV sets turned up full volume, tuned off station. Apparently, the fuzzy hiss was 'White Noise', better than silence to meditate to, man! This is the same noise you get next to a river flowing over rapids. You'd need one hell of a pump to simulate rapids, but the thought is there.

But there are other reasons for a pump. For example, there are those who built themselves their first pond to put Tommy's Goldfish in that he won at the fair because it was "cruel to keep him in a bowl". If you fall into this group, you then probably bought another fish to keep the first one company and they both nearly died of Fungus. You brought them back from the brink with salt baths and goodness knows what and nursed them and pampered them. They had babies ... and the story goes on. An abiding love affair develops that eclipses all previous love affairs ...

Then that terrible dark and stormy night in the middle of that long hot summer. The fish were gasping, gasping for air on the surface. Of course, you realised the pond was over-populated but you couldn't get rid of any fish.

Besides, they all seemed so happy.... But what can you do now?

Here is **Reason Number 2.** According to my luminary and mentor, Bill Heritage, there is nothing better than splashing water for:

(a) mixing air and water to increase the supply of dissolved oxygen in the water for the fish, and

(b) (more importantly) increasing the rate at which carbon dioxide is released from the water.

Therefore, a fountain can quite often mean the difference between life and death for fish, particularly on a dark stormy summer's eve when the plant life is not producing oxygen but is continuing to absorb it.

Reason Number 3. As fishkeeping becomes more than a hobby and develops into a way of life, the world of fish is *our* world, and what sort of world would it be without cleanliness and good housekeeping? Nothing is too good for our fish, although the pond is still over-populated. Besides, what self-respecting fishkeeper does not have a *filter* and can still see the fish? And all *filters need pumps*.

For this type of waterfall effect, allow 50-60 gallons per hour to the height you want for every 1 inch of width of sill.

Fountain ornaments need very powerful pumps to give this effect because of the in-built restrictions within the ornament pipework.

Which pump?

Once you have decided on the real reason, or combination of reasons, for buying a pump, the first task is to find out which design fits the bill, performance-wise, and which fits your depth of pocket, cost-wise.

Electric water pumps fall into two main categories: **external pumps** (or **surface pumps**) and **submersible pumps.**

Most of the pumps chosen by the general public (and therefore the ones to be found mostly on the shelves of aquatic centres) are submersible. Some of the reasons for this are the cost-to-performance ratio and the ease of installation.

External pumps

External pumps sit outside of the water, being fed by gravity through the side of the pool, or by sucking water from the pool. If the inlet is through the side of the pool, the problems of plumbing and sealing pipes to pool wall are solved by careful planning and *very careful plumbing*.

If the pump is sucking water up out of the pool, then it depends on strongly reinforced inlet tubes and a non-return valve at the water intake to keep the pump primed. If this fails, they burn out. An alternative is to have a header tank that keeps the pump primed, but now we are entering the realms of serious expense.

The act of sucking involves a considerable expenditure of power, which means higher running costs in relation to performance and, indeed, the pump is also more expensive to buy than submersible equivalents.

These pumps need plenty of circulating air around them to keep them cool and dry. It is therefore necessary to house them in their own well-ventilated housing not too far away from the edge of the pool. However, because they are powerful pumps running at quite high revs, you will find that the noise factor in all but the very best pumps puts them right out of the question in a poolside situation. The extra plumbing involved is also an inhibiting factor.

Nevertheless, external pumps are perfect for a site that is open to the general public. If water is taken through the inlet through the side of the pool, the pump can be as big as necessary to supply any number of fountains or water features without any wire or machinery being visible or allowing the pump to be tampered with.

Large pumps are expensive pieces of machinery and their motors are safer and more reliable in external situations. When it comes to servicing or repair, they are more accessible, more repairable and infinitely more serviceable than submersible models and, as a consequence, go on for years and years.

Submersible pumps

Submersible pumps of one type or another fit most people's requirements, but they are a completely different kettle of fish.

All pumps consist of a device to move water; in the pumps we will be examining they have rotating blades on a shaft, or a disc with blades or fins on the surface. The thing that drives those blades or that disc is an electric motor, and it is the design of that motor that divides the category of submersible pumps into two subcategories: **Direct Drive** or **Induction Drive** Pumps.

However, if we look at the design of the water-pushing or pumping mechanism, we find that that, too, creates two basic subcategories of pump: the **centrifugal design of rotor** and the type of pump that pushes water out by a **flat-bladed impellor.**

In the next article, I will get down to the real nitty-gritty of 'what's what' in submersible pumps and in asking ourselves what we really want out of a pump. I also hope to show which designs fit the bill ergonomically (dynamically) and economically (financially)!

(TO BE CONTINUED)

AAP

Budget for all the electrical fittings and pipes. Whoops! I forgot to include the circuit breaker in this photograph.

Some technical terms associated with pumps

1. **Amps** or current of electricity, is the rate of flow of an electric charge through a particular conductor in a given time.
2. **Current** is calculated by dividing the **resistance** (watts) by the **voltage** (volts): Ohm's Law.
3. **Bar** is a unit of pressure equal to 10m of water column (1 bar = 14.5 psi — psi: pounds per square inch).
4. **Flow rate** defines the volume of water in a certain period, for instance l/s (litres per second), l/m (litres per minute), m^3/h (cubic metres per hour) (1 m^3/h = 16.67 l/min). By the way, 1,000 litres per hour = 225 gallons per hour (gph).
5. **Induction motor** is a type of electric motor used to drive pumps. The electrics are physically separated from rotating components of both motor and pump. This does away with the need for dynamic seals that are susceptible to wear.
6. **Pump Performance Curves.** These show the output from a pump in litres, gallons or cubic metres against a head pressure height of a column of water in metres, feet or bars (1 bar = 10 metre water column). They are usually self-explanatory, but can be misleading. Really, you should not expect any worthwhile performance by operating the pump near the top of its potential head.
7. **Rated voltage** is the voltage supply for which the pump is suitable. In mainland Europe, the standard voltage is 220/50hz; in the British Isles it's 240/50hz; in the USA it's 110/60hz. Electrical equipment must be suitable for a voltage variation of 10% over or under the available supply.
8. **R.C.C.B.'s.** You must use a circuit breaker. These are generally referred to as R.C.C.B's. They provide protection against a build-up of earth fault when this reaches a pre-determined level (generally expressed in mA). Apart from being sensitive to small fault currents to earth via high resistance paths that could cause a fire, R.C.C.B.'s will detect small currents to earth via the human body and will disconnect the voltage, hopefully, in 10-30 milli-seconds, thus preventing electrocution.
9. **Watts.** Electric power: volts x amps. Often referred to as the **resistance** of an appliance; manifests itself when we get that appliance to do something.
10. **A kilowatt** is a 1,000 watts. If we run an appliance or machine that uses 1,000 watts for one hour, we use, in this country, one 'Unit' of electricity. This is the unit by which our electricity bills are measured: the kilowatt hour, kWh.

QUESTION TIME

Having problems? Send your queries to our panel of experts who will be pleased to be of service. Each query receives a personal answer and, in addition, we will publish a selection of the most interesting questions and responses each month. *Please indicate clearly on the top left hand corner of your envelope the name of the experts to whom your query should be*

All letters must be accompanied by and S.A.E. and addresses to:
Question Time, Aquarist & Pondkeeper, 9 Tufton Street, Ashford, Kent TN23 1QN.
Herpetology, Bob and Val Davies.
Koi, Alan Rogers.
Tropical, Dr David Ford.
Coldwater, Pauline Hodgkinson.
Plants, Barry James.
Marine, Gordon Kay.

MARINE

Nitrite/Nitrate problems

Even though all of my fishes seem to be fine, my test-kits are always showing traces of nitrite and nitrate. Is this a problem and, if so, how can I rectify it?

Yes, it is a problem and, even though your fishes are OK now, they won't stay that way indefinitely.

You give no details regarding your aquarium or the livestock, so I can only give you general advice.

Go back through the way you set up your tank, what type of filter you use and the flow-rate through that filter. Examine how often and how much you feed. Finally, check on the level of stock — including how quickly after maturation you bought the animals — and how often and in what quantities you perform water changes.

I feel sure that a scrutiny of this nature will reveal the problem.

Compatible butterflies

Like yourself, I love butterflies and want to start a collection. However, everyone I know tells me that I cannot keep lots of butterflies together. Is this true?

No, it is utter rubbish! The best tankmates for butterflies... are butterflies.

You merely have to ensure that you follow the rules on doing your homework and make sure that the species you choose are compatible. It is also a good idea to buy fishes of different sizes.

I suggest that you invest in a book which specialises in butterfly species. *Butterflies and Angelfishes of the World* may be old, but I consider both volumes to be the definitive works on the subject, even today.

Generally speaking, the best tankmates for butterflies are other butterflies.

CORAL WORLD-EILAT

PLANTS

Armchair viewing

I am thinking of buying a cabinet or a stand on which to place my planted tank. What is the best height for viewing?

It seems that 30in is the standard height for most cabinets and stands. However, this means you have to bend your back if you are standing up; a most uncomfortable position. Conversely, it is too high if you are sitting down in a reclining chair.

Personally, I like to look at my plants from a sitting position, and build the supports for my aquaria 20in in height.

BARRY JAMES

***Vallisneria asiatica* — not imported as often these days as it once was.**

Search for Corkscrew Vallis

Many years ago I had a plant called 'Corkscrew Vallisneria'. I have asked in dozens of shops about it, but am offered just the ordinary twisted Vallis or a stronger, bigger variety called Giant Twisted Vallis.

The variety I grew was like an ordinary straight Vallis but with tightly twisted leaves. Is this variety still available and if so, where can I buy some?

The plant you are looking for now goes under the rather grand name of *Vallisneria asiatica* var. *biwaensis*.

The problem is that it seems to be rather more difficult to grow than other Vallisnerias and is also a difficult plant for importers to store. So, although it is still widely grown, both on the continent and in the Far East, it is seldom imported anymore.

However, if you are prepared to buy a bunch of 50 plants, I am sure your supplier could order this plant for you from his or her exporter.

Breaking up Milfoil

I want a fine-leaved plant for my coldwater aquarium containing a shoal of White Cloud Mountains Minnows. I have tried some Milfoil from my pond but it breaks up after a few weeks.

Try using the American Milfoil (*Myriophyllum elatinoides*). It is more perennial in nature than our native species, which needs a long resting period in winter.

KOI

Siphons v drains

I plan to improve my small external filter very shortly, and having drawn my design on paper first, I feel quite happy with the system. My one dilemma is that I intend to clean the filters by periodically siphoning off accumulated waste, rather than fitting proper drains in the bottom. My decision is both in consideration of additional cost and unfavourable access levels to my current house drains.

Are there any alternatives which I have not considered?

Siphoning off your filter bays is, at least, in your thoughts, as indeed it should be. I am not sure that being able to see accumulated waste is all that needs to be considered. What about dissolved heavy solids and other impurities? I have known many Koi keepers who have regretted not installing some form of drain in their filter chambers, finding it a costly exercise at a later date.

If you are referring to 'levels of fall' as your waste disposal problems, have you considered a pumping chamber once waste is pulled from your bottom drains? Here, filter discharge is collected into a large pit or sump and can later be pumped away, uphill if necessary, to your drains, or perhaps, on occasions, onto the garden.

It might, however, be prudent to familiarise yourself with your regional bye-laws and environmental health regulations with regards to distribution of waste into public main drains; you could be in breach of certain local conditions.

Tackling dropsy

Recently I have noticed one of my Koi 'hanging' in the water, looking somewhat sluggish and unhappy. On closer examination, we noticed, when looking directly down over the fish, that both eyes are rather protruding. There are also a couple of raised scales on the right side of the fish. The remainder of the Koi in the pond appear very healthy, although a little lethargic probably because of lowish pond temperatures.

As I have been informed that any problems with eyes or gills are difficult, if not impossible, to treat, I would be most grateful for any advice and assistance you may be able to give me.

It rather sounds like your Koi is suffering from a bacterial infection and is exhibiting early symptoms of abdominal dropsy. This condition is invariably caused by induced stress on weakened Koi. Keep a close watch on the number of raised scales visible at any time, as this will be your guide to the degree of development of this complaint.

Your concern regarding treating the eyes need not cause worry in this case, as this symptom is merely a secondary one and the eyes should return to normal if the overall treatment applied is successful.

Your comment regarding water temperature being low will not be helping matters. Remove the Koi into an isolation tank with good aeration and heating facilities. Slowly raise the temperature to a minimum of 62°F (16°C) and higher if possible.

Proflavine hemisulphate or Acriflavine at the rate of 1 gram/220 gals can be added, along with half an ounce/gal of cooking salt for 7 to 10 days. These are helpful bactericides and considered good standard treatment in cases like this.

Monitor the water quality during treatment and carry out a part water change if necessary. If you are successful in establishing an improvement, reduce the forced temperatures very, very slowly, extending the process over several days.

TETRA

Dropsy is not a disease, but the symptoms of disease: usually a bacterial infection.

If there is no improvement to the health and present symptoms of the Koi within this time, you may be faced with considering treatment using antibiotics. For this, you will need further advice and assistance from your local veterinary consultant.

Krib queries

I am planning to keep and breed Kribs and have read that I should add 5 teaspoonfuls of sea salt to every 2.5 gallons of water. Is this correct?

Do Kribs make good parents?

The original wild Kribensis (*Pelvicachromis pulcher*) derives from mildly brackish water in Nigeria, hence the recommendation to add a little salt. However, the fish is now largely farmed in the Far East and the need for salt is no longer deemed necessary.

Breeders claim hard, slightly acid water is best (tapwater stored over a little peat). The female is obvious from her more rounded body (and, unusually, better colour). Placed with a male in a separate breeding tank with a plant pot (on its side, facing away from the front glass), the pair will raise 200-300 fry regularly.

They are such good parents that they will often kill the older family to make way for the new brood, so have growing-on tanks ready for the baby fish as soon as the pair show signs of spawning again. The fry accept crumbled flake from birth.

A colourful Krib female with some of her week-old fry.

TROPICAL

Failing Angels

Over the past couple of years, I've enjoyed great success spawning Angels. My fish have not only spawned, but I've also been able to raise the fry with no trouble at all.

Feeding has included a wide range of foods, among these being *Tubifex* worms, brine shrimp, frozen foods and flakes.

Two months ago, everything changed. The adult fish still spawn, but I can't get any eggs to hatch. I have even added methylene blue to the water, but to no avail.

Please help!

There is no clue in your letter as to why the new spawning should be infertile. All I can do is make a few suggestions:

① How many breeding pairs do you have? If just one pair, they cannot be expected to spawn forever. In the wild, two or three spawnings is all nature expects. If the female is still laying eggs, choose a younger male for her.

② You say you feed live food . . . freshly hatched brine shrimp is OK, but *Tubifex* worms are full of bacteria and are often associated with parasites. It is always a gamble to feed aquatic live food. Choose non-aquatic kinds, earthworms, white worms, microworms, flies etc. Perhaps the male has a gut parasite, so he cannot fertilise the eggs.

③ Peat is better than methylene blue. Store water for changes over peat until it is really brown in colour. This reproduces the Amazonian conditions where the wild Angels breed.

COLDWATER

Plants and Goldfish

As a newcomer to Goldfish keeping, I would like to know which plants will do well in my coldwater aquarium.

Although there is not a very wide choice, there are, nevertheless, a few plants which flourish in cool conditions and contribute to an overall attractive feature or display.

Ceratophyllum demersum — Hornwort, *Egeria densa* — Pondweed, *Fontinalis antipyretica* — Willow Moss, *Ludwigia*, *Myriophyllum* species — Milfoil, *Sagittaria* species — Arrowhead, *Vallisneria* species — Valis.

Goldfish can be a bit disruptive in planted aquaria and may feed on some of the plants, but this is a small price to pay and, of course, the plants can always be replaced.

Mixing a few of the better-quality plastic plants will help to add a little further beauty to the aquatic environment and will also give a surface for good bacteria to colonise.

Treatments for Costia

My fish are unwell. They swim awkwardly, with their fins folded. They rub and scrape themselves against the gravel and rocks and I can see an off-white film over their body which also has reddening patches, particularly on their underside and on the backs. Please help.

This sounds a likely case of *Costia*, a microscopic protozoan flagellate, normally with two flagellae. Fish which are attacked are usually weakened in some way, for example through overcrowding, or being kept in a pond and having had to contend with harsh winter conditions.

Heat is the simplest form of treatment (the temperature should be gradually raised over several hours). At 86°F (30°C) *Costia* (*Ichthyobodo*) dies so, after a short period, the temperature should be gradually lowered.

Alternative treatment is a 3% salt dip until the fish roll over and then quickly move them into a clean, sterilised tank with fresh matured water.

M.P. & C. PIEDNOIR

Goldfish and plants can co-exist, but careful choice of the latter is essential.

HERPETOLOGY

BOB & VAL DAVIES

This is *Bufo regularis*, a typical 'warty' toad.

The rough and the smooth

What is the difference between Frogs and Toads? I have seen a reference to 'The Clawed Frog' and 'The Clawed Toad', both having the same scientific name and find this most confusing.

All amphibians belong to an order (large group) known as Salientia (or Anura). Scientifically, there is no difference between the two, although their skin, shape and other external features may seem different.

In common usage, however, a frog has a smooth skin, as in our Common Frog (*Rana temporaria*), while a toad has a rough, warty skin, as in our Common Toad (*Bufo bufo*). Having said this, Horned Frogs (*Ceratophrys* spp) and the African Bullfrog (*Pyxicephalus*) both have rough, warty skin and could easily be mistaken for toads according to the above criteria.

The genus *Rana*, usually referred to as 'typical frogs,' contains warty-skinned species such as the Stream Frogs (*R. boulengeri*, *R. phrynoides*) and smooth-skinned species such as *R. nigromaculatus*, *R. pipiens* etc. Several species of Hylid frogs also have a rough, tubercular skin.

Frogs of the genus *Xenopus* are sometimes called 'Clawed Frogs' or 'Clawed Toads' and *Atelopus* species are variously referred to as 'Harlequin Frogs' or 'Harlequin Toads'.

Advanced fungal infection

Some months ago I purchased two Map Turtles. They had very slight white pale blotches on their carapace and these have now increased.

There are also velvet-looking patches on the legs and some of the claws have fallen out.

I bathe the turtles in saltwater and clean their limbs with cotton buds about once a week. This seems to have improved their condition but they are still badly affected.

Your guidance would be most welcome.

It would seem that your terrapins are suffering from a fungal disease which is in an advanced stage. We would therefore recommend immediate veterinary treatment.

One possible cause of the fungus may be that the terrapins may not have been able to dry out completely. Most terrapins need basking facilities, e.g. a light bulb, and will spend long periods on a stone almost touching the heat/light source. Low temperatures could also be a contributory factor. Water temperature should be in the range of 26-28°C (79-82°F) in the day, falling to 18-20°C (64-68°F) at night.

Saltwater is often recommended for fungus, but it will, obviously, wash off when the animal enters the water. Keeping them out of the water for a few days (under a heat source) will help dry them out and will assist in killing off the fungus, but they will probably need a more effective medication as well.

Even after veterinary treatment, your terrapins will still need a regime of adequate temperatures, clean water and basking facilities under a heat/light source if the problem is not to recur.

American DWARFS

Dr Robert Goldstein introduces the three species of Centrarchids commonly known as Dwarf Sunfishes.
Photographs by the author

TOP — This is the best known member of the genus: the Blackbanded Sunfish (*E. chaetodon*)

ABOVE — Note the brilliant spots on this appropriately named Bluespotted Sunfish.

The fish family Centrarchidae contains the American Basses and Sunfishes. Within the family, the genus *Enneacanthus* contains three species seldom attaining four or five inches in total length.

The best known is *Enneacanthus* (sometimes called *Mesogonistius*) *chaetodon*, the Blackbanded Sunfish. The other two members of the genus are *E. obesus*, the Banded Sunfish and *E. gloriosus*, the Bluespotted Sunfish.

All of them live on the Atlantic seaboard or the immediate Gulf Coast, often in isolated populations in the Coastal Plain (a prehistoric seabed) to the Fall Line (the old shoreline where the land rises sharply from the old seabed).

All members of the genus have the same habitat requirements and, in fact, are often found together where their ranges overlap.

They all like darkly stained waters that are clear, often acidic, stagnant or slow-moving, and moderately deep. They occur in ponds, blackwater creeks, rivers, rice ditches and small lakes with a bottom of silt and organic debris over sand.

Within these waters, they live in dense vegetation, which includes species such as *Myriophyllum, Cladium, Panicum, Nymphaea, Hypericum, Brasenia, Nymphoides* or *Utricularia*.

Other fishes and invertebrates found in these habitats include Grass Shrimp, Pygmy Sunfishes, Redfin and Chain Pickerel, Pirate Perch, Warmouth, Flier, Mud and other Sunfishes, Bowfin, Longnose Gar, American Eel, Gizzard Shad, suckers, minnows, catfishes, mosquitofish, Eastern Mudminnow, Swampfish, killifishes, and Swamp and Sawcheek Darters.

To collect all three Dwarf Sunfish species, I always pick the densest shoreline vegetation of a clear, dark-stained pond or river, and work a seine from deep water toward shore, being careful to keep the lead weights on the bottom.

Before working to shore, I prod the vegetation vigorously to drive Blackbanded Sunfish out and into the seine. They are runners, whereas Banded and Bluespotted Sunfishes tend to stay in the weeds. In deeper waters with a mucky soft bottom unsuitable for seining, I work the dense vegetation with a large dipnet.

Blackbanded Sunfish are absent or sparse in most places, but occasionally abundant. I collected several dozen from a city lake in South Carolina in just a few hours. Blackbanded Sunfish can be bagged with or without oxygen and tranquiliser, or carried in open styrofoam boxes, and travel well with no sign of stress.

Breeding

I've bred Blackbandeds lately, time after time. My Bluespotted Sunfish look like they're also getting ready to spawn, and I don't have good stock of Banded Sunfish at the moment.

However, they're all reported to breed the same way, so my observations on Blackbanded Sunfishes should be sufficient. A twenty-gallon (US gal — c75 litres) tank is appropriate for two to four fish. I always throw in that many specimens, as I cannot sex them by any reliable characters.

I use dechlorinated tapwater at neutral pH, a tray of sand on the bottom containing rooted plants (*Vallisneria* or another prolific species), and a thick area of *Natella* or Java Moss. I always have duckweed or Water Sprite at the surface, but it's not necessary.

Conditioning

Provide at least twelve hours of overhead light and sponge aeration-filtration. In nature, Blackbanded Sunfish eat cladocerans (Daphniae and their relatives), copepods, insects and their larvae, and other invertebrates.

In aquaria, I feed them live blackworms (a coldwater tubificid), live baby brine shrimp and frozen adult brine shrimp. I think they also eat some of the smaller snails.

The breeding season is extensive, starting in very early spring and extending into the autumn. Sternburg (1991) reported that spawning is induced by rising temperatures around April after a winter of cool temperatures. However, I found fish to spawn in aquaria from August through at least October, with no prior cooling period.

The first thing to notice is a colour change. The silver background of the male becomes muddy grey as he prepares a three-inch wide shallow pit in the sand among the rooted plants. The female, with intense black bands on a silvery body, enters the nest for side-to-side spawning in the pit and otherwise remains in the general area. The eggs, which I've never been able to see, are said to be adhesive. They're fanned solely by the muddy coloured male, who caresses the sand pit in slow circles until the eggs hatch in about three days.

Rearing the fry

The fry hang from plants until free-swimming four to five days later. I could not see them either, but shaking the *Nitella* with a net handle will cause them to break off and dash about, at which time they're easily seen. I don't raise very many from each spawning.

Sternburg says that the adults eat the young, and recommends siphoning the top layer of sand with the eggs and any hatched fry to a separate aquarium, or removing the parents from the breeding tank after hatching. I always take the parents out after seeing fry, and they will proceed to spawn yet again.

The very small fry need infusoria, or they can graze on the micro-organisms in the vegetation. They are as small as gouramis, but a week later can take baby brine shrimp. They grow slowly and erratically, with larger fry apparently cannibalistic on the slow growers. Sort the fry by size, or keep the tank thickly vegetated to provide hiding places.

Blackbanded Sunfish

The most desirable of the group, the Blackbanded Sunfish (*Enneacanthus chaetodon*) is also the hardest to find. It exists in isolated populations long separated from one another by a change in sea level, and today remains scattered from the Pine Barrens of New Jersey, to the pine flatwoods of the Coastal Plain in Florida.

Several black vertical bands cross the head and body, and may be continuous through the front spines of the fins. The pelvic fins are intensely black, but the dorsal and pelvic fins often have an orange leading edge.

The Blackbanded Sunfish is not aggressive and many of various sizes can be kept together. Pond breeding is said to be especially productive, but I would expect it to require enormous amounts of vegetation and no open areas.

Bluespotted Sunfish

This dark grey sunfish often has a blood-red iris, no distinct bands, multiple brassy to green-blue spots over the entire body, and an orange or red tint to the vertical fins. A dark opercular spot is less than half the eye diameter, and there are no blue lines on the cheeks.

As its name suggests, *Enneacanthus obesus* — the Banded Sunfish — has a thick-set body.

The Bluespotted Sunfish (*Enneacanthus gloriosus*) occurs throughout the Coastal Plain to the Fall Line, from southern New York to Florida, and westward to the Tombigbee River in Alabama. It has the same habitat requirements as the Blackbanded, and occurs in dense vegetation close to shore, along with all the typical fishes of the southeastern Coastal Plain, including Blackbanded and Banded Sunfish and Pygmy Sunfishes.

The Bluespotted Sunfish is common to abundant throughout its range. For collecting, I use a dipnet or seine in shoreline vegetation. The fish are poor travellers and must be transported with salt in their water. I have bagged them with oxygen and tranquiliser, but have frequently taken severe losses within two days if no salt was added in the field (and sometimes when it was).

The most delicate member of the genus, it is also the largest and a twenty-gallon (c 75-litre) tank is appropriate for a group of four. I give them a dark background or low light, and sponge or submerged box filtration to maintain high quality water and minimise stress.

In nature, Bluespotted Sunfish eat the same mix of tiny invertebrates as its relatives. In aquaria, feed them only live foods such as brine shrimp, tubificids, mosquito larvae, Daphniae and small earthworms.

The breeding season in Florida is, at least, April through October. I find small young abundant in vegetation from early spring through late fall. Sternburg reported that the Bluespotted Sunfish and Banded Sunfishes both breed just like the Blackbanded Sunfish, in sand pits with dense vegetation.

The Bluespotted Sunfish is prone to bacterial invasion of the skin in nature and in captivity. Water should be near neutral pH, warm and highly oxygenated.

Banded Sunfish

This short, thick-bodied sunfish (*Enneacanthus obesus*) has about eight dusky vertical bands, and green-blue spots distributed over the light grey-green, tan, white or pale blue body.

It is recognised by its unbroken blue streaks on the face, a dark opercular spot the size of the eye, and slightly greater depth and thicker body than the Bluespotted Sunfish.

It occurs from central Florida northward to New England, thus being the mostly northerly of the three species. It is common throughout its range, but is less abundant and widespread down south than its relative, the Bluespotted Sunfish.

Habitat, feeding and aquarium requirements are the same as for its two relatives. I collect them the same way, in shoreline vegetation of any dark-stained quiet waters. They travel well without oxygen and tranquiliser, and don't need salt to reduce stress.

Moderately robust, Banded Sunfish adapt well to frozen food well.

Spawning in Florida occurs from March through November, and has been thought to be stimulated by increasing temperatures and daylight hours.

I doubt that inducement of spawning behaviour depends on anything more complicated than abundant food. They've been spawned in aquaria, and breed the same way as the Blackbanded Sunfish. AAP

PANTILES AQUATICS

By John Dawes

Out & About

The coldwater and tropical aquarium section is now partitioned off from the open Koi area.

I always thought Pantiles Aquatics dealt exclusively with Koi. I was wrong.

The Koi are there, of course, and in magnificent condition, but there's a great deal more to this attractive, roomy and very well stocked retail outlet situated just a short distance from the Chertsey turn-off on the M25.

Located within the grounds of Pantiles Garden Centre, Pantiles Aquatics caters admirably for all freshwater hobbyists. There may not be any marines on offer, but if your preferences lean towards freshwater fish, I think you'll be hugely impressed by what you'll find if you pay them a visit.

For example, if you want to spend a mere 75p on a small Common Goldfish, then you'll find an extensive selection to choose from. If you want unusually coloured Common Goldfish (say, black and white), then you could strike it lucky and visit during one of those weeks when the Pantiles team have managed to track some of these gems down.

Still with Goldfish, what also impressed me enormously was the very large selection of top-quality realistically priced fancy varieties. I must stress that I visited the premises before the coldwater season really got under way, so I wasn't expecting to find a particularly extensive assortment of Fancy Goldfish on offer. Again, as with my Koi assumption, I was wrong... and how!

There were Pandas, genuinely Black Ranchu, Calico, Golden and Red and White Ranchu, Redcap Lionheads (TRUE Lionheads for a change!), Chocolate Pompons, a host of Orandas (including some superb Calicos and Redcaps), Pearlscales, Hamanishiki, Ryukins, Telescope Eyes... and many more.

JOHN DAWES

Golden Neons are a regular feature at Pantiles.

I can't remember the last time I visited a shop that displayed Ranchu *and* genuine Lionheads side by side, thus allowing prospective customers to assess the differences that are so often spoken and written about, but so rarely seen in shop specimens. As for the Black Ranchu — take a look at the accompanying photograph and judge for yourself.

As I mentioned above, the Pantiles team are always searching for something that's just that little bit special, so if you are on the lookout for a particular variety of Fancy Goldfish, it might pay you to give the company a ring to see what they have in stock, or what they are expecting to bring in. My guess is that your chances of finding something suitable are pretty good.

Not so long ago, the decision was taken to go into freshwater tropicals to complement the selection of aquarium-based Fancy Goldfish and other coldwater species. In typical fashion, you will find that, in addition to most of the bread-n-butter species and varieties, there are many of the more specialised (and less often seen) fish, which are generally associated with much larger tropical outlets. Take for instance, Orange Bronze Corydoras, or Golden Neon Tetras, to name but two out of the exciting and varied range... or what about Halfbeaks, or the rarely seen 'Elongated' Glassfish (*Chanda nama*)? These, and many others, were all available during my visit.

If none of the above interests you (though this is highly unlikely), then there are the Koi, of course. My impression of the stocks that were on sale (with many more due to arrive) was that they were in excellent condition, looking solid, active, colourful and very well fed. Sizes ranged from around 3 inches (at £2.50) to nearly 30 inches, the most expensive of which were priced at around £2,500.

Some of Pantiles' excellent Koi selection.

JOHN DAWES

Check out the intensity and all-over colour of this beautiful Black Ranchu.

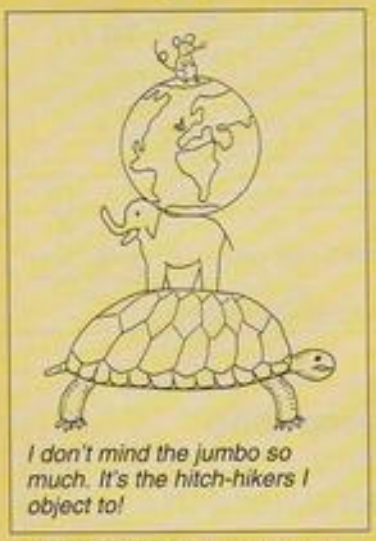
Pantiles Aquatics is open every day of the week. The summer opening times are: 9.00am-5.30pm. During winter, closing time is half an hour earlier: 5.00pm.

If you would like any further information regarding stocks of fish or dry goods and pond ornaments, filters, etc., contact: **Colin Osborne, Peter Dickerson, Terry Palmer or Danny Bartlett, Pantiles Aquatics, Almers Road, Lyne, Chertsey, Surrey, KT16 0BJ. Tel: 01932 874919.**

More Mythleading Mythtakes

Susan Brewer unearths some further weird and wonderful legends.

Cartoon by the author



I don't mind the jumbo so much. It's the hitch-hikers I object to!

You open your front door one bright sunny morning, whistling happily, with not a care in the world. There, lovingly coiled around the milk bottles and your strawberry yoghurt, is a mean-looking adder. Beware!

Doorstep-frequenting adders are considered by many country folk to foretell a death; though whether the approaching demise is of the finder, other occupants of the house, or the milkman, is not clear. Likewise, a toad hopping over your foot is another portent of doom — a sure sign of your passing. No doubt, toads, in their turn, believe that a human foot treading on one of them is a guarantee of death. They are probably right!

Medicinal qualities

Throughout history, snakes have been attributed with various powers. In ancient Greece, the Aesculapian Snake was considered to be an incarnation of the god of medicine and so, attributed with great healing forces. Even today, small isolated colonies of these reptiles can be found far away from their native habitat and some people attribute this to the Romans' custom of taking these sacred snakes with them on their travels to distant lands.

Years ago, people thought that if you ate the flesh of a snake it would ensure wisdom and long life. It would also cure tuberculosis and short-sightedness. Snake oil applied to the skin was a sure cure for rheumatism, gout and deafness, and a poultice made from their flesh acted as an antidote to their poison. The American Indians regarded the rainbow as a giant snake in the sky. To them, it was a good sign, a sign of rain and of 'thirst-quenching'.

Hypnotic charms

Some folk believed snakes to have the 'evil eye', and any person foolish enough to gaze at one would immediately be hypnotised. No doubt this was partly due to snakes' unblinking stares, and partly to their head-swaying antics when stalking their prey. To many people's way of thinking, they were the equivalent of an early Paul McKenna.

Most people realise that the snake-charmers who profess to play their pipes to such great effect are not really playing the music for the cobras at all. Snakes are deaf but respond to the swaying movement of the charmer's pipes and to the stimulus of light when the basket lid is opened — the shock of the bright sunshine after the dark basket makes it natural for the snakes to rear up.

Sadly, often the fangs of these creatures have been removed, or their mouths stiched, so that the snake-charmers can kiss and fondle them impressively, without endangering themselves.

World-supporting tortoises

Tortoises and turtles form the basis of numerous creation legends, some arising from their uncrushable shell and longevity. The Greeks considered that tortoises hatched their eggs by the warmth of their gaze; if they looked away, then the eggs would cool and the young would die.

In many lands it was believed that a tortoise supported the world on its shell; the Chinese thought that its four legs represented the four points of the compass. This might well account for the extremely worried expression which tortoises wear — they feel they are carrying the world's problems on their shoulders!

Some cultures said that the world was supported by a massive turtle with an elephant on its back, and perhaps this would explain why turtles cry so many tears.

In Roman times, lizards were meant to represent death and rebirth because they slept all winter and re-emerged during the spring.

The Elizabethans regarded lizards as highly poisonous, which explains why they crop up in Shakespeare's plays as ingredients of toxic brews. In Polynesian, Tahitian and Australian Aboriginal mythology, however, they are regarded as gods or great heroes.

Barnacles and geese

For centuries, people believed that the fleshy growths which sometimes attached themselves to the hulls of boats were the young of the Barnacle Goose. How such a belief arose is quite easy to fathom, because, certainly, the weird shape of the growth — the Goose Barnacle — does resemble the bird.

This large barnacle consists of five shiny white plates which form the shape of a bird's body, and it is attached to a rock, or ship's hull, by a thick brown stalk, which resembles the neck of the Barnacle Goose. The long feathery 'legs' add to the illusion. Incidentally, this belief was not discouraged by the clergy of the time, as it meant that Barnacle Geese could be regarded as 'fish', and so eaten at times of fasting, when meat was prohibited.

So, next time you see a lizard, a snake, a tortoise, or even a barnacle, it might be as well to treat them with reverence, merely to be on the safe side. And — just a thought — perhaps it would be a good idea to invest in an adder-proof milk-bottle holder?!

SUPPLEMENT

AQUARIST & PONDKEEPER

POND FILTRATION

BASIC GUIDE TO FILTRATION

BIO-FILTRATION MADE EASY

EXTERNAL POND FILTERS

IN-POND SYSTEMS

ULTRA-VIOLET STERILISERS

WATER PURIFIERS

Contents

Pond Filtration Supplement

EDITOR John Dawes

ART EDITOR Adam Turner

SENIOR ADVERTISEMENT MANAGER Lesley Anderson

ADVERTISEMENT MANAGER John Young Tel: 081 904 8886

ADVERTISEMENT SALES Rosemary Brookman

ADVERTISEMENT PRODUCTION Pauline Philpott

PUBLISHED BY Dog World Publications, 9 Tufton Street, Ashford, Kent TN23 1QN

TELEPHONE: ADVERTISING AND PRODUCTION/ CLASSIFIEDS & BUYERS GUIDE 0233 621877

FAX NUMBER 0233 646893

SUBSCRIPTIONS £22.50 per annum post paid. Overseas rates on application. All subscriptions payable in advance to: Aquarist & Pondkeeper, 9 Tufton Street, Ashford, Kent TN23 1QN

Origination by Wishpark Ltd,Ashford Composition Ltd. Printed by Headley Brothers Ltd, The Invicta Press, all of Ashford, Kent

Distributed to the Newstrade by: Seymour International Press Distributors Ltd, Windsor House, 1270 London Road, Norbury, London, SW16 4DH

ISSN 0003-7273

A BASIC GUIDE TO FILTRATION

Peter Skinner of Koi Kraft introduces the concept of filtration and looks at some of the options available and the jobs they do.
Illustrations by the author

In order to look after fish in a domestic pond, it is important to emulate as nearly as possible the environment that the fish would enjoy if they were in their natural habitat. In a lake or river, the environment is totally controlled by nature and the interaction between all animals and plants is constantly being fine-tuned so that all species can live in harmony.

In such a system an abundance of, for instance, a particular type of insect would mean that, suddenly, there would be more food for certain animals, which ultimately would have the effect of increasing their numbers in direct relation to the food availability.

Once the food supply has diminished, the population of those animals would automatically adjust in line with the new food supply levels. In this way, all species of plants and animals are controlled by what the area can support, and none of these species is able to pose an overwhelming threat to the others.

If the balance of nature is upset by a sudden change in the environment, such as urban encroachment or the introduction of non-indigenous species, or even the removal of one vital member of the community, then the whole balance can be altered and, inevitably, there will be casualties.

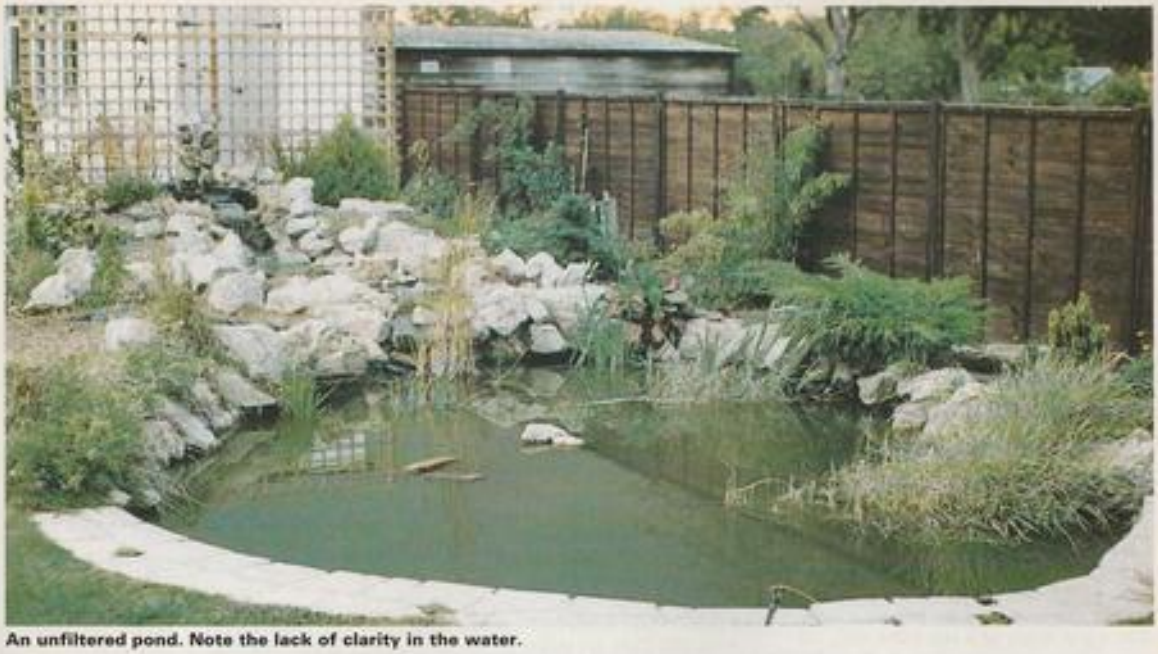
Stocking level

The chemistry of water is controlled in a similar way to that of the food chain. An unacceptably high level of a nutrient would automatically encourage the growth of plants to reduce the level. Usually, alterations in the water chemistry would be so small that the increase in plant growth would be only enough to cope with the situation and return it to normal levels.

If, for instance, industrial effluent were to contaminate a body of water, the usual mechanisms of nature would be thrown into disarray because of the speed of the change and, inevitably, the community would suffer.

A natural pond such as this cannot support a large collection of fish unless supplementary filtration is used.

This large pond surrounded by trees is likely to be quite difficult to filter adequately. (Note the high concentration of leaves in the water).



An unfiltered pond. Note the lack of clarity in the water.

The fish stocking density in a natural pond would achieve a level in direct relation to the support nature can provide. If, say, the stocking level should be one fish for every 5,000 gallons (c22,700 litres) then, unless there is an outside influence (such as over-fishing), the community will fluctuate fairly closely to this level.

In a domestic pond, the stocking density may be, for example, 20 fish in 2,500 gallons (c11,350 litres) which would be in the region of 40 times the natural stocking level. The pond may also be devoid of vegetation and natural organisms which would normally help maintain the water quality. In this situation, the pondkeeper will be responsible for the well-being of the fish because nature on its own will not be able to cope.

The food requirements of the fish are easily met with modern pelletised foods, but it is the water quality that would deteriorate if adequate steps are not taken to maintain it. In a recirculating system, all the droppings and urine from the fish will remain in suspension or fall to the bottom of the pond and the effects of the fishes' respiration will all combine to spoil the water quality.

Health risk

The droppings will start to decay and will harbour many types of bacteria, some of which can be harmful to fish, and the ammonia content of the water will rise. A combination of these two factors will cause the fish to be stressed and will predispose them to disease. If the ammonia levels get too high, then the fish will suffer irreversible physiological damage and losses will result.

It is not always immediately obvious to the pondkeeper when water conditions have deteriorated only slightly, unless he/she is regularly using test kits to monitor them.

It is often the case that action is taken to improve conditions only when the water clarity falls below an unacceptable level. Unfortunately, by this time, the health of the fish may be under threat, as they will have been rendered more vulnerable to attack by disease organisms because their immunity to them will have been inhibited by poor water quality.

The use of a suitable filtration system is the only practical way of maintaining good water conditions for a collection of fish in a domestic pond. The size and type of filter required will depend upon the following factors:

- The number of fish in the pond
- The size of the fish in the pond
- The variety of fish
- The size of the pond
- How high you wish the quality of the water to be
- How much maintenance is likely to be done

A single chamber filter.

Every pond will have a certain amount of natural algal and higher plant growth which will be able to look after the water quality for a certain stocking level. For instance: a heavily planted pond may be fine for a dozen small Goldfish and the water may stay clear and the ammonia levels will remain very low. This is a natural balance and a filtration system is not necessary.

If, however, this stocking density happened to be at the maximum that nature alone could support, then the addition of two more fish would cause a deterioration in water conditions. The pond would still be able to cope with the first twelve fish, but a filter would be necessary in order to deal with the waste products from the two new fish and, subsequently, the growth rate of all of them.

Types of filtration

It is important to consider the varieties of fish in a pond when choosing a filtration system. Goldfish varieties rarely exceed 12 (30cm) in length and have a relatively slow metabolic rate. Orfe and catfish grow more quickly and achieve a larger size, but it is the carp varieties which are less forgiving to an inadequate filtration system. These can grow at a rate of between 2in and 5in (50mm-125mm) in length per year. They are voracious eaters in warm weather and can pollute the water very rapidly if the filtration system cannot cope.

There are two main types of filtration: mechanical and biological.

Mechanical filters are designed to trap particles of waste, such as droppings,

uneaten food, dust, leaves, etc. These will accumulate in one place until they are flushed to waste at the next maintenance time. It is important to remove these waste materials, otherwise they will gradually rot down and pollute the water. A build-up of this type of sludge can harbour dangerous disease organisms and the water will look cloudy.

Biological filter materials are not designed to catch physical waste; instead, their purpose is to deal with dissolved ammonia and nitrite and convert them to nitrate, which is much less harmful to the fish.

The actual filter materials are inert and do not affect water quality. Instead, they are designed to provide a very large surface area upon which naturally occurring bacteria can grow. All you need to do is pass the water over the filter material constantly by means of a pump and the bacteria will gradually increase in numbers until they reach full strength, which normally takes about 6-8 weeks.

Once the filter is mature, you need only to keep the biological material reasonably clean by flushing it with pond water occasionally and never stop the pump for more than a few hours at a time; like this, the biological colony will perform indefinitely.

Filter materials

There is a very wide variety of filter materials available to the pondkeeper, but they must be chosen with care, because some are better at biological filtration and others are better at mechanical filtration.

There are some that are somewhere in between, but are not particularly good at either task. Others may be excellent for their purpose, but may be very expensive, or may not be very durable.

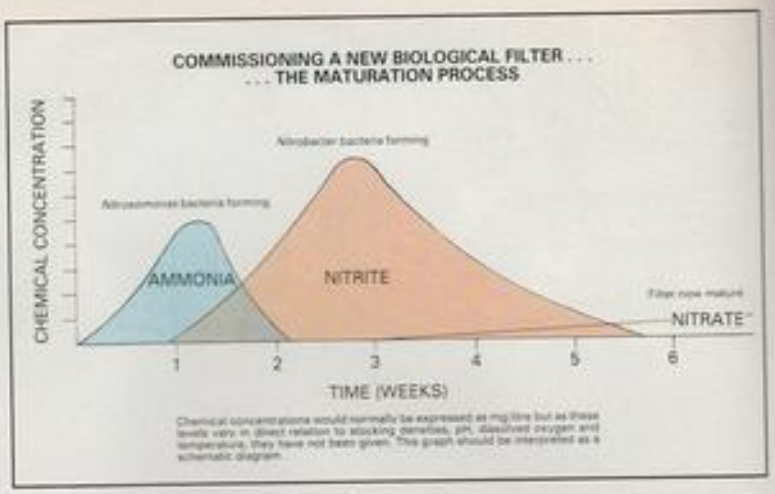
Some of the smaller proprietary filtration systems are not always large enough to contain the ideal combination of filter materials, or marketing and commercial forces dictate that a compromise must be made in the choice of media. This is not to say that they do not work well, but with this type of system it is most important that care is taken to ensure that the capabilities of the filter are recognised.

For the smaller pond, or those with predominantly Goldfish varieties, this type of filter may be sufficient, but where high stocking densities are present, or if the pond is populated by Koi, then a more efficient filter design is usually required.

D.I.Y.

Many people choose to build their own filter using a plastic tank and ordinary domestic plastic plumbing fittings. In this way, it is possible to build a large filter at low cost, but care should be taken in the choice of filter materials. Some media are more forgiving to the less-than-ideal design than others, and time and money could be wasted.

Large Koi pond filters can be purchased ready-made or can be built *in situ* using concrete and blocks or bricks. Once again, design is all-important in order to get the best performance from the materials, money and space employed.



Another consideration that is sometimes overlooked at the time of construction is the ease of maintenance. It is important that all chambers are drainable for cleaning purposes and that the whole job can be done quickly and efficiently. Human nature is such that a poorly designed filter that is difficult to maintain will receive less maintenance than its well thought out cousin, although it demands attention sooner in order to maintain an adequate level of efficiency.

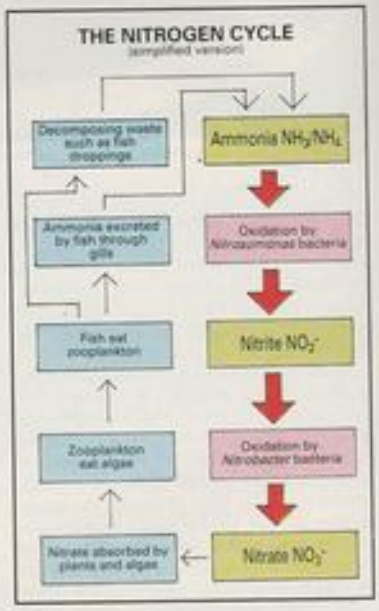
In general, if you are building a filter using plastic tanks, remember that these usually work most efficiently if one type of filter material is used in each tank. That is not to say that you cannot have more than one tank using the same material, but in order to use two types of medium in one tank, it would normally be necessary to put a partition in the tank.

Since most of these tanks are of a flimsy construction and they change shape when filled with water, partitioning a tank is not as simple as it may at first appear. Also, most of these tanks are too small for you to gain any significant benefit from this operation.

If you are going to use one tank as your filter, then choose a filter material that offers both good mechanical and biological efficiency. If a medium is excellent at one job, but not good at the other, then the consequences will be poor water clarity, or water that is chemically unsuitable for your fish.

In a multi-chamber filter system, you have the opportunity to do different jobs at different stages and therefore you can use the product of optimum efficiency where appropriate.

When the raw water is introduced to the filter system, it is usual to separate the particles of waste mechanically first so that only physically clean water is introduced to the main biological stage. It is important to have the layout in this order because, for a biological material to be efficient, it must be dense, with small voids. If large amounts of waste are allowed to reach this material, it will block rapidly and the level of efficiency will drop quickly.



Maintenance

It is most important that the filter receives regular maintenance. No matter how well designed a filter is, or how large it is, the efficiency will eventually suffer if it is allowed to get too dirty. Remember that fish waste has no value at all in the filtration process. The beneficial bacteria in the filter require only oxygen and ammonia or nitrite in order to live. The presence of solid waste matter is not required.

If large amounts of droppings are allowed to accumulate, the water quality will suffer in three ways: first, as the matter is broken down, small particles will be released into suspension and these will be

carried around the system by the flow of the water and will cause cloudiness. Secondly, in order for the matter to decompose, it will absorb large amounts of valuable dissolved oxygen. Lastly, too much debris in the biological chamber will cause blockages and the extremities of the chamber(s) will not be contributing to the purification effort.

When a biological filter chamber is cleaned, it is first necessary to drain the chamber completely and then to flush any remaining dirt to waste using buckets of pond water. A hose pipe should not be used for this purpose because tapwater contains chlorine, the bactericidal properties of which will have detrimental effect on the performance of the biological colony. Also, a hose will be less effective at flushing than a sudden deluge from a bucket. The mechanical chamber can be flushed with a hose if you prefer.

Popular misconception

It is a common misconception that a biological colony will be washed away by the above action. A small proportion of the bacteria will be removed, but there is no way to maintain the filter properly otherwise. There will be no noticeable consequence of the cleaning, because the colony will regenerate to its full complement in only a few days.

In fact, the build-up of excessive waste would have a far greater inhibitive effect on the colony, because it would impede the distribution of the dissolved oxygen, thus suffocating the bacteria.

The flowrate through a filter system is quite important, but is usually a compromise between what the filter requires, what is best for the pond size and how much it costs to run the pump. The efficiency of the filter can be affected greatly if the flowrate is too fast or too slow.

In a settlement chamber area, the efficiency is dictated by the flow pattern and, more importantly, the speed at which the water is travelling. The larger the chamber relative to the pumping rate, the more waste will be allowed to settle, because the water will be travelling more slowly and there will be less turbulence in the chamber.

A certain amount of waste matter is buoyant and therefore will not settle, no matter how slowly the water is moving. Instead, this material needs to be trapped mechanically in a suitable medium.

Once again, the efficiency of such a process will be dictated by the speed at which the water is travelling. If it is moving slowly, the accumulated debris will be trapped and will remain static until the next maintenance operation.

If the mechanical medium is subjected to a more violent stream of water, it will still catch a certain amount of debris, but much of it will subsequently be encouraged on its way, because the washing effect of the water will eventually break down the droppings into particles too small to remain trapped. For this reason, spraybars, venturis and nozzles are unsuitable ways of introducing the pond water to the settlement/mechanical section of the filter.

The biological section, however, usually works best with a reasonably fast flowrate, because the water will be distributed more evenly in this way and higher oxygen levels will be available to the bacteria. Also, tracking (water taking the easiest route) is less likely to occur.

The flow through the pond should be fast enough for there to be movement in all areas, but not so fast that all the fish are heading into the current as they fight to maintain their position in the water. The flow should also be sufficient to remove the waste from the pond as it is produced (via the pump or bottom drains) and send it to the filter. The principle is similar to that of windscreen wipers; there is an ideal speed for a particular set of conditions.

Food for thought

When you think about building a new pond it is important to take great care in choosing a filtration system. No matter how well the pond is constructed, or the surrounding area is decorated, the aesthetic contribution to the location will be ruined if the water is not clear and the fish are not healthy due to inadequate filtration.

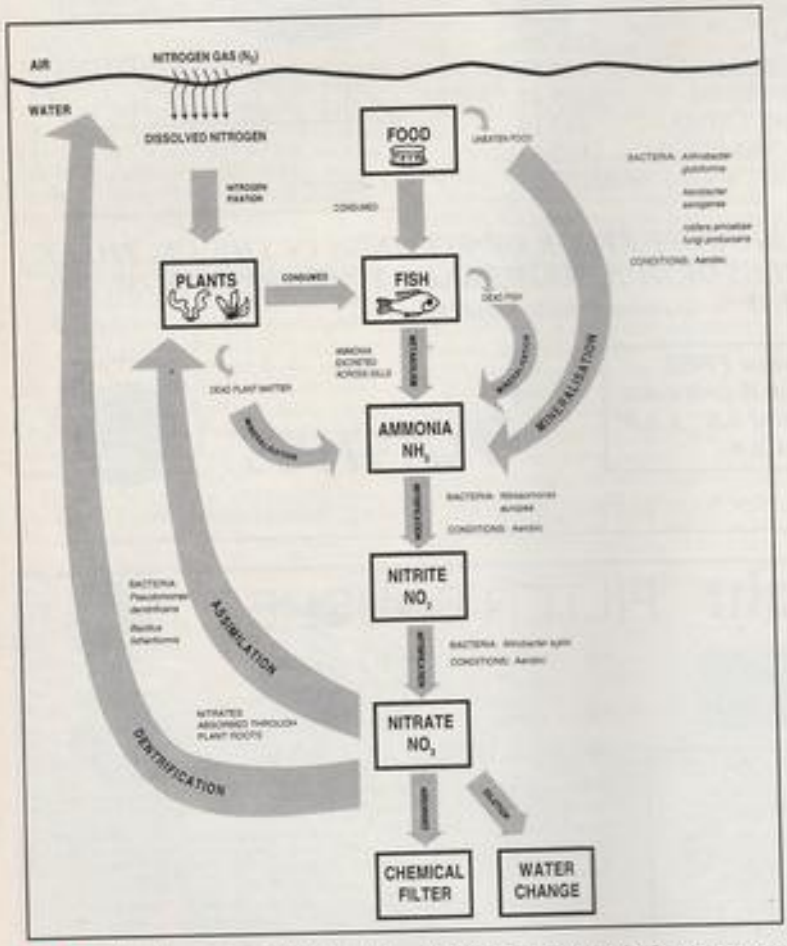
Also, the worry caused by these problems will wipe out most of the enjoyment that the pond should provide, thus defeating the original object of the project. AAP

Only when your filtration installation is working efficiently can you enjoy the pleasures of fishkeeping!

Biofiltration Explained

PART ONE

THE NITROGEN CYCLE



Roger Foggitt of Tetra's Information Centre looks in detail at biological filtration, the processes going on and the organisms which carry them out.

I wonder how many aquarists and pondkeepers realise that within their aquarium and pond filters they are harbouring millions of biological organisms, not just bacteria, but other microscopic creatures like rotifers, protozoans and worms. Don't reach for the disinfectant, though, because it is these micro-organisms that give us the ability to remove the toxins produced by fish and waste materials in the aquarium and pond, thus creating ideal water conditions for our fish.

Although many of us know that micro-organisms are present in our filters, it's somewhat more difficult to understand what they are and how they help to remove these wastes.

To understand what is actually happening, we first need to look at a process occurring in all aquatic environments.

A large amount of plant and animal tissue is composed of four main chemical elements: Carbon, chemical formula (C), Hydrogen (H), Oxygen (O) and Nitrogen (N).

These four main elements are chemically combined together to form such materials as proteins and enzymes, and it is when these materials are broken down within the aquatic environment by fish and micro-organisms that they form toxic nitrogen-containing compounds such as ammonia (NH_3), and nitrite (NO_2) which are, of course, a concern to us as aquarists and pondkeepers, as high concentrations can cause harm to the occupants of our aquariums and ponds.

It is the movement of nitrogen within the aquatic environment in different forms such as those mentioned, that we call the Nitrogen Cycle, and it is the 'cycling' process present in nature that all of us must try to re-create in our pond or aquarium with effective filtration equipment.

As shown above, a large amount of living tissue contains nitrogen, and this is not really surprising if you consider that the air that we breathe is essentially four-fifths nitrogen. The actual composition of air is 79% nitrogen gas (N_2), 20% oxygen (O_2), and 1% of other gases, including carbon dioxide (CO_2).

Nitrogen Cycle stages

The stages of the Nitrogen Cycle (see diagram) are:

① The conversion of atmospheric nitrogen gas (N_2) into plant tissues by bacteria contained in swellings in the roots (root nodules) of plants. **(Nitrogen Fixation).**

② The consumption of plant tissues and food by fish, producing ammonia (NH_3) as a waste product. **(Metabolism).**

③ The conversion of dead plant tissues, dead animal tissues and excess food to ammonia (NH_3) by bacteria and other micro-organisms such as amoebae, protozoans, fungi, rotifers and microscopic worms. **(Mineralisation).**

④ The conversion of ammonia to nitrite (NO_2) by bacteria. **(Nitrification).**

⑤ The conversion of nitrite to nitrate (NO_3) by bacteria. **(Nitrification).**

⑥ The absorption of nitrates by plants which are then converted to plant tissues. **(Assimilation).**

⑦ The conversion of nitrates to nitrogen gas by bacteria. **(Denitrification).**

We can see, therefore, that the major contributors to successfully 'cycling' nitrogen in the aquatic environment are the bacteria, and it is these that we try to culture on our filter media.

There are several different species of bacteria that we need to culture within our filtratin equipment, all of which require a food source and an oxygen supply.

1 Food sources

Bacteria can utilise two different forms of food source, those which are organic and those which are inorganic. Dead plant and animal tissues and any uneaten food in the aquarium and pond are carbon-based and therefore organic. Those materials in the aquarium that do not contain carbon, such as ammonia (NH_3), nitrite (NO_2), and nitrate (NO_3) are inorganic.

Bacteria using an organic food source are known as *heterotrophic* bacteria and those which use an inorganic food source are known as *autotrophic* bacteria.

The bacteria carrying out the differing processes in the Nitrogen Cycle are generally heterotrophic; therefore those bacteria breaking down organic material to form ammonia are know as *heterotrophs*. However, the bacteria which convert ammonia to nitrite, nitrite to nitrate and nitrate to nitrogen gas are capable of utilising *both* types of food source and known as *facultative autotrophs*. Not all species of bacteria are capable of doing this and it is those which have the ability that we culture on our biological filters.

2 Oxygen sources

For the majority of the conversion processes that occur in the Nitrogen Cycle, the bacteria and other micro-organisms require a high level of atmospheric oxygen to be present in order to carry out their respective job. These conditions are known as *aerobic*. The bacteria are therefore known as *aerobic* bacteria or *aerobes*.

To provide aerobic conditions in the aquarium or pond is easy, as oxygen readily dissolves into the water, from the atmosphere. This dissolved oxygen is then used by the bacteria. Aerobic processes can be increased in efficiency by utilising wet and dry trickle filters. This increases the oxygen available to the bacteria by allowing greater mixing of the air and water, thus ensuring that the water always contains very high levels of oxygen.

However, where nitrate is converted to nitrogen gas, conditions which are *free* of atmospheric oxygen are required as the bacteria use the oxygen chemically bound up in nitrates when converting them to nitrogen gas, instead of using dissolved oxygen. If any dissolved oxygen is present, then the bacteria will utilise this and *not* convert nitrates to nitrogen gas.

We are therefore attempting to force these bacteria to utilise nitrates and not dissolved oxygen by keeping them under *anaerobic* conditions. These bacteria are known as *facultative anaerobes*, as they will use dissolved oxygen if it is present, but can also utilise alternative oxygen supplies if conditions are correct.

Bacteria which are cultured within a filtration system colonise any surface available to them to form a slime coating or film known as *zoogleal slime*. For this reason, it is important that we use a filter medium that provides as large a surface area as possible for bacteria to colonise; this way, we can ensure that there are always sufficient numbers of bacteria around to do what is required. AMP

TO BE CONTINUED

In Part 2, I will be looking at how we can 'build in' the Nitrogen Cycle into our filters for maximum effect.

Clean & Clear

Nowadays, no discussion regarding pond water quality can be regarded complete without due consideration being given to ultra violet sterilisation and water purification. **Barry Goodwin** offers some expert tips and puts them in perspective.

Illustrations — unless otherwise indicated — by the author

A pond full of show-quality Koi. Clear water such as this, which is essential to get the most out of our hobby, can be assured by the use of an Ultra Violet Steriliser.

Two of the main considerations that should be at the top of every pondkeeper's agenda are clear water and healthy water. There are many ways that hobbyists have tried, over the years, to achieve these goals; some have met with success, some have not. As technology has advanced, though, the available equipment has correspondingly become better and better, with the result that we no longer have to try very hard to achieve our ends.

Ultra Violet Sterilisers have ensured that we can have clear water that may also be controlled bacterially, while purifiers have ensured that we can have top-quality water from the kitchen tap for our fish to live in.

The use of both of these types of units is now widespread. They do, however, hold some pitfalls for the unwary, so I will take a close look at the scene here and indicate some of the finer points associated with their use.

1 ULTRA-VIOLET UNITS

Ultra Violet Sterilisers (UVS) have been around on the water treatment scene for a

considerable period of time. They are used by hospitals for sterilisation purposes, by some third world countries for sterilisation of their drinking water, by seafood farmers for sterilising water for breeding shellfish and, latterly, by pondkeepers to rid their ponds of the dreaded green water.

One of the main design functions of UVS's is to kill bacteria in water, and to achieve this requires a lesser dose of ultraviolet radiation than it does to suppress the green water; therefore, hobbyists are beginning to realise that too much UV can

Water Management

A UVS on a pond system. If installed outdoors, as this one is, it is important to ensure that it is rainproof.

create an environment that is 'too sterile'. This can degrade the immunity of exposed fish to all kinds of organisms in the water that they would normally build up resistance against. The current recommendation therefore is that a UVS is only run for as long as it takes to clear the water and no longer.

UVS is useful for clearing the algal cells that cause green water by causing them to 'flocculate' or clump together, when they can settle in the pond to be hoovered out, or eventually find their way to the settlement chamber where they can be flushed away to waste.

Those of you who have been around pondkeeping for a little longer, will remember a similar situation some years ago with another piece of equipment referred to as a 'Pia' which combined UVS with ozone and by so doing, created a clinically pure environment that created all sorts of problems for fish in the ponds of the keepers who used it.

Positioning & design

A UVS unit should be placed in the pumping stage immediately before the water returns to the pond for two reasons.

It is desirable that the water flowing through the unit is turbulent, something that will be assured after it has been through the pump; some units actually include a turbulator of sorts to carry this out. The turbulence ensures that the water passing through the unit receives the maximum dose of radiation.

The life of the unit will be extended if it is always full of water, which cools it down; this is not always assured if the units is gravity fed and before the pump.

A typical unit consists of a UV-resistant plastic outer casing with an entry pipe at one end and an exit at the other. Mounted longitudinally and central in this casing is a quartz tube which is sealed by 'O' rings in the end caps to the outer casing. Water can therefore be pumped through it without leakage.

The UV tube, which must be a 'medicinal' type to ensure the right wavelength of light, sits inside the quartz tube and is held in place by the electrical connectors which are mounted in rubber or silicone end caps which also seal the unit, making it 'rainproof'. Earlier units do not use this method and were not classified as 'rainproof'.

Quartz is chosen for the tube that contains the UV lamp as it is about the only material suited that is UV-transparent. If ordinary glass were used, this would filter out the very radiation waves that we require.

There are many types of UV tube on the market, but as stated earlier, the one that we require is the 'medicinal' type, which gives out the correct wavelength of light.

Tube replacement

When buying replacement tubes, be very careful that you buy a reputable brand, as there were some tubes around during 1993/94 that were way below spec — some did not work at all.

Be very careful when dismantling units to clean the quartz tube, as this breaks very easily and is expensive to replace.

Never connect a tube to the electrics outside the casing to 'check' it; your eyes could be easily damaged by looking directly at a lit, uncovered UV tube.

When the UVS is fully assembled and switched on, the whole unit lights up with an eerie greenish glow, easily seen at night, and this will assure you that it is working. Try to avoid handling tubes with ungloved hands, as the perspiration from your skin will mark the glass and reduce the overall efficiency.

Choices and uses

Manufacturers tend to vary somewhat in their recommendations as to how much UVS is needed on a pond, but general guidelines suggest 10 watts per 1,000 gallons (c4,500 litres), so a 6-watt unit should cope with a 600-gallon pond (c2,700 litres), a 15-watt unit with a 1,500 gallon pond (c6,800 litres), up to a 60-watt unit coping with a 6,000-gallon (c 27,280 litres) pond.

UVS units can be used on treatment and quarantine set-ups to control bacterial levels, thus assisting the healing and treatment processes, but in general, pondkeepers use them to abolish green water, they can also, of course, be combined with other methods of control to achieve the same end.

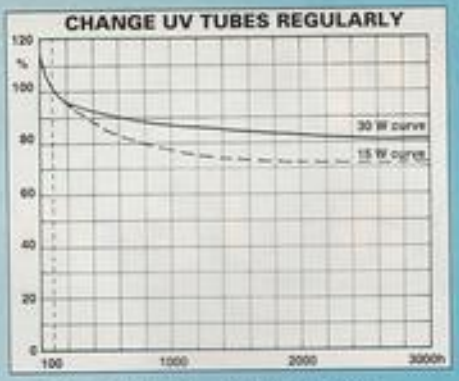
One keeper has a large vegetable filter which controls the nitrate levels reasonably well in his pond, and he combines it with a UVS, the combination providing complete protection from unicellular algae all year.

This means that on an 8,000-gallon (c36, 370 litres) pond, combined with the vegetable filter, 30 watts of UVS will suf-

This amount of UV sterilisation has been installed by a Koi keeper for a specific purpose. It would certainly be considered too much for the average pond system, however. Always keep to the manufacturers' recommendations when deciding upon the amount of UVS required for your pond.

HOZELOCKS AQUATICS

Some modern UV units have in-built turbulators to optimise exposure of the water to the radiation.



This graph shows the fall in emissions of a typical U.V. tube. It shows that in less than 6 months running, emission drops to just over 70% in the case of a 15w unit and 80% for a 30W unit.

Graph taken from information supplied by Philips for U.V. Germicidal Tubes.

fice (80 watts of UVS would normally be recommended here), thus enabling it to be run all year without adversely affecting immunity. This is, in one way, advantageous, as a UVS unit, while switched off, will develop a film on the quartz tube, necessitating cleaning before putting it back into use.

2 WATER PURIFIERS

Despite assurances to the contrary, UK tapwater continues to deteriorate as far as fishkeeping is concerned and we therefore have to protect our fish from water-borne pollutants to ensure their long-term health, if not their very survival.

The first water treatment units available some years ago, were the dechlorinators, which were those tall spun fibreglass containers filled with activated carbon. As a bonus, lots of other contaminants such as pesticides and herbicides were also removed and dechlorinators seemed to provide the complete answer to the pondkeeper's prayers. In a lot of cases they still do and are still readily available.

It was noted, however, that catastrophes still occurred from time to time, particularly where Koi were concerned, and these were due to things like chloramine, copper sulphate, aluminium sulphate, lead and other chemicals. It was quickly discovered that dechlorinators alone would not even touch these pollutants and an answer had to be found relatively quickly.

The dechlorinator manufacturers therefore started to produce 'add-on' cylinders for their products to remove specified contaminants, but gradually it was realised that there already existed technology that would outstrip even this, and so the water purifier was born.

Choices

There are an increasing number of purifiers appearing on the market now using design philosophies based on activated carbon in various forms, and one, at least, combining this with an ion exchange resin. This can only be good for pondkeepers in general, and Koi keepers in particular, as there is now choice to be had and your own selection will depend upon searching through the manufacturers' data and talking to other users of the equipment for recommendation.

Whichever system you choose, however, it will all depend upon what you have to remove from your water, and you can only decide this after seeing the drinking water analysis report for your own area. This should be available free of charge from your water company.

From this, you will be able to see what the main contaminants of your water are that will affect (or be likely to affect) your fish, and this will, in turn, affect your choice of purifier. One thing to bear in mind is that the whole picture will not always be revealed by your water quality report, as some pollution seems to come in surges, possibly undetected by the water company. Whether this is contaminated at source, i.e. river, lake or borehole, or is local contamination from road repairs, etc, that may have fractured water mains, is somewhat open to conjecture.

For instance, there is undoubtedly lead in some tapwater and it would appear that the prime polluter of the mains water with such metal is old lead pipework in buildings. Some Koi keepers have, as a result,

An example of what can happen if your purifier has a transparent prefilter housing fitted and it is kept in full sunlight. As you can see, the algal growth is considerable and has prematurely blocked the prefilter cartridge.

put in the highest specification models of purifier available to be safe, and they have been amazed at the amount of contaminant removed by them, especially that of a particulate nature.

Micro filtration

There is another system on the market which comes from General Ecology in America, and that is a micro-filtration system called 'Spark-L-Pure' that was developed with the aircraft industry in mind. The principle behind this system relies on particulate matter removal from the water down to a very fine micron rating to protect ponds from contaminants.

These systems have been around for a number of years now and are used by some of our top Koi keepers on their pond systems, and in some cases for their whole house. Smaller versions using similar technology are available from different manufacturers for mountaineers and campers to obtain drinkable water from highly polluted sources, so that, in itself, is a good recommendation.

Prefiltration units

It is important that all the purifiers, whether carbon-based or microfilters, are well protected by prefiltration cartridges to remove contamination by larger particulate matter. This is necessary, as some main cartridges have a retention factor down to 1 micron or less, and will mechanically block long before absorbtion capacity is reached.

Prefilter cartridges have certainly been prematurely blocked with iron sulphate, copper sulphate and aluminium sulphate in particulate form, which would, undoubtedly, overwhelm or prematurely block main cartridges.

A prefilter cartridge is relatively inexpensive to replace; not so the main purifier cartridge, so adjust your techniques accordingly, possibly employing more than one stage of prefiltration.

Correct positioning

1 Purifiers should be mounted somewhere they will be protected from freezing during the colder weather, as the sturdy plastic housings can be damaged beyond repair by freezing; the cartridges can also be damaged by excessively low temperatures.

Water purifier mounted in an ideal position, in a garage near to the central heating boiler (but not too near!). It is fed from the owner's old dechlorinator unit as mentioned in the text. Note that this keeper has also got a water meter fitted which will give him an indication of when the cartridges are approaching exhaustion.

This picture shows graphically the value of prefiltration in a purifier. The cartridge on the extreme left is an unused one, the one second left is from the purifier prefilter of a keeper whose water suffers from high sedimentation. Third left is a new dechlorinator prefilter cartridge, and, lastly, the same cartridge type from a low sedimentation area after over 500,000 gallons of water has gone through it.

2 Purifiers should also be mounted in a situation where they will not be exposed to large temperature fluctuations, or to very high temperatures.

3 If your prefilter casing is transparent, it should not be mounted in direct sunlight, otherwise the resultant algae will block the prefilter cartridge.

Some pondkeepers, having upgraded to a purifier from a dechlorinator, now use their old dechlorinator as a prefiltration unit for their purifier. This seems to be a very good idea, since it will extend the life of the purifier cartridges considerably.

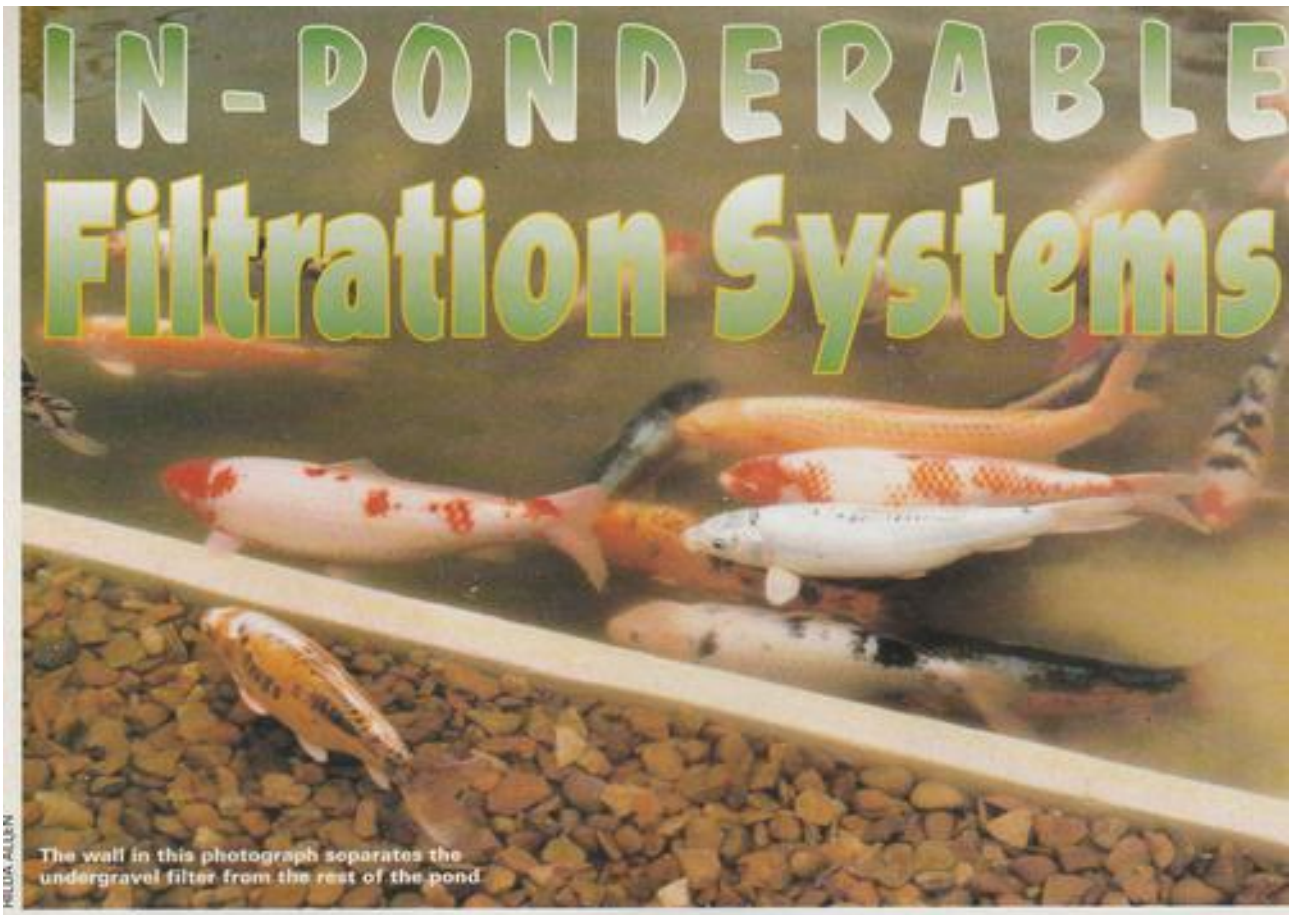
It has been postulated that some purifiers will reduce the essential minerals in the water that are vital for fish health and that, as a result, these will need to be replaced. This is usually done by employing 'refresh' or 'montmorillionite'.

As we have no means of testing for all the pollutants that our purifier will reduce, we must adhere to the manufacturers' instructions.

It is better to be safe than sorry!

MP

IN-PONDERABLE Filtration Systems



The wall in this photograph separates the undergravel filter from the rest of the pond

HILLIA ALLEN

Neat, effective and out of sight, internal pond filters have a great deal going for them, as **Dick Mills** explains

Elsewhere in this **Supplement, David Twigg** concentrates on external filtration systems. However, not everyone wants (or has room for) a filtration plant alongside the pond or hidden in a rockery (not everyone has got room for a rockery, either), and so all the water purification has to take place in the pond itself.

In catering for this, there is a complete reversal of the usual order of the equipment line-up as, except for one instance, all the 'filtering' occurs *before* the pump, rather than after. The virtue of this is that the pump only has to deliver clean water, so fountain-kit type pumps which cannot (or shouldn't be asked to) pump solid materials are perfectly suitable, if their flow-rates are applicable, for this task.

The latest in-pond filters are compact and very effective.

INTERPET

FISHER POND PRODUCTS

The 'spider principle' fairly recently applied to an in-pond undergravel filter system, is proving very popular with pond keepers.

pond?' will be largely nullified once the pond plants fill the water spaces and cover the surface. Fortunately, manufacturers have foreseen the difficulty in locating the filter by providing an indicating float on a line attached to the filter. Following on from this, it seems that the biggest setback likely to occur is negligence by the lazy pondkeeper working on the 'out of sight, out of mind' principle. Like all aquarium and pond 'support systems', in-pond filters are no different in relying on regular maintenance for their continuing efficiency.

Basic designs

The simplest form of in-pond filtration is an enlargement of the pump's pre-filter, either a large cube of foam or a wrap-around circular device in the centre of which sits the pump. Newcomers to pondkeeping please note that the strainers on the inlet to pond pumps are there to protect the pump from damage due to solids drawn into the pump, and not to filter the pond.

Many fountain-kit pumps have the facility to add on extra foam cartridges, which increase both the filtration (straining out debris) capacity and prolong the time intervals between cleaning. Incidentally, where such a multi-cartridge set-up exists, it is beneficial to clean out only a proportion of the cartridges at any one time. When cleaning out any filter medium, be sure to use pond water to avoid killing nitrifying bacterial colonies, as would be the case if raw tapwater was used.

More advanced types

Once the next design step is taken, ie, to build a container arrangement which fits on to the pump's inlet, then more ambitious water cleaning processes can be envisaged. A perforated box can hold both mechanical and biological filter media; the first traps suspended debris, while the second provides ample surface areas for bacterial colonisation, and may consist of any large surface area material, from plastic pieces to sintered glass, or other specially designed bacteria-favourable media materials. A chemical medium, such as ammonia-absorbing zeolite, could also be incorporated.

A recent design of pre-pump filter has been given a secondary usage, especially for when the pondkeeper is away and cannot carry out the regular cleaning. By making available a second, coarser replacement filter sleeve, the filter can be left for longer periods without attention being needed. Once again, the specially-designed, sintered glass biomedium gives a home to aerobic nitrifying bacteria on its surfaces, where oxygenated waterflow exists, while — in its innermost areas — anaerobic bacteria remove nitrates by converting them back to free nitrogen gas.

A further feature of this filter is that it doesn't have to be sited right next to the pump; it can be placed anywhere in the pond and connected to the pump by its supplied length of wide-bore tube. This, obviously, obviates any criticism of a purely local water-purifying action, but it might be worth remembering (especially when using a powerful pump) that any across-the-pond water currents set up by having filter and pump spaced widely apart may upset the development of water lilies.

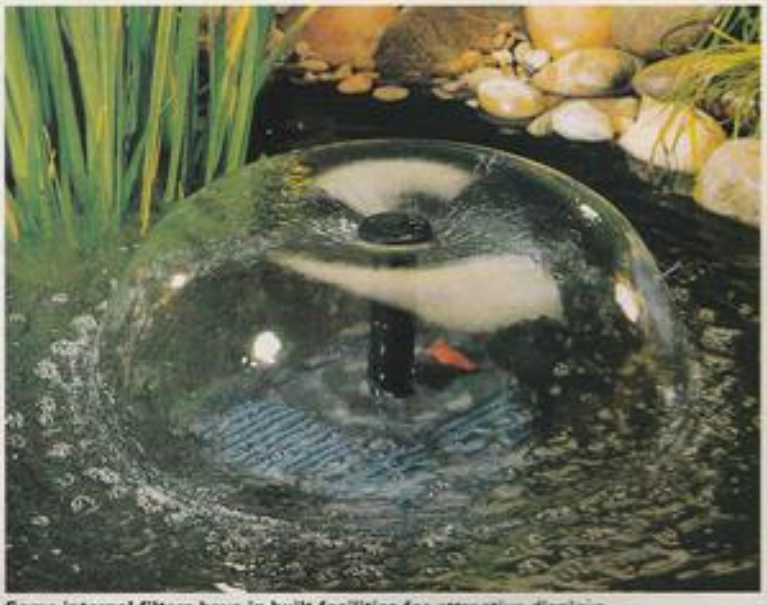
Undergravels

Not all biological filtration has to take place in the 'filter box.' One form of biological filtration which takes up little of the swimming space is hidden beneath a gravel substrate in the pond. The radiating, perforated spider-like arms from the central pump-connecting hub of a particular model draw in water from the substrate and so create an oxygenated waterflow in which nitrifying bacteria thrive.

This in-pond equivalent of the aquarium's undergravel filter need not take up the whole of the pond's base area; a section can be walled off to form a separate biological filter and it can even have a protecting plastic mesh, or netting, covering it to avoid its 'works' being uncovered by fish rooting around in the gravel. It is good practice, both with the spider type, and the more conventional pipe-lattice types of u/g filters, to rake through the substrate regularly above the filter to ensure that waterflow through the 'filterbed' remains unobstructed.

As the substrate needs to be a few inches deep to accommodate an efficient bacterial colony, the pond could be dug out these few extra inches deeper when first excavated — but then, we're all wiser after the event, aren't we?

Of course, the standard biological filter only really does half the job: it certainly converts fish wastes rich in ammonia into less toxic nitrite and thence into much safer nitrates, but a further range of bacteria need to be employed if the whole nitrogen cycle is to be completed. Some degree of de-nitrification occurs in any anaerobic



EHEIM

Some internal filters have in-built facilities for attractive displays.

Some of the most powerful in-pond systems can filter, 'throw' a fountain jet 12ft into the air *and* run a 2ft wide waterfall from a height of 6ft!

One of the best vegetable filters, but only during the warmer months, is Water Lettuce.

areas of all filters, and here is scope for a little experimentation if so desired.

Why not take a leaf out of the indoor aquarist's book and bury a de-nitrifying box, complete with its special medium, in a gravel bed in a quiet corner of the pond? One thing to remember if you do this, is that any rising bubbles seen in that area of the pond are not methane (marsh gas) from decaying vegetation or other waste materials, but bubbles of nitrogen — or else, your Tench is busy!

Space saver

As inferred earlier, there is a way for an in-pond filter not to take up valuable room in the pond at all and it isn't connected directly to the water pump either. Hiding a filter, complete with mechanical and biological media, in a well-oxygenated waterflow is ideal, and the simplest way to do this is to set it up in a cascade or mini-waterfall.

Having the filter set in the waterflow somewhat isolated from the pond prevents unnecessary water currents disturbing the tranquillity of the pond, which would be to the detriment of water lilies, as mentioned previously.

Such an item is available at your stockist. It may well be easier to maintain than in-pond types (just lift the covering lid and extract the medium) and admirers of your pond's crystal-clear water will have to hunt high and low before they spot where the filter is!

Vegetable filters

So far, the water has been purified by various filter media and bacterial action. Another, completely natural, method is to make use of plants in so-called vegetable filters.

Fast-growing aquatic plants do much to extract nitrates from the water and connecting a small battery of suitable plant-filled containers in the waterflow, or simply in the corner of the pond, can supplement any type of existing pond filter system, whether in-pond or fitted externally.

By describing the keeping of water plants in a cascade or in an external filter's returning water-flow, I am hoping our editor will still consider this type of filtration having an 'in-pond' qualification — otherwise, I've strayed into the wrong article! [*I agree with you entirely, this is a perfectly legitimate method of in-pond water quality control,* Ed]

It is important that any plant used is forced to take its nutrients from the surrounding water and not from any planting substrate so inert substrate material can be used to anchor plants, or they can be left free-floating.

The addition of certain compounds to pond water, such as highly porous minerals of planktonic origin (e.g. Aquaplancton), will help further improve water clarity and will, thus, enhance photosynthesis among submerged oxygenating plants. This, in turn, will help the water purification processes even further.

Suitable candidates

Of the plants regarded as suitable 'filterers', Watercress (*Rorippa* sp) immediately springs to mind with its spin-off advantage for your salad table! Additionally, any fast-growing multi-leaved plants, *Elodea*, Hornwort etc could theoretically be used (even Duckweed and Blanketweed can play their part in water purification).

During the summer months, warmer water species such as Water Hyacinth (*Eichhornia*) and Water Lettuce (*Pistia*), another rampant grower, are also suggestions.

Once again negligence is to be avoided; fast-growing plants may well take out nitrates from the water, but a clogged cascade or plant filter section may also result in water losses too — from overflows! AP

External Sol

David Twigg offers some pointers to ponder over if you are considering installing or buying an external pond filter

Many years ago, I created the first garden pond for my family. This pond was of the preformed fibreglass variety, about 10ft long and 5ft wide overall, but of irregular shape; a very popular model at the time, that gave us a great deal of pleasure. It was not long, however, before we realised that the fountain pump driving a three-pool cascade was, although very attractive, insufficient for the needs of a well stocked pond.

The biggest problem in those early days was 'green water', which all the books told us would disappear in a few weeks when the pond became 'balanced'. Well, yes it did ... almost, but the water was never crystal-clear and I decided that the only way to clear it of free-floating algae was to filter it.

So, how best to do it? I know, I thought, I will pass the water through some foam to act as a strainer. My first external biological filter was born and I didn't know it.

The foam, mounted in, firstly, one large ice cream tub and then two larger 4-gallon tubs for improved efficiency, was acting both as a mechanical strainer that required surface cleaning several times a day at the height of the summer, and a biological filter that was developing in the 'cells' of the foam sheeting. The water was almost sparkling, though, and continuing development put me well on the way to becoming an 'expert filter maker' as the size and complexity of my creations increased so as to maintain my 200 galls or so of water at the highest quality I could achieve.

High-quality water, then, is what pond filters are all about. A well designed filter will mean that not only will you be able to see your collection of fish, but it will also produce a quality environment to promote growth and health.

Design stage planning

Elsewhere in this **Supplement** you will find an explanation of biological filtration. It is the way that the filters convert the waste from the fish and other harmful products (e.g. dead algae) into less harmful substances by utilising bacterial action.

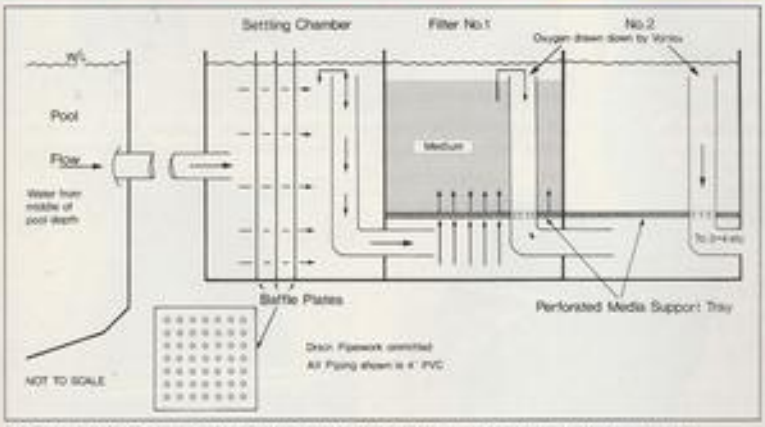
However large or small the garden pond, it is wise to incorporate adequate filtration into the system at the design stage. If, as was my case, it is 'bolted on' afterwards, then external filters can be difficult to hide and quite often it is necessary to chop down some favourite plant(s) to fit it them in.

Some external filters can be mounted **below ground (gravity-fed)** and so are not as visible, and this may be the best option if there are no suitable shrubs to

JON MONTGOMERY

Complex water systems such as this one are more easily serviced by means of a multi-chamber external filter.

utions



Part of a multi-chamber external pond filtration system (see accompanying diagram for final elements).

hide an **above-ground filter (pump-fed)** behind. Gravity-fed filters are usually plumbed into the pond when it is constructed, with the filter input piped directly from a bottom drain in the pond.

A filter is usually designed to have at least two chambers. The first will cause heavy floating solids to settle out (an absolute necessity) and the second is where the biological action takes place on the ammonia content of the water, to break it down into less harmful substances.

Choice of media

A variety of media has been used over the years to achieve these tasks, some more successfuly than others. Foam, in a number of densities, as mentioned above, can be used successfully to 'strain' out the solids, as well as acting as baffles in the first chamber to aid settlement. Foam can be purchased in both sheet and block form.

DIY'ers should beware using upholstery foam, as this can have toxic deposits inside the cells from the manufacturing process; it may also have been treated with toxic fire-retarding chemicals which, if released into the pond water, may be harmful to fish.

Plastic tubular material, such as hair rollers and Flocor, are popular open media and a relative newcomer to the market is Springflo, a coil of tape with an embossed surface that is coated to make a suitable home for bacteria to grow.

Matting, cut and stitched into open blocks, has proven (in recent years) to be a popular medium in the Koi world. The idea is that the flow will not be restricted, but because of its construction, the flow will nevertheless be broken up, thus permitting solids to be settled out, as well as having a large surface of mat for biological colonisation. Brushes are another useful medium that, both help to break up flow and have the ability to grow a bacterial colony for biological action. However, although it is not normal to clean matting, it is necessary to hose off the brushes from time to time.

Some media are sold as being eminently suitable for biological action. These are often man-made and based on materials with small pores in which bacteria (both aerobic and anaerobic) can grow, thus reducing nitrate levels as well. Siporax, Biohome and Biomedia are probably the best known of these sintered glass products, but the hobbyist may like to consider gravel and Canterbury Spar at the end of a filter system.

I know of one Koi pond filter that has been running on coke (coal with the gas burnt off!) for well over 10 years now. Canterbury Spar and gravel are comparatively cheap to buy, but may be prone to blocking if good settlement is not obtained before the water arrives at this chamber.

Settlement is probably best carried out by the round 'vortex' type chambers, as these generally have good disposal facilities plumbed in that make 'flushing' very easy. They are, however, generally more expensive than the rectangular units and need to be of a relatively large diameter for best results.

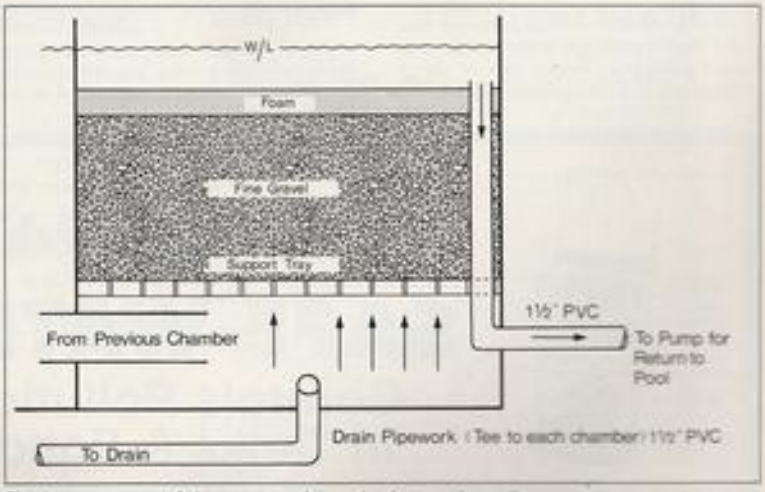
Commercial units

External filter units are produced by a number of manufacturers to meet almost every possible pond requirement. Most are constructed from plastics, but others from fibreglass (G.R.P.). Some are 'modular', others offer several chambers in one unit. Most come with their own media, although some do allow the purchaser to decide their own requirement. One filter unit actually comes with its own pump built into the lid!

However good the filter unit is, it is unlikely that, without the aid of an Ultra Violet Clarifier, it will maintain clear water throughout the summer months and therefore the purchase of one of these units should be carefully considered (See **Barry Goodwin's** article for fuller details on such units).

Pump choice

Another factor that will affect clarity of water is the flow rate around the pond and filter system, so the choice of pump,



Final component of the system shown in the previous diagram.

CYPRIO

Plastic-based commercially produced biogenial media.

HOZELOCK

A cistern-type of external filter. Such models (such as this one) come with a full complement of pipework and media.

DAVID TWIGG

A modern free-standing (but usually located in a pit) vortex chamber. Such units are excellent forsettling and disposing of solid wastes.

GREENAWAY

Many external models now come with in-built Ultra-violet water sterilising units.

JOHN CLEVELEY

An in-ground multi-chamber system in operation.

as well as the new filter, is very important. Pipe bends and fitments (e.g. UVS's) can cause a great loss of pressure, so be a little over-generous when making your selection. It is easy to close a valve partially to restrict flow, but impossible to increase it if required.

The generally accepted turnover rate for a filtered coldwater pond is: the **total pond gallonage every two to three hours,** e.g. a 1,000-gallon pond requires a pump with 330gph minimum capacity; 500 gph would be preferred. (For advice on pumps, please see the article by **Peter May** elsewhere in this issue of *Aquarist & Pondkeeper*).

Final plea

Finally, please remember that filter systems, just like ponds, require cleaning from time to time. Media need to be lifted out of the chambers and hosed off; very difficult if gravel or Spar is chosen, and the bottom of settlement chambers should be capable of being 'flushed' regularly.

This means having a convenient supply of water for both cleaning and topping up purposes, as well as adequate drainage for disposal of waste water. It may therefore be well worth considering some sophisticated plumbing! **MP**

SEAVIEW

BY GORDON KAY

No return to Fuerteventura

I was on holiday on the island of Fuerteventura a few months ago. We had a good time, but I would never go back there again, for a variety of reasons. Chief among these is the fact that they are planning a dolphinarium which is due for completion in 1996. The thing is planned for a holiday complex called Aguilla 2000, which is near to the airport.

It is, by now, well known how I feel about captive dolphins and whales and so I would ask you to think again if you're considering Fuerteventura for your holiday. If you're not — or even if you are — I would be delighted if you wrote to voice your consternation at this news to **Oficina del Delegado del Gobierno, c/10 de Mayo, Puerto Del Rosario, Fuerteventura.** Thanks.

'Alternative' human births

I get material for **Seaview** from the most unlikely sources — even womens' magazines; at least, that was the case with the next item. It seems that people's perception of the powers of the sea knows no bounds.

Women in Russia are, apparently, shunning hospitals and giving birth in the sea. More than 40 babies have, so far, been born at a special birthing centre on a quiet stretch of the Crimean coast in the Black Sea.

The mothers arrive by boat and give birth in shallow rocky inlets where the water is warmed by the sun. An increasing number of Russian women are escaping the terrible conditions of the country's hospitals, where, it is alleged, physical abuse is rife. They therefore travel to have their babies at the centre, which is run by an 'alternative' midwife and her husband.

However, founder-member of the Global Maternal Child Health Association, **Barbara Harper,** warned that women are running dreadful risks. The Black Sea is one of the world's most polluted waters, being full of radioactive waste. "I'd advise staying at home with some dolphin music", she said. Weird!

Gurnard encounter

Following my **Snippet** in January's issue about the Flying Gurnard, I had a letter from **Keith Roberts** — who claims to be one of my oldest readers, at 74 — which told of his sightings of a specimen while on holiday in Majorca.

Apparently, he was snorkelling in the Bay of Pollensa in about 5-6ft of water, when a big black shape appeared beside him. As it overtook him, Keith realised that it was a fish.

"It was thick and banana-shaped, pointed at both ends and looked just like the body of a large moth", said Keith.

The creature flopped down onto the seabed, then opened its pectoral fins, giving a "wing-span" of some 18 inches. It lay on the sand for about 30 seconds, before lazily flapping its wings and swimming out to sea.

That was the last Keith saw of it, but he took a few shots, which he included with his letter (but which, unfortunately, aren't sharp enough for us to publish). Thank you for sharing that mind-blowing experience with us all, Keith.

IN THE NEWS

1 An article in *The Sunday Times* in early March told of how the 'Great Whales' are coming back from the brink of extinction, after nine hundred years of hunting, following the moratorium imposed by the IWC. Blue Whales are increasing by 5%, while a report collated by the IWC says that 77% of whale populations monitored were believed to be increasing.

Scientists have said that the benefits of whale protection have so far out-weighed the threats like pollution from dioxin and PCB chemicals, in spite of environmentalists claiming that these represented an even greater danger than harpoons. However, **Roger Payne** believes that pollution, entanglement in fishing nets and collisions with ships have meant that recovery has been hampered. Interesting, don't you think?

2 The second item was shown on *BBC News*, also in March. It's official: dolphins kill porpoises! Apparently, some amateur photographer and scientist has made a video which shows a dolphin playing with a dead porpoise in the Moray Firth, Scotland. This is also interesting, but excuse me: did we not know all of this anyway?

SNIPPETS

1

One of the loudest ocean noises is made by the Pistol Shrimp, which stalks small fishes and then knocks them out with 'shots' of high-intensity sound.

2

One species of Peanut Worm (*Aspidosiphon*) looks like a pineapple, with its complex set of spines and hooks at the front end. These spines help the worm to bore into coral and act as grinding plates once the coral has been softened with acid.

3

Coral reefs, as we all know, are very fragile ecosystems and it wouldn't take much to push the animals which live upon them into extinction. For instance, the French Angelfish (*Pomacanthus paru*) has already been driven from many Caribbean reefs by spearfishing or pollution.

4

The erect tubes of some sponges not only provide useful 'chimneys', but also allow them to feed above the fine sediments which would otherwise block the animals' feeding canals were they buried in fine sand.

5

Although Green Turtles surface every ten to thirty minutes for air, they can stay underwater for many hours, and, in fact, very often rest under coral shelves.

Green Turtles can stay underwater for hours on end.

TREVOR McDONALD

TREVOR McDONALD

Iridescent Tube Sponge in Roatan. (See Snippet No. 4)

TRAVELLER'S TALES

Eyeballing marines at Kissimmi

Aquarian's **Dr David Ford** gets the chance to meet some of his favourite marines face-to-face, courtesy of Mr Disney.

Photographs by the author.

Of the millions of British holiday-makers who visit Florida, thousands must be aquarists, and Americans certainly cater for them with Sea World, Sea-aquarium and Epcot's Living Seas. In last month's **Traveller's Tales** we visited the wild freshwater fish of Florida — gars, mullet and bass in the Silver Springs river, the place where the glass-bottomed-boat was invented. This month we visit marine fish.

There is one Disney-owned attraction that I only discovered by accident. It includes a public aquarium where you are invited to swim among the coral fish.

The Walt Disney Company offer a water attraction called Typhoon Lagoon on Buena Vista Drive, just past Disney Village exit, at Kissimmi, South of Orlando. This complex is a freshwater 'sea' with waves and a "beach" of sterile coral sand. Therefore, you can swim safely in the man-made sea or laze on the super-clean beach for about $15 a day. There is a Castaway Creek, a continuous flowing river, Ketchakiddee Creek, raft rides and bubbling jets, Humunga Kowabunga, speed slides, and much more. There is even a rain forest (with perpetual misty rain) and, just beyond this jungle... a Burger Bar, of course!

The main feature is the sea of Typhoon Lagoon (Fig 1).

Designed for surfers. The wave machine, the largest in the world, was built in Scotland. When a wave is due, a hooter sounds and surfers can prepare for a ride, while hopeless surfers like me, can swim to the beach.

Swimmers or paddlers can enjoy the facilities every day of the year — except when there is a thunderstorm (it is a legal requirement to close if lightning is overhead).

The exciting feature for marinists is that you have the option to swim among shoals of popular coralfishes. Called Shark Reef, it is a totally artificial coral reef in an artificial seawater mix, all filtered and UV sterilised like any marine aquarium.

Here (Fig 2) are the tourists getting instructions on how to operate snorkelling gear. Before they are allowed in the water, tourists have to pass under a freshwater shower to rinse away the lashings of suncream they all use (and need). The only restriction is that you must be able to swim. All the gear, flippers, goggles, mask and breathing tube are available on free hire; changing rooms are nearby, too. In addition to the instructor, a duty lifeguard sits on a high stool — overlooking thousands of gallons of artificial seawater!

Swimming in the marine pond (Fig 3), you finally come face to face with your most popular coral fishes. I saw French Grunts, Sargassum Triggerfish, Scrawled Filefish, Yellowtail Damsels, Leopard Sharks, Rainbow Parrots, Southern Stingrays, Rock Beauties, Sergeant Majors, Queen Angels, Spanish Hogfish, Blue Tangs and more, eyeball to eyeball!

Even if you are a non-swimmer, you can see the fish. The Shark Reef has a sunken ship in the centre into which you climb via a bridge. Descending into the upside-down wreck, you can view the fish through the portholes.

New for '96

Typhoon Lagoon is very popular, since it is safe for families to visit and swim or paddle in. It never gets crowded because a strict limit on numbers is maintained — that is why queues from early in the day and it is often closed to further visitors by 10 am.

Since it has proved so popular, a second water feature is being built nearby to be called Blizzard Beach (should be completed by the time you read this...). Their water engineer John Pruzec, told me that they decided not to include a 'snorkel with the fish' in the new complex . The reason is that, despite the showers, tourists still pollute the seawater with sun barrier creams which keep blocking the sand filters.

So, take junction 26B from the I-4 to the original Typhoon Lagoon (early), borrow a snorkel and you can visit the world's most popular coral fishes, face to face. You can even see that they are probably thinking "Welcome to Florida!".

BREEDING:

Day's Spike-tailed Paradisefish

Kevin Webb offers his personal tips for success with this delicate-looking labyrinth fish.

Photographs by the author

Some time ago, I had to set up a new spawning tank for my Spike-tailed Paradisefish because I was down to my last pair. My aims were to spawn them and photograph them breeding.

Pseudosphromenus dayi is not a rare or expensive fish. It is one that can make a good community subject and is occasionally seen in our local shops.

For breeding purposes I first cleaned and prepared an 18 x 18 x 10in (45 x 20 x 25cm) tank. I then added aged tapwater and some aquarium salt (approximately three tablespoonfuls).

A polyfilter was placed at the back of the aquarium, along with some artificial plants. This was to provide cover for the fish, especially the female so she could get out of the way of the male after spawning, should she wish to.

A flat piece of rock was balanced on top of two ceramic pots and placed at the front of the aquarium. This made three artificial caves for the fish to spawn in, and also gave me an opportunity to photograph them.

Making sure the temperature was 80°F (c27°C), the pH 7.7 (ie alkaline) and the GH (General Hardness) approximately 158°, I then added the fish.

They were conditioned on bloodworm and, after a couple of days, the male built three bubblenests, one in each of the caves. When the female was ready to spawn, she came out from the back of the tank and swam into the right-hand cave.

The male followed her and, after a few false embraces, spawning proper began. Embracing at the lower level of the cave, they floated up to the top near the nest, where they broke off the embrace. The small white eggs sank slowly to the floor, whereupon the male swam down, picked them up in his mouth and placed them into the nest. This whole procedure was repeated several times.

Once the spawning was over, the female disappeared to the back of the tank, leaving the male to look after the nest of eggs. Before I had time to pack away my camera, the male started to move the eggs into the left-hand side cave. I have seen other bubblenesting anabantoids do this, so I am sure that it was not due to the fish being disturbed by my camera.

The male guarded the eggs and improved the nest all night and for the next 30 to 40 hours. Then, he kept the fry in the bubblenest, until they became free-swimming.

At that point, the fry were fed on infusoria and single-celled algae. After that, small quantities of newly hatched brine shrimp were added. When the fry started to show little red bellies, I knew they were ready to take brine shrimp and microworm, so these foods were given in larger quantities, being careful not to over-feed. Before long, they were exact miniature replicas of their parents.

Male Day's Spike-tailed Paradisefish.

AAGB in action

In the Anabantoid Association of Great Britain (AAGB) and the other anabantoid

Spawning under way.

Male guarding the eggs.

My breeding tank set-up.

associations, members acquire a quality strain of fish, with the aim of breeding from them and then passing on the juveniles to fellow enthusiasts to breed. In this way, the resulting fry can be distributed to the associations in Britain and abroad.

This approach provides, both to interested members and beginners, newly described, rare fish, or fish that are hard to get hold of for whatever reason (eg wars in countries of origin, difficult locations to get to, etc). Subsequently, the fish in question can be studied and bred by the more experienced members, or even used to introduce other aquarists into keeping anabantoids.

Provided this is done with all species, and not just the rare, or popular ones of the time, this approach should reduce the need to remove fish from the wild, while, at the same time, providing the hobbyist and science with some of the most beautiful and unusual fish in the world.

By passing on your fry and juveniles, it should also be easy to get back your strain, should you be unfortunate to lose your own fish. I have managed to keep and study several strains of different fish for many years (including a species of anabantoid for over ten years) and still see their offspring at fish shows all over the country; I even find them in shops.

For details of the AAGB contact **Tim Groom, 12 Pinefield Road, Barnby Dun, Doncaster, DN3 1QT.** AAP

DAYI FACTFILE

1. The common name for *Pseudosphromenus dayi*, is Day's Spike-Tailed Paradisefish.
2. The male and the female grow to a size of 6cm — 2.4in ISL — standard length, ie from the snout to the base of the tail fin).
3. The female's dorsal and anal fin extensions are shorter than the male's, and the caudal fin is more rounded.
4. This species comes from the coastal regions of south east India and Vietnam.
5. They are omnivorous, and will eat flake flood, live foods and brine shrimp.
6. There is another species in the genus, *Pseudosphromenus — P. cupanus*. Both species are very similar to each other.
7. Both make good community fish and are somewhat undemanding with regard to water conditions.
8. Both species' eggs are white and are heavier than water.
9. These fish will also spawn at the surface among floating plants, under leaves and in floating tubes.

TRADE "TALK"

Lawrence plc acquires Interpet

Lawrence PLC has just announced the acquisition of **Interpet**, the well-known manufacturer and distributor of aquarium, pond and pet products.

Commenting on the move, Lawrence director Mike Brent, who takes over the reins at Interpet, says "Interpet has a well-earned reputation, both in the UK and in export markets for high-quality products and innovation and this is an important acquisition for us.

"Interpet will continue to operate from the current Dorking premises and for our customers, suppliers and staff, it is very much business as usual. Both **Neville Carrington** and **Maurice Martin** will be working with us for a considerable period of time and I am delighted that we shall be benefitting from their knowledge and expertise.

"With new ranges of products launched at Pet Index in April and many exciting projects in the pipeline, we are looking forward to progressing the future development of the company."

Interpet Division, Lawrence plc, Vincent Lane, Surrey RH4 3YX. Tel: 01306 881033; fax: 01306 885009.

Waterscene's Dupla appointment

Waterscene Enterprises have recently been appointed the exclusive UK representatives for the highly acclaimed range of **Dupla Aquarium Products.**

Dupla have long been associated with providing high quality aquarium hardware, customer service and technical support.

The comprehensive product portfolio offers equipment for coldwater fish and plants, tropical fish and plants and marine fish and invertebrates, sub-divided into a number of sections known as 'systems'.

① **Heating System:** This offers a range of electronic thermostats and substrate heating cables — ideally suited for successful plant growth and development in both tropical freshwater and marine aquariums.

② **Lighting System:** A vast range of mercury vapour and metal halide pendant lamps for fresh and saltwater aquariums of all sizes.

③ **Carbon Dioxide (CO_2) System:** Assures stability within the aquarium via constant pH, stable carbonate hardness and optimum carbon supply — all essential for the successful growth of aquarium plants and optimum water quality.

④ **Fertilisation System:** A series of fertilisers, substrate additives and granules for successful tropical and coldwater plant nutrition.

⑤ **Water Treatment System:** A range of products designed to ensure optimum water conditions — including water conditioners, carbonate hardness builders, activated carbons, float switches, plastic filter media and water pumps.

⑥ **Analysis/Test System:** A comprehensive series of highly accurate digital and manual test kits covering all necessary water parameters.

⑦ **Feeding System:** A modern feed concept using various sizes of food granule for coldwater, tropical and marine fish. Highly recommended for all coldwater fish, including Koi.

Dupla also publish an informative, user-friendly book covering most techniques in order to establish the correct set-up. This is also a reference book.

An approved dealer network is currently being established throughout the UK. For further information contact: **Waterscene Enterprises, Unit 8 Bentley Court, Paterson Road, Finedon Road Industrial Estate, Wellingborough, Northants, NN8 4BQ. Tel: 01933 729956; Fax: 01933 279860.**

JOE MONTGOMERY

A typically spectacular Dupla aquarium photographed on Waterscene's stand at the recent PetIndex.

Cyprio appointments

Peterborough-based pond management specialists **Cyprio** have re-organised their sales and management department to provide an improved response to increased demand and to assist expansion into overseas markets.

Gareth Vaughan, who has a significant pedigree in the retail industry, has been appointed as international sales and marketing manager, while **Ron Goodson** has been promoted to UK sales manager. **Jonathan Bradley** becomes sales representative for the South-East, with **Andy Paxton** being responsible for sales in the South-West. A northern representative is expected to be appointed in the near future, according to the company.

Jonathan Hart has been promoted to **Helpline** manager, and **Richard Goodson** has been appointed as general manager, to oversee increased production and the general running of Cyprio's new offices.

Explained **Malcolm Goodson,** managing director of Cyprio: "There have been some dramatic developments by the company over the last 18 months. We have acquired land in Frognall, near Peterborough and invested in a 30,000-square-foot factory with 3,500 square feet of office space. In addition, we have increased our range of products and are now providing more detailed help to our customers and to the market generally."

Cyprio Ltd., Hards Road, Frognall, Peterborough, PE6 8RR. Tel: 01778 344502; Fax: 01788 348093.

New offices for Aqua-Soil

Aqua-Soil Products has closed its sales office at Bovey Tracey, Devon. All administration, raw material ordering, delivery and invoicing, has been moved to the company's head office at **Wessex House, South Newton, Wiltshire SP2 OQW. Tel: 01722 742500; Fax: 01722 742571. (Contact Karen).**

Sales and product information is available by contacting **Barry or Sylvia, 26 Chapel Street, Buckfastleigh, Devon TQ11 OAB. Tel: 01364 642944; Fax: 01634 644054.**

Shott for Carlo

Former managing director of Sacem, **Carlo Greggorio,** has formed a new company called **Shott srl**, manufacturing pumps, filters, and other equipment for the aquarium and garden market. The company was formed in November of last year and launched its ranges at this year's '**Zoomark** in Milan, Italy, in March.

Information about the company and its products are available by contacting **Mr Carlo Greggorio, Shott srl., 22 Via Palladio, 35010 San Giorgio in Bosco, PD, Italy. Tel: 049 9450860; Fax: 049 9450551.**

WATER'S EDGE

BY DICK MILLS

What every fish wants

Good food and clear water, that's what. Fulfilling both these demands is easy work with two products from **AQUA COMPANY**.

Firstly, good food: AQUAFEAST is a floating food shaped like a ring whose design makes it soften quickly so that it can be eaten and digested immediately; it won't have time to disintegrate and cloud the water. Made from natural ingredients, the balanced diet can be used all year round, even for Koi, and has an extra-special ingredient, **Vetregard**™ which helps fish to fight infection. This high-quality food can be delivered to customers free of charge in 2kg boxes, with resealable bags to keep it in fresh condition. Should you wish to try a 60g sample of this food, there is a way to get it for free.

O'CLEAR, the green water treatment introduced by the company last year, is now available in different sizes to suit various sizes of ponds: The standard size treats ponds of 2,200 gallons, but owners of smaller ponds (up to 1,600 gallons) will find the new smaller packs more convenient. Got a bigger pond? Try the multiple 4-pack for practicable economy and easy and accurate dosage without waste.

Crystal-clear water after treatment

Murky, algae-ridden water before treatment with O'clear.

O'Clear's unique process flocculates algae and sends them to the bottom. Harmless to fish and plants, the treatment can be seen to work within two hours; it also blocks and traps phosphates, stabilises the water chemistry and prevents regrowth of algae for several months.

Now for a couple of bonuses: O'Clear packs are now supplied with a free pH Test Kit as a matter of course; also included is that 60g test sample of Aqua Feast fish food mentioned earlier. So, you can give your fish a double whammy of goodness with door-to-door service with these two beneficial products.

Details from: **AQUA COMPANY LTD., Abbott House, 14a Hale Road, Farnham, Surrey GU9 9QH. Tel: 01252 712307; Fax: 01252 712308.**

Breath of fresh air

Air (oxygen in particular) is vital to the pond, just as much as it is to the indoor aquarium. As well as providing oxygen for the fish and other pond life, beneficial bacteria also need this vital 'lifeline' if they are to do their natural cleaning job properly.

The new, highly-efficient POND-AIR AIRPUMP SYSTEM from **INTERPET** is uprated from the already successful **Aqua-Air pumps** to provide the necessary airflow at water depths of up to (or should that be down to?) approximately 1.5 metres. The PA1 model is equipped with 10 metres of silicone airline (non-kinkable and permanently flexible) and a 50mm airstone ball, while the PA2 has 2x10 metres of airline and two airstones; both are fitted with a power plug.

With one of these airpumps operating in your pond you can sleep easy, especially on warm summer nights when oxygen levels fall due to overnight plant demand and increases in water temperatures.

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

Pondside filter

One is having to look even more closely for signs of filtration equipment around the pond these days, and the latest addition, which augments the more conventional **Aquapur** range, from **OASE** is just as difficult to spot.

The EUROPOND 200 FILTER BASIN has a 200 litre bio-filter ▸

◄capacity and is set neatly in the ground beside the pond. A small pump is required to transfer water into the basin from the pond, where it passes via a settling chamber into a shallow reservoir at the base of the unit; the body of the basin is filled with coarse and fine filtering medium (and or gravel) and planted up with marginal aquatics (remember, when the filter is full of water these, plants will be standing permanently in water).

As the water rises through the unit to overflow back into the pond, bacteria break down waste products in the water and the roots of the marginals abstract nitrates too.

With its water-level location, this almost-bog garden planted area will produce clean pond water without any fuss and the minimum of attention.

Details from: **OASE UK LTD., 3 Telford Gate, West Portway Industrial Estate, Andover, Hants SP10 3SF. Tel: 01264 333225; Fax: 01264 333226. and BAYLER PRESS SERVICES, 136 Castelnau, London SW13 9ET. Tel: 0181 748 7171.**

Cleaner, faster and cheaper water

Contaminated water from disused coal, iron and salt mines presents problems to fishkeepers in areas so affected. While modern filters can remove much of the contamination, the process is slow and, although feasible for indoor aquarium owners, it has been, until recently, hardly a practicable proposition for pondkeepers. Thanks to a revolutionary ion-exchange resin used by **PURITY ON TAP** contaminated water can now be 'cleaned-up' faster (and cheaper) than ever before.

The new HI-MET and HI-MET 20 FILTERS will remove all manner of contaminants including copper, aluminium sulphate, manganese, iron and lead, together with a reduction in zinc levels and all the other anti-aquatic life hindrances, such as chlorine, chloramines, pesticides and herbicides — in short, anything detrimental in the water short of a supermarket trolley.

Flow rates have been doubled to that found in the HILUX range and with the rated life of the systems exceeding 50,000 gallons, it is easy to predict that the units will find favour with owners of large ponds, especially those containing valuable fish as Koi.

The units come fitted with integral flow control tap, 1in or ¾in ports and ½in hosetails and mounting wall bracket. A Kent water meter is available as an optional extra.

Details from **PURITY ON TAP LIMITED, Wickfield Farmhouse, Shefford Woodlands, Newbury, Berkshire RG16 7AL. Tel: 01488 648319; Fax: 01488 648997.**

Waterlife news

New from **WATERLIFE** for the season are two treatments and test kits.

MYXAZIN P is a broad-range bactericide for the successful treatment of Fin Rot, open wounds and bacterial diseases in pondfish. The 'P' suffix indicates that the new product has been specially re-formulated for pond use from its original namesake, Myxazin, the long-established successful aquarium treatment. Both products contain stress-relieving agents in addition to their therapeutic properties.

The Aloe Vera component in POOLSHIELD (a dechlorinator and water conditioner) means that fish are less likely to become infected during scale loss or other skin damage, thanks to the protecting coating given by the product.

All instructions are exceptionally clear (included with every product), but there are now two new TEST KITS to enable you to monitor water conditions on a regular basis. These are for POND pH and POND NITRITE, each containing enough reagents for up to 50 tests, together with recommendations as to what further action, if necessary, should be followed.

All Waterlife products can be recognised by the new stylish packaging (look for the Kohaku Koi and/or Water-Lily designs and colour-coded product names). Calibrated measuring cups make for easy and accurate dosing. The complete 10-product range can be divided into four distinct categories:

1: Disease treatments — Algizin P, Stenazin P and Myxazin P.

2: Water additives — Poolshield, Algizin A and Pondsal.

3: Test Kits — Pond pH and Pond Nitrite.

4: Plant fertiliser — PondFlora.

Details from **WATERLIFE RESEARCH INDUSTRIES LTD., Bath Road, Longford, nr. West Drayton, Middlesex UB7 0ED. Tel: 01753 685696; Fax: 01753 685437.**

'Regular' habits

While habits and routines are often seen as taking the spontaneity out of life, according to **ROLF C. HAGEN**, it is being 'regular' in your aquarium keeping habits that promotes its vitality.

To this end, they have cleverly put the idea in your mind by marketing a triple pack of what every aquarium needs in one box. The box contains CYCLE, the bacterial biological filtration supplement and organic sludge remover, which initiates and maintains good water conditions; FIN CARE, a dechlorinator to use at every regular (there we go again!) partial water change and NUTRAFIN, the daily ammunition of high-quality food to promote a long and healthy life for the fish themselves. It's as easy as 1,2,3! Look for the triple-packed products on your dealer's shelves.

Details from: **ROLF C. HAGEN (UK) LTD., California Drive Whitwood Industrial Estate, Castleford, West Yorkshire WF10 5QH. Tel: 01977 556622; Fax 01977 513465.**

Clearwater tips

The 'algal' season is upon us, but help is at hand in the shape of CLEARWATER from **PET JOY PRODUCTS.**

This new high-quality synthetic absorption resin has been specially developed for aquarium (**A series**) and pond (**P series**) uses. It works by denying algae their natural nutrients, such as nitrate, nitrite and phosphates and keeps levels of these unwanted minerals at safe amounts for up to three months.

Do not look for immediate results, though: for example, beard, thread and brush algae first turn grey and then gradually die off. Its use also results in crystal-clear water (plants then grow better because they receive more light and less debris on their leaves), maintains a stable pH and removes unpleasant odours.

The medium can be used in all types of filter units, on its own simply immersed in the water, or with any other filter medium as required.

A single bag of Clearwater A100 will treat 65 gallons (c 300 litres) of aquarium water for up to three months. Clearwater P500 comes packaged for larger ponds and contains two water-permeable filters each with 2.5 litres of resin, enough for 5,000 litres of water; alternatively, use one 2.5 litre pack on ponds up to 2,500 litres.

Details from **CHEMICAL RESIN PRODUCTS UK LTD., 33 New Road, Richmond, Surrey TW10 7HZ. Tel/Fax: 0181 332 7604.**

Complete O_3 kit

The use of ozone (O_3) as a sterilising agent is well-known, particularly to marine fishkeepers who integrate this gas into protein skimming operations.

The new O_3 ZONATOR from **O_3 SYSTEMS** provides a modestly-priced system which is completely safe to use. The ozone produced is introduced into the airflow from the airpump and fed into the aquarium via an airstone enclosed in a vertical tube through which the aquarium water is drawn.

The action of ozone on the water is beneficial in many ways — reducing ammonia, rendering smells unnoticeable and, of course, killing any bacteria in the waterflow. Additionally, discolouring algae are bleached out.

Details from: **O_3 SYSTEMS, Louis Pearlman Centre, Goulton Street, Hull HU3 4DL. Tel: 01482 224646; Fax: 01482 580404.**

NEW EGGLAYING LIVEBEARER(?)

Is it a livebearer ... or is it an egglayer? Either way, this new species from Sulawesi, as **Derek Lambert** shows, is a pretty special, weird and wonderful fish.

Photographs by the author

Adult male. Note the large dorsal and anal fins.

Ever since listening to a lecture by our editor John Dawes entitled "What is a livebearer?", I have had more than a passing interest in those fish which fall into the contentious category which fertilise their eggs internally like a livebearer, but then go on to lay their eggs. Many scientists consider these fish livebearers, but to most aquarists and many other scientists, they are, obviously, egglayers. For a full discussion of this particular topic I would refer you to *Livebearing Fishes* by John Dawes which deals with this subject in depth.

Apart from these weird contentious fish that are halfway (or more) towards being livebearers, one of my other interests is in the captive maintenance of endangered species of fish. So, when a letter arrived from my friend Dr Angelo Bisazza of the Universitá di Padova, Italy, with the following paragraph in it, you can understand my excitement. I quote:

"I have recently received and I am now breeding an interesting fish, Xenopoecilus sarasoeium, *originally from Sulawesi. Although it is not viviparous, it has internal fertilisation and the female bears the eggs until they hatch (about 20 days) attached to the belly and protected by the large, very dimorphic, ventral fins. According to Heiko Bleher, who collected these fishes, all the other species of the family Adrianichthydae are extinct because of the massive introduction of Tilapia and other fishes in South-east Asia and so this is probably the only remaining example of this unique reproductive adaptation."*

As you can guess, I was hooked, but how to solve the problem of the fish being in Italy and myself in England? In the end, after about 18 months wait, Angelo finally came to England for a conference and he kindly brought me over about eight specimens of this fascinating fish. A pair of these were passed on to Tim Henshaw who runs the aquarium at Bolton Museum. Since he is in a soft water area, I thought it would double our chance of success.

Into the unknown

Apart from the information Angelo had given me in his initial letter, he was unable to provide any additional details, apart from the fact that they ate most foods and were very nervous in the aquarium. His fish had been maintained in large containers with lots of plants and they 'flock bred' in this situation (ie, they spawned in a group), the fry being removed as soon as they were seen at the surface.

I placed my fish in a 2ft (60cm) long aquarium with lots of plants in pots towards the rear. This aquarium, in common with most others in my fish room, is positioned with the side (or end) facing front, giving me a viewing area of only 10×10in (25×25cm). This way I can fit more tanks in the room, but it also means nervous fish like this one can lurk towards the rear among the plants.

No filtration was included in the set-up, but 50% of the water was changed every week and the growing plants helped to maintain the water quality. The water in my set-up is over 425ppm hardness, 240ppm alkalinity and pH 8.0. The temperature was maintained between 72° and 74°F (22-23°C) and lighting was provided

by four fluorescent tubes in the middle of the room.

My *Xenopoecilus* soon settled in and ate bloodworms the first day after arrival. Flake food and a variety of live foods were given several times a day after this.

Although they were very nervous to start with, over a period of several months, the adults became less jumpy and spent more and more time in the open. Now I find most of them are swimming around at the front of the aquarium looking for food, except when a stranger enters the fish room, at which point they dart back into the plants.

Until my specimens arrived I was totally in the dark about what the species looked like. No book, paper or magazine article I had been able to find had a photograph of them. Indeed, I did not even know what size they grew to. I later discovered that they only reach about 3in (7.5cm).

Bizarre attraction

They are also quite attractive, in a bizarre sort of way. The body is long and torpedo-shaped. The mouth is large and upturned with a protruding lower lip, which can easily be damaged on the sides of the aquarium. There is a lovely golden sheen across the flanks, and each scale gleams and reflects the light.

In the female the dorsal and anal fins are smaller, but the pelvics (ventrals) are considerably larger.

One of the more remarkable features of this species is the finnage. In males, the dorsal and anal fins are greatly enlarged and have extensions similar to those found on Rice Fish (*Oryzias* spp). The pelvic fins are small and tend to be held close to the body.

The females, however, have very large pelvic fins which are usually held well clear of the body and look like trailing veils. The dorsal and anal fins are much smaller than in the males and lack the extensions.

Progressive success

Things eventually settled down and, after a few months, one of the females produced a bunch of grape-like eggs which hung from her vent. After about 15 days, I carefully transferred her to a small tank with plenty of plants for the fry to hide in.

The eggs duly disappeared and the female was removed. The fry, if there were any, had probably been eaten by the mother.

Next time a female produced a bunch of eggs, they dropped off after about 10 days, when they had already eyed up. I put these eggs in a shallow container of aquarium water and waited for them to hatch. After several weeks, it was clear they were not going to hatch, even though they had not fungused.

A one-month-old fry.

Then, early this year, I had a female go 15 days with her eggs before I caught her out and put her in a large trap. A few days later, the eggs dropped off and hatched. Interestingly, there were only three fertile eggs, but all the infertile ones still remained with the cluster. However, no fungus was seen on them.

Confusing theory

One theory which I have proved to be inaccurate, is the use of the female's pelvic fins as a method of protecting the eggs. At virtually no time during the eggs' development have I seen these fins hanging down around them. Indeed, they seem to be held tightly against the body at this time.

What I think is happening, is that the females' enlarged pelvic fins are used as a decoy by females not carrying eggs. By trailing these fins below the body, they look *as if* they are carrying eggs and so confuse any predator out for a tasty snack of fish eggs.

Latest news

My females are producing eggs on a regular basis and, as you can see from the photograph, the latest female has a good brood of young developing, with only one infertile egg. These are at the 15-day stage as I write, so they should hatch within the next few days.

The oldest fry I have are over a month old and have reached ½in (1.25cm) in length. They were about ¼in (6mm) long at birth and ate newly hatched brine shrimp straightaway; this is still their favourite food. They will take other live foods and even small flake foods, but they go potty for baby brine shrimp.

I have not mixed my adults with any other fish, but the fry are being reared with Spiketail Platies (*Xiphophorus xiphidium*). So far, I have not observed any sort of aggressive behaviour, either in the adults' aquarium, or in the fry tank. If this continues, then we should have a nice community fish on our hands. AKP

Female carrying a batch of eggs. The developing embryos (fully eyed up) are clearly visible. There's also a single fungused (white) egg.

COLDWATER JOTTINGS

BY STEPHEN J. SMITH

Puzzle over colour change

At last, we are into the 'thick' of the coldwater season proper and, hopefully, beginning to enjoy the fruits of our efforts throughout the past winter and spring months. It is at these times that the real seeds for success are sown, having cleaned the pond and pruned the water plants, repotting where necessary and sorting the best of last year's fry.

I receive many letters throughout the summer with regard to Goldfish changing colour. My favourite was from a Goldfish keeper who had purchased a pretty-looking Ancestral (or Common) Goldfish from her local retailer. The main attraction of this fish, she explained to me, was that it was golden red "with an attractive jet-black stripe running along its back."

Understandably she called her new fish 'Black-back'.

Much to her dismay, however, she noticed that within a few months, the black stripe began to fade, and she therefore contacted me to enquire if her fish was suffering an illness.

I know of many Goldfish keepers who have encountered a similar experience so, if you have the same 'problem', please don't worry. I can assure you that this is a perfectly natural phenomenon, and one which occurs with all 'golden' Goldfish.

When Goldfish are just fry, they assume the olive-brown colour of the original Ancestral Goldfish, *Carassius auratus* (a native of rivers and streams in China). This colour blends in perfectly with their surroundings and, thus, helps to ensure the survival of as many fish as possible. However, an accidental gene caused some of the offspring to display coloration, and it is the development of strains with this accidental colouring which has led to the myriad ornamental varieties of Goldfish which we see today.

So, Goldfish fry (more usually those with metallic scaling) in our own ponds and aquariums will gradually turn from their ancestral olive-brown to the familiar golden-red, or even yellow, or white, depending upon their parentage.

The change starts with the underbelly of the fish, which turns lighter, while the upper regions go darker. Eventually, the fish appears to have the characteristic 'black-back', but even this stripe will fade and only the tips of the fins will retain the black colouring, until finally, the fish becomes single-coloured all over.

STEPHEN SMITH

These young Lemon Goldfish, which I bred, illustrate various stages of the colour-change peculiar to *Carassius auratus*.

Going for Gold

Aquatic supplier **Interpet** has embarked upon its first venture into the Goldfish food market with an aquarium Goldfish food. Called Gold Health Food, the new product is designed to be used and understood by children.

"There are around 2.8 million households in the UK with one or more pet Goldfish, and the majority of the fishkeepers are children", explained Interpet's brand manager **Adrian Exell**. "By providing young fishkeepers with the right sort of products at an early stage, we are helping to encourage them to treat their fish in the best way possible. In the long term, this must be good for the fish, for the Goldfish keeper and for the hobby in general," he concluded.

Gold Health Food is said to be easily digestible and promotes growth, health, colour and vitality, while minimising pollution. In addition, Interpet claims that the food contains a unique stimulant which helps to prevent disease.

Health Food is priced at £1.69 and is the latest product in the range of Interpet Gold products, which includes Fish Safe, Disease Safe and Tap Safe.

Ricefish success

Full marks to **David Page**, of Corby and District AS, for his response to my encouragement of all fishkeepers to have a go with 'alternative' species for the pond.

David, a leading light at Corby, achieved some success with the Golden Medaka (*Oryzias latipes*) in his garden ponds last summer, and was understandably quick to let me know about his triumph.

"These really are tough little fish. They spawned right through to September, when I found some eggs during the removal of blanketweed. These proved viable and duly hatched."

He added that the fish have survived temperatures of minus 10°C, with a layer of ice one and-a-half inches thick on the pond. "The ice was absolutely flat and crystal clear, and the fish could be seen swimming below it. We

DENNIS BARRETT

The Rice Fish or Medaka — an interesting alternative pond choice.

have since had several nights below zero, as well as a fall of over six inches of snow, and the fish are still OK, becoming quite active and showing no signs of damage or infection."

David explained that the Golden Medaka, also known as Japanese Ricefish, or Geisha Girl, is ideal for a temperature range of 20-25°C and is easy to keep in the garden pond or aquarium. "They like a large surface area brightly lit by sunshine, and soft neutral water suits them better — especially if you intend to breed them.

"They are not easy to sex when young, though the males are slightly slimmer and with a pointed dorsal fin, larger anal fin and extensions to individual rays of the fins," David added. "Spawning takes place right through the summer and egg clusters like bunches of grapes will be seen on the females. In the right conditions, hatching will take place in around 14 days and the fry are very tiny. I collect eggs and fry carefully with a spoon and transfer them to hatching and rearing quarters in a separate aquarium in the greenhouse."

Thank you David, for your news, which has certainly provided inspiration for at least one coldwater enthusiast. I do hope many other readers will take up the challenge of this remarkable little fish. And do keep information coming about your success with different coldwater species.

Out & About

YAF's HAPPY 21st

By Pat Lambert

This year's Yorkshire Aquarist Festival (YAF) took place over the first weekend in April in the Exhibition Hall at Doncaster race course. This is an excellent, spacious venue which is readily accessible from all parts of the country.

The organising committee are all aquarists who spend many months planning this event and are well supported by a team of volunteers. As usual, they presented our hobby in a good light.

This year was much like the previous twenty years (yes, YAF is now 21) with the same mix of tableaux, specialist society information stands and traders selling all manner of goods, from cut-price fish foods, to top-of-the-range sophisticated filtration systems.

Thousands of people from all over the UK flocked to this event and most thoroughly enjoyed themselves. Aquarists from as far apart as Cornwall and Scotland had a chance to meet, exchange fish and discuss their latest aquatic escapades.

Bradford won the tableau competition, but for sheer size and ingenuity, **Otley's** tableau deserves a special mention. With its display of pleasing furnished aquaria, however, **Darwen's** tableau had far more aquatic appeal than any other. Yet, there were many rare and unusual fish on show in other tableaux.

It would have been great to have seen some information on these fish made available to visitors via the displays on the tableaux.

In addition, I felt that some fish were shown in tanks that were too small for a three-day event. I think fish should be heavily down-pointed or even disqualified for being exhibited in this way.

Critics of tableaux often take the view that they have outserved their usefulness. (Tableaux in the early days were built so that the fish could enjoy an enclosed, warm environment in the cold and draughty halls of yesteryear). They ignore the fact that families, some of whom are not 'immersed' in aquatic pursuits, need some kind of 'fun' displays and tableaux can provide this.

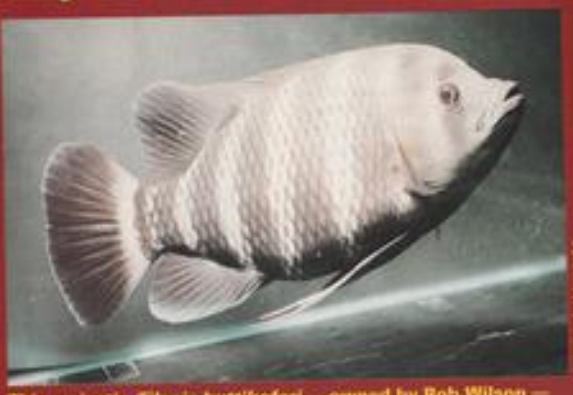
Nearly four hundred fish entries competed for top awards. Best Fish in Show belonged to **Peter Jones** of **CAST 88**, and the Fish of Fishes trophy was won by **Rob Wilson** of **Driffield. Mrs Joan Douglas** gave out the prizes. This was a good touch on YAF's 21st and is symbolic of what this show stands for: a true hobby event, not a slick professional exhibition. (Joan is the wife of **Trevor Douglas**, who has been a senior Yorkshire judge for many years).

On the 'wet fish' stands, there was a very good range of species, including some which we had never seen offered for sale before. Indeed, Derek (my son) — who is not normally given to such things — was so smitten with a rare catfish that he bought it! So, there was certainly something there for the experienced hobbyist.

For the first-time visitor there were also some very interesting lectures and fascinating fish to see, while for those aquarists on a limited budget, there were some good bargains to be had. Indeed, something for everybody.

It was nice to see the **Chester Zoo** display on the Lake Victorian cichlid endangered species project. This was part of the **Aquarian Advisory Service** stand and was manned by a representative from the Zoo the whole weekend. Other fish food manufacturers were also well represented at this event.

This was my 11th YAF and I have always enjoyed the weekend. A couple of club members who attended and helped for the first time this year had a great time. As they struggled to their car with their cut-price tanks and various other acquired items, they commented, "Great! See you next year."



JON MONTGOMERY

This majestic *Tilapia buttikoferi* — owned by Rob Wilson — won the Fish of Fishes trophy.

JON MONTGOMERY

Chester Zoo's/ Aquarian's educational display.

JOHN DAVIES

***ABOVE* — Darwen's tableau contained some superb furnished aquaria.**

***BELOW* — Peter Jones and his Best in Show Rainbowfish.**

JOHN DAVIES

TEST YOUR AQUATIC KNOWLEDGE TODAY

ENTER OUR EXCITING

INTERPET/*AQUARIST & PONDKEEPER* CHALLENGE TROPHY COMPETITION

How good is your aquatic knowledge? Want to find out and earn the chance of winning a very special trophy and additional prize in the process? If so, then here's your chance.

Leading aquatics supplier, **Interpet**, has got together with ***A&P*** to create a major, annual **Challenge Trophy** designed to test the knowledge of today's fishkeepers. To enter, all you have to do is answer the following 10 questions and submit the answers to **Interpet** by **Monday 19 June.**

The winner will receive the fabulous **Interpet/A&P Challenge Display Trophy** which he or she can keep for one year. In addition, the winner will also receive **£250** of **Interpet** products of his or her choice and free travel (either AA standard mileage allowance for a direct journey from home, or train fare for two adults and two children from the nearest BR station) to Dunstable for the **Association of Aquarists European Aquatic Fair** held on the weekend of **1 and 2 July**, where the prize will be presented on **Saturday 1 July.**

The winner will be notified during the week before the show.

The Trophy

The **Interpet/A&P Challenge Trophy** (shown in the accompanying photograph) is a traditional one-pint heavyweight measuring jug-style hand-cast pewter tankard with a solid brass rim. Manufactured by **Englefields**, the only surviving London Pewters, the tankard carries the prestigious **Crown & Rose** trademark granted to **Englefields** in recognition of their excellence in working with pewter.

Now, this authentic tankard, manufactured using traditional methods which go back to 1700, can be yours for a whole year, **engraved with your own name** as the winner of our **Challenge Trophy.**

The Questions

Select the correct answers from the three given:

1 **Q.** What bacterial species found in filters convert **nitrite** to **nitrate?**
A. *Nitrosomonas; Nitrobacter; Nitrogobble.*

2 **Q.** Of what is Specific Gravity (SG) a measure in a marine aquarium?
A. Salt content; Humidity; Weight of a fish.

3 **Q.** *Ichthyophthirius multifiliis* causes which common parasite problem?
A. Flukes; Fish Lice; White Spot.

4 **Q.** Koi are coloured versions of which fish species?
A. *Carassius auratus; Tinca tinca; Cyprinus carpio.*

5 **Q.** Which one of the following prefers soft acid water conditions?
A. *Symphysodon discus; Synodontis multipunctatus; Tropheus moorii.*

6 **Q.** How many litres are there in one Imperial Gallon?
A. 10; 2; 4.5.

7 **Q.** A Silver Dollar is related to which of the following fish?
A. Piranha; Sucking Loach; Neon tetra.

8 **Q.** What is a Geisha Girl?
A. White Cloud Mountain Minnow; Japanese schoolgirl; Golden Medaka.

9 **Q.** What is the modified anal fin found in Guppies and other livebearers called?
A. Andropodium; Gonopodium; Polypodium.

10 **Q.** What is puddled clay used for?
A. Wildlife ponds; Creating models of fish; Sealing cracks in pond liners.

How to enter

Select your correct answers and send them on a postcard or stuck-down envelope to **Elaine Dennett** of **Interpet** (see **Rules**) to reach her by **Monday 19 June** at the very latest.

Your entry must include your **FULL NAME**, plus a daytime telephone number. Please also confirm that you will be able to attend the **A of A** show in Dunstable on **Saturday 1 July.**

Good luck!

The Rules

1. Write your answers to the competition questions on a postcard or stuck-down envelope.
2. Write your FULL name, i.e. including full first name and address, in **BLOCK CAPITALS** on your entry.
3. Send your completed entry to:
Elaine Dennett, INTERPET/A&P CHALLENGE TROPHY COMPETITION, Interpet, Vincent House, Dorking, Surrey, RH4 3YX.
4. Closing date: entries must be received by **19 June 1995**, at the latest.
5. Only **ONE** entry per household will be accepted.
6. Entrants must be over 18 years of age.
7. No correspondence will be entered into regarding the competition.
8. The judges' decision will be final.
9. No responsibility is accepted for entries lost, delayed or damaged in the post, and proof of posting will not be accepted as proof of delivery.
10. The **Challenge Trophy** will be awarded to the first correct entry drawn at the end of the competition.
11. No cash alternative will be given.
12. The winners' name will be announced in the **August 1995** issue of *Aquarist & Pondkeeper.*
13. This competition is open to all residents of the UK, excluding employees and families of ***Aquarist & Pondkeeper, Dog World Ltd., Pet Business World, The Water Gardener,* Interpet and their agencies.**

NEWSDESK

Some of Longford's animals and their admirers.

Aquatics courtyard at Longford

Longford Children's Farm has received planning permission to build an Aquatics Courtyard as the centrepiece of their attractions near Hemel Hempstead, Buckinghamshire.

The courtyard will replace existing redundant chicken units, and will house aquatics, tropical birds and craft workshops, as well as additional attractions to complement the farm.

"The potential for aquatics is unlimited," explained proprietors **Roger Pike** and his wife **Jan,** who added that three units will be built in a courtyard effect and will be leased to suitable applicants.

Animals at Longford Children's Farm are often used in television and film work, and have appeared in productions such as *Frost, Pie in the Sky, Hale and Pace, Don't Forget Your Toothbrush,* and the recent video of singer **Phil Collins** singing *Old MacDonald Had a Farm.*

The farm used to be a commercial egg production centre with 40,000 laying hens until, in 1982, Roger and Jan diversified into a leisure farm specialising in hand-reared animals as a family attraction. The centre now receives around 25,000 paying visitors per annum and, with developments planned throughout the next, 12 months, the couple hope to double that figure.

Longford Children's Farm is situated approximately six miles from the M1 and M25, the A4146 at **St. Margarets, Great Gaddesden, near Hemel Hempstead, Herts. Tel: 01442 843471.**

Poole awards winers

Three young herpetologists, all from Poole, Dorset, have received awards for their conservation efforts from London Zoo's 'Young Herpetologists Club'.

Fourteen-year-old **Ben Limburn** won the 'Young Herpetologists of the Year', while 12-year-old **Paul Morton** and 11-year-old **Matthew Sharpe** received runners-up awards.

Ben Limburn's award follows his campaign to prevent heathland fires in his area, having spent a lot of his time helping to rescue lizards and other animals from the flames, often started by young people who do not appreciate this special habitat and its precious wildlife. Ben highlighted the problem by sending a letter to his local newspaper asking people to take more care. He has also helped on practical conservation, clearing invading pine trees off the heathland.

Ben received a framed certificate and £50-worth of book tokens.

Paul and Matthew had become very concerned when their favourite lizard site had been bulldozed away. Consequently, they rescued viviparous lizards and slow worms and released them onto a reptile nature reserve, for which the pair are now voluntary wardens.

They have also been helping toads across roads on their annual migration, surveying their local heathland for reptiles and spending several hours watching adders and sand lizards. In addition, they rescued newts from an old swimming pool and took part in many practical heathland preservation projects, as well as giving over a dozen lectures to a wide range of adult and young audiences.

Paul and Matthew each received a signed certificate and a discount to the Young Herpetologists Club annual summer reptile camp, and were presented with their awards by **Chris Packham,** from BBC TV's *The Really Wild Show.*

Bristol underwater week

Bristol Zoo Gardens is presenting a third season of special themed weeks between the end of July and the beginning of September, with the highlight for aquarists being an **Underwater Week** (Monday 7 August-Sunday 13 August).

Experts will be available throughout the week to provide information and demonstrations about home aquaria and how they work. Advice will be available to newcomers to the hobby, while specialist societies will be showing how to become involved with captive breeding projects and how some contribute to the conservation of habitats and species.

Emphasis will be on encouraging the public to take an interest in the underwater world, whether through fishkeeping, SCUBA diving, or being involved with conservation projects. Organisations taking part include **Hagen, Marine Conservation Society, Bristol SCUBA Club, Reef Life Centre, Coral Reef Technology, Federation of British Aquatic Societies, Aquatic Conservation Network, International Marine Aquarists Association, National Rivers Authority and Coral Cay Conservation.**

To complement Underwater Week, **Aquarian** is presenting an evening talk as part of their 20th Anniversary presentation tour. The event will be held on Friday 11 August, when the speaker will be either **Dr David Ford,** or **Dr David Sands** of the Aquarian Advisory Service. People attending the lecture will be given a guided tour around the aquarium and tickets for the Aquarian talk, at £2.00, are bookable only in advance by contacting Bristol Zoo.

Other themed weeks at Bristol Zoo Gardens are: **Supersense** (24-30 July), **Conservation** (31 July-6 August), **Eating** (14-20 August), **Communication** (21-27 August) and **Locomotion** (28 August-3 September). All themed week exhibitions are open with no extra charge to everyone visiting Bristol Zoo Gardens.

For further details write to: **'Underwater Week', Bristol Zoo Gardens, Clifton, Bristol, Avon BS8 3HA,** or telephone **Colin Grist, Jane Palmer, or Lorna Beal, 0117 970 6176; Fax: 0117 973 6814.**

Bristol Zoo Aquarium — hosts for a superb aquatic week in August.

New London Zoo aquarium

A new aquarium, including a giant four-metre diameter floor-to-ceiling cylinder holding Paddlefish, and a giant shark exhibit, are just two of the features of major projects unveiled at a reception at London Zoo to launch **London Zoo 2005** recently. In addition to the aquarium complex, the plans include a new walk-through tropical birdhouse and a hi-tech display of 'The World of Invertebrates'.

Among the distinguished guests at the presentation was **Dr David Ford,** senior consultant to 'Aquarian', which has supplied the zoo with flake fish foods for over ten years.

The complex will also house aquariums arranged in a semi-

circle within the existing building and will show a story of water development, starting with a river source, then a delta, swampland and open sea, with appropriate examples of flora and fauna. Also on display will be lake fishes, a touch tank, mountain stream and coral seas, while — behind the scenes — the new aquarium will have breeding tanks operating for rare and endangered species.

Architects for the project are Marden and Knight, and zoo director **Dr Jo Gipps** explained that the theme of the development will be 'The Zoo for Tomorrow' using the latest technology, while the main aim of the zoo will be conservation of species.

Book by card for Hampton

Tickets for this year's **Royal Horticultural Society's Hampton Court Palace Flower Show** (5-9 July) can be booked by credit card by telephoning **0171 344 4444.** The organisers are providing a rail voucher worth £2 for every ticket sold in advance.

The Hampton show is said to be the largest gardening event in the world and, according to the organisers, "combines horticultural excellence with imaginative show gardens and every gardening need available, as well as a superb day out in a spectacular setting."

Admission is £14 for adults (£11 for RHS members, who can book on 0171 344 9966); £8 after 3.00pm (£7 for RHS members); £4 for children aged five to 15; tickets are also available at the gate.

OBITUARY Dr Peter Humphry Greenwood (1927-1995).

The death has occurred of **Dr Peter Humphry Greenwood,** one of the leading cichlid ichthyologists of our times, best known for his work on the haplochromines of Lake Victoria.

Born in Cornwall, he emigrated to South Africa with his parents at the age of 18 months. He initially planned a naval career, but after serving in the South African Navy for the last two years of the second world war, he joined the University of Witwatersrand to study medicine. He instead discovered a preference for zoology, and fate intervened when his professor suggested he read J.R. Norman's *History of Fishes.*

After obtaining his degree he came to London to the British Museum (Natural History) to study for his PhD. Here, he came under the influence of Dr Ethelwynn Trewavas, who introduced him to some of the problems relating to the Lake Victoria cichlids which were to become his main interest for the rest of his career.

In 1950 he travelled to Uganda on a six-month Colonial Office fisheries studentship, but enjoyed the work so much that he abandoned his PhD studies and instead joined the East African Fisheries Research Organisation (EAFRO) as a research officer based at Jinja, Uganda, a post he held until 1958. He then returned to the BM(NH) as Senior Research Fellow, bringing with him the vast collection of "Happies" he had accumulated.

During the next 25 years he published a succession of important papers on the taxonomy of the Lake Victoria cichlid species flock, culminating in his revision of the East African "catch-all" genus *Haplochromis*, which he restricted to a small number of Victorian species. Although this revision has not gained universal acceptance, it has proved an invaluable basis for further studies by other workers, and the value of his research remains undisputed.

During this period, he received a number of awards in recognition of his work, including a DSc, in 1963, for his published work on "Haps". He was president of the Linnean Society 1976-9, and made an Honorary Foreign Member of the American Society of Ichthyologists and Herpetologists in 1972.

Following his retirement from the BM (NH) he returned to South Africa, where he continued his researches at the J.L.B. Smith Institute in Grahamstown. He was nevertheless a regular visitor to "the Museum" whenever he happened to be in London. It was during one such visit to his former haunts that he collapsed and fell into a coma, dying two days later on Friday 3, March 1995, without regaining consciousness. His loss will be felt, not only by his friends and colleagues, but also by anyone with an interest in Lake Victoria cichlids.

Mary Bailey
British Cichlid Association.

KEEPING:

Apples & Cucumbers

Svein Fossá introduces the most popular types, offers tips on their upkeep and issues an important warning.

Photographs by the author

A Sea Apple (*Pseudocolochirus* sp.) eats plankton by 'licking' its ten branched tentacles in turn.

Sea cucumbers — or Holothuroids, to give them their proper scientific name — belong to a class of animals known as echinoderms. The echinoderms also include such familiar marine animals as starfishes, brittlestars and sea urchins. All echinoderms have a striking radial symmetry, with the body being divided in five similar parts arranged around a central axis.

Sea cucumbers are no exception in this respect, but they are distinguished from other echinoderms in having the polar (mouth-to-anus) axis greatly lengthened, which results in the body having an elongated cucumber shape. Sea cucumbers are therefore rather long and narrow animals, with the mouth and anus located at opposite poles. This shape forces the animal to lie on its side, rather than on the oral pole — such as can be seen in most other echinoderms.

Typical features

The body is clearly divided into five sectors, with five longitudinal rows of **podia** or 'sucking feet'. These rows are known scientifically as **ambulacral areas**, while the sectors in-between — devoid of podia — are known as **interambulacral areas**. The side on which the sea cucumber lies, the ventral side or sole, is composed of three ambulacral areas. The dorsal side has two ambulacral areas.

In some sea cucumbers, including some of the most commonly seen aquarium species, it is difficult, or even impossible, to find differences between the dorsal and ventral sides. Yet, in many others, the two surfaces are much differentiated. Some have almost lost the dorsal podia, or they have been reduced to warts or tubercles, while the ventral podia are fully developed suckers.

The mouth of sea cucumbers is surrounded by from 10 to 30 highly retractile tentacles, which are used, either for catching planktonic food particles, or for searching through the seabed for detritus and micro-organisms. In other words, these invertebrates are either suspension or deposit feeders. Different species are thus able to utilise different food sources, and occupy different ecological niches and habitats. Some holothuroids live on the bottom surface, be it soft or solid, while others burrow in sand and mud, or even gnaw their way through calcareous rock.

Incredibly beautiful, planktivorous 'mini-cucumbers', possibly of the species *Thyonidiella oceana*, are occasionally imported from Southeast Asia.

Sea Apples

Undoubtedly, the most commonly seen holothuroids in the aquarium trade are the so-called Sea Apples. These, up to 15-20 cm (6-8in) long animals, are suspension feeding sea cucumbers belonging to the genus *Pseudocolochirus*. There is much confusion regarding the systematics of this genus, and it is difficult to ascertain whether the imported animals are of different species, or if they all belong to a single, highly variable, species.

Common to all the individuals I have seen are very strong colours, mainly red, yellow and blue. From this they could actually fit the descriptions of both *Pseudo-*

Holothuria edulis is a readily identifiable, 35cm (14in) long, species which has become increasingly common in the trade over the last few years.

colochirus axiologus and _P. tricolor_. Sea Apples are to be found in several areas of the Indo-Pacific, but most aquarium specimens are imported from Southeast Asia.

The name Sea Apples descends from the obvious globular shape of the animal in the contracted state. Even when fully expanded, they are still less oblong than most other sea cucumbers, but the relationship is more apparent then. Like other holothuroids, the Sea Apple is also equipped with five rows of podia. These are more or less equally developed all over, are normally clearly visible and have contrasting coloration (such as yellow in a red animal, or red in a blue one).

Surrounding the mouth opening is a crown of ten branched tentacles. These are frequently, but not always, of a contrasting coloration. With the aid of the tentacles, the Sea Apple gathers plankton which is brought by the currents. In turn, the tentacles are put into the mouth, one by one, and 'licked' clean.

When a Sea Apple is introduced to a new aquarium, it immediately seeks out the best spot for catching plankton. Therefore, in order to make it prosper in captivity, regular — preferably daily — feedings of varied live or frozen plankton is necessary.

Artemia (brine shrimp), bosminids and copepods are all good choices. If not, the animal will soon shrink in size, before it eventually dies.

Other species

In addition to the Sea Apples, some smaller species of other planktivorous sea cucumbers are also, more or less regularly, imported. Most of them are very difficult to identify. We can, however, be reasonably certain on the identity of the small (5cm-2in) _Cladolabes accola_. This species, which is pink with yellow rows of podia, is quite a frequent import from Indonesia and Thailand.

More uncertainty applies to the name _Thyonidiella oceana_, which is normally given to a minute (2cm — 0.8in), bright yellow species imported from much the same areas. Anyway, both these species are planktivorous and amazingly hardy in the aquarium, much more so than most of their larger cousins. Frequent feedings of plankton are, however, also a necessity with these.

Several of the deposit-feeding, sand-dwelling sea cucumbers are irregularly imported. Most of them do a very good job in the aquarium, feeding on, and stirring up, detritus, but from most aquarists' point of view, they are not particularly attractive. Some species, such as the very soft and delicate 'Worm Cucumbers', _Synapta_ spp., are very difficult to keep and should actually (in my opinion) not be imported. Besides, some species of _Synapta_ attain lengths of nearly 2 metres (6.6ft) when fully extended, which must be regarded as a little too much for the majority of aquaria!

More hardy, and much better suited aquarium animals, are found, for instance, in the genera _Stichopus_ and _Holothuria_. Most of the aquarium specimens originate from Southeast Asia, but at least some _Holothuria_ spp. are occasionally imported from the Caribbean as well. Both genera contain distinctly cucumber-shaped, medium sized (15 to 35cm — 6 to 14in) animals. Species of _Stichopus_ are typically equipped with large conspicuous warts, while _Holothuria_ spp. normally have a smoother skin with less evident papillae.

It should be noted, however, that members of several other genera, plus a multitude of different species, appear in the trade, so no positive identification can be made without thorough study of the specimen in question and comparison with scientific literature. Among the many similar genera, which are known to have been imported to date, are _Actinopyga, Bohadschia, Eostichopus_ and _Isostichopus_.

Most of these detritus-eating sea cucumbers seem to do reasonably well in captivity, provided they are given a healthy aquarium with a diverse fauna of microscopic detritus-dwelling organisms on which they can feed. Specific feedings are difficult, if not impossible, to undertake. Decorating the tank with live rock should be obligatory in order to introduce the necessary food organisms.

Word of warning

At this point I must issue a warning. Sea cucumbers may cause major poisoning when they die in the aquarium.

All holothuroids produce a toxic substance called Holothurin. This very strong toxin is mainly concentrated in the intestines and may be released if the animal is injured or dying.

Many aquarists have learned this the hard way, and often too late, when every single fish in the tank has suddenly died from acute poisoning. Such situations have frequently occurred as the sea cucumber has ended up by accident in a powerfully stinging sea anemone or coral, has been sucked into the filter and, thus, torn to pieces, or burned itself on an unprotected heater. In addition, there are also reports of poisoning in connection with sea cucumbers spawning.

There is no reason to maintain that a dead sea cucumber _always_ leads to poisoning, though. Personally, I have had experiences with holothuroids dying in aquaria with no resulting damage whatsoever. But even the fact that things **may** go wrong, should be reason enough to think twice before introducing such an animal to an aquarium containing many and valuable fishes. If you do this, then your aquarium keeping may become similar to playing Russian roulette! AEP

There is no doubt how these animals got the common name Sea Apples. When they are fully contracted, they look like something from the Fortnum & Mason department for exotic fruits.

WRITE BACK

BIOPLAST LETTER OF THE MONTH

Plastic UV test

I wonder if any other *A&P* readers have had the problems of not knowing when an apparently working fluorescent tube stops emitting UV and needs replacement if they don't have access to an expensive UV detector.

I've worked out a crude but free method of testing for UV which might interest others. It relies on the way that some clear plastics go slowly opaque under UV.

What to do is:

① Collect a few pieces of different clear plastics for testing (not those designed for aquarium use, as they are the wrong type to discolour).

② Cut a sample from each and put them under a new fluorescent tube (don't mix them up!).

③ Check the samples each day until one has gone completely white, and make a note of how long it took (the one I'm using takes 5 days). Then put away your sample, together with the rest of the piece it came from, and discard the others.

④ In 6-9 months, when you want to check your tube, cut another sample from your original piece of plastic and put it under your tube for the same length of time and at the same distance as your first sample.

Then simply compare the two.

If your new sample is much clearer than the first one, then your tube needs to be replaced. If it's gone just as opaque, then your tube is still good (at least, as far as UV is concerned). If there is more than one fluorescent tube in use, then to avoid other tubes interfering, slide an empty toilet roll tube over the fluorescent tube and put the sample(s) into that.

As I said at the start, this is a very crude measure of UV output, but, if it saves replacing tubes before you need to, it's worth doing.

Brian Cooper,
St Austell, Cornwall.

Thank you, Brian, for what appears to be a painless, easy and efficient way of avoiding unnecessary expense. Your useful tip wins you this month's BioPlast letter award. You will therefore shortly be receiving £30 worth of BioPlast products from our sponsor, BioPlast (UK). Tel: 01535 636230.

Premature alarm

An alarming article appeared in *New Scientist* magazine (7 January) entitled "Is a virus wiping out frogs? The article speculates that ornamental fish may be the cause of declining frog populations in many parts of the world. According to the report, researchers at the University of Queensland have isolated a virus from ornamental fish and *Tilapia*.

This virus is also known to affect a species of Australian Burrowing Frog. The scientists argue that the release of virus-infected aquarium fishes into Australian waters may have been responsible for transmitting the disease to the local frog populations. The virus in question is apparently a type of iridovirus, related to the lymphocystis virus which infects marine and freshwater aquarium fishes.

Judging from the article, it seems far too early to confirm any link between an iridovirus isolated from fish tissues and a disease condition in frogs: virology research demands careful and laborious investigations which may take considerable time to complete.

In any case, it could be that food fish (*e.g. Tilapia*), rather than ornamentals, are the cause of the problem. In the meantime, we must therefore refrain from rushing for the panic buttons, at least until further results become available. I am sure that the ornamental industry will do all it can to assist the University of Queensland with this important line of research.

This article does, however, serve as a sobering reminder that we should never ever release exotic fishes into the wild.

Dr Peter Burgess
Fish Research Unit,
University of Plymouth.

Hedgehogs and ponds

It was good to read the warnings on pond safety in a recent issue. Hedgehogs can swim but, unfortunately, many of them die in garden ponds when they fall in and cannot climb out again.

Although Hedgehogs are good swimmers, they need a rough, sloping surface to enable them to climb to safety. Steep or slippery-sided ponds can be fatal.

If your pond has steep sides and you want to make it safer for animals, you can drape a length of chicken mesh over the edge to act as a ladder. Some people prefer to place some large rocks below the surface of the water so there is a shallow area near the edge of the pond, giving any small creature that falls in a chance to climb to safety.

Many of your readers will know of the existence of the British Hedgehog Preservation Society. Others may be interested in its aims:

① To encourage and give advice to the public about the care of Hedgehogs, particularly when injured, sick, orphaned, treated cruelly or in any danger.

② To encourage the younger

IGGY TAVARES/PENTAX UK LTD

A pair of Blood Red Parrots. The female (smaller fish) is laying eggs while the male waits to fertilise them.

Blood red pointers

While flicking through my collection of *A&P*, I have seen several mentions requesting details of the new, Blood Red Parrot Fish.

I currently own eight Parrot Fish, all of which were bought as brown juveniles. Currently, three are canary yellow and the others are at some intermediate point between yellow and brown. All of my fish are 4-5 inches, and reading what other people have said, they seem to be late developers.

I have noticed that many people regard these fish as charming or peaceful, but I have personally found that they are aggressive and regularly attack other fish as a group (both, other species and individual Parrot Fish). I have also observed that they are often seen flaring gills in head-to-head displays. One particularly nasty characteristic is that they seem to go for the eye of any fish being attacked. Having said all of this, they do readily swim as a shoal, although they tend to prefer the planted areas.

My fish have, presumably, tried breeding, as a large nest was dug in the centre of the tank; much displaying was observed, but no spawn was ever evident. A juvenile male also dug a large nest, although no displaying occurred.

My water is hard and alkaline, but the fish seem to be thriving. Tankmates include: Plec x 1, Tilapia x 1, Convict Cichlid x 2, 8-inch Sucking Loach x 2, Rainbowfish x 3 and Rift Lake Cichlids x 4. This is a rather odd collection, I admit, but all specimens can either protect themselves, or are fast enough to escape.

My one concern with my specimens is that it appears to be thought that the Severum is its ancestor, but Severums always appear to be peaceful and try to keep out of trouble, more or less; the opposite is true of my Parrot Fish.

Ross Anders,
Bristol

Please see the article entitled **Man-made Parrots** *by Dr Iggy Tavares in last month's issue of A&P, Ed.*

generation to value and respect our natural wildlife and, by supplying information and giving lectures, to foster their interest in Hedgehogs.

3. To fund serious research into the behavioural habits of Hedgehogs and to ascertain the best methods of assisting their survival.

Anyone who wishes to learn more about the society, its activities and the wide range of Hedgehog goods which are sold should send a stamped addressed envelope to **British Hedgehog Preservation Society, Knowbury House, Knowbury, Shropshire SY8 3LQ.**

A H Coles, B.H.P.S.

Stickleback female sought

Recently, while in one of my local pet shops buying *Daphnia*, I spotted a *Pungitius* (Ten-spined Stickleback) in one of the bags.

It was brought home and now has a small well aerated aquarium all to himself. In this lies the problem — where to find a mate for him, as he has started building a tunnel nest and has blackened up beautifully; sadly, to no avail as there is no female.

I am hoping that an *A&P* reader will be able to help me acquire another two or three specimens to be relatively sure of acquiring a female.

Heather McCormack, Glenrothes Fife.

If any of our readers can help Heather out, drop us a line and we'll be pleased to pass on her full address. **Ed.**

New Show for Tyne Tees

We ere most interested to read John Dawes' article in the March edition of *Aquarist and Pondkeeper*, **The Show Must Go On.**

Here, in the Tyne Tees Area of the FBAS, we have decided to organise a one-day aquatic festival to be held at the Park Hotel, Tynemouth on Sunday, 27 August 1995. This is a luxurious and comfortable hotel, situated next to the Tynemouth Sea Life Centre. The festival committee is not attempting to produce a mirror image of other large festivals. We have neither the experience nor the resources to fund such an event.

We were already planning to incorporate many of the ideas which appeared in John Dawes' article, hoping to present a compact, homely, but above all, fun-filled day with fesitval visitors and exhibitors able to participate in competitions and demonstrations.

Yes — there will be a traditional open fish show — definitely **not** tableaux.

Yes — there will be trade stands. The festival is sponsored by Hagen, but the emphasis will be on small local traders and displays by specialist groups and member societies of the T.T.A.A. Local Junior Schools are also being invited to visit the festival and enter art work.

The committee would welcome any requests from specialist groups or traders who wish to take advantage of free promotional space. But, most of all, we want exhibitors and interested public to join together in enjoying this new concept of an aquatic festival.

Jane Bell, Tyne Tees Area Secretary, 116 Leafield Road, Darlington, Co. Durham DL1 5DE

High carbonate hardness and invertebrates (this is a Bun Starfish) don't mix.

TREVOR MACDONALD

High KH problems

I noticed in the February issue of *Aquarist & Pondkeeper* that Philip Hunt recommended a carbonate hardness level for both the marine fish-only and reef aquarium of 15-20° dKH. This is, of course, well beyond that of natural seawater, which is 7°dKH.

Myself and several friends are all very experienced marine fishkeepers, with tanks of 100-300 gallons. We have all tried boosting our KH levels into the areas that Philip states, with very poor results. Fish do not seem to mind, but corals look distinctly unhappy! On returning the KH to NSW (Natural Seawater) levels the corals have recovered to their former glory. We therefore have several questions to put forward:

1. Has Philip ever tried boosting the levels of KH in his tanks to these exceptionally high levels, or is he merely reporting from Martin Moe?
2. If he has tried it, how did he achieve it and what results did he get?
3. What mileage is there in boosting KH levels in a fish-only tank from that of NSW?
4. Does Philip not agree with Nick Dakin and other British authorities that a KH of NSW (i.e. 7°) is perfectly acceptable and that some of the best show tanks in the UK are actually to be found at these levels? (We have first-hand proof ourselves of this!)

I hope Philip will take time to answer these points fully; we appreciate his time in doing so.

Rick Allen, London.

Philip Hunt comments

Following the publication of my article **Quality Assurance,** I have received a number of letters indicating that the carbonate hardness level recommended for reef tanks (15-20°dKH) was, in fact, too high, although this level is recommended by various authors in both the USA and Europe.

By experimenting, I was able to determine that increasing the carbonate hardness of seawater to such levels can, indeed, cause the calcium concentration to fall to unacceptably low levels, which would not be tolerated for long periods by many invertebrates. I would therefore recommend, despite the advice given in some textbooks, that the carbonate hardness is maintained around 7-8°dKH in reef tanks, close to the natural level.

The higher levels quoted for marine fish-only tanks, however, are acceptable, as fish will not be harmed by relatively low calcium concentrations, and the higher stocking densities of most fish-only systems require an increased buffering capacity to help to maintain the correct pH.

For all marine systems, as mentioned in the article, it is generally more useful to measure alkalinity, rather than carbonate hardness, as this gives a more accurate picture of buffering capacity.

FASCINATING FISH FACTS

Seeing red

What do you think of Guppies? Common, stupid, pretty boring, perhaps? No, of course not!

How about their mating techniques? Will a female mate with any male, as long as he keeps up the chase? It may surprise you to learn that females actually show a preference for males of one particular colour. Experiments show that given a choice, and with everything else being equal, a female Guppy will choose the male that sports the largest, brightest, reddest markings.

In their natural environment, the pigment necessary to produce red markings comes from carotenoids (yes, these make carrots red, too) which are scarce. Only fit, healthy males are able to find enough carotenoids to affect their appearance. So, by picking a red mate, the female 'knows' he is in good condition, and her chances of producing strong offspring are improved.

Pretty smart for a fish, isn't it?

DAVID TIDEY

Red: the colour to be... if you are a Guppy male.

Linda Lewis

SOCIETY WORLD

BAF News

Aquatic federations, societies and organisations, are invited to participate in this year's **British Aquarists Festival (BAF)**, to be held at Bowlers' Exhibition Centre, Manchester (**28-29 October**), and organised by the **Federation of Northern Aquarium Societies (FNAS)** in conjunction with *A&P*.

The theme of this year's festival is 'Conservation' and a number of lecturers are expected to speak on the subject in relation to the fishkeeping hobby, while an exhibition of fish bred under FNAS breeders' schemes will incorporate explanations by members about how the species were bred, their water conditions, habitat and other factors.

More entries than ever are expected at this year's **Champion of Champions** stand, while other attractions include a children's entertainment area providing cartoons, painting and drawing, plus other fun activities, as well as a bar and refreshment area and free car parking.

Admission is £2.50 for adults (concessions £1.25, free for children under six accompanied by an adult).

For information, contact: **Arnold Chadwick, Festival Organiser, BAF '95, 9 Bronville Close, Chadderton, Oldham OL1 2RH. Tel: 0161 652 6207.**

Convention success

A series of lectures and a "100-lot" auction were some of the highlights of the third convention organised jointly between the **Association of Aquarists (AofA)** and the **Federation of Northern Aquarium Societies (FNAS)**.

Brian Walsh, Dr Anthony Gill, from the Natural History Museum, and **Derek Lambert**, covered a spectrum of fishkeeping topics, while the Ray Cooke Trophy for the category "My Best Fish" was won by **Helen Aylmer** of Milton Keynes for her Red-Bellied Dace. The organisers added that three of the first four placings were taken by coldwater fish.

The organisers convey their thanks to '**Aquarian**' for their donations, which contributed to a successful event.

Over thirty people attended a caravanning weekend held by the AofA at Sandy Bay Caravan Park. The AofA are hoping to make the event a full week next year.

For information, contact **Mrs Judith Aylmer, Secretary, Association of Aquarists, 5 Napoleon Drive, Basingstoke, Hants, RG23 8DW. Tel: 01256 653793.**

Mills on Tees

Lectures from fishkeeping author and *A&P* contributor **Dick Mills** are just some of the highlights of an aquatic festival organised by **Tyne Tees Area Association** in conjunction with the **Federation of British Aquarist Societies (FBAS)** and sponsored by pet products manufacturer **Hagen**.

Tyne Tees Aquatic Festival will take place on **Sunday 27 August** at The Park Hotel, Tynemouth, and will include an area open show, including an inter-area contest, trade and hobby stands and demonstrations and competitions throughout the day.

Admission is just £1 (concessions: 50p) and further details, including trade space and local accommodation, are available by contacting **TTAA Event Management Group — Telephone 0191 2533452 (Colin Tweddle) or 01325 466630 (Jane Bell).**

Sands Catfish President

Thames Valley Catfish Group (TV Cats) celebrated its 20th anniversary with a talk by **Dr David Sands** of '**Aquarian**' — and made him President of the group.

David's talk was attended by around 100 members, and covered aspects of the aquarium environment for catfish, including filtration and the adjustment of water depth in the aquarium.

The next meeting of TV Cats will be held on **25 June** at Amersham Community Centre (2.00pm.)

For details, contact **Steve Halliwell, 14 Constables Croft, Arncott, Oxon OX6 0PG.**

N.E. BCA group

Cichlid enthusiasts in the north east of England are urged to contact **Chris Marshall**, who is setting up a North-East Area Group of the **British Cichlid Association (BCA).**

An informal meeting is expected to be arranged in the near future and anyone interested in joining the group should contact **Chris Marshall** by telephoning **01429 860579.**

New Avon herp club

Two students at Bristol University have launched a society devoted specifically to reptile enthusiasts. Called **The Herpetological Passtimes Club,** the organisation has been formed by **Richard Perry** with the assistance of his colleague **Andrew O'Connor.**

Membership is free for the first six months, during which time members will receive a newsletter every two months, a special membership number which entitles them to enter free competitions and obtain discounts at participating stores, a chance to send in their own articles, plus other opportunities.

Further details are available by writing (including a stamped self-addressed envelope) to **Andrew O'Connor c/o 27 Copse Road, Clevedon, Avon BS21 7QN.**

DIARY DATES

JUNE

Sunday 4
Derby and District AS — Annual Open Show. Sinfin Community Enterprise Centre, Sheridan Street, Sinfin, Derby. Details: **Richard Frey,** 615 Burton Road, Littleover, Derby DE23 6EJ. Tel: 01332 760193.

Tuesday 6
Gloucestershire AS — First anniversary meeting, 8pm, Bell and Gavel, by the Cattle Market, St Oswald's Road, Gloucester, celebrated with a quiz, club table show and party. Details: **Andy Ramsbotham.** Tel: 01452 521609.

Sunday 11
Redcar Fishkeepers Society — *21st Annual Open Show of Tropical and Coldwater Fish*, West Redcar School, Kirkleatham Lane, Redcar. Details: **J. Duffill.** Tel: 01642 476836.

Saturday 17
South Park Aquatic [illegible] Society (SPASS) — [illegible] Community Centre [illegible] George's Road [illegible] ing from [illegible] **Ken Seaton**, [illegible] Road, Sutton, Surrey [illegible] 0181 641 [illegible].

Sunday 25
Association of Midland Goldfish Keepers — Open Show. Foleshill Community Centre, Foleshill Road, Coventry (10.30am). Details: **Mrs Anne Bloor**, 10 Barnett Crescent, Woodford Halse, Daventry, Northants NN11 3SP. Tel: 01327 61198.
Portsmouth AS — Annual Inter-club Show. Portsmouth Community Centre, Malins Road, Portsmouth. Details: **Mr J. Sykes**, 31 Queens [illegible], Portsmouth. Tel: [illegible].
St Helens AS — 22nd Annual Open Show. Jubilee Social Club, [illegible] Lane, Astley, Liverpool. [illegible] 12.45pm. Auction: [illegible]. Details: **Mrs H. Steadman** [illegible] Tel: 0151 426 4213.
Workington & District AS — [illegible] Auction, The Cumberland Hotel, Bank [illegible] St, Working[illegible]. Benching: 11am-1pm. Details: **Bernard O'Neill** (Show Secretary), [illegible].

JULY

Sunday 2
Scarborough and District AS — [illegible] Annual Open Show, [illegible] Primary School, Scarborough. Benching: 11.30am-1.30pm. Auction: 1pm prompt. Details: **G. Hawksby.** Tel: 01723 862205.

Sunday 23
OASIS — Auction, Thompson Park Community Centre, Monkwearmouth, Sunderland. Details: **Mrs A.M. Banks,** 122 Moor Crescent, Gilesgate Moor, Durham DH1 1DL. Tel: 0191 3841433.

Sunday 30
Association of Midland Goldfish Keepers — *Meeting and pretty fish show (members only)*. Foleshill Community Centre, Foleshill Road, Coventry (2pm). Details: **Mrs Anne Bloor,** 10 Barnett Crescent, Woodford Halse, Daventry, Northants NN11 3SP. Tel: 01327 61198.
Sandgrounders Aquatic Society — *25th Annual Open Show*. Meols Cop School, Meols Cop Road, Southport. Details: **R. Clift,** Secretary, 13 Lancaster Drive, Banks, Southport, Lancashire PR9 8AS.

DISCUSSIONS

BY STEVE DUDLEY

Spotting colour-fed Discus

At the age of 10 weeks all Discus begin to show some kind of coloration. The first to show any at all, are those with blue characteristics (this is always the first colour to be noticed in most varieties).

Discus that will eventually exhibit red pigment generally do not show this colour until they reach the age of six months, especially when not given any colour enhancers, eg shrimp-based food or Tetra Bits (Prima).

When you purchase Discus, always check the colour of the droppings. If the fish has been fed colour enhancers, their faeces will be red (it should normally be dark brown to black).

Another way to spot a colour-fed fish is to observe the colour of the pectoral (chest) fins and caudal (tail) fin, especially at the base. Usually, in shrimp-fed fish, these areas show a deep orange to red colour which later fades when the fish has ceased to eat colour foods. This, in turn, allows the original colour to return.

M.P.& C. PEDDER

The absence of any deep orange or red coloration at the base of the pectoral fin in this Discus is a clear indication that it has not been colour fed.

Common eye problems

1 Discus are prone to having a good 'flick' now and again, sometimes causing them to catch their eye on the object which they are scraping against. Under these circumstances, no intervention is needed, as the damage will heal on its own.

2 Another problem situation is when one or both eyes become slightly clouded. This can be caused by an increase in ammonia or a drop in the pH value to below pH 5 (acidic).

In either case, a water change of at least 30% must be carried out to bring the pH back to a reasonable level. No medication is needed, as the damage will regenerate on its own, seven days being the norm.

If, however, generation of eye tissue has not taken place after seven days, use Tetra Fungi Stop which will arrest any further infection.

Water changes will help reduce the bacterial count in the aquarium, stabilise the pH and dilute ammonia, nitrite and nitrates.

3 Pop-eye (Exophthalmia) is a name given to a condition when a fish's eye protrudes from its head. This condition may be caused by a bacterial or viral infection of internal organs.

Dropsy is also associated with Pop-eye, due to the over-abundance of fluid held within the fish. This can be caused by a failure of an organ.

Treatment depends on which organ has become infected or inactive. Successful treatment of these disorders is not often possible, as correct diagnosis (which can be difficult) is essential. It would therefore be best to consult a fish vet, some of whom advertise in *A&P*.

Many infections are caused by bacteria which are normally found in aquaria, others occur in stressed or weakened fish, or are the result of poor water quality or other inappropriate conditions.

Prevention is better than cure

Discus are considered to be difficult. This may, indeed, be so at the beginning, but after a few months of experience and some guidance from books, plus specialist advice from breeders, you may well wonder what all the fuss was about.

In order to understand why some difficulties are encountered, here are a few points to bear in mind.

Problems do arise from time to time in Discus aquaria, but most of these are inadvertently caused by the aquarist. With the exception of air-borne bacteria and algal spores, the only way anything else that can enter the aquarium is through introduction by the keeper.

Transferral of organisms causing disease, such as copepods, parasites, worm infestations etc, are all effected by the aquarist. It is therefore essential to stop and consider how to prevent any problems from entering the aquarium.

Most aquarists are very keen at the beginning as, at this time, they are probably most concerned and aware of the need to avoid any contamination. Trouble, therefore, usually arises after many months of problem-free keeping, due to the much more relaxed approach that tends to develop.

There are two main sources of these problems, the first being diseases and parasites; the second, un-natural toxins in the water. Both can be controlled by quarantine and water purification.

Causes of contamination

1 New additions of water containing harmful toxins, eg: heavy metal pollutants and some organic materials used by the local water authority.

2 Use of an active biological filter to seed a new filter and aquarium.

3 Introduction of new fish without previously quarantining them, even though they may have been under quarantine before purchase.

4 Transferring of fish from tank to tank.

5 Feeding of live foods; always make sure of the source and rinse the food well before use.

6 Aquariums that are individually set up, and are closely situated to each other, often have the potential to infect one another through splashes and sprays of water. Take care, therefore, that tanks are well isolated by using splash trays and covers.

Ghost Discus are among several of the newer varieties featured in *Discus Farms in Asia*.

JOHN DAVIES

Video review

I was quite impressed with the editing and quality of *Discus Farms in Asia*. This is a professionally put together film, with excerpts from top breeding facilities in Hong Kong, Bangkok and Penang. It provides an exciting peek at what normally goes on behind closed doors, enabling you to enjoy some fine specimens of Discus from the comfort of your armchair.

The film visits some well known breeders, and some not-so-well-known ones. It runs for 58mins and the contents are excellent... with only a couple of exceptions. The varieties of Discus included are Alenquer, Ica, Red Turquoise, Turquoise, Cobalts, Pigeon Blood, Ghost and Golden Rainbow.

At the time of filming, the last three were almost unknown in the western world. Subsequently, all three have proved to be at the heart of the success now enjoyed by Asian breeders.

The first port of call in the film is Worldwide Fish Farms in Hong Kong, with over 200 breeding pairs constantly in action. It then moves on to a smaller showroom where Victor Rocher shows some fine specimens — absolutely breathtaking.

After 25 minutes viewing in Hong Kong, the film travels to Penang, where over 90 breeders provide Discus for sale. Mr. Teok Beng Chye is one of the largest breeders in Penang and is

included in the film. Then, it's on to Ronnie Chew, who breeds the Golden Rainbow, a new colour variation.

After a further 15 minutes, the film moves on to Bangkok, visiting Mr Somsar Cheua Puttisakul who owns some superb stock. He produces over 15,000 Discus of high quality per year. Then, we go on to the producer of the Pigeon Blood Red, Mr Kitty Phanaitthi, where we see a lot of magnificent Discus.

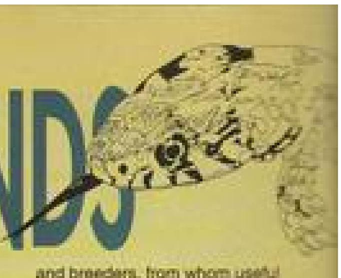
This video provides good entertainment and 'education' for those who are interested in what is being achieved in Asia. I only have one minor criticism, and that is the lack of information presented regarding how certain variations were produced. But, I suppose, all breeders still have to retain some secrets!

Discus Farms in Asia is one of several films in the series **The World of Aquariums**. It is available at £24 (postal charges included) from: **Aquarama — Video, 24, Rue de Verdun, F-67000 Strasbourg, France. Tel: +33 88 61 96 08; Fax: +33 88 41 10 74.**

Golden rules

1. If you have a canister filter operating on your breeding tank, fry may well be sucked up the intake when they become free-swimming. Try to fit a sponge filter over the intake to prevent this happening.
2. Do not leave running airstone in full light 24 hrs a day, as they will soon become exhausted.
3. When using Reverse Osmosis water, use it as soon as possible if you don't possess a pressurised storage vessel. Pure RO water just left to stand for days is an ideal habitat for bacteria to populate, as all organic material that would otherwise inhibit their growth has been filtered out. This can pose a danger both to fish, and to yourself.
4. Always use separate nets and hoses for each of your tanks. This simple measure will help prevent transferring problems from one tank to another.
5. Airstones are a must in heavily populated tanks, especially growing-on ones for young Discus, as the biological need for oxygen in them servicing such tanks is always high and displacement of carbon dioxide is essential.

FROGS AND FRIENDS



By BOB and VAL DAVIES

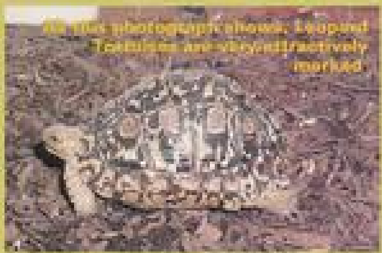
Passed-up Leopard Tortoises

Although, today, a great deal of emphasis is placed on captive-bred species, we are always interested to hear what various reptile outlets have on offer in wild-caught/farmed imports.

In January we were almost tempted to buy some imported Leopard Tortoises (*Geochelone pardalis*) but having considered the pros and cons, reluctantly turned down the offer, mainly on the grounds of their eventual size and the space they would need with regard to housing.

The possible maximum length is given as 28 inches (70cm) and they are proportionately heavy, with matching appetites. Adults would need a large well-heated, dry vivarium but could be allowed outside in a good summer. A cool, damp summer would cause problems.

If kept outside, a very strong fence is necessary, as they have been known to use their weight to push through fencing. Like most tortoises, Leopards could probably dig their way out underneath a barrier, unless it is sunk deep into the ground.



As this photograph shows, Leopard Tortoises are very attractively marked.

BOB & VAL DAVIES

There are two subspecies of Leopard Tortoise, their range being Central South Africa. The common (and scientific name) is based on the variable spots or patches which decorate the carapace.

The specimens we saw were easy to sex by the length of the tail and distance of the cloaca from the body, so it would not have been difficult to obtain a pair. However, this would have required even more space and since we do not like keeping a solitary specimen, which is in effect 'biologically dead' i.e. not reproducing its kind, this was another determining factor in passing them up.

Herptile Fairs

The popularity of keeping reptiles and amphibians has been growing steadily over the last few years which, in turn, has led to an increase in the number of herpetological societies, some of which have started to hold regular reptile shows, fairs, exhibitions etc.

These vary from small, local affairs to much larger ones held in sports halls. They usually consist of a mixture of trade stalls, private breeders and information displays. Such shows present an opportunity to see a wide range of herptiles and equipment, as well as the chance to talk to keepers and breeders, from whom useful advice can be obtained.

A few societies already keep us informed and, if we know well in advance, we will give dates and venues in this column. We are regular visitors to some of these shows, but cannot attend them all because of the time and distance involved. Reports, opinions etc., on any of these events would therefore be welcome.

The following societies have sent us details of their upcoming shows:

Saturday 3 June 1995 — Milton Keynes Herpetological Society: Annual Exhibition and Trade Day, Lord Grey School, Rickley Lane, Bletchley, Milton Keynes.

5 & 6 August 1995 — British Herpetological Society (North West Group): Reptile Rally — exhibition of native and exotic species, plus some handling of specimens. Wildfowl and Wetlands Centre, Martin Mere, Burscough, Lancashire.

CITES update

The European Union has accepted the recent CITES recommendations (reported in **Frogs & Friends** last month) and has also introduced its own import ban on the following Day Geckos from Madagascar — *Phelsuma antanosy*, *P. minuthi* and *P. pusilla*.

In addition, the export quota of Royal (Ball) Pythons (*Python regius*) from Ghana remains the same for 1995 as last year i.e. 7,000 wild specimens and 10,000 captive-bred specimens.

CONSERVATION CORNER — Grass Snake sites

Our native Grass Snakes are under threat from loss of egglaying sites caused by various changes in their natural habitat in recent years. The eggs are usually laid in heaps of rotting plant material, manure heaps, fallen leaves, compost heaps, seaweed on sand dunes etc. which must be near water (damp meadows, river banks, ponds, ditches).

Although the snake will travel several hundred metres to lay, if necessary, this is not ideal. Egglaying heaps can be constructed in known Grass Snake habitats to assist in their conservation.

Location — preferably away from farm buildings, roads and other sources of disturbance. The site must be in a relatively sunny position and must have sufficient shelter for the snake to reach it safely.

Timing — the heap must be in place well before June when egglaying begins. Eggs are usually laid between June and September and the heap may well be used as a hibernation site in winter.

Construction — the heap must have good aeration and yet be humid. Heat to incubate the eggs (23 to 28° C — 73 to 82°F) is generated by the action of bacteria and fungi on the material.

Coarse material, branches or logs should be criss-crossed at the base to provide adequate ventilation, the rest of the heap consisting of small twigs and prunings mixed with less rigid material.

This creates gaps for the snakes to crawl in and also permits aeration. The heap is then covered with a layer of dry material (long grass, dead leaves etc.). It will need to be replenished or rebuilt after two years. New heaps need to be near to the original one.

Size — large heaps provide space for more snakes and produce more constant warmth. Minimum size: 1.6m long by 1.2m wide, 1m high (after initial settling). There is no maximum size — the bigger the better.

Info wanted

The Conservation Committee of the British Herpetological Society are asking for reports of Grass Snake laying sites. It also issues a leaflet giving more detailed instructions on making heaps. Anyone knowing of such sites please send details to:-

Jan Clemons (Conservation Committee), British Herpetological Society, c/o Zoological Society of London, Regent's Park, London. NW1 4RY.

BOB & VAL DAVIES

Details of egglaying sites for the Grass Snake are being sought.

B.C.G. needs volunteers

The **British Chelonia Group** (mentioned in **Frogs & Friends** last month) is asking for volunteers, especially people with a biological background, who have some time to spare to help in activities such as writing, editing, chairing meetings and co-ordinating conservation projects.

If you are interested contact:
Dr. June Chatfield,
Anglefield,
44 Ashdell Road,
Alton,
Hampshire. GU34 2TA.

HERP FACT
Snakes' teeth

Practically all snakes feed on live prey and their dentition has evovled in different ways that allow them to tackle their food. Many species possess recurved (backward-pointing) teeth that assist the retention of live animals. Older teeth are shed regularly and replaced. Four main types of dentition are distinguished:

1 Aglyphic. Solid teeth which are not used to introduce venom. Most non-venomous snakes have teeth of equal size, although occasionally, some may be slightly larger than others.

2 Opisthoglyphic (rear-fanged). These species have two or more venom fangs at the rar of the jaw bone which are enlarged and carry a groove along which the venom flows into the prey. The venom strength of such snakes varies in potency according to species.

3 Proteroglyphic (fixed fangs). Here, the two venom fangs are fixed at the front of the mouth. The groove has been enclosed, the join being visible on the anterior surface of the tooth. The venom is introduced via an aperture near the point of the fang. This is a more efficient method than the former. Certain species e.g. the Spitting Cobra, can actually spray venom some considerable distance (6 to 10 feet) through the aperture, which is forward-facing.

4 Solenoglyphic. These species possess the most efficient and advanced venom delivery. The fangs are hollow, and are normally folded back, but can quickly be moved into postion when striking. In most solenoglyphic species, the mouth is usually opened wide so that the fangs face forward and stab, rather than bite, the victim, the mouth closing after contact. The action is similar to that of a hypodermic syringe. Usually, sufficient venom is delivered to kill or, at least, paralyse the prey.

Rear-fanged and fixed-fanged species tend to seize and hold the prey, allowing the venom to enter the wounds caused by the fangs. Certain Elapids (cobras), most Vipernds (vipers or adders) and Crotalids (pit vipers) release the prey after biting, and it may then cover a considerable distance before becoming immobilised; the snake then follows its scent. Snake venom is modified saliva which actually starts the digestive process from the inside of the victim.

having a couple of fish tanks included in the overall construction. They are not usually something which anyone would choose to have as a feature in their house, indeed some are as big as a house!

A lot of time and effort is obviously devoted to the design and construction of the tableaux, but it is often let down by the lack of information provided for the viewer. I believe that every tableaux should have to conform to certain stipulated standards, such as having a permanent representative on hand to answer questions, a specific theme for everybody and a finite limit on cash and materials used and space available.

The ideal show?

Given the number of differing audience needs can there every be the ideal show for every aquarist?

Currently, a number of shows go a long way towards the 'ideal' format, but there will always be someone who wants something different, unless a really huge show is created. Even then, does a major international event like the Motor Show meet the needs of every visitor? Probably not!

The answer is for shows to appeal to either the widest possible audience, or else a small number of specialists. There is nothing wrong with having a specific type or 'breed' show, but if so, do not expect the numbers attending to be as great at for some other types of show and plan accordingly. The fewer people attracted, the fewer people there are to share the costs.

Having said this, there are some fundamental rules which should be adhered to by exhibitions, whichever type of visitor is targeted.

Firstly, it is vital to provide information. If a visitor turns up and is faced by a mass of tanks or equipment without any information regarding the exhibits, he or she will rapidly become disenchanted, and probably leave.

There is nothing more frustrating than looking at something new or different without being able to identify what you are looking at. The information does not always have to be written down — it can be spoken by an attendant, or given in a lecture, for example — but it does have to be there... and be accessible.

I am certainly not suggesting that a beautiful marine tank full of corals should be covered in labels, but someone knowledgeable must be on hand to answer the questions.

Simply put, providing information should not be simply a case of standing around waiting to be asked. "What's that funny blue fish over there?"

Displays & education

The second fundamental rule concerns displays.

There is probably little benefit in setting up only several highly decorative marine tanks if you are trying to encourage visitors with a wide range of interests and limited fishkeeping experience. They may be deterred by the perceived cost of setting up such an aquarium, the complexities of keeping the water quality correct and the ramification of incorporating wave machines and the like.

It is probably best to have a wide range of set-ups, varying from a simple Goldfish bowl to a full-blown Discus or marine tank. Most children have, at some stage or another, seen Goldfish in a bowl. Why not explain the benefits of having a larger tank, with filtration, plants and so on, compared with just a solitary Goldfish and (if it is lucky) a day-glo ornament which it can swim around?

In addition, having once sought knowledge, it is highly likely that an individual will continue to seek knowledge, which is where the clubs and societies come into their own. This also illustrates the ever-expandable nature of the hobby.

The educational value of fishkeeping is vital and something that should be further developed.

Well run shows provide something for all members of the family.

A major or unusual feature is always useful as a crowd puller at exhibitions, particularly for school parties, who are often carrying out environmental studies into endangered species and the like.

Teachers are invariably looking for educational trips that combine information-gathering tasks with science project work. The specialist societies have a tremendous role to play here, but unfortunately, often do not have the resources necessary to put on an appropriate display.

Commerce & families

It is a fact that without support from manufacturers and retailers, a lot of shows would not survive. However, there is a popular misconception that the trade comes only to sell products. In reality, the trade does not often actually make money from attending shows, and certainly not from selling products at less than normal retail prices.

Exhibiting companies have to pay for both the trade stand, and the space it occupies, transport a large amount of delicate stock to the show — which usually involves hiring special transport — accommodate staff overnight and either suffer the loss of earnings created by the fact that staff are setting up and manning an exhibition stand and not working, or pay overtime to staff who are expected to work through a weekend.

The real opportunities for manufacturers at shows are to explain the many benefits of their products to fishkeepers and offer their customers the chance of comparing different products to see which best meets their specific needs. Ideally, this should be done in the context of the actual aquarium, showing the products in use.

It is also important to remember that while one member of a family may be a devoted aquarist, there may well be others who have been dragged kicking and screaming to the show. These people, who may yet be converted to the delights of the hobby, need to be entertained at a fairly basic level.

Competitions aimed at children — such as the colouring charts or furnished aquarium races held at the Weston-Super-Mare last year — are an excellent way of doing this. They also provide a source of light relief for those not completely immersed in the finer arts of water quality and fish husbandry, and offer a little fun for everyone who arranges and takes part in them.

Closing thoughts

A wholesale move towards more shows *per se*, will not, in the long term, be in the best interests of either the market or the hobby.

Manufacturers plough an enormous amount of money into researching and developing new products which provide up-to-the minute technology for fishkeepers. They need to work with aquarists to bring on a constant stream of new and innovative products designed to create perfect conditions for their fish.

However, this can only be sustained by the existence of a structured market place which channels products, via the wholesale and retail trades, to the aquarist. It is impractical to expect the trade to attend an ever-increasing number of events, which merely dissipate the numbers of existing visitors. If there is a concerted effort to increase the attendance at such events, at the same time increasing the number of people involved in the fishkeeping hobby, then the overall benefit to the hobby and, thus, the industry will be significant.

In all of this debate, there is only one certainty, and that is that shows can only succeed with support from all areas of the hobby.

Perhaps, a national show located somewhere centrally, purely for the display of furnished aquariums, with expert advice on how to achieve the end results, may be a solution. The problem then comes as to who should oversee the project and how it should be funded. Any comments? AAP