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features

MINI SUPPLEMENT

TOP TEN MARINES
(see page 49)

Also in this issue

editorial

REAL OR MYTHICAL RESISTANCE?

I was talking to one of our readers who came to see me at the *A&P* stand at a show recently.

"How was Aquarama? he asked.

"Brilliant", was my immediate response.

"Did you see anything really new? Anything that could make a real difference?"

"Well, actually, yes" I said.

I then proceeded to describe the superlative Swedish-made three-dimensional in-tank backgrounds I'd wrote about and showed in my Aquarama report last month. I pointed out that, although I didn't know their exact price, it was bound to be, at least, several hundred pounds.

Our reader was quite adamant:

"It'll never sell in this country. It's far too expensive for the UK. Germany, Holland, Japan, yes..., the UK, never! We don't go in for that sort of thing."

Why should this be so? Why do we have what seems to be an in-built resistance to aquatic products if they are priced on the high side? *Do* we, in fact, have such an in-built resistance? Or is it a myth? After all, we spend thousands on Koi and Koi pool equipment, as well as on marines.

If, in reality, we don't have an in-built resistance, why should overseas manufacturers, distributors, breeders and exporters of fish, inverts and plants, believe what we do? For example, we still haven't seen any of the illegal captive bred Dragon Fish from Singapore over here. They are all (or most of them, at least) going to Japan.

Any suggestions? Please drop me a line.

John Dawes

Tomorrow's Aquarist

BY GINA SANDFORD

BUG OF THE MONTH

MIKE SANDFORD

Single Black Fly larva.

I thought I'd try something a little different this month. I came across the cocoons of a little fly while turning over stones looking for shrimps. It is the Black Fly, known scientifically as *Simulium*.

They are pests of the first degree, as, when they emerge, they will bite both humans and animals to feed on blood. Indeed, their attacks have been so bad that they have been known to cause the death of cattle. They are most active in sunlight and their bites bleed far longer than normal fly bites.

The early stages of the fly's life is spent under water. The larvae can be found attached to rocks or plants by a disc, covered in fine hooks, on their rear end. If they are swept away by the current, they produce a fine silken thread and, just like a spider falling from a leaf, will crawl back up the thread to their anchorage point. They are filter feeders, the hairy appendages at their front end being used as baskets to trap very fine food.

When the larvae pupate, they produce a silk cocoon near the substrate and it was these strange-looking things that I came across quite by accident. The larvae were also an accidental catch when sweeping my net through fibrous tree roots along the banks of a shallow, fast-flowing stream.

When ready to hatch out, the adult fly floats up to the water surface in a bubble of air and, as it bursts at the surface, the fly flies off.

As far as fishes are concerned, the larvae are relished, but the pupae are fairly safe from attack, hidden away under stones in their cocoons. Of course, if you are feeding these to your fish, make sure they are all eaten. Otherwise, you may be the next meal for the adult fly!

MIKE SANDFORD

These unusual structures are cocoons containing pupae.

Wavy Swords and Lace plants

Now that the weather is cooling a little and the nights are drawing in, you'll probably start looking a little more closely at your aquarium.

How about trying to grow some Aponogetons? The corms are readily available and have usually already sprouted a shoot or two before you buy them. *Aponogeton crispus* (Wavy-edged Swordplant) is probably one of the easiest to grow. A Southeast Asian plant, it is not fussy about water conditions and, as long as the temperature does not fall below about 20°C (68°F), or climb much above 24°C (75°F) it will thrive.

Plant the corm with the shoots just above the surface of the substrate. The leaves will grow steadily and, depending on how strong your lighting is, may either have long leaf stems (petioles) if conditions are dim, or short ones in much brighter lighting. This is a tall plant, best suited to the middle to rear of the aquarium.

Once growing strongly, it is essential to feed it; I use pelleted fertiliser every month or so and just poke it into the gravel. With any luck, a tall flower spike should appear with a single set of blooms (inflorescence). This flower spike readily sets seeds and so you can help pollination along by gently brushing the flowers with a soft paintbrush. However, in the fish house, there seem to be enough flying and crawling insects about to do the job. The ripe seeds fall into the water and will germinate.

MIKE SANDFORD

Aponogeton flower spikes will set seed which will fall into the aquarium and germinate.

Aponogetons need a resting period. After growing vigorously for up to nine months, they need a cool period. The plants will shed some of their tall leaves until just a few short ones remain. Now is the time to take them up and put them into cooler conditions. The water should be about 10°C (50°F) for a couple of months, after which they can be replanted in the main aquarium to grow and flower again.

The most flamboyant of the Aponogetons is the Madagascan Lace Plant (*A. madagascariensis*). Although you may be tempted to buy one of these, they are difficult. My best results have been in cool water, 10-15°C (50-59°F), and in dimly lit conditions. When transferred to a tropical aquarium, they fall foul of algae which clogged their delicate leaves and they quickly perished.

Maybe someone out there has had better luck with this? I hope so. Please let me know.

Wayward bands

When you get back home from the fish shop clutching your bag of precious fishes, you disappear into the fish house (in my case) and carefully float the beasties in a tank.

I usually wander back indoors and sometimes forget about the fish until a few hours later, when I go out to feed and check on things for the night. When undoing the bag, the elastic band invariably flies off to the outer reaches of the fish house, never to be seen again, and as they say, it's out of sight, out of mind... but don't be too sure.

Recently, I noticed that there was a slight problem in one of the tanks. My Wood Pim Catfish (*Goeldiella eques*) had tried to swallow an elastic band — part was hanging out of his mouth and the rest was protruding from his gills. I say 'his', but I haven't really got a clue as to whether it's a male or a female!

Goldie is not large, but he is very swift when it comes to attempting to catch him. So, I cornered him with a net and used a wet heavyweight linen cloth to hold him in my hand. Good job I did, as his pectoral and dorsal fin spines are sharp and I've been on the receiving end of those

more than once before.

Once removed from the water and semi-wrapped in the cloth, he produced some rather loud croaks and grunts and one of his pectoral spines was being moved back and forth with great speed.

The offending elastic band was easily seen and the only way to remove it was to cut it. Be careful if you have to do this! I used a pair of curved scissors so that I didn't cut the fish. I snipped the end that was trailing from his gills and unwound the bit that was wrapped around a pectoral fin. Fortunately, when I pulled the band gently, it came out of his mouth with ease and, today, he is back to normal, eating anything and everything.

So, if you have a wayward elastic band... find it! My tanks have all got cover glasses on, but somehow, probably due to Murphy's Law, one band got through.

Tetra TA COMPETITION

WIN a Tetra Plant Care Set

Taking care of your aquarium fish is something that you probably take very much for granted and becomes almost second nature. But do you also make sure that your plant life is looked after in much the same way?

Tetra has now produced a new **AquaPlant** range that will ensure your aquarium plants remain as healthy and lush as they do in the natural world. They need to be cared for because, not only do they look attractive, but they also play a significant role in helping to maintain the biological balance in the aquarium. The three new products work together to create a complete plant care system. Importantly, they don't contain nitrates or phosphates that could lead to unsightly algae.

FloraSticks is a gravel additive which creates a fertile environment for plants, allowing them to grow quickly and without clouding the water.

FloraTabs contain all the iron and essential elements in a compound form which encourages healthy plant growth and increased root formation.

FloraPride is an iron-rich fertiliser which strengthens the plants by supplying them with nutrients while producing a luxurious green coloration of leaves by the formation of chlorophyll.

The retail price of the set is **£11.20**, but we have **6 sets** to give away to **TA** readers. Simply answer the five questions and write down the word that appears in the shaded area either on a postcard or the back of an envelope.

Put your own name and address and send to **Dept FL, Tetra Competition, PO Box 2162, Bournemouth BH2 5ZA** to arrive **no later than 30 September** 1995. The first six correct entries to be drawn will each receive an **AquaPlant** set.

For detailed advice on any problems associated with fish or ponds contact the **Tetra Information Centre, Lambert Court, Chestnut Avenue, Eastleigh, Hants SO53 3ZQ.**

Q1 Which is the most often kept pet in the world?

Q2 What aquarium and pond 'pests' do not like **Tetra AlgoRem?**

Q3 Name the well-known 'shy' fish from Japan.

Q4 What is the most feared two-legged feathered menace to ponds, especially in the spring?

Q5 What type of 'container' is regarded as being much better than a round Goldfish Bowl?

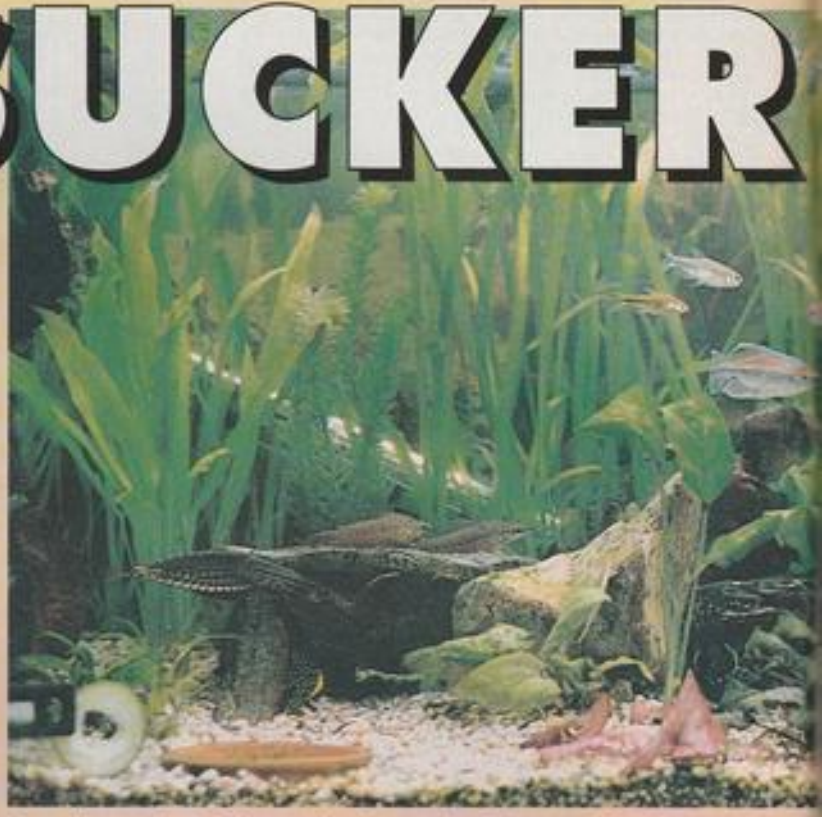
1									
2									
3									
4									
5									

A SUCKER

Janet Marshall shares her enthusiasm for Suckermouth Catfish.

Photographs by the author

Golden Nugget at rest.



General layout of my Suckermouth tank, complete with compatible mid-water tankmates. Some of the resident cats can be seen under and on top of the shelter on the left. The white suckers are used for holding vegetable bits for the fish (see partly eaten cucumber slice in the extreme bottom left corner).

Of all the different types of catfish available to the hobby, my favourites have to be those belonging to the Loricariid or Suckermouth family. I like them so much that in addition to including two or three in each of my general catfish tanks, I also keep a larger, varied selection of Suckermouths in a five-foot, seventy-gallon tank.

Initially, I was not sure whether or not this set-up would work, as I am well aware that these fishes need plenty of individual territory. Fortunately, though, there appear to be no problems with compatibility, maybe because there are plenty of hiding places in the shape of caves, rocks, bogwood and plants and, perhaps, because I have tried, on the whole, to include as many different specimens, both in size and appearance, as possible.

Low-down on Suckers

The Loricariids form the largest family of catfishes found in South America, containing over six hundred species, with new types being discovered all the time. In the majority of these species, the mouth and lips form a circular disc with which these fishes are able to attach themselves to underwater surfaces, an ability that allows them to survive in swiftly flowing waters.

Within the mouth, there is a set of rasping teeth which enables the fishes to feed on algae, small crustaceans and insect larvae. Their bodies are generally flattened, the chest and body broad, and they are almost entirely covered with overlapping bony plates, causing them to be frequently described as 'Armoured Catfishes'.

Here are some details of the types of Loricariids that I keep together.

Spotted Sailfin Sucker

These beautiful fishes(*Glyptoperichthys gibbiceps*) are fast-growing giants of the Suckermouth family; my specimen has grown from two to ten inches (5-25cm) very rapidly. They originate from the Peruvian and Brazilian Amazon, can reach an eventual length of about 18in (45cm) and have a lifespan of around fifteen years.

When small, these fishes can look very similar to *Hypostomus plecostomus* (the 'Common Plec'). An easy way of differentiating between these two species is by counting the dorsal fin rays. In *Glyptoperichthys* species, there are ten or more rays, while in *Hypostomus* there are only seven.

In the wild, *Glyptoperichtys* are peaceful shoaling fish, but obviously, owing to their potential size, it is advisable to keep only one specimen, and to aim for an eventual tank size of not less than fifty gallons.

My Sailfin Sucker apparently waiting to be fed.

Peckoltia species

The tank houses four species: three 'Tiger' Peckoltias (*Peckoltia vermiculata*), a 'Leopard' Peckoltia (possibly *P. brevis*), a 'Scribbled' Peckoltia and a *Peckoltia 'arenaria'*.

None of these will grow very large; in general, they reach about 4-5in (10-12.5cm) when fully grown and are therefore ideal for the smaller aquarium. They are very attractive and amusing fishes and, like many Peckoltias, they have very striking markings.

Although inactive for some of the day, these catfish can be frequently seen 'hopping' around the tank in search of food. On the whole, these are peaceful fishes, although some can guard their territories

FOR CATS

This Bristle Nose, grazing on the aquarium glass shows just why this family of catfish is known as Suckermouths.

very jealously, so it would therefore be inadvisable to keep more than one or two specimens of a particular species in a small tank.

Bristle Noses

There are more than fifty varieties of *Ancistrus* known, all of which are found in rivers in South America. Identification of individual species is difficult, as they show many similarities. I think that the one I keep in this tank is an *Ancistrus dolichopterus* – commonly found in retail outlets.

Like Peckoltias, *Ancistrus* species grow to about 4-5in in length and, again, are ideal for a small tank. As they mature, they develop 'tentacles' on their cheeks and noses (normally more pronounced in the male) which give them their well known common name of 'Bristle-nosed Catfishes'. It is thought that these 'tentacles' may be used to sense the speed and direction of water currents, or even to identify smells.

Golden Nuggets

The final Loricariid in this tank is a 'Gold Nugget Plec'. It is, apparently, fairly new to the hobby and, consequently, nobody seems to be quite sure exactly which genus it belongs to. I have been told that it is a dwarf 'Plecostomus' and will only grow to about 6-8in (15-20cm).

It is, at present, very peaceful and lives quite happily with all the other Suckermouths. The bright yellow spots on a jet black background, added to the vivid yellow edging to its dorsal and caudal fins, make it one of the most attractive Loricariids presently available.

Care tips

All the above fishes are predominantly herbivores and, to survive, need large amounts of greenstuff in their diet. They will quickly remove any traces of algae from the tank glass, decor, plants, etc. and will need to have their diet supplemented with such foods as cucumber, potato, apple, pear, vegetable tablets and algae wafers. They do, however, also enjoy small amounts of frozen live food, including bloodworm and shrimp, chopped prawn and basic catfish tablets.

Some bogwood in the tank is important for these fishes, for as well as providing hiding places, it also provides an important addition to their diet. In fact, Suckermouths can, in time, actually wear a piece of bogwood away with their constant rasping.

Because these fish inhabit fast-flowing waters in their natural habitat, they enjoy clean, well filtered and aerated water with, if possible, some turbulence from the filter. Water hardness does not appear to cause a problem; they will adapt well to hard water conditions. Ideally, the pH should be neutral and the water temperature maintained between 24°C and 27°C (75-81°F). Frequent water changes are appreciated and about 25 to 30% should be changed each week if possible.

Provided there are plenty of caves and hidey holes for the fishes, lighting need not be subdued, particularly if good plant growth is required. Despite these fishes supposedly needing their own individual territories, I have been surprised to find that many shelters are left unoccupied, while half a dozen or so Loricariids squash themselves into one favourite cave with no signs of aggression.

When moving these catfishes it is always advisable to catch them by hand, rather than using a net, as their armoured bodies can easily become entangled.

To add colour and movement to the Loricariid tank during the daytime, almost any non-aggressive mid- or top-water swimming fish could be added. My personal choice includes a group of six Congo Tetra, which are very active and beautifully coloured, and two Keyhole Cichlids, well renowned for their peaceful natures.

Suckermouth Cats are fascinating fishes and it is possible to find a suitable specimen for any size or type of tropical aquarium. Provided a little care is taken with feeding and supplying suitable shelters, these fishes will enhance any tank and give much pleasure to their keeper. AFP

Scribbled Peckoltia can, generally speaking, live in harmony with closely related species.

KOI TALK

by Alan Rogers

THE ROUTE TO STRESS

It is a well known fact that pain can be recognised in many ways. The accidental striking of the thumb with a hammer blow is painful; the fall from a tall ladder or losing one's footing on a sheet of ice is undoubtedly painful.

Receiving a letter only to find the contents contain an assessment demand for unpaid tax for the previous year from Inland Revenue is hardly painful, but more likely to be described as *stressful*. The unexpected report of the sad loss of a close friend brings with it its own form of *stressful* reaction.

A constant bombardment and creation of stressful forces develops a weakness in many forms of life. The thin dividing line that separates stress from weakness, and ultimately pain, is simply one word... *resistance*. Once this barrier is broken, we have immediately created *stress*. If we permit a condition that in any way lowers our Koi's resistance to stress and weakness, we then create a serious hazard to their continuing healthy existence.

Sadly, I am aware that, in their early years, a number of Koi keepers accept annual losses as part of the initiation to the hobby, one might say the 'penalty' paid for experience gained. One should never accept regular losses under *any* circumstances, and it must be considered as grave inexperience in one's Koi keeping abilities to permit such catastrophes to continue. Stress is probably the most misunderstood and most underrated subject within the entire hobby.

Stress in our Koi can be induced in many ways. It might therefore be prudent to highlight the most common forms of stress generators, so that newcomers to the hobby can avoid such pitfalls.

1 Nutrition

Some scientists regard critical life functions themselves, such as growth and reproduction, as stresses. Most practising nutritionists supply the needs of fish during critical life stages by feeding a special formulated diet to supply extra energy and nutrients.

It is generally held among research physiologists who study stress, that if a prolonged period of stress is not too great, the fish usually adapts and lives an almost normal existence. When two stresses occur simultaneously, however, the fish is less likely to adapt and usually dies.

According to this theory, a fish can live and grow moderately well, even though the diet is slightly deficient in a required vitamin or amino acid. However, if it is then attacked by a bacterial gill disease while still adapting to the nutritional deficiency, it may die even though the disease alone is not severe enough to kill it.

A fish, like any other animal, has several mechanisms for fighting disease. The antibodies and other immuno-stimulating substances in the blood are capable of reacting with invading pathogens (disease-causing agents), rendering them harmless. These substances are protein-like, being composed principally of amino acids, and their synthesis in fish requires that certain vitamins, minerals and fatty acids are available at all times in the diet.

Theoretically, a deficiency in any one of the major nutrient classes reduces the amount of antibodies and globulins in a fish's bloodstream and lymphatic system, thus reducing the resistance of the individual to attack from pathogens in the water.

The effect of nutrition on resistance to disease and on immunological capability has been a subject of great interest and conjecture for many years. In the case of humans and common domestic animals, this has been the subject of intensive scientific study, yet there is a scarcity of published studies showing the specific role of correct nutrition, or the lack of it, in disease resistance in fish, particularly in a closed pond environment.

The relation between the nutritional state of a Koi and infection, can be one of synergism or antagonism, depending on the nutritional state of the fish, or the infectious ability of the organism involved.

Infections are therefore prone to have serious consequences, often resulting in death, in fish likely to be suffering from malnutrition. Likewise, most infections can cause a Koi's borderline nutritional condition to become a much more serious deficiency.

Thus, the effects of malnutrition and disease attack are scientifically known as being synergistic: the *combined* effects of each are far more damaging than their *individual* effects. For Koi or, for that matter, all animals, optimum health and growth are achieved by providing the animal with the correct type and quantities of all essential nutrients.

2 Temperature

Temperature is probably the most common form of stress that a Koi will be subjected to. Koi can endure low temperatures down to 34°F (1°C) and, at the other end of the scale, up to 86°F (31°C), provided the changes are introduced very slowly over a considerable number of days, or, better still, weeks.

Rapid overnight temperature fluctuations in excess of 6°F (3°F) will create some stressful results, although these may not be immediately apparent. Koi subjected to minimum conditions of 34°F for a long British winter, will be suffering traumatic stress followed by inevitable weakness. *Ichthyobodo (Costia)*, a coldwater parasite, may show visible signs on the bodies of the fish, creating a secondary weakening factor.

At these extreme cold temperatures, with the Koi lying on the bottom, the ability to maintain equilibrium may often be suppressed and the Koi will probably rest on one side. While resting like this, friction and abrasion to the abdomen and finnage may result in an open wound. This open lesion will eventually become the gateway for a secondary bacterial infection, while the Koi's resilience will be in a severely low state.

At the other extreme, the higher temperatures will create oxygen deficiencies, with a great deal of energy wasted in search of cooler waters and pockets of enriched dissolved oxygen. It has been my experience that when temperatures soar into the mid-eighties, appetites start to diminish progressively, and energy reserves are not replenished at the same rate as 'burn off'. This scenario will produce stressed Koi, all of which are subjected to varying degrees of weakness and immunity. Weakened Koi will always be the target for parasitic and pathogenic epidemics, especially at higher temperatures.

3 Water quality

Koi keepers are constantly encouraged to monitor water quality and to be mindful of unacceptable readings of ammonia, nitrite, nitrate and pH etc. This 'sentinel' part of the hobby is 'indoctrinating' us (in the nicest possible way) to maintain water conditions that cause an absolute minimum level of stress to our Koi by taking whatever actions are deemed necessary to lower levels to safe acceptability.

Being astute enough to recognise undesirable water quality is one thing, but being able to convert this to a more favourable level is quite another. It is in this area where the beginner will become more competent with experience.

4 Observation

Perhaps the most important aspect of preparing for eventual disease problems is to take time regularly to observe your fish while they are healthy. Too often, aquarists and pondkeepers only begin to study the behaviour of their fish carefully after a suspected disease problem appears.

Then, all kinds of 'peculiar things' are observed, most of which are quite normal but which were unnoticed due to a lack of attention. This can only confuse diagnosis and treatment.

For example, the breathing rates of many fish increase

Good quality water reduces stress and is essential for peak health. (These Koi were photographed underwater at Hawkhurst Fish Farm).

JON MONTGOMERY

noticeably in the hour or so after a heavy feeding. This is a normal response to the higher oxygen demand required to assist digestion. Yet, it can be quite alarming to the fishkeeper who first notices it in the course of discovering White Spot parasites on his or her favourite fish.

To those pondkeepers lacking, to a greater or lesser extent, in confidence, I would strongly suggest that they record everything they can observe in a notebook. Observe the fish carefully, noting both appearance and behaviour, logging — in the process — anything which looks strange. You will, of course, have difficulty differentiating between normal and abnormal behaviour if you rarely spend time observing your fish.

For instance, ask yourself: are there raised scales, swellings, discoloured areas or coatings on the skin? Are any of the fins damaged or inflamed? Is there anything unusual about the way the fish moves? How does the fish behave when it is not moving? Take the time to count normal breathing rates (gill movements) on healthy Koi, noting current water temperature, as this will help you identify irregular respiratory behaviour when it shows itself.

Next, test every parameter of water quality. Measurements for temperature, pH, ammonia and nitrite are essential, and those for nitrate, hardness, and dissolved oxygen can be very helpful. Again, record the results in your notebook for evaluation at a later date.

SIMMO NOW

While regular feeding with appropriate foods is essential for good health and increased resistance to stress, overcrowding has the opposite effect.

While it is always tempting to give diagnostic advice, such a complex topic requires far more space than I have available in this column. Instead, let me offer some procedural guidance.

Use the descriptions in your notebook to narrow down the options. Write down the most likely candidates and the associated signs for them. Try grouping them according to whether they are bacterial, parasitic or fungal problems, and use the assistance of any photographic illustrations in any fish disease books that you might have access to.

Treatments

There are, in fact, only a limited selection of fish treatments available that are useful, and these have fairly broad application within the pathogen group they apply to. In other words, the really useful antibacterial treatments tend to work against a wide range of the most common bacterial pathogens, while the most effective parasiticides kill many different types of parasites.

So, if you can narrow the problem down to external parasites, but you cannot determine whether it is flukes, *Ichthyobodo (Costia)* or *Chilodonella*, then this action will be acceptable because you will use the same treatment to control all of these parasites anyway.

The use of salt as a treatment in the pond or fish house serves several purposes. Firstly, it relieves some of the osmotic stress on the fish. The tissues and fluids of freshwater fish have roughly a 1% salt concentration, whereas pure freshwater has a negligible salt content.

Because the fluids inside the fish have a significantly higher salt content compared with the fluids outside, water floods into the fish. As a consequence, freshwater fish expend tremendous amounts of energy pumping water out of their bodies. Under normal circumstances, this is not a problem. When a fish is sick, however, this effort can further debilitate the individual.

Advanced symptoms of Abdominal Dropsy (Pine Cone Disease), i.e. excessively raised scales, is, in fact, created by the entrapment of body fluids which the fish is unable to expel during its normal metabolism. This exchange process of body fluids and water to and from the fish is termed osmosis.

The advantage of adding salt to the water lowers the osmotic gradient between the fish and its environment and allows it to conserve energy for fighting disease. In addition, major wounds on fish, such as those caused by bacterial infection or physical injury, are pathways for the loss of minerals and ions crucial to maintaining proper metabolic activity. Rapid loss of these minerals often results in death by 'shock'. Lowering the osmotic gradient by adding salt to the water also reduces the mineral loss rate.

Finally, the reproductive rates of a number of pathogens are slowed by the presence of salt or by the osmotic change that accompanies the addition of salt to the treatment tank.

If you are unable to reach any conclusion about the problem, the time has come to seek outside advice. Continue the observation and record any valuable symptoms or signs in the notebook as outlined above. Wild speculation or inaccurate diagnosis poses more risk for the fish than does your decision to hold off further treatment.

Prevention

Preventing disease is a far more favourable policy to adopt than having to become involved in frantic efforts to cure a problem once it has become firmly established.

Before returning a patient to the main tank or pond, you should always reflect on the original disease problem. As already stated, fish disease complications are most often initially caused by environmentally induced stress. It will therefore serve no real objective to cure a fish and then return it to the same stressful situation. Thus, improving your fishkeeping techniques is probably the best method of reducing the occurrences of problems in your pond.

For example, consider the problem of overcrowding. Many aquarists believe that it is reasonable to keep as many fish in their pond as the biological filter will support. However, nitrification capacity, which is the maximum ammonia and nitrite load that the biological filter can reduce to safe levels efficiently, is not the proper indicator of appropriate stocking levels for long-term fish health.

A properly operating biological filter can support far more fish than should ever be placed in a single ornamental tank or pond, but allowances must be made for oxygen demands, bacteria/algae die-back, temperature variations, etc.

The situation at Koi dealers' premises, however, is quite different, where the fish are held for comparatively short periods with minimal feeding ratio. In this case, heavily stocked tanks are more of an economic necessity.

Crowding is a physiological and psychological stressor that depends on many factors besides nitrogen waste concentrations in the water; it also varies tremendously among species.

For instance, a single Goldfish can live quite happily in a 5-gallon tank with suitable filtration and aeration, yet four such fish show overcrowding stress in a 20-gallon tank, even though there is still 5 gallons per fish and no measurable ammonia in the water. The maximum number of fish that can be crammed into a given space should never be considered as an accomplishment of fishkeeping skills.

In short, even the most experienced Koi keeper should review his or her fishkeeping techniques. This is where the notebook comes in handy, as it permits you to look back over several years of records and look for patterns between disease outbreaks and events, such as adding new fish, altering filter set-ups or routine filter maintenance and so on.

Snap-Happy Fishkeeping

Easy freshwater 'target': a Corydoras Catfish

Easy dos and don'ts for all fish photographers, courtesy of super snapper Dr Iggy Tavares.

Illustrations by the author/Pentax UK Ltd

I have had a camera of some sort, as well as kept fish, from an early age and I have long admired the colourful fish photos which appear in *Aquarist and Pondkeeper* and other publications. A couple of years ago, I decided that maybe it was time to combine my two hobbies and have a go at fish photography.

My aim initially was to take good quality photographs with the simplest set-up. I did not want to be lumbered with heavy equipment or a vast array of flashguns. I wanted something simple so that I could take fish photographs any time, any where, say for example at a fish show or at aquatic outlet or maybe even at home.

Basic equipment

A period of trial and error began and I quickly learned that the small compact fully automatic range finder camera could be used for photographing large fish, but was largely unsuitable for close-up photography, primarily because the minimum focusing distance, even in the macro mode, is around three feet. A single lens reflex (slr) camera was therefore a must.

When starting out in the hobby, one does not need expensive equipment to get good photographs of fish. My original basic equipment consisted, quite simply, of an old slr camera (Pentax ME Super), a set of extension tubes and a small flashgun.

An slr camera is absolutely necessary, not only because of the interchangeable lens facility, but also because one can see the actual image produced by the lens in use. Light entering the lens is diverted to the viewfinder by a system of mirror and prism.

Thus, when you vary the focusing and framing, you can watch the actual image changing in the viewfinder. When you click to take your photograph, the mirror and prism fold back to allow the light to hit the film.

With the standard 50mm lens which comes with the camera it is possible to take photographs of large fish, since one needs to be some distance away to capture the whole fish. The standard lens has a minimum focusing distance of about 24 inches (c 60cm).

Close-up photography of small fish can be done using the standard 50mm lens, providing extension tubes, or bellows are used. Extension tubes, which are relatively cheap, usually come in sets of three and are fitted between the camera body and the lens.

The larger the extension tube, the closer the camera can be brought to the subject to provide an in-focus photograph where the fish fills virtually the whole frame. One has to select the correct tube or combination to suit the situation.

Bellows work in a similar sort of way but provide a continuously variable separation between camera and lens, hence allowing greater flexibility in approaching one's subject. Another alternative is a special close-up lens which screws onto the front of the standard lens and enables one to do close-up photography.

Film & technique

There is a whole range of film on the market. I started off by using Kodachrome slide film (100 ASA), the cost of a 36-slide film roll and processing being about £8. Apart from the obvious disadvantage of not being able to view your slide without a projector or viewer, an extra set of slides or prints at £1 each (£36 for an extra set) is expensive.

Ordinary negative colour film (100 ASA) and prints are much more cost effective, since a whole range of photographic houses will develop, produce two sets of 36 prints and give a free film for under £8. I usually use negative film (100 ASA) and am not inhibited in my shooting, by the cost. Faster film (200,400 ASA) can be used, but the photographs might be slightly grainier.

I use a simple set-up with one flashgun mounted in the hot shoe of the camera for taking my fish photographs.

The trick, however, is not to point the

Freshwater Angels are more difficult, owing to fin movements. Backgrounds can also 'make' or — as in this case — 'break' a picture.

camera and flash straight at the glass of the aquarium, as this results in the flash bouncing straight back into the camera, ruining the photograph. This problem is easily overcome by always having the camera at an angle to the aquarium glass and never face-on. Even a small angle ensures that the flash does not bounce back into the camera and the result is a good photograph with little distortion (see diagram).

On my slr camera, the shutter speed is synchronised for flash photography at 1/125 second that is invariably what I use. For normal flash photography with a 50mm macro lens, the aperture is usually set at f5.6, but with macro lens in close-up mode and a standard small flashgun, the best results were obtained between f11 and f16. With the lens in macro mode, the in-focus depth is very small and using larger f stops (i.e. smaller apertures) is beneficial, since this increases the depth of field.

Streaks on the aquarium glass can affect the quality of a photograph

More complicated techniques involve using three flashguns all off the camera, one well above and the other two on each side of the camera. This, of course, limits one's movement, making photography difficult and time-consuming, since the fish never stay in one place ... especially not in front of the camera.

Fish photographs

Taking good photographs of fish needs practice and patience. In a community tank, most fish are always on the move. This, coupled with the small depth of field because of the special lens or extension tubes, makes such fish difficult subjects to photograph.

Marine photography is probably best started with a species that stays relatively still, such as shrimp, gobies and anemones. This gives one the chance to focus and shoot, taking care to keep the camera pointed at a small angle to the aquarium glass. The light stocking of marine tanks is an added bonus, because this usually permits one to frame just one fish for each shot.

Publishers prefer just one fish per photograph and, at most, a male and female pair. This is more difficult to achieve in the hurly burly of the sometimes more crowded freshwater aquarium.

In freshwater tanks, good subjects are large cichlids or catfish, because the camera needs to be further away to take in the whole fish, making it easier to focus and giving a greater depth of field.

Hawkfish tend to sit still and are therefore good 'easy' marine subjects

I usually sit quietly in front of an aquarium studying the preferred routes of the fish in the tank. I then set up the camera at a selected vantage point, allow the fish time to get accustomed to me and the camera and take photographs when the fish fills the viewfinder and is in focus. I usually take two, three or more shots to ensure one good photograph. Of course, the aquarium glass must always be perfectly clean for best results.

The photographic tank

For difficult-to-photograph fish, or when my patience has run out, I have very occasionally used a special photographic tank. This consists of a small tank (10x10x3 inches — 25x25x7.5 cm) with an additional pane of glass 9.8 inches (c 25cm) square placed inside the tank to restrict the movement of the fish if necessary.

I have seldom used this set-up to photograph cichlids, since they invariably show their fright colours and not their lovely breeding colours. The photographic tank is more successful with tetras, barbs, Guppies, Swordtails and other fish which do not easily lose their coloration. Quite naturally, you probably would not use this tank for expensive and more delicate marines.

Using the extra pane of glass angled from the bottom front of the tank to restrict fish movement, a very 'natural' photograph can be produced, since the extra pane of glass is invisible in the final picture, especially if a nicely planted background is used. Again, care has to be

On light uniform backgrounds shadows stand out and can spoil the overall effect.

taken to avoid flash reflection. One day, I hope to use this special photographic tank a lot more, when I am out in the field collecting my own fish.

Spawning fish

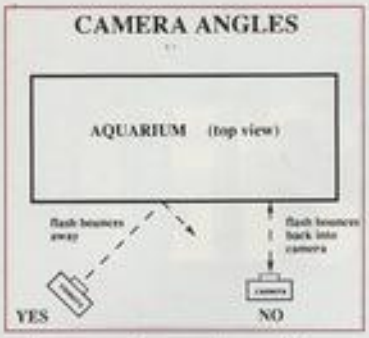
For me, fish photography comes alive when photographing spawning cichlids and I have been fortunate enough to have done this several times now. This can be surprisingly easy, especially with the open-spawning cichlids. Once I see prolonged pre-spawning activity, such as fin flaring displays, cleaning of the spawning site and perhaps even jaw locking, I know that it is time to have the photographic equipement on standby.

I tend to mount the camera on a tripod at a small angle to the aquarium glass, such that the field of view is sufficiently large to capture both fish entirely during the spawning. Great care is taken on the initial focusing in order to ensure pin-sharp photographs. I then use a long remote release cable and an autowinder to expose and wind the film from a safe distance, leaving the fish to spawn undisturbed. The spawning fish are usually so engrossed in their own activities that they hardly notice the flash going off.

Auto-focus camera

Technology has moved on and, today, a new generation of single lens reflex cameras is available. Like the small fully automatic range-finder cameras of the eighties, these have autofocus lenses to ensure pin-sharp images, built-in microchips, automatic exposure and different modes providing perfect results under varying conditions. However, all these features can be over-ridden if the camera is set in manual.

Moving fish, like this marine Butterfly, are more difficult than static subjects, but are well worth the extra effort.



Because such a camera is an slr, the image in the view-finder is that which is actually produced by the lens, unlike the image one sees with the small fully automatic range-finder camera. Therefore, one can accurately compose one's photographs with these automatic slr cameras which usually come fitted with a 'standard' 28 - 80mm zoom lens, set in the auto mode, giving terrific photographs in everyday use.

Moreover, the camera and standard lens at its wide angle setting (28-35mm) can be used to photograph whole aquaria and large fish, or even, at the telephoto setting (80mm), to photograph medium-sized fish. Usually, however, for close-up fish photography, the special 50mm, f2.8, macro autofocus lens is needed and since this is an slr, one can easily change lenses, which one can't do with the fixed lens of most small automatic range-finder cameras.

These new slr cameras also have a small built-in pop-up flash which is perfectly adequate for most everyday situations and, because of its position on the camera, is ideally suitable for close-up fish photography. For close-up work using the pop-up flash, the apertures and shutter speeds have to be set manually (f11 to f16, 1/100 to 1/60 sec, 100 ASA film), to get the best results.

With the autofocus facility, all the hard work of focusing is done by the camera. All one has to do is point and shoot. Obviously, the aquarium glass has to be perfectly clean so that the autofocus facility is not fooled. However, this is hardly ever a problem and I get good results almost every time.

The photographs published here were taken with a fully automatic, auto-focus Pentax Z-20, but I have taken many good photographs with an old slr camera.

Conclusions

An old manual single lens reflex camera and a cheap set of extension tubes is all that is needed to get one started in this absorbing hobby. Many of us probably purchased an slr camera in the seventies or eighties and it is probably now sitting in a cupboard unused, following the invasion of the small fully automatic range-finder camera. Alternatively, a secondhand slr manual camera can be bought for as little as £40.

Successful fish photographs can be taken any place, any time, with just the single, small flashgun mounted on the camera. I have used such a camera (Pentax ME Super) and set-up with great success. However, I must confess that the new-generation slr camera (Pentax Z-20), with its autofocus capabilities, has made my fish photography truly 'snap happy'.

Worth reading

Photography — The Guide to Technique. A. Hawkins and D. Avon, 1980, **Book Club Associates.** AAP

Basic set-up to get started

1. Single lens reflex camera body
2. Standard 50mm lens
3. Set of extension rings, or
4. Close-up lens to screw onto front of standard lens.
5. Small flashgun.

My current set-up

1. Pentax Z-20 (fully automatic, auto-focus
2. Standard 28-80mm, f3.5-4.7 lens and
3. 50mm, f2.8 Macro lens.
4. Large flash AF 500FTZ (used only sometimes)

FASCINATING FISH FACTS

Elusive Rockpool Dwellers

Have you ever spent hours staring into a rockpool, searching in vain for the 'common' blennies and gobies that are reputed to live there? Don't despair, you are not alone! These often tiny fish rely on camouflage for protection and are just plain hard to see. The most common species of blenny, the Shanny, even comes in different colours to suit its background.

Patience brings its own reward, though. When you do, eventually, spot a fish, you can impress everyone by announcing confidently that it is (a) a blenny, or (b) a goby. Just look at the dorsal fin. If the fish has one, it's a blenny. Two, and it's a goby.

I expect you've heard the line: "Although he's slippery, he still gets caught". This is specially true for blennies. They have a slimy, scaleless skin making them very hard to catch hold of. It also explains their other common name — slimefish. Hardly surprising they prefer not to be seen!

Linda Lewis


LINDA LEWIS

Two dorsal (back) fins identify this individual as a goby.


LINDA LEWIS

The long, single continuous dorsal fin of this fish makes it a typical blenny.

Koi Pool on a Budget

Tony Aslett's Koi were outgrowing their cramped quarters, so they needed a larger pool. The challenge? how to provide good conditions for the fish without breaking the bank. Here's how he did it.

Illustrations by the author

I stood in my back garden mentally taking stock of the changes I could make to improve the overall picture and create more interest and practical use of the space available. The patio needed to be extended and edged with flower troughs. That would peovide the extra seating space amid a fragrant surround.

Walking down to the bottom of the garden I surveyed the arrangement of a sunken pool I had installed there three years earlier. It was situated near some tall trees belonging to a neighbour. These trees had been a constant source of debris and involved a lot of work keeping the pool and filter system clean.

The pump in this layout had been placed in the accepted manner: in the pool. This, I reasoned, was not a good system; neither did the pool offer the best way of viewing the fish.

I was suddenly aware that my Koi, whom I had cherished over the years, were outgrowing their home and were wallowing in murky water. Time, I thought, for a major change.

It had started to rain again, which gave me the excuse to go and sit down with paper and pencil and outline what type of pool I wanted and how it should be built. I had already decided on my way indoors that a suitable site would be the area under the pergola.

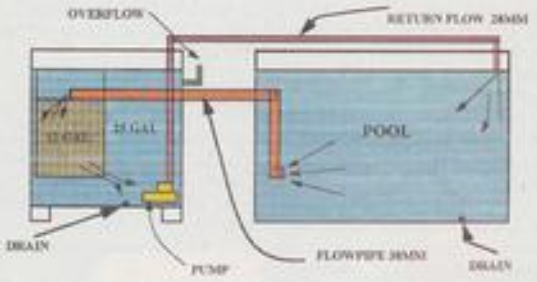


Fig 1. Front Elevation

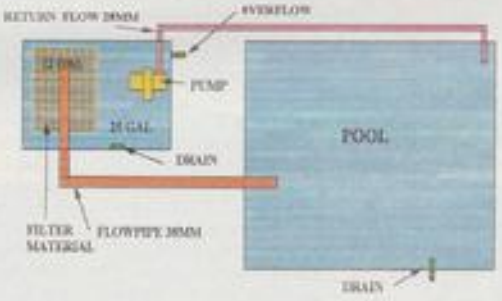


Fig 2. Top Elevation

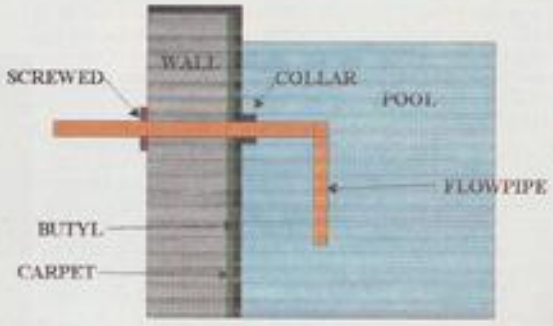


Fig 3. Securing the pipe to the pond wall

The planning

Listing my requirements, a way had to be found to satisfy as many of the following needs that could be incorporated in the new system.

1. I wanted a raised pool, up to waist height, allowing the viewer to feel closer to the fish.
2. A filter system that placed few demands on wear and maintenance.
3. A system that would retain a water level in the event of a pump failure, leakage in the plumbing, or siphonage.
4. A filter system that was easily accessible and not raised above pool level where the presence of a problem, if encountered, would be disguised.
5. Because I am a pensioner, the cost of this undertaking was a key factor that had to be taken into account.

I lost count of the number of books, magazines and other sources of information I scoured in an effort to resolve these challenges. In the end, I sat drawing endless sketches and it wasn't until I tackled the problem from another angle that a solution began to emerge.

Instead of looking at a system that relied on water being pumped from a pool to a filtration system, I started with a drawing

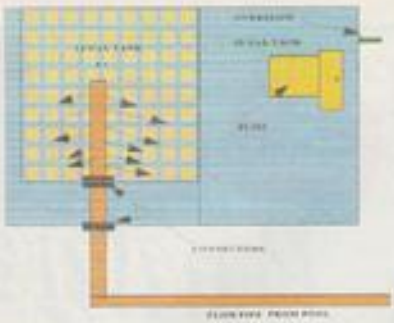


Fig 4.
Top view of filter tanks

showing a pool and filter side by side, their water levels on the same plane.

Next, a flowpipe needed to be introduced that would allow unfiltered water to pass through into the filter unit, drawn by the action of water replacing water pumped out from the filter back to the pool. In other words, in forming its own level, a circulation of water would take place, this being driven by the action of balancing its own loss. The momentum of the circulation would be perpetuated by a suitable pump that could be placed anywhere in the flowline and, as I concluded, this could be within the clean section of the filter. And so from this germ of an idea, the plan developed into what appeared to be a workable system, at least on paper that is!

I completed the plans and included all the additional requirements that I expected to need for successfully operating the whole system. These included such items as overflow outlet, drainage outlet to facilitate filter cleaning and, of course, the provision of a separate chamber within the main filter unit where the filter medium would be contained. Fig. 1 and Fig. 2 show front and top elevations of the whole system.

Choosing materials

Concrete blocks were chosen for building the pool, as these would allow a quick, easy and solid frame to withstand water pressure. Two plastic water tanks, one large, one small, were needed as filter units. I was fortunate to acquire these in almost-new condition for £5 from a building salvage contractor.

My discount card from a well known DIY store made the purchase of the plastic plumbing fairly painless (it is relatively cheap in any case today). A butyl lining proved to be the most expensive purchase, but I was surprised to find I had only spent £120 in total so far. I intended to use my existing pump, as it was a good make and almost new.

Passing a high street store, I chanced on some heavy-duty carpet being thrown out following refurbishment. This, I thought I would use to line the interior walls of the pool before putting in the butyl lining. It came to mind that the thick pile of the carpet would provide some cushioning of ice pressure in the event of a bad winter, as well as protecting the butyl lining from the rough walls.

Other most obvious items needed to complete my project were cement, filter medium and small everyday tools and fittings. Having gathered together all the materials I wanted, I turned my attention to the construction.

The construction

The pool site under the pergola, approx 9 x 9ft, was paved with concrete slabs. I lifted these and used them to extend the patio. Hardcore, followed by concrete, was laid to form the base for the pool. Once hardened, I laid the first course of the concrete blocks.

At this stage, I inserted a drainage pipe between two blocks and level with the base. The drain would serve a two-fold purpose:
① It would give warning that a leak was taking place.
② It would allow any seepage between walls and lining caused by rain to escape.

At the fourth course, the flowpipe was temporarily installed. Thereafter, bricks continued to be laid until the required height had been reached. A hardening period was given before proceeding with the next stage.

Next step was the lining of the interior of the pool with the thick carpet. This was followed by laying in the butyl lining. I found that it greatly assisted me in this awkward task to fill the interior with water up to a few inches to where the flowpipe had to pass through. The pressure of the water kept both linings tight against the walls of the pool.

I found this was important because the cutting of the two linings to pass the flowpipe through, has to be accurate. The hole cut in the butyl lining needs to be smaller than the diameter of the flowpipe. That allows it to be stretched over the flowpipe, forming a tight collar. The carpet lying behind the opening was cut to the diameter of the flowpipe.

A waterproof sealing compound was now used to make a good join between pipe and butyl lining. To prevent any movement disturbing the join, measures need to be taken to secure the pipe to the wall. (See Fig. 3).

The pool was finished, apart from providing decorative features i.e. capping along top edges and rendering on the outside walls to enhance the appearance.

The filter

Obviously, while awaiting cement and mortar etc. to dry, I got on with siting and preparation of the filter unit.

Firstly, a drain plug was required to be let into the base of the 25-gallon (c 115-litre) unit to facilitate future cleaning.

Next, I cut a hole into the front side of the tank at a point 6 in. (15 cm) from the top and 9 in (c 23 cm) from the left side. The diameter of the hole is determined by the size of the coupling installed here to accept the flowpipe.

Another hole to take a 28 mm (1.1 in) coupling was made on the rear right side to make an overflow. This would ensure that during heavy rainfalls, water in the pool and filter would level off and not rise over the top.

The tank was then mounted onto two blocks so that the top was level with the top of the pool.

Taking the 12-gallon (55-litre) tank, I drilled some holes along the bottom edge for the filtered water to pass through into the larger tank (see Fig. 1). A hole, the same diameter as in the larger tank, was cut 6 in. (15 cm) from the top and 6 in from its narrow side, again to take the coupling accepting the continuation of the flowpipe. The 12-gallon tank was then mounted inside and to the left of the larger tank, ensuring that the top of this smaller tank was level with the top of the larger tank (see Fig. 4).

All that remained now was for the sections of flowpipe to be cut to appropriate lengths in order to couple up the pool with the filter. I drilled some holes along the section of flowpipe within the 12-gallon tank to help disperse the water flowing over the filter medium.

The filter media I used were nylon scouring pads and foam sheet placed inside the tank. The pump was set up in the clean side of the large tank and the return pipe attached. A flexible 28 mm (1.1 in) hose was used for this job. The

The chosen site for the pool.

The finished pond with its complement of happy Koi.

hose passed out through a hole in a cover fitted to the top of the large tank, eventually to empty into the pool.

Final analysis

My system has been up and running since spring 1994. I have been very pleased with the outcome and can honestly say I have not experienced any problems with its operation.

The above construction took place in March '94. At the end of April, I installed an ultra-violet unit on top of the large tank. Return flow water passes through the unit after leaving the pump and before its journey returning to empty into the pool. It is controlled by a time switch, so no power is used during night-time hours.

I have only given a brief outline of the construction of my system as a guide. What I have endeavoured to show is a set-up for a system that is almost trouble- and maintenance-free. The principal points offered by this arrangement are:

1. The action of pumping clean filtered water back to the pool draws unfiltered water in from the pool as the waters find their own level.
2. If the pump should fail, no water loss is experienced.
3. The pump suffers little wear, as it is not pumping up dirty gritty water from the bottom of a pond.
4. Cleaning of the pump becomes a minimal routine job.
5. Water lift from the pump is minimal and therefore does not require a large capacity pumping unit.
6. Because the pump is situated in the filter, the pool will never drain by reason of siphonage or water lost during leakage in the plumbing. Once the pool's level drops to the flowpipe exit, no further loss takes place.
7. All aspects of the system are easily accessible and cheap to replace.

Having experienced more than a year living with this arrangement, I find I am taking more interest than ever in my fish friends. Every time anyone passes the pool, they are there at the surface waiting to be spoken to; they have even grown and become tamer. The pool is now a focal point and enjoyment is now greater, as maintaining a crystal-clear pool is no longer a chore. AFP

SEAVIEW

BY GORDON KAY

Cod facing extinction

Surprise, surprise. North Sea Cod will soon become extinct! Scientists are saying that the breeding stock which is left, is equivalent to less than is needed by Britain's chip shops every year.

A short piece in the *Sunday Times*, on 4 June, told how research by the Fisheries Laboratories in Lowestoft showed that fishermen were killing so many cod that less than 3% reach breeding age and less than 1% ever breed more than once. This is quite a staggering figure, but one which does not surprise me in the least.

This warning came just before ministers from eight countries — Britain included – were attending a conference to discuss the dangers which face the North Sea; dangers such as pollution and overfishing. The research shows that there are just 60,000 tonnes of breeding stock left in the North Sea. Remember the fate of the North Sea Herring?

The **Worldwide Fund for Nature** is organising a campaign which will include appeals to the public to stop them eating cod. Now, this is good. I don't mean to be flippant, but I can't somehow see the Great British public suddenly clammering for Flying Gurnard and chips, or a rash of "Save the Cod" stickers in the rear windscreens of half the cars on the M5. Can you?

TREVOR McDONALD

Evening in the North Sea. The sun is also setting on its stocks of cod... just like it did on its herring.

No Punch and Judy show

I see that they're still slaughtering Pilot Whales in the Faroe Islands, despite all the contempt expressed by a huge number of countries around the world.

For anyone who's just returned from an extended stay on another planet, the people of the Faroes have a tradition of slaughtering thousands of Pilot Whales in a binge of what can only be described as bloodlust.

Anyone who has witnessed this annual event will know just how sickening it is. The sea turns red with blood, people hack away with gay abandon at the poor creatures and it takes ages for many of them to die. All this is watched by small children as though it were a Punch and Judy show.

They carry this tradition on every year and nobody really knows why. The locals maintain it is for food, which they badly need. Absolute rubbish! The islanders have become quite wealthy from other activities and need the meat like I need to eat the half-eaten burger I saw on the pavement outside Macdonald's yesterday.

There was a TV programme on Channel 4 recently which gave an insight into the whole thing. I hope that you all saw it, for the whole business was laid bare for all to see. Even the local law gets in on the act. The activity has to be sanctioned by the sheriff, who gets a share of what everybody catches. To him, this means some 15 tonnes of prime whale meat.

Now, I've just read of how the European Union are putting pressure on the UK Home Secretary to reduce the sentence of two boys involved in the killing of another! If the Europeans can spend time on trying to free certain individuals, why can't pressure be brought to bear on the Faroese — in the way of economic sanctions — to make them change their minds? Where, for goodness sake, are our priorities?

JOHN GAMES

Friendly Florida manatees. (see Snippets)

Rallying call

It would appear that this great hobby of ours — fishkeeping as a whole, I mean — is as much a victim of recession as the building trade. Every dealer I talk to nowadays tells me that business has never been so bad — and the marine sector is suffering the most.

It was only to be expected, of course. We are only just starting to climb out of the worst recession this country has seen for decades; in fact, some would have us believe that we are still in it. At times like these, the last things that people spend money on are luxuries like watching fishes in glass boxes. And, naturally enough, the aquarium trade is the kind which feels the benefit of any upturn last.

The real problem is that, when business is so bad, companies tend to retrench, simply to survive. There is no money around for expansion or for developing new products.

For example, I can't remember the last time I saw anything really new, which was destined to change the face of aquatics forever. All we seem to see are old ideas, repackaged.

There is also the danger, of course, that it is always darker before the dawn. I mean, how much longer can shops — especially the small, independent ones — survive, having had so many years without good profits?

And it's not just shops. The hobby as we know it is in danger. Not from the so-called environmentalists who would see us stopped, but from the lack of money.

But where are all the salesmen? The motor industry has survived because they have been virtually giving away new cars for the past few years. Heavy marketing campaigns and gobsmacking deals have meant that cars have still been sold. Why can't the aquarium trade wake up and smell the flowers? Fight, for your and our sakes!

SNIPPETS

1. Of the mammals which took to the sea millions of years ago, three major groups survive today. First, the order Sirenia - the sea cows, represented by manatees and dugong — consists of only three species. The second is the order Cetacea, the whales and dolphins. The third group, the Pinnipedia, seals, sea lions and walruses, is a sub-order of the order Carnivora, the meat eaters. There was a fourth order, the Desmostila, but they became extinct during the Miocene period.
2. A whale's normal body temperature is 37°C (98.6°C) ... just like ours.
3. Whale's milk contains, typically, 16-46% fat. Milk from a human contains only 3-5% fat. Daily quantities of milk produced can amount to more than 100 litres, depending on the species.
4. The near-term foetus of a Blue Whale calf puts on 35kg (77lb) of body weight every day.
5. A Bottle-nosed Dolphin can produce 1.4kg (3lb) of faeces and 4 litres (0.9 gal) of urine, every day!
6. The Blue Whale is sometimes also called "Sulpherbottom".
7. The scientific name for the Minke Whale is *Balaenoptera acutorostrata*.

DAVID TWIGG'S

KOI CALENDAR

Jobs for the month

September is a month where the longer nights pull temperature down and, once again, it is probable that the temperature will fluctuate widely. Care must be therefore be exercised and an eye kept on the weather forecast when feeding.

If a heater is not a part of your pond system, then please give consideration to the installation of one. Even if it is not possible to heat to sub-tropical temperatures, it should be capable of minimising swings of temperature as winter begins to approach.

Utilising a heater in this way gives Koi a longer feeding season and they will therefore be better prepared to enter winter.

MMR update

I mentioned a couple of months ago that I had ordered an MMR water purifier for use on the tapwater fed into my pond that supports phenomenal filamentous algal growth. The filter arrived and has, at the time of writing, been installed and running for 23 days. Over this period, I have watched the blanket weed die back and the resultant clarity of water in my pond is quite remarkable.

As usual, there is always a downside in most situations and in this case, no blanket weed means nothing for the Koi to root around in. However, I am sure that they will soon acclimatise to their new 'clean' environment and give Lyn and me continuing pleasure for many years to come.

A point worth considering here is this: as the blanket weed dies, there arises a greater need for extra cleaning of pond and drains to prevent ammonia levels rising. Should this happen, it will be necessary to cut back, if not stop, feeding until the problem resolves itself.

Also, and this applies to any situation where water is being added from the main supply, care should be exercised in choosing where in the system to feed this fresh water. When water temperatures are relatively high, the filter bacteria will not take kindly to being 'hit' with cold water, and this may cause die-back, which can only be recovered with time. It is good practice to make any changes to a pond system, particularly those that affect water quality, slowly so that the Koi can acclimatise without stress to this new environment.

DAVID TWIGG

Mark Martin won the Novice Class with this impressive Size 5 Showa.

Show talk

Lyn and I have attended two shows since last writing, and both were very enjoyable days out. The first was the **Middlesex & Surrey Borders Section BKKS** on 4 June. The weather was a lot kinder to the organisers this year than last. A wide selection of Koi dealer stands were present and the 'food kitchens' seemed to be doing a non-stop trade. Craft stalls were again offering a wonderful selection of wares.

Many familiar faces were encountered and, once again, we placed several faces to what were hitherto 'telephone names'.

Our thanks to Chairman **Kevin Kenny** and the show committee for their hospitality and to P.R.O. **Chris Pinchen** for sending me the results. Judges this year were: **Geoff Kemp, Lloyd Bartley** and **Paul Jarrett**, assisted by **Reg Coleman, Bill Johnson** and **Andrew Richards**, who chose a Size 5 Kohaku belonging to **Clive Whitebread** as **Grand Champion**. Well done to Clive, as he also took Supreme Mature Champion and Best Jumbo Koi with his Size 6 Ogon, 1st Size 5 Bekko and Koromo, Size 4 Sanke and Utsurimono, Size 3 Asagi/Shusui.

Other major results were: **G. Barclay** — Supreme Adult and Best Size 3 (Kohaku), 1st Size 4 Hikarimuji, Size 2 Asagi/Shusui; **George & Kathy Rooney** — Supreme Baby Champion and Best Size 2 (Sanke); **Samantha Alderson** — Best Junior, Best Size 1, 1st Size 1 Utsurimono and 1st Size 2 Kohaku; **Bill & Betty Steen** — Best Size 4, 1st Size 4 Tancho and GinRin; **Mark Martin** — Best Novice, Best Size 5, 1st Size 5 Hikari Utsuri, Showa, Sanke and GinRin; **Dave Nicholls** — 1st Size 3 Sanke and Bekko; **S. Craig** — 1st Size 3 Tancho and Koromo; **Peter Turner** — 1st Size 5 Asagi/Shusui, Size 4 Kohaku, Size 3 Hikari Utsuri and Showa, Size 1Kawarimono and Hikari Utsuri; **Tony & Marie Martin** — 1st Size 4 Hikarimoyo and Size 2 GinRin; **Derek &**

WHAT'S ON IN SEPTEMBER

3 — Suffolk & North Essex Section BKKS. *Visit by Crouch Valley Section BKKS.* Contact **Alan Carter**, 01206 866011.
— Lea Valley & Harlow Section BKKS. *Coach trip to South Herts BKKS ponds.* Contact **Mick Fahey**, 0181 508 5155 or **Alan Burnall**, 01279 814838.
— Heart of England Koi Society. *Coach trip to Selective Koi Sales and Breisingham Gardens.* Contact **me**, 01926 4952123.
6 — Leicestershire Koi Section BKKS. *Speaking on Judging Koi in Japan is* **Bernard Channing** of **Japanese Water Gardens**, B.S.C. Social Club, Soulsmor Road, Leicester. Contact **Pip Ostell**, 01533 609707 or **Kevin Luckman**, 01455 250413.
7 — Suffolk & North Essex Section BKKS. *Monthly meeting.* Stanway Rovers Football Club. Contact **Alan Carter**, 01206 866011.
— Middlesex and Surrey Borders Section BKKS. *Guest speaker is* **Alan Rogers**. 8 pm, Norbiton C.I.U. Club, Kingston. Contact **Peter Saul**, 0181 979 9117.
9 — Heart of England Koi Society. *Monthly meeting.* Contact **me**, 01926 4952123.
10 — Merseyside Section BKKS. *Visit from Mid-Staffs Section BKKS.* Contact **Phil Adamson**, 0151 2202970.
11 — Northampton Section BKKS. *Monthly meeting.* Contact **Albert Day**, 01604 407361.
12 — Nottingham & District Section BKKS. *Monthly meeting.* The Western Club, Nottingham, 8 pm. Contact **Shirley Hind**, 0115 981 0923.
13 — Merseyside Section BKKS. *Monthly meeting.* Contact **Phil Adamson**, 0151 2202970.
17 — Central Section BKKS. *Visit Middlesex & Surrey Borders Section ponds.* Contact **Sue Finney**, 0121 747 2733.
— Northern Koi Club. *Speaking on Microscopes is* **Brian Mouat** *and* **Jack Howcroft** *on his trip to Japan.* Clifton Park Hotel, Clifton, Swinton. Contact **Tony McCann**, 0161 794 1958.
21 — Peterborough & Cambridgeshire Section BKKS. *Club Night.* Breaks Snooker Club, Peterborough. Contact **Gary Found**, 01733 573178 or **Alan Peppercorn**, 01733 349472.
27 — London Section BKKS. *Speaker is* **Gary Pritchard**, Ruskin House, Croydon. Contact **Keith Nind**, 0181 673 3574.

SHOW CALENDAR

AUGUST

19/20 **Lea Valley & Harlow Section BKKS**. *Closed Show*. Harlow Garden 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.

SEPTEMBER

9/10 **Mid-Somerset Section BKKS** *Koi Show* as part of the "Countryside Cavalcade" at the Royal Bath & West Showground. Contact **Alan Purnell**, 01458 272132.

10 **Leicestershire Koi Society** *Show*. Contact **Pip Ostell**, 0116 260 9707 or **Kevin Luckman**, 01455 250413.

OCTOBER

1 **Northern Koi Club** *Show*, Cascade Water Gardens, Radcliffe, Bury. Contact **Tony McCann**, 0161 794 1958.

Stuart Herman — 1st Size 2 Hikarimoyo and Hikari Utsuri, Size 1 Hikarimoyo; **Gary Clemons** – 1st Size 1 GinRin, Size 3 Hikarimoyo, Size 4 Koromo; **Frank Chalke** — 1st Size 4 Showa, Bekko and Kawarimono, Size 3 GinRin; **Terry Hill** — 1st Size 1 and Size 2 Tancho; **Ron Mansfield** – 1st Size 1 Hikarimuji; **Mike Linwood** — 1st Size 1 and Size 2 Showa; **Peter Saul** — 1st Size 5 Kawarimono and Utsurimono; **J. Brennan** — 1st Size 1 Asagi/Shusui; **John Giddens** — 1st Size 1 Sanke and Size 2 Utsurimono; **Alan Harrington** — 1st Size 5 Hikarimoyo; **Keith Stanhope** – 1st Size 1 Kohaku, Size 2 Koromo and Kawarimono; **Alan Jordan** – 1st Size 1 Koromo and Size 2 Bekko; **Kevin Kenny** — 1st Size 3 Kawarimono and Utsurimono, Size 4 Asagi/Shusui.

DAVID TWIGG

Clive Whiteland's Supreme Champion Kohaku.

Results of the **Crouch Valley Show** next month.

OPEN INVITATION

My thanks go to all Koi club Secretaries or PROs and others who send me their latest calendar for inclusion in this column. Although I do my best to ensure all events are mentioned, it may be that some information, which arrives a little late, misses my deadline.

Ideally, I need to have information **at least 10 weeks** before the date of the event to guarantee publication. You may, of course, ring me direct on **01926 495213**, which will allow a little leeway. This request also applies to dealers with special events, auctions, etc. I look forward to hearing from you.

All Koi keepers are welcomed to the events mentioned in this **Calendar** (an entry fee may be payable). Further details can be obtained from the contact telephone number quoted alongside the diary entry. Please write to me at your earliest convenience via the **Editor, 9 Tufton Street, Ashford, Kent TN23 1QN.** Thank you.

WHAT'S ON (LATE AUGUST)

20 — Heart of England Koi Society *entertain members of Yorkshire Section BKKS*. Contact **me**, 01926 495213.

23 — London Section BKKS. *Open evening*. Contact **Keith Nind**, 0181 673 3574.

KOI: QUARANTINED SUCCESS

Why risk losing all your Koi when you can do something about it? Quarantine/acclimatisation is the obvious answer, as Barry Goodwin explains.

Illustrations by the author

Quarantine is the means whereby we can protect our existing Koi from potential risks to their health brought in by new stock. Most Koi keepers do not quarantine new fish when they are purchased and, as a consequence, cause their existing fish, and themselves, a wide range of problems.

The decision to quarantine or acclimatise new fish is one that should really be adopted by all Koi keepers, and in the early stages of the hobby, as it is necessary that a good mature system be kept in operation all the time. The idea of setting up a brand new system to carry out quarantine is flawed, in that there will be the problems associated with a new system to contend with, at the same time as the quarantine procedure, and this can, more often than not, result in the loss of the fish you have just purchased.

Quarantine (or acclimatisation) is not just a case of isolating fish and watching what happens; there are measures to be carried out, such as anti-parasite or bactericidal treatment, all of which means that the system must be a mature one with a filter capable of withstanding the medications that will be used. Such a system should be kept in operation all the time with a crew of 'maintenance' fish in it. It should be a set-up that can be used for treatment of other fish when not being used for quarantine.

This dictates, of course, that you should plan your Koi keeping a year in advance, selecting your purchases to coincide with the time that your quarantine system should be free to accept them. If you are using the facilities for treatment purposes, then do not attempt to quarantine fish at the same time.

System design

To design a suitable quarantine system is not as simple as you may, at first, think, because there are a number of considerations to be taken into account.

1 Size

The size of the system should be suitable to accommodate the largest fish that you are ever likely to purchase; you must bear in mind that this must include adequate space for the 'maintenance crew' as well.

If you intend to purchase Koi of 20in plus, a system to accommodate these should have between three and five hundred gallons capacity, with enough room for adequate exercise.

2 Filter

The filter must be large enough and mature enough to take any medication without faltering. There are many misunderstandings about this which lead Koi keepers into a variety of measures which are usually counter-productive.

I will make a bold statement here which, I am sure, some of you will disagree with: if you have a filter that is badly affected by medication, then it is probably too small, or there is something about its design that should be altered.

If you have a quarantine system that has a capacity of, say, 500 gallons (c2,270 litres), then you should equip it with a filter capable of filtering 2,000 gallons (c9,000 litres). This will give it the capacity, when mature, of being able to cope with medication.

Full maturity of this nature could take over a year to attain.

3 Stress management

This is a very important factor. It could turn out that you need to carry out fairly large water changes during quarantine, so

Top Koi keepers like Liz and Mike Donlan (whose pond is featured here) ensure that the stunning Koi in their pond remain so by quarantining every new fish that they buy. They simply do not want to find out the hard way that a quarantine system is as essential a part of every Koi keeper's equipment as even their pond is!

The quarantine system belonging to Brian Mouat of Manchester. This is an indoor set-up which, due to space restrictions, has its filter situated outside. Note the cover and airlines.

This is the outside filter. Because of its situation, outside the shed, you will note that it is very heavily insulated. The brush chamber is nearest to us, and the biological chamber beyond. Note the airlines which feed airstones situated within the filter.

it is important to ensure that you can do this without stressing the Koi.

You should, for example, have a drain on the system that is not capable of emptying it completely. This is very important, as an accident, such as forgetting that the water is running out if the 'phone goes while you are changing it, can prove fatal for the Koi!

You should also have a means of replenishing the system that does not involve pouring water directly into the vat. A separate chamber in the filter system could be used for this.

A cover for all, or at least part, of the system is also a good idea, as it gives the Koi the added security of a 'hiding place' and is, thus, useful for lowering stress.

4 Location

You should consider at the outset where you are going to locate your system. It should be somewhere that can be maintained in relative quiet, but should be near a suitable electricity supply.

It should also be near a water supply and it should not be situated where direct sunlight can have a dramatic effect.

5 Heating

You should equip your quarantine quarters with a suitable heating system and a means of thermostatically controlling the temperature.

This will be needed if you discover any infection with your Koi that needs treatment. It will also be useful if you need to use the system for other treatment, or even for overwintering Koi that, for various reasons, do not take pond winters well.

There are plenty of commercial systems for doing this now available, but it is also an area where the DIY hobbyist can excel.

Construction

There are many ways that you can construct a quarantine system, probably the most ideal being the purchase of ready-made units: the vat and the filter. Indeed, there are units available where the entire system is built into one large fibreglass whole, but these are relatively expensive.

You can also use alternative methods such as a brick-built vat (in a garage) which can be rendered and then sealed or even fibreglassed. A wooden framework with thick plywood or blockboard sides can also be used if it is fitted with a liner. Plastic water tanks, such as those available from DIY stores, are usually used for the filtration system.

Equipment

A pump is, obviously, required; a variable speed central heating pump is ideal.

An Ultra-Violet Steriliser (UVS) can also be fitted and this will be used to keep down the bacterial loading in the water. You must be careful, however, *not to use it when there is any medication in the vat water*, as UV will degrade chemicals very quickly.

There are several types of heater you can use, from the submersible aquarium types, to a kettle element let into the side of one of the filter chambers, preferably the settlement chamber. Heat control is normally accomplished electronically using a commercially obtainable unit which is coupled to the heater.

The tank can also be insulated with glass wool, the same as used for loft insulation, and exposed pipework can be covered with bubble wrap.

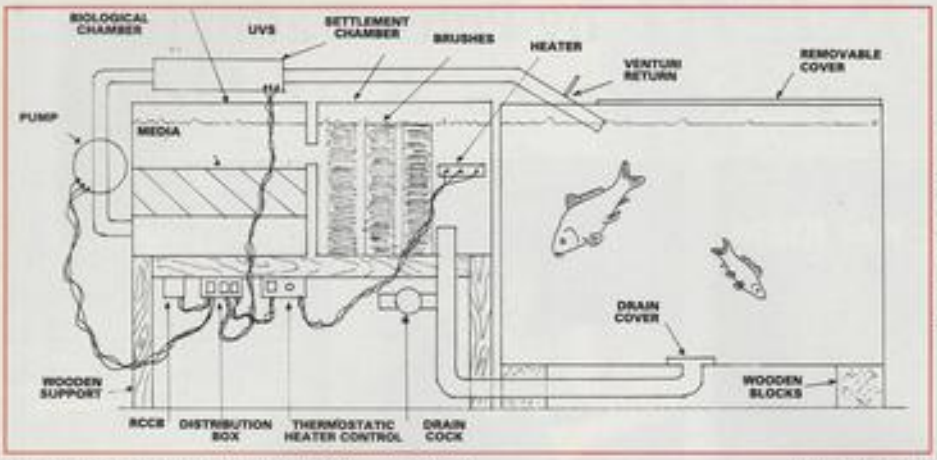
Aeration is very essential and this can be achieved by using a venturi, a splash return, or airstones/diffusers driven by an air pump. A large vibratory unit is adequate here, but the ideal is a 'Hi-Blow' pump.

Setting up

Summertime is the best time of the year to set up a quarantine system, as the filter will stand a better chance of maturing. If you have a pond that is already 'up and running', then the ideal thing to do would be to fill the system with pondwater. By doing this you will avoid many of the 'new pond syndrome' effects that you normally would encounter.

You should next put several fish into the system and carefully monitor the water for ammonia, nitrite and pH. After a period of time, you should notice ammonia readings and these should be controlled by percentage water changing. Discard the water you remove, and top up

Nice fish at a dealer's premises. This dealer would never consider introducing fish to his existing sales stocks without first subjecting them to quarantine. His whole livelihood would be at risk were he to default in this department.



This diagram shows a layout for a quarantine system such as described in the text. Please note that electrical wiring should be correctly loomed; it is only portrayed in this manner for clarity of diagram.

from the pond. If you use tapwater, however, make sure that it is treated with a purifier first.

After a couple of weeks, your ammonia readings should start to drop and nitrite will become more of a problem. Carry on with the water changes until you get stable zero readings. Try to ensure that the pH remains around neutral throughout.

Your filter should become 'mature' after about five or six weeks. This does not mean that it is capable of coping with all eventualities; it simply means that it will control ammonia and nitrite. If you were to use medication at this stage, then you would destroy the newly established bacterial colony to a great extent.

Only after about a year's undisturbed running will your filter be strong enough to withstand medication.

Quarantine procedure

The question that is now usually asked is, "How long should I quarantine my fish for?"

The answer is, once again, not too simple, since it all depends upon what you hope to achieve.

If you wish to guard against parasites, then you should leave your fish to settle for a week, observing them during this time. You should ensure that they behave normally, eat, excrete and use all their fins properly.

If you observe no untoward symptoms, then you can safely assume that all you need to treat against are the more common lower forms of parasites. This can be done using formalin and malachite green at the standard recommended doses, once per week for three weeks. This will intercept the life cycle of the parasites.

The Koi should then be left for a further period of seven days to settle before (assuming that no untoward symptoms are noted) being introduced to your pond.

There are, of course, other problems which require specialist remedies to control, so your Koi must be observed during the quarantine period to ensure that they are infected with none of these.

If a Koi, for instance, does not use its gills correctly, it is safe to assume that it has one of a number of problems in the gills. It could be Gill Flukes, or gill damage due to ammonia levels during transit, or a fungal problem or a bacterial problem, to mention but a few. You should get a more experienced hobbyist or vet to diagnose this properly for you.

There are a number of easily recognisable larger parasites that you should be aware of, such as the Fish Louse (*Argulus*), Anchor Worm (*Lernaea*), or the leech (*Piscicola geometra*). These will not be eradicated with formalin and malachite; they require specialist remedies. Once again, get a more experienced hobbyist or vet to diagnose these problems for you and advise treatment if you are not sure (see also my article **Tackling Parasites** in the April '95 **Koi Supplement**).

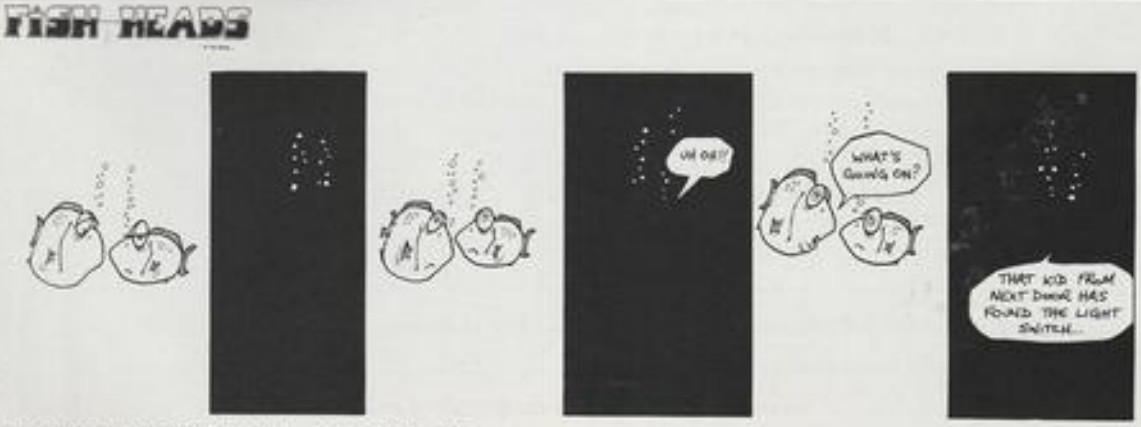
You must also make the decision if you are going to quarantine against disease and, if you are, what diseases you will look for. We are getting into another field altogether here, one which you would require specialist knowledge to go further.

Useful tips

Your best safeguard is to buy your fish from a reputable source that you know and trust. If the dealer buys his or her stock from a supplier of healthy Koi, then there should be no problems of this nature. A dealer should carry out quarantine procedures anyway and this will be your best protection against disease.

You must remember, however, that the major sources of problems during quarantine are 'own goals' scored by the Koi keeper. Putting Koi into an immature system that is too small while they are in stress from travelling and possible changes in water chemistry from one part of the country to another, can end up being a death sentence.

Get it right at the outset, and your Koi will reward you with many years of pleasure. Get it wrong and... **AEP**



KEEPING:

Chinese Water Dragons

A nice quartet consisting of one male (bottom left) and three females.

They are large and they are beautiful ... and, as Charles Worrall explains, they make great pets, if you can cater for their needs.

Photographs by the author

I have been keeping Water Dragons for over five years and of all the reptiles I have kept, I have found them the most endearing. Water Dragons display more obvious personality and character traits than many other reptiles. They have, for example, some very unusual ways of communicating, such as head bobbing and waving their forelimbs. When they are in flight they run on their back legs using their tail as a counterbalance.

It is easy to mistake males and females when they are young, but as they get older, the males develop a very prominent crest and comb and grow considerably larger than females, reaching a total length of over 3ft (90cm).

The vivarium

In the wild, Water Dragons live together in loose groups; they are among the largest members of the Old World family, the Agamidae. These large lizards need to be kept in an appropriately spacious enclosure, a minimum of 6x2x2ft for a single pair of adult animals. High humidity of around 70% and a daytime temperature of 84-88°F (29-31°C) dropping to 75-80°F (24-27°C) at night.

The use of a thermostatically controlled infra-red heat source positioned out of reach of the animals is essential. There should also be a temperature gradient within the cage and a basking lamp can be used to create a hot spot.

I believe if animals are to be kept in captivity, they must be taken care of properly. The enclosure should therefore be as large and as naturally furnished as possible. No reptile should be kept in captivity unless the right conditions for their optimum welfare can be provided.

Water Dragons, like other reptiles, should be fed a varied diet. I now feed all my animals on defrosted mice, cockles and mussels, fruit, vegetables and rice etc. Particular care should be taken of the diet of female Water Dragons after egg laying in November and December to ensure they restore their lost calcium and mineral levels used in egg development.

UV lighting

Water Dragons need adequate UV lighting for the synthesis of Vitamin D3 in their skin. This is needed for the deposition of calcium in bone formation. Lack of Vitamin D3 causes softening of bones, rachitus and loss of teeth; it also facilitates bone fractures.

There are several full-spectrum lights on the market that can provide this beneficial UV. The most well known of these is Trulight. UVB, producing black light, may also be used, as long as the sources are shielded in such a way that the animal/animals can keep well away from the light when they want to (only a small area of the cage should be lit by the black light). Alternatively, black light may be used but only kept on for a short period each day by the use of a time switch.

Constant exposure to intense UV may be just as detrimental as not providing any UV at all, and may cause cataracts and skin cancer. If it is noted that the animals have irritated eyes, then UV should be reduced.

Females are smaller than males and do not possess the well formed crests.

Close-up of a male. Note the crest.

WATER DRAGON FACT FILE

Common name: Chinese Water Dragons.

Scientific name: *Physignathus cocincinus.*

Distribution: South Eastern Asia. Most imported specimens are from Thailand or Southern China.

Length: 24 to 36in (60-90cm).

Characteristics: Water Dragons are among the largest members of the family Agamidae, bearing some similarities to the Green Iguana. There is a pronounced dorsal crest on the neck. The body is approximately 8-10in (20-25cm) long in an adult, with the rest of the length being made up by the tail. The tail is broad and flat for swimming purposes. The arms and legs have sharp claws, which, in the wild, are necessary for climbing. Water Dragons run on their hind limbs. Body coloration is green with broad black bands running around the tail which provide effective camouflage for animals basking in trees. The belly is dull olive colour.

Habitat: Jungle trees overhanging water (rivers etc) where they may bask, diving into water when they are disturbed/frightened. They live together in loose colonies.

Sexing: Maturing males develop comparatively larger heads than females, large jowls and a larger crest behind the neck. The femoral pores (on the thighs) on the male are slightly larger than on the female.

Young: Water Dragons are egg layers; they dig tunnels beneath trees for laying, then replace the earth which is patted back down using their snouts to cover up the site. The young are 6-7in (15-17.5cm) at hatching.

Related species: *Physignathus lesueurii* (Leseur's Water Dragon) from Australia and the small South East Asian *Physignathus temporalis.*

Bullying

If keeping Water Dragons together in a colony, they are best kept in a group of one male and up to four females, though in a room-sized enclosure, it may be possible to keep more than one male together with a group of females.

A major cause of stress among a colony of Water Dragons is bullying. When bullying is observed, the animals concerned should be closely watched and if this continues, the animals must be separated, otherwise the animal being bullied will quickly decline. Obvious signs that an animal is being bullied is that it will tend to keep away from the rest of the colony and may stop feeding.

With care and patience, Water Dragons become used to being handled.

CAPTIVE CARE TIPS

1 Cage
Only a very large cage, minimum 6ft, will provide the necessary requirements for these large animals. The terrarium/palludarium should, ideally, be devided equally between land and water, with large branches overhanging the water. The water depth should be at least 8-10in (20-25cm). The water should be efficiently filtered and there should be frequent water changes (depending on the volume of water). The enclosure should be planted, both on land and in the water, where possible.

2 Temperature Range
Land — 84-88°F (29-31°C) with 10°F (5.5°C) drop at night (and in winter for several months if preparing to breed). Water 75-80°F (24-27°C).

3 Vitamin/Mineral Supplementation
Food should be dusted with a vitamin/mineral reptile supplement two or three times per week for juveniles, but only once a week for adults, as long as (frozen/defrosted) mice are included in the diet.

4 Feeding
Adults should be fed about twice a week (every 3 to 4 days); juveniles every second day.

5 Special Needs
UV light is essential for bone formation, particularly in young animals. Full-spectrum light such as 'Trulight' and/or restricted use of 'Blacklight' is a must.

6 Breeding
This species has been bred successfully, though mainly in zoos. Mating takes place during the cooler months. The females will lay eggs two months after copulation has occurred. A layer of sand/peat or other equivalent moist medium at least 8-10in (20-25cm) deep should be provided for them, in a secluded place in the enclosure. Around 9-15 eggs will be laid. These should be removed immediately and placed in an incubator in moist vermiculite (taking care not to turn the eggs). The eggs should hatch after 60 days at a temperature of 27°C (80°F).

7 Snout rubbing
This should be watched out for, particularly in imported specimens. Water Dragons have a tendency to rub their snouts against the glass in an attempt to get to the other side; the size of enclosure does not appear to effect this tendency. (The notion of a glass wall is not easily grasped by these animals). Placing barriers, such as plants etc on the inside of the glass, should reduce this problem. Any wounds caused through snout rubbing should be treated with an iodine-based disinfectant to prevent infection.

Self-contained quarters

As can be seen from one of the accompanying pictures, I have built a fairly large enclosure for my animals. It is 12ft long, 8ft high in places and just under 30 inches wide. Twisted vine protrudes from the water in the large tank set in the base of the vivarium; this interconnects with other vines throughout the vivarium. This is ideal for Water Dragons, as they are arbo-

My under-stairs Water Dragon enclosure.

real and therefore love climbing

The tank is 6ft long, 28 inches wide and 2ft high, ideal for Water Dragons to swim in. In the wild, they like to live over water which they dive into for refuge when threatened. I have noticed one of my female Water Dragons staying submerged for as long as 20 minutes.

The above enclosure (called a palludarium) is a self-contained ecosystem. Water is recycled around the whole enclosure through the hydroponic gravel medium in which the plants grow. The water flows over the roots and oxygenates them, while the plants take nitrates out of the water produced by the breakdown of waste products from the fish (barbs, cichlids etc) and reptiles living in the enclosure. The reptiles and fish appear to live in relative harmony, and I have never noticed the Water Dragons try to catch any of the fish.

Cleaning the enclosure is very easy, as the Water Dragons usually defecate in the water, which is recycled in the process described above. Only the branches need to be sprayed and wiped occasionally with an iodine-based disinfectant.

Plants that are successfully grown in these hot humid conditions include species of *Dracaena* and *Philodendron* (such as Bread Fruit and Cheese Plants); Stag Ferns can be grown on Sphagnum Moss attached to the walls of the vivarium.

Water Dragons will not eat vegetation, but it is best to position and secure the plants out of reach of your animals where possible, as they will otherwise sit on them, making very short work of your prize possessions.

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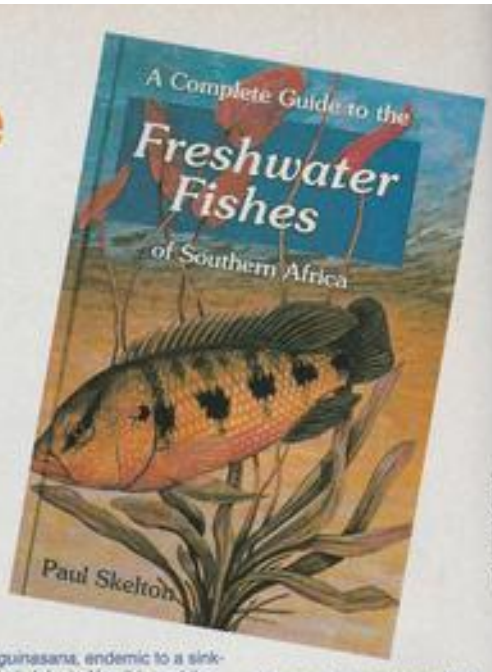
The General Care and Maintenance of Green Water Dragons, Sailfin Lizards and Basilisks by Philippe de Vosjoli published by **Advanced Vivarium Systems, Lakeside** CA 92040 U.S.A. (1992).

The Care of Reptiles and Amphibians in Captivity (Revised Second Edition) by Chris Mattison. (1982) **Blandford Press London.**

BOOKS

A complete guide to the freshwater fishes of Southern Africa



DAVID ARMITAGE

By: Paul Skelton with colour paintings by Dave Voorvelt and Elizabeth Tarr.
Published by: **Southern Book Publishers**
ISBN: 1 86812 493 2, 388pp.
Price: £20

Open this book and you enter the world of Squeekers (*Synodontis*), Happies (Cichlidae), Catlets (*Chiloglanis*), Fat-heads and Yellowfish (*Barbus* spp), Redfins (*Pseudobarbus*), Moonies (*Monodactylus*), Stone-bashers (Mormyridae) and even Rockies (*Sandelia bainsi*).

It covers the larger unfamiliar freshwater fish fauna of Zambia, Zimbabwe, Mozambique, Namibia, Botswana and South Africa.

Following a brief history of southern African ichthyology, the book discusses geographical factors, such as drainage, climate and aquatic eco-regions, before covering aquatic systems and habitats and factors affecting fish distribution. It also covers general fish biology, fisheries and aspects of their ecology, such as behaviour. A particularly valuable section is that on threats to fish and their conservation. There is even a useful section on fish photography.

The bulk of the book is made up of the fish species, each covered with distribution map and a scientifically accurate colour painting. This includes the threatened Red-finned Minnows, *Pseudobarbus*, which are endemic to the Cape-fold mountains. Among the cichids covered is *Tilapia guinasana*, endemic to a sinkhole lake in Namibia and the subject of a recent *Survival* film. In all, 245 species of freshwater fish are covered, including aliens and 29 marine and estuarine species.

This is now the authoritative volume on fish of the region. It fulfils the traditional identification function of a field guide, but also, in its opening section, acts as a broad introduction to ichthyology. The quality of binding, printing and the beautiful paintings also make it a very attractive production.

The softback is available from **Stephen Simpson Books, 23 Melton Street, Melton Constable NR24 2DB.**

David Armitage

Fishes of the World (Third Edition)

By: Joseph S Nelson
Published by: **John Wiley & Sons Inc**
ISBN: 0-471-54713-1
Price: £66

I have been using *Fishes of the World* for years (in fact, ever since the first edition came out) and have always found it to be about the best reference work on the subject. The lastest (3rd edition) maintains the same enviably high standards of its two forerunners and represents, in my view, an absolutely indispensable aid for anyone who wishes or needs to know what's going on in the fast-evolving world of fish systematics.

Let me give you just one example of the sort of thing I mean. All aquarists are familiar with the Anglerfishes. In fact, we've been mentioning them very regularly in *A&P* over the past year or so. But, did you know that there are 15 families of fishes that fall within this group? Well, not only are they all listed, but so are the superfamilies and the subfamilies, along with details of how they relate to each other. The number of genera in each family and subfamily are also included, as are mentions of significant species within these genera. Apply this to all the major families of living fishes and you can see why this book is of such enormous value.

The 600 pages of *Fishes of the World*, with their numerous simple line drawings, are an absolute mine of information which I, and 'countless others,' could just not afford to be without.

John Dawes

Recent T.F.H. books

1 Discus... as a Hobby

By: Jim E Quarles
ISBN: 0-86822-405-X
Price: £5.45

This is a well illustrated book which will be found useful by anyone planning to take up Discus keeping for the first time. Experienced hobbyists will also find much to interest them, particularly the chapter entitled Discus Health and Treatments.

The chapter on wild species and subspecies is also of relevance and interest to all Discus fanciers, especially as it contains a picture of *Symphysodon discus willischwatzi*, the so-called subspecies over which there is considerable debate.

Discus... as a Hobby is from the **Save-our-Planet** series, profits from which "go towards the purchase of land in the virgin rainforests of Brazil to preserve them from exploitation".

2 Breeding and Keeping Frogs & Toads

By: W P Mara
ISBN: 0-7939-0130-3
Price: £13.95

"Frogs and Toads can be among the most rewarding of all animals, with their varied good looks and amusing habits, but before you get too deeply involved in them you should first learn their basics, and that's where this guide comes in."

This quote, taken from the author's introduction, encapsulates what this attractive book is all about. In general, it does a great job. My only major criticism is (as is often the case when dealing with feeding) its unquestioning approach to the use of live 'pinkies' (newborn mice) as food for certain species.

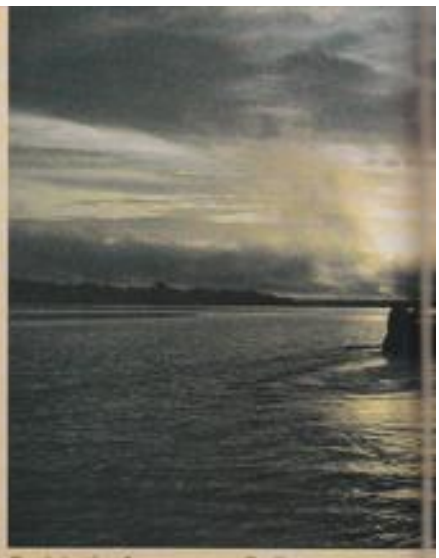
This aside, I would recommend this book as a useful aid to any herpetologist interested, not just in straightforward maintenance of these amphibians, but in their captive breeding as well.

John Dawes

AMAZONIAN REFLECTIONS

PART THREE

PROBLEMS & SOLUTIONS



Dusk in the Amazon as a Zodiac returns to base

I wondered how a ship like the *Columbus Caravelle* dealt with the more 'basic' needs of the 400 or so people on board. In particular, where did the tapwater come from, and what did the ship do with our 'wastes'? As a result, one evening I set out to explore the bridge.

The ship was only two or three years old and hence, it turned out to be truly state-of-the art in this regard. I had seen that we had taken plenty of freshwater on board in Iquitos, and were now chlorinating this for our daily needs. When fully booked with passengers, the ship needs about 60 tons of freshwater per day, and — as a back-up — also carried a desalination plant that could deliver 50 tons per day, which was especially useful on ocean cruises.

What about our waste materials? To begin with, any dry solids were incinerated on a daily basis. In addition, the *Columbus Caravelle* had its own sewage treatment works that ground up solid wastes and then let bacterial digestion in on-board sewage tanks do the rest. Eventually, a relatively clear effluent was produced, which was then discharged into the river, adding some nutrients but little else.

I was told that these systems had allowed the ship to be very highly rated in a recent study on how the environmental impact of cruise ships may be minimised. However, from the look on the face of the officer on the bridge who I questioned on these matters, such enquiries from passengers were relatively few and far between!

Jungle walk

Toward the end of the trip, while in the area of Boca do Jutiça, we ventured into the forest on a jungle walk. Taking about 200 people on a walk through the Amazon rain forest is quite a novel experience, although I must confess that I quickly decided to let the majority of the tour go ahead, while I led my own little detour.

It rained quite heavily that day, and we were soon soaked, so it was a struggle to keep our camera gear dry. Nonetheless, we saw — and chased — some small nondescript frogs around in the dense undergrowth, and several Basilisk Lizards showed why they are called "Jesus Lizards", as they skittered across the surface of some flooded areas, pausing on tree branches to look back in an almost scornful fashion.

At one stage my daughter insisted that we were lost, which was (of course) impossible? We eventually stumbled across the rest of the entourage, and later set off to explore the flooded forest in the inflatable boats.

Despite the overcast weather, we saw macaws, parrots, Squirrel Monkeys and a seemingly obligatory sloth in a (similarly obligatory) *Cecropia* tree, as well as several large iguanas draped across branches in the taller trees. Binoculars were a useful piece of equipment on this trip. For a few brief magical moments we also saw a Blue Morpho Butterfly flit like a lilting cartoon character along the edge of the forest, before it disappeared from view.

Later we stopped at a clearing where a small family of *caboclos* (river people) had made their home, and were surviving by growing a few crops, raising pigs and chickens, and by hunting and fishing. The head of the household told us (via our native guide) that the jaguar skin that was drying on a frame in front of his house came from a large male that had been terrorising the locals and had killed some of their livestock, which left him with no alternative but to kill it.

The Rio Negro

The Rio Negro is very well known to most aquarists, since it is in this area that many of the most familiar South American aquarium fishes occur. This is home to a whole host of species, such as Discus, Angelfish, Cardinal Tetra, various catfish and so on. Having passed the city of Manaus earlier the same day, we cruised a short distance up the Negro, and then moored in the region of the Anavilhanas Archipelago, a group of several hundred small islands, some of which are privately owned.

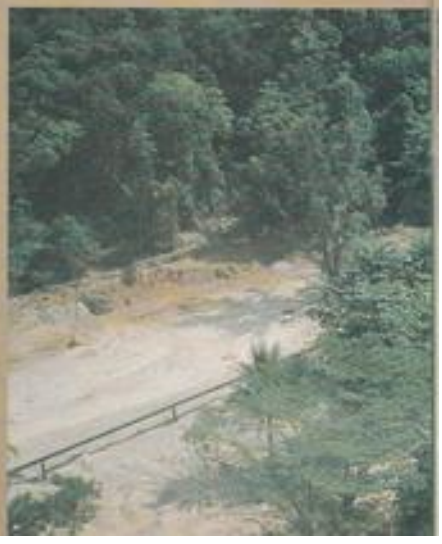
We eagerly boarded the Zodiacs, and then set off to explore. Once again, the high water level allowed us to glide along small streams and penetrate into the flooded forest, and it was here that we saw our first real example of *terra firme* forest (the forest above the normal flood plain of the river).

On a fiercely hot day, we were glad of any shade that we could find along the edge of the forest, where the trees reflected in the still, dark water and where, in one or two areas, flower petals and pollen formed a fragrant carpet over the surface.

The remarkable clarity of the water was in contrast to the sediment-laden conditions of the main Amazon, and it was easy to see branches of submerged trees several feet below the water surface. We saw relatively little wildlife that day, although everyone seemed to enjoy the quiet stillness of the flooded forest, which was occasionally pierced by the shrieking cry of the Cotinga Bird (which is also known as the Screaming Piha).

Problems

There are between 50-100 commercially important food fishes that occur in the Amazon basin, and these fishes provide a relatively cheap and available source of protein for the local people. In fact, the people living along the rivers in this region may get over 60% of their protein by eat-



In the final part of his mini-series, **Dr Chris Andrews** of the National Aquarium in Baltimore, examines the main threats facing Amazonia and offers some suggestions on how best to tackle them.
Photographs by the author

ing fish. Since more than three-quarters of these fishes rely at some time on the flooded forest for food, this is clearly an environment that needs protecting and managing with the greatest care.

In addition to this is the importance of many other 'fishes of the forest' in the global ornamental fish trade, and the source of income that they provide to at least 10,000 local Amazonian people. But the floodplain rivers of the Amazon — and the fishes that they contain — are suffering from the effects of a number of environmental changes, including over fishing, pollution, habitat destruction by deforestation and the building of dams, and the introduction of exotic species.

1 Over-fishing

Although there are some concerns that over-fishing of some species for the ornamental fish trade may be occurring, the consensus of opinion is that no Amazonian fish species is threatened with extinction as a result of these activities. Similarly, most of the important food fishes in the region are not threatened with extinction but there are also clear signs of over-fishing of these species in some areas.

The artisanal forms of fishing are typically low-impact, being non-mechanised, sometimes quite specific, and often carefully applied by the local people. However, the mechanised, efficient and often non-specific forms of industrialised fishing that are occurring out of ports like Manaus and Belem are producing obvious warning signs, as the size of the fishes that are caught is declining, and the boats have to go further and further afield to catch their desired species.

Since the growing urban centres in the Amazon will continue to rely on the river as a source of protein, the fisheries will require careful study and management to balance the needs of urban people with those in more rural (and perhaps politically less prominent) areas.

2 Pollution

In addition to industrial pollution (e.g. paper mills, oil exploration and extraction, etc.) and sewage wastes from an increasing population, prospecting for gold has also become a problem. For example, in the 1970's, gold prospecting became much more commonplace in some areas.

The gold miners used — and still use — mercury to extract the gold in the gravel of the river bed, and then the gold is obtained by burning off the mercury. Unfortunately, much mercury escapes or is spilt into the environment, and experts estimated in 1989 that up to 132 tons of mercury were entering the Amazon system each year — and accumulating in the food chain.

Fish can concentrate up to 100,000 times the amount of mercury in the water around them, and then pass this on to predators (including humans) that eat them. Noting that the effects in humans can include blindness, deafness, loss of balance and mental stupor, this could be a problem of frightening proportions, but one that is largely overlooked or ignored at the moment.

Another sad comment on the state of the environment (and the world in general) is the impact of the cocaine trade on streams and rivers in the rain forests of Peru, Colombia and Bolivia. Cocaine (which kills over 3,000 people per year in the US) is obtained by processing the leaves of the coca plant. This process involves a wide array of toxic chemicals, including various solvents, paraffin (kerosene), sulphuric acid, hydrochloric acid and ammonia, and it seems that many millions of gallons of these may be dumped into Amazonian waterways each year, killing aquatic life and polluting irrigation and drinking water.

3 Deforestation

The siltation of rivers and streams that result from deforestation is also a threat to the natural integrity of the region.

Although estimates vary, it seems likely that around 10,000 square miles of Brazilian rain forest are being cleared each year, and perhaps 10% of the original total has been cleared to date. I have mentioned the relationship between the fishes and the forest; in one area it has been estimated that forest clearance has led to a 23% decline in fish catches (between 1970 and 1975).

Unlike parts of Africa and Asia, where a main drive behind the deforestation of rain forests has been the value of the timber, the main reason for deforestation in Amazonia has been to make land available for farming — for both crops and cattle ranching (including water buffalo). In fact, the drive to provide land for farming may have been behind three-quarters of the deforestation of the region. This deforestation has led some natives to refer to three seasons during the year: the wet season, the dry season and "the burnings".

This land use is inappropriate, as the forest soils are relatively poor and cannot sustain intensive agriculture in the long term, and once deprived of forest cover, the soil washes into the rivers where it causes siltation problems. Of note is the fact that over $1 billion has been spent in the last decade to encourage cattle ranching in Amazonia, and yet the meat production from these ranches has showed a marked decline.

What is needed is the more sustainable use of forest products, such as rubber, nuts, timber and so on (including fisheries). The good news is that if a patch of forest is cleared only once, and so long as there is more forest nearby, it appears that it will often regenerate in a few decades, although a lack of available seeds and/or poor soil can still be a problem (for obvious reasons).

4 Dams

The first major reservoir in Brazil was built in 1889. A century later, there were over a thousand, and many more planned. One reason for these impoundments is the generation of cheap electricity — but this power has a price that is sometimes overlooked.

Huge areas of forest are flooded, native people have to be relocated, the migration routes of fishes can be disrupted and the

Deforestation presents a major threat to the region.

The famous 'Meeting of the Waters' at the confluence of the Rio Negro and Rio Solimoes at Manaus.

Eco-tourism — properly managed — can generate resurgent benefits for the world's wild places.

local fish diversity decreased.

The fishery that develops in a newly formed reservoir can be a short-term source of food for the local people, but much then depends on that fishery being stable on a long-term basis. Perhaps more efforts should be directed toward research on the careful management of existing river fisheries, many of which have some indication of long-term sustainability.

What about aquaculture? This should not be discounted, nor should it be seen as a way to avoid careful management and exploitation of the natural resource in the river. Aquaculture should, in fact, augment and support wild fisheries, not replace them, especially if the production of fish on fish farms replaces the need to protect the natural habitat of the fishes (and other animals of the forest).

5 Exotic species

A range of South American species are being moved around and introduced into areas where they did not previously occur, as well as exotic (non-native) species too (e.g. African cichlid fishes). These introductions are often made with the best intentions (e.g. to increase food supplies for the natives, to control pests, etc.), but once introduced into a new environment, it is almost impossible to remove them — and the number of disastrous introductions right around the world are growing.

The horrendous example of Nile Perch on native fishes and people of Lake Victoria in Africa should be familiar to everyone.

Solutions

The answer to these problems is simple! We need to stop deforestation, pollution, over-fishing and introducing non-native species! This is — obviously — a very simplistic outlook, as there are some very human issues and needs involved.

The human population in Amazonia will continue to grow and will demand, not only the bare essentials of life (food, water, shelter, etc.), but also education for the children, modern medicines and the more materialistic trappings of the (so-called) developed world. Television satellite dishes are already appearing in villages along the Amazon! So, what can be done?

1 Forest management

To begin with, it will not be possible to 'save all the rain forest', nor should we as 'westerners' even try. The local people have needs, and these needs must be provided for.

Therefore, some forest will go (or, at least, be developed from primary, virgin rain forest), although it will be important to maintain a substantial amount of tree cover in the region, because of its effect on local and global climate, soil erosion, fisheries and so on.

2 Sustainable yields

Methods need to be adopted — perhaps similar to some of the methods already used by the local natives — to exploit the forest in a **sustainable** fashion. The techniques of mass destruction and a fast return for a quick-fix and/or political gain must go, and plans must be put into place to manage the many resources with a long-term view.

3 Local projects

This requires the support of urgent research and study, as well as action and commitment from governments. Perhaps funding should be directed to smaller, local-based projects involving the local people, rather than huge investments into huge projects of almost biblical proportions from international funding sources. "Think global, but act local" seems to be a good adage.

4 Preserves

Parts of the forest need to continue to be set aside as preserves, although not all of these will be off-limits to everyone. There is a need for a range of different types of preserves; some very strict (scientific research and observation only), with others allowing various amounts of sustainable development involving the local people (including tourism).

5 Eco-tourism

So what of eco-tourism? The participants on these trips seem to have a genuine thirst for knowledge and information about the area they visit and, hopefully, some will be inspired to become active in relevant conservation initiatives when they return home. In my opinion, anyone who visits, for example, the Amazonian rain forest, cannot fail to be moved into some form of action!

But the tours must go further. They should involve local guides and other local people and products wherever possible, so long as it is done with conservation and habitat preservation in mind. And finally, some of the monies generated must go back into the area visited, to support much needed conservation activities.

It would indeed be unfortunate — perhaps inexcusable — if the people on these tours were the last generation to be able to appreciate these habitats, and if they did no more than witness the passing of the last truly wild places, such as Amazonia.

AAP

Further Reading

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"Man Did Not Weave the Web of Life"

This we know. The Earth does not belong to man; man belongs to the Earth.

This we know. All things are connected, like the blood which links one family.

Whatever befalls the Earth, befalls the children of the Earth.

Man did not weave the web of life; he is merely a strand in it; Whatever he does to the Earth, he does to himself.

(A poem by Chief Seattle of the Suquamish Tribe, circa 1866.)

A Sprat to Catch a Mackerel

When it comes to buying fish, Sue Arnold's genes always win the day.

I'm off to Lacock, not the village you understand. Oh no! I can quite happily ignore all those lovely little cottages with not a TV aerial in sight. The ones that seem to appear in almost every historic serial dished up for our amusement. No, I have to admit, culture overdosing leaves me really quite cold.

I'm strong willed ... too strong willed, if the boss man is to be believed. I can bypass the Abbey and its beautiful grounds, without a pang or a prayer, or a thought for my soul. I'm too busy searching for a different sort of enlightenment.

Lacock, to me, means a garden centre ... and a garden centre ... means fish.

You expected plants? So why is your nose buried deep in this magazine? How come you're not perusing *Botanica Monthly*, or *Weeds Galore?*

Within seconds of arriving, something interesting catches my eye. I prepare to queue for a while, happily anticipating Mutley's, the Manager's, bargain offer. There's bound to be one, he's a master at setting a sprat to catch a mackerel. Joe Public to him is a challenge.

Fishkeeping genes

He reckons that an empty handed aquarist is a very sad fishkeeper. He's very well aware that the gene for fishkeeping is tightly linked with a huge desire for tank overfill. I wonder if the powers that be knew this when they constructed the fish-inch-per-foot rules? I know that I always add 'just one for luck.'

There is a danger with buying from a fish centre where the staff are aquarists first, and salesmen second. They have the stockpiling gene too, so they know exactly how to reel you in. Mutley does it mostly with fish, while Andy the 'Angelic' has back-up tactics to sell pumps, filters and tanks. The disadvantage is you can end up poor ... but happy.

The advantages of expertise, however, are enormous. Vast lines of tanks with everything from the routine to the exotic. Fish that are lively, colourful and, most of all, healthy. One of the greatest gifts the enthusiastic aquarist can offer is the promise of something different: a new species, a different colour morph, an unusual breeding mechanism. I expect to find an oddity that makes it worth coming to look. I am rarely disappointed. Mutley frequently manages to persuade me to spend my housekeeping on a fish I won't eat.

The special offer

"How much are those?" I ask the first member of staff I find among the throng of ardent aquarists.

"They're specials. I'll ask." She grins at me, sensing a kill, and hops off to find Mutley. I stay behind, more than willing to study my find ... and guard it. There are, after all, only two who are in full colour, and the only problem that I can see is they might be too big for my wallet.

"£200 each!", the new assistant says, trying to keep her face straight as instructed, but I'm an old hand.

"Oh! Cheap."

"But for **you** Mrs A, there's a special price, just because it's the seventeenth."

"How much!" I ask, noting her grin has spread from ear to ear, and planning a series of bread and dripping dinners.

"Mutley's with the Koi. He wouldn't say."

Mutley the Manager is not as daft as his

name. He knows that Joe Public is halfway to a purchase when she scents a bargain. He has a shop full of greedy customers to prove it ... and I'm in front. Newer arrivals watch and listen ... and learn fast!

At a good fish centre, you don't just buy a fish. You purchase a system, and get free and patient advice on how to use it. You usually start off as a small girl with a Goldfish, and end up as an old lady with gills. Slowly, over the years, total addiction grips, and with good reason. If you haven't a spare space, you don't have to dust, do you?

Open forum

I would rather travel fifty miles to a good fish house, than pick up a stressed half dead cheapy from a brain-dead seller who can't tell a Guppy from a gourami; even though it can be hell if you're wanting to buy in a hurry. No, I'd rather have staff that might bore me to death with detail at the merest hint of interest, any time.

I like friendly staff who know what's in my tanks almost as well as I do. I like them, even if they sometimes forget that I have the right to be always right, even if I'm wrong. I like aquarists who dare to say what they think and share my love of piscine pets.

I'm about to hunt for Mutley when he appears and takes his place beside me. We kneel on the slightly damp floor and stare with due reverence into the tank of the moment.

Boss man's ahead of me. He's realised that mega-fish mean mammoth tanks. It's lucky he likes them too, even if the fact that we starve will be **"all your fault."** I have the quiet satisfaction of knowing he lies. I see him, leaning against the wall negotiating with Angelic Andy, him with the innocent boy looks, and the hunting ability of a half-starved tiger.

Mutley and I still kneel. Curious customers join in. This is a community of look-and-learn merchants, an example of aquarist education at its very best.

"What are they?"

"Are they a pair?"

"Can anyone keep them?"

There's an open discussion, an exchange of experiences, an expert in the crowd. We all learn, we all enjoy. We are one. I think it's more friendly than church.

Only boss man is absent, hopefully, being persuaded to buy a slightly bigger tank than **he'd** planned, just because it's the seventeenth, no doubt. Boss man will curse all the way home, pretending he wasn't persuaded at all; that he chose it just to please me.

"I'm having the dominant male," I say.

"What about that one? His markings are quite perfect in every way."

"He's not such a *character*."

"That's the female he fancies. You've missed it. She's shot over there."

Catching fish is a serious business. More eyes than mine inspect. Our audience shares our tension, notes how the fish are caught gently, persuaded where possible, rested when necessary. Novices try to decide if they want one too; proficients weigh up the success or failure of my choices; experts offer hints and tips on their care, all of us stopping to admire these descendants of the great order Pisces.

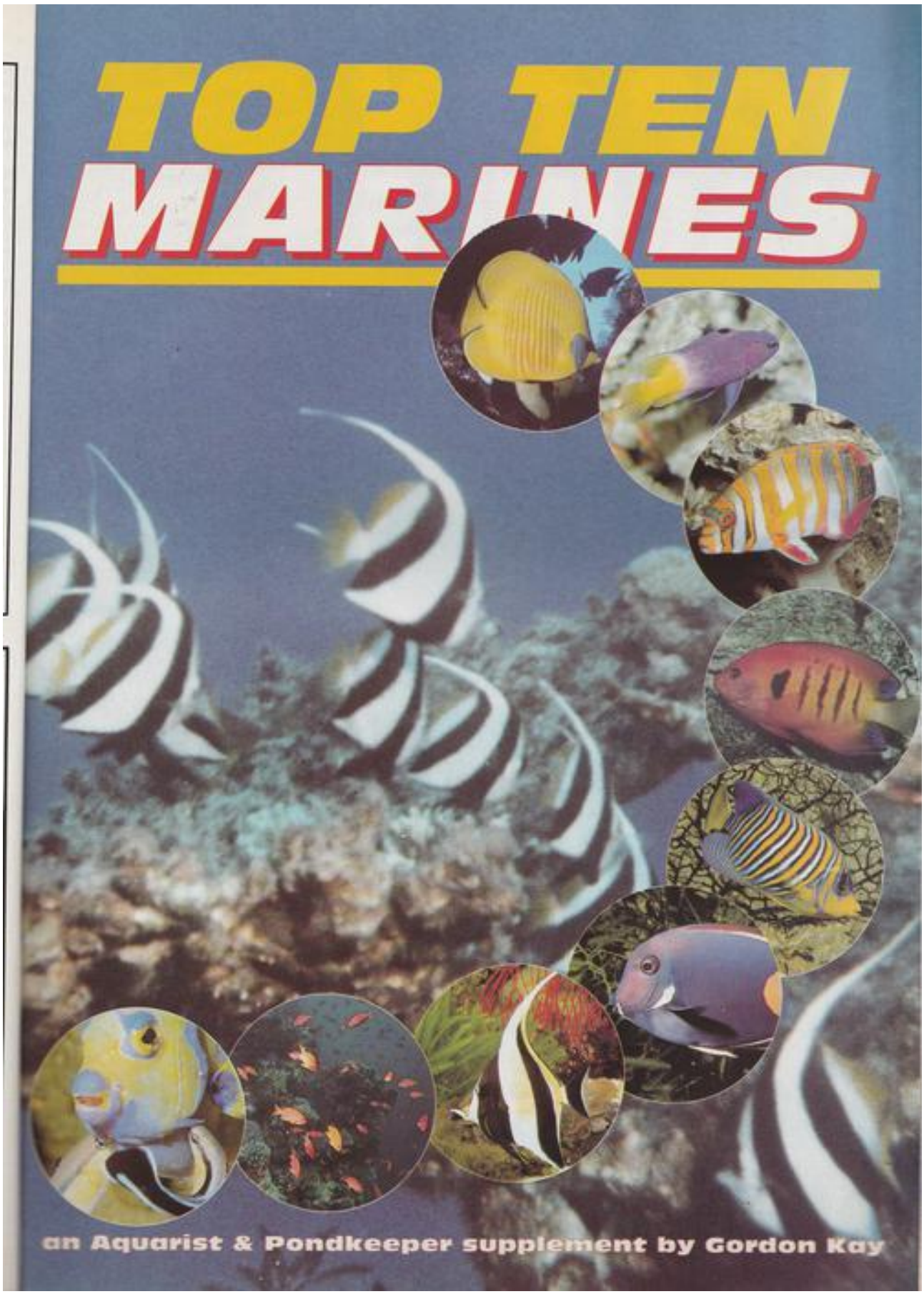
Inverse relationship

Bartering over, we go home clutching fish bags. I am complete in the knowledge that my house space is inversely proportional to the time I've spent watching fish, and growing ever smaller.

Over and over I swear that just this once I'll only look. I'll simply pop in and say hello. Often, I make this promise; always I fail.

I'm an addict aquarist. Happiest on my knees in front of a great glass tank. Forget the Abbey. This is the sort of Sunday that I understand. I pray I can afford **that** fish when I've heard Mutley's final offer; not for the strength to resist the sprat that he set to catch his mackerel.

TOP TEN MARINES



an Aquarist & Pondkeeper supplement by Gordon Kay

TOP TEN MARINES

Our regular 'Seaviewer' Gordon Kay faces the Top Ten Challenge and comes up with a mouthwatering selection of personal favourites

Oh my! What a quandary! To have to choose one's top ten of anything one is enthusiastic about is one hell of a task. For instance, if I had to select my ten favourite cars, or my ten favourite records, I wouldn't know where to begin.

To pick a top ten of something about which I am passionate is going to be impossible. What do I base my selections on? Is it looks? Is it interesting behavioural patterns? Heaven alone knows, so I will not think too much about it.

What I shall discuss here are my favourites... for whatever reason. They are not recommendations, and I am not saying that all of the species mentioned here are suitable for the home aquarium. They are simply my ten favourite coral fish species... I think!

1 Achilles Tang

Acanthurus achilles is one of the most drop-dead gorgeous species in the world's oceans. It has a wonderful dark brown — almost black — body, with an orange spot near to the caudal peduncle which masks its scalpel. It also has an orange stripe on its tail fin and another at the base of the dorsal and anal fins. These are edged with white and mirrored in the pectoral fins. To complete the picture, Achilles has white cheeks.

But don't just read this — take a look at the picture and you'll see exactly what I mean.

Acanthurus achilles is a strange beast, in that individuals either do superbly well in captivity, or die. This has resulted in the species acquiring a rather unfair reputation for being difficult to keep. As with any species of coral fish, a quick study of its natural history and an aquarium home which mirrors it as far as possible, will go a long way towards eliminating potential failure.

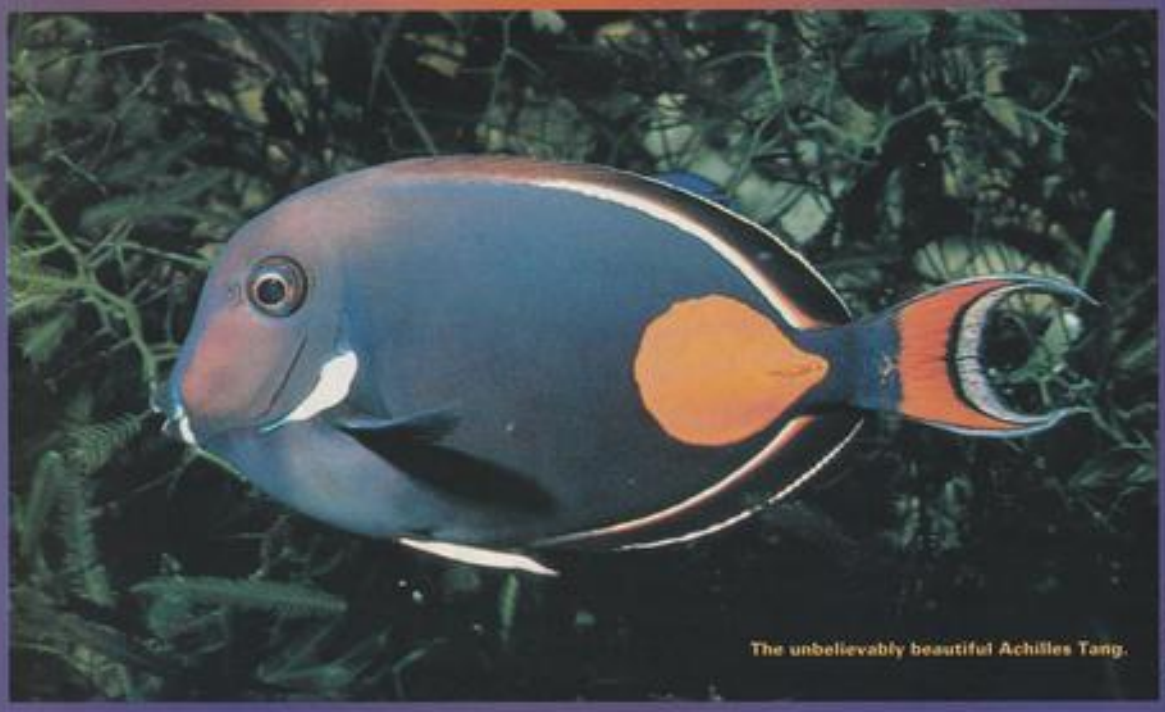
The Achilles Tang lives on the crest of the coral reef, where the level of water turbulence is high, to say the least. The animal simply does not do well in aquariums with little or no surface water movement. Strong aeration and surface water flow are vital if the aquarist is to succeed.

Secondly, as a member of the Surgeon family, *Acanthurus achilles* has a natural diet which consists almost entirely of algae. Now, even though it DOES eat other types of food, like any other Tang, if it doesn't get a high proportion of algae — or a substitute — in its diet, it will die.

If your aquarium doesn't have a good growth of naturally occurring algae, then a substitute simply MUST be offered. The ever-popular lettuce comes into its own here. As I've said many times before, we are not talking Webbs or Chinese Leaves here, but the cheap round lettuce, which must be scalded before it is offered. Any other type of lettuce is too high in cellulose for it to be digested, so it will probably be refused. Frozen spinach is another good substitute, as can be frozen peas.

Finally, because the Achillese Tang can fare badly in captivity, it is good sense to do everything possible to ensure that you start with a specimen which is as healthy as possible.

If you see one and you want it, leave a deposit and wait a couple of weeks, going back in the interim to check on its



The unbelievably beautiful Achilles Tang.

progress. That way, at least if it dies, it doesn't die in your tank and you get your deposit back.

Acanthurus achilles is a magnificent species which, with the correct environment and the right food, should give years of pleasure. It lives in the Pacific Ocean.

2 Regal Angelfish

Pygoplites diacanthus is another species with a reputation for being difficult to keep. This time, however, that reputation is more than a little justified. Still, I know of one or two Regal Angels which lived in captivity for three or four years.

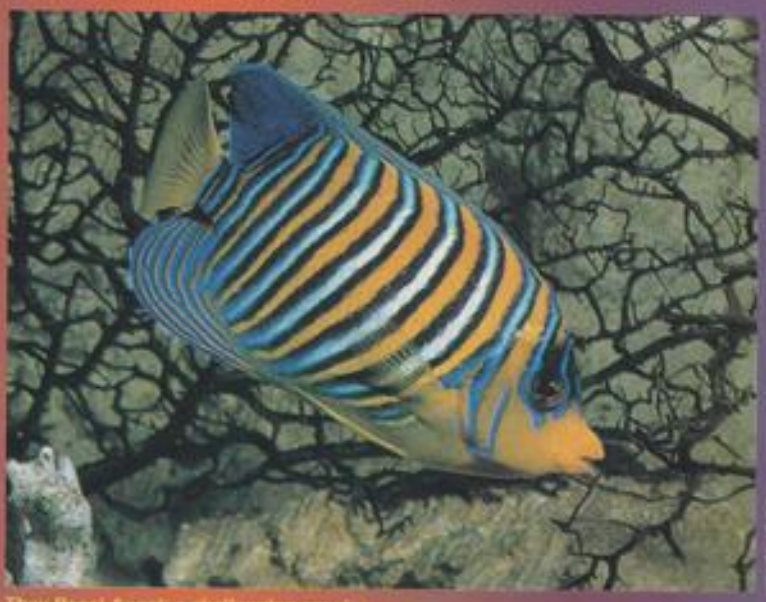
The main problem with this species is feeding it. *Pygoplites* usually proves to be a major headache on the acclimatisation front and so, again it is probably a good idea to watch the one at the dealer's for a couple of weeks before taking it home.

If you were to do a survey of, say, ten individuals in captivity, you would almost definitely see a pattern emerge of very pale and sickly looking animals on the one hand, and wonderful, strong fishes with vibrant coloration on the other.

This phenomenon is all down to where the fish was originally caught. The paler specimens will almost certainly have come from the area around the Philippines, Taiwan or Southern Japan. Specimens from the Indian Ocean — the Maldives and Sri Lanka, for example — or the Red Sea, will be the vibrant ones and the animals much more likely to acclimatise and to feed.

Pygoplites diacanthus is usually found in areas which abound with holes and crevices, so this aspect should be borne in mind. The majority found in captivity are caught from inshore waters, where algae flourish and wave action is quite strong. This should also be replicated as far as possible if the animal is to feel happy.

Water quality must be absolutely perfect as well. There is no room here for traces of nitrite or nitrate levels of anything over 20ppm. Given good conditions, a varied diet which contains algae and sponge-based foods and, above all, patience, your Regal Angelfish just might do OK.



M.D. & C. Piddock

They Regal Angel: a challenging species.

LINDA LEWIS

The Flame Angelfish is one of the most popular of all marines.

3 Flame Angelfish

Centropyge loriculus has grown in popularity over the last decade or so, until it is now one of the classic aquarium subjects.

This is down to two things. First, there is the species' undeniable beauty and, secondly, its hardiness. It is, in fact, possibly the strongest species in its family.

However, there is a downside. Its natural habitat is the outer reef slopes — at depths of up to 25 metres — so it costs an arm and a leg; £60 upwards can be expected, which is a lot to pay for a *Centropyge* species.

This hasn't deterred the world's aquarists, though, because this is one truly wonderful species which will grace any fish collection. Furthermore, most of the Flames in the hobby originate from Hawaii, one of the best supply countries in the trade.

4 Moorish Idol

As gorgeous as the Moorish Idol, *Zanclus canescens*, is, you should never, in my opinion, be tempted to buy it. Ever. Even expert marine aquarists find it very difficult to keep this species and I, myself, came to grief when I tried.

My Idol was a lovely fat beast which was feeding in the dealer's tank. It did well for around a month, feeding and swimming about as though it was the happiest fish in the world. Then, one sad day, it simply keeled over before my very eyes.

Now, that is a criminal fate to befall any animal, let alone one so wonderfully elegant. Please don't buy one.

One of the most challenging species of all: the Moorish Idol.

MAX GIBBS — THE GOLDFISH BOWL, OXFORD

5 Lyretail Coralfish

The first coral fish species I ever kept was the Lyretail Coralfish, *Anthias squamipinnis*. It didn't live for long — about 6 months, as I remember. This wasn't due to my ineptitude. I had been keeping fish since I was eight years old and considered I knew a thing or two.

However, it WAS due to my inexperience. I broke one of the most basic of rules. I didn't learn anything about the species before I bought it and so didn't provide the right environment for it.

Had I done some homework, I would have known that this species swarms over the reef in huge shoals and wastes away without the company of its own kind. If, on the other hand, *A. squamipinnis* is kept in groups of around six individuals, it is extremely strong and can live for years.

One of the joys of keeping a group of this species is to see a definite leader emerge, this leader developing an extension to its first dorsal spine and becoming a pinker shade than all of its fellows. This is the male.

Anthias squamipinnis is a hermaphrodite, which means that all of the individuals are born females and change to male as and when required. In a group, there will be one such male and a harem of females, which he stops from becoming male by domination. However, if the male is killed — or is taken away — then the most dominant female will change sex to take its place. This she does in a matter of hours.

This species comes from the Indian Ocean and the Red Sea, where it feeds on zooplankton just above the reef. This diet should be reflected in its aquarium food. Things like brine shrimps and mysids are favourite, but any small meaty food should be taken well.

Although this species is not often seen in the trade, it is well worth tracking down, as it is a wonderful fish which looks terrific.

6 Harlequin Tuskfish

No article which discusses a list of coral fishes would be complete without a wrasse. This piece is no exception, because one of my favourite species is the Harlequin Tuskfish, *Lienardella fasciata*.

This Pacific Ocean animal looks rather aggressive, with its fearsome looking dentition. However, nothing could be further from the truth. The Harlequin Tuskfish is a mild-mannered community species which can be trusted with most animals.

It will eat small fishes, though, and should never be kept with invertebrates. This species has the potential to grow to around 14 in. (35 cm) in the aquarium (24 in. — 60 cm — in the wild) and so will need a large aquarium. Given this, however, and excellent water quality, along with foods such as cockle, mussels and squid, there is no reason why *Lienardella fasciata* should not be with you for years.

In the wild, the Lyretail Coralfish occurs in shoals. Solitary specimens therefore do badly in captivity.

M D & C PEDRON

The fearsome-looking Harlequin Tuskfish.

7 Cleaner Wrasse

Just to prove that my favourites are not all expensive, showy animals, I simply have to include another wrasse which I consider to be an essential part of anyone's aquarium stocking list. I am talking about *Labroides dimidiatus*, the humble Cleaner Wrasse, of course.

I would be the first to admit that this species wouldn't win any awards for looks or presence, but it simply is a joy to watch. I firmly believe that the Cleaner Wrasse is the biggest ally available to the hobbyist in the war against parasites and disease.

Forget about those expensive ultra-violet sterilisers and ozonisers; get yourself a pair of *Labroides dimidiatus* and watch as they solicit clients for their services, then proceed all over their tankmates, ridding them of parasites just as they would in the wild.

If you keep two, they will replicate their natural behaviour by setting up a cleaning station — a phenomenon which almost never happens with a single specimen. To supplement their diet of parasites, Cleaners should be fed small food items like brine shrimps and mysids.

8 Royal Gramma

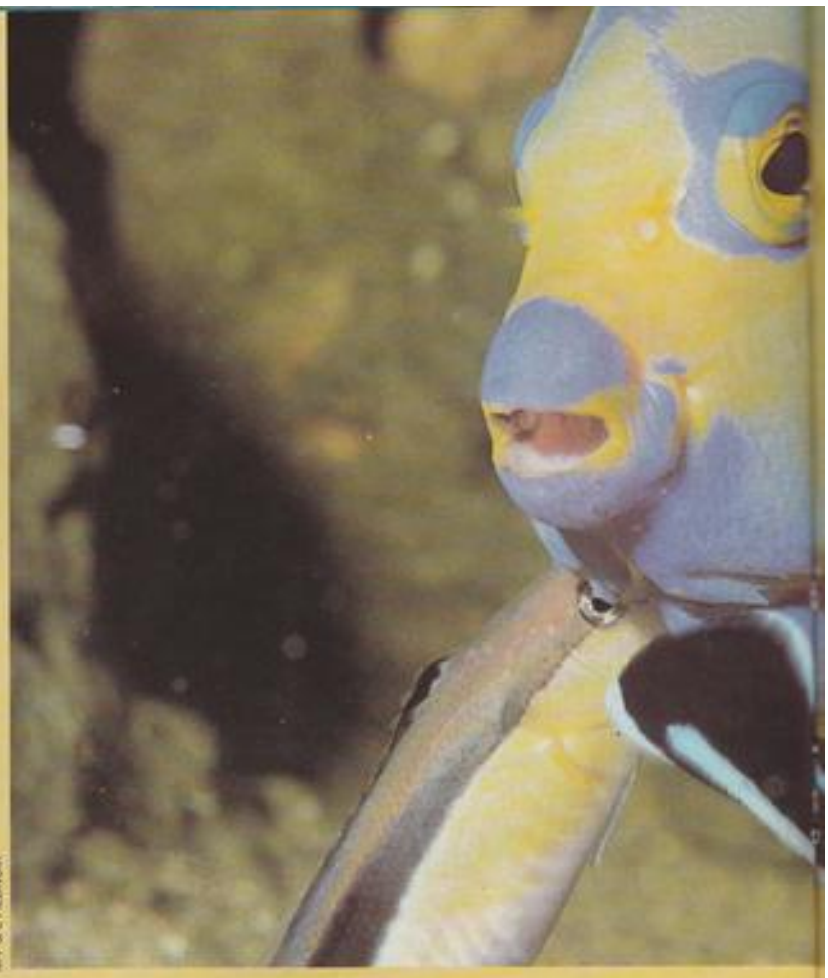
In a hobby chock-full of breathtakingly beautiful animals, there can be few to beat *Gramma loreto* — the Royal Gramma. This small species, which comes from the Western Atlantic, spends much of its time in caves and beneath overhangs, orienting itself so that its underside is pressed against the substrate and often lying upside down as a result.

The fantastic coloration of this species — violet at the front and yellow at the back — has made it a great favourite among marine aquarists. However, it is a highly territorial species which resents the presence of others of the same family in the aquarium.

It should be fed small food items and provided with lots of caves and hiding places. An ideal addition to an invertebrate aquarium, the Royal Gramma will also thrive in a quiet fish-only collection.

***TOP* — Cleaner Wrasses at work on an Angel.**

***RIGHT* — Gramma loreto — the spectacularly coloured Royal Gramma.**



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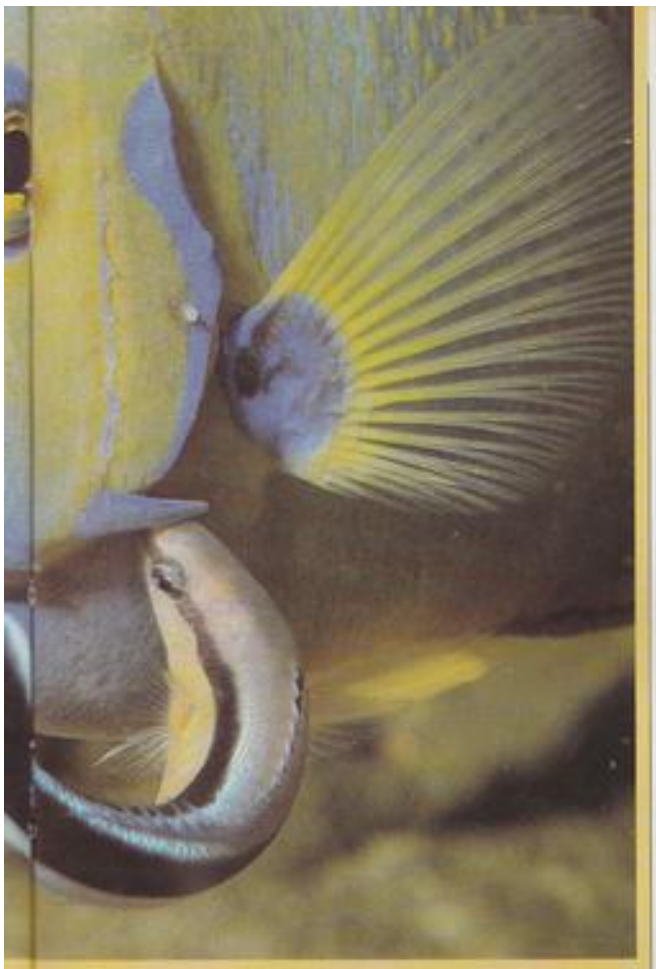
LINDA LEWIS



9 Poor Man's Moorish Idol

For anyone who may be disappointed at my advice on the Moorish Idol, there is always *Heniochus acuminatus* — the Poor Man's Moorish Idol.

I've never been able to work out quite why this species has that awful popular name. First, the name implies that the Wimple Fish, as it is also called, is somehow inferior. Let me tell you, it most definitely is not! Secondly, although I can see that a beginner might get the two species mixed up for five minutes, the trained eye will see that they don't look alike at all.

Heniochus acuminatus is found all over the Indo-Pacific region and the Red Sea, ranging all over the Indian Ocean as far as Australia, the Philippines and Hawaii. It is, in fact, the most common of its genus over its range.

It is commonly seen either singly or in small groups in clear, shallow water. Unlike the majority of its cousins, this species positively welcomes others of the same species in the aquarium. Be warned, however, that you will need a large aquarium for a group of Wimple Fishes. The juveniles which you buy at 2 in. (5 cm) long, could well be 6 in. (15 cm) long by the time they finish growing.

Whereas *Zanclus cornutus* is almost impossible to keep, *H. acuminatus* is anything but. It is, in fact, one of the very few butterfly species which can be recommended to hobbyists who have limited experience. I cannot, in all honesty, tell you that it is totally hardy and long-lived, but one that I kept lived until it was 13 years old.

The first few dorsal rays extend into a long streamer (the wimple), which increases in length with age. When fully grown, this species is amazing.

10 Golden or Lemonpeel Butterfly

I've saved the best until last again. How could I possibly write an article called **Top Ten Marines** without including *Chaetodon semilarvatus*, the original drop-dead gorgeous species?

Truly a fish to die for, it is rare in captivity and is horrendously expensive. Yet it is the species which I would choose over anything else.

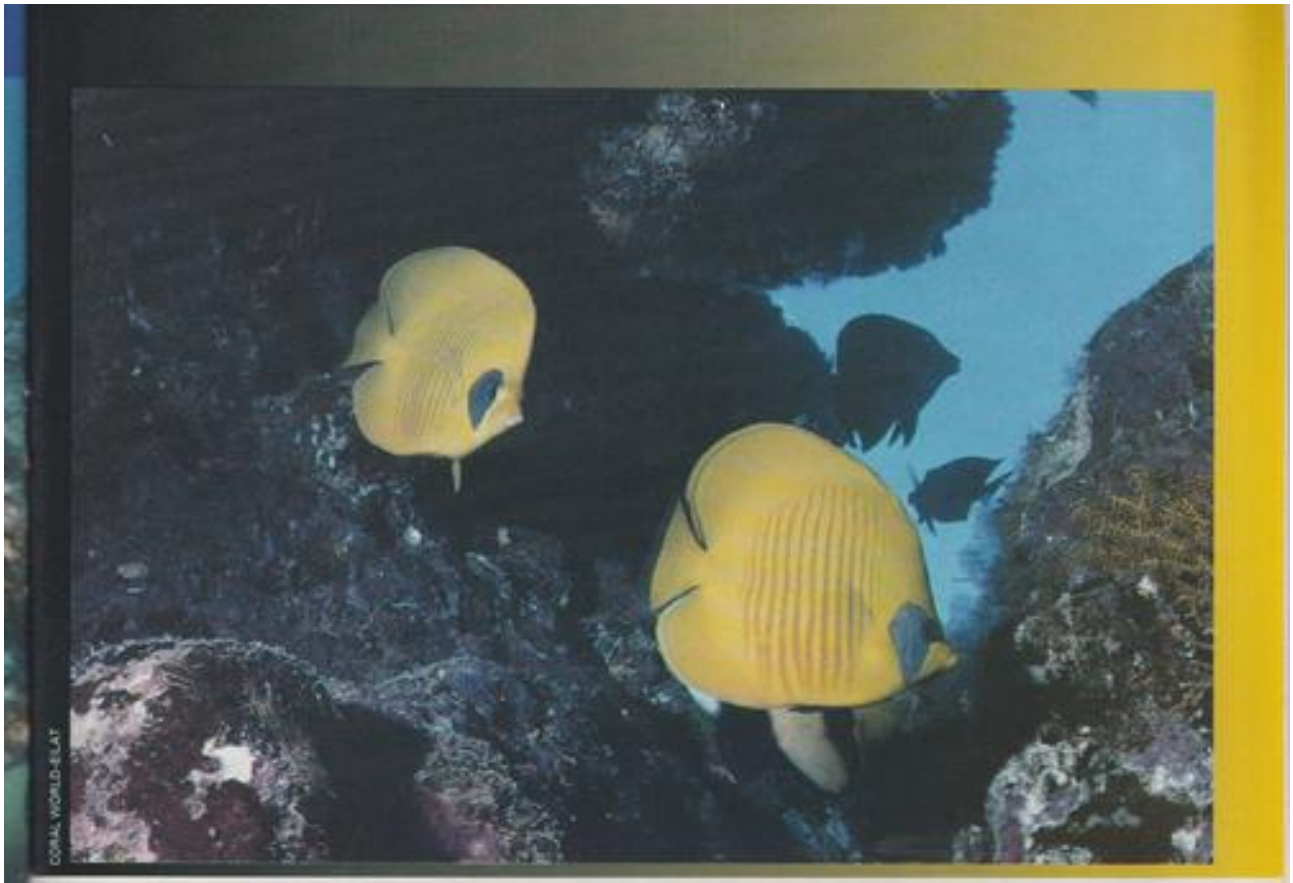
It is a native of the Red Sea, so you very, very rarely see a poor specimen and, unlike most other expensive species, it is relatively easy to keep.

The aquarist needs some experience of keeping other butterflies, it's true, and the Golden Butterflyfish, as it is popularly called, could never be kept in anything other than perfect water, but provided that these two criteria are met, then *C. semilarvatus* is as hardy as any other butterfly species. It is not fussy when dinner time comes around either. Truly wonderful!

Well, there you have it. My top ten favourite species. At least, they are at this moment. Then again, ask me tomorrow and you will, no doubt, get a different list altogether.

***TOP* — The amazing and resilient Wimple Fish or Poor Man's Moorish Idol.**

***RIGHT* — My top favourite fish of all is the Golden or Lemonpeel Butterfly.**



TRAVELLER'S TALES

Pirates Invade National Aquarium

Aquarian Advisory Service expert **Dr David Ford** travels north for the first-ever Scottish pirates' exhibition.
Photographs by the author

Unlike England (but watch this space!) Scotland has a National Aquarium. It is 'Deep-Sea World' at North Queensferry. Built just two years ago under the base of the Forth Bridge, the public aquarium has the longest acrylic tunnel in the world. At 112 metres, this tunnel had to meet fire regulations by having an emergency exit installed halfway along — despite running through a 41/2million-litre (1 million-gallon) aquarium!

The tunnel has a people mover and since opening, over half a million visitors have viewed Europe's largest collection of Sand Sharks. The huge tank (50 metres x 20 metres x at least 31/2metres) is also home to thousands of marine fish that can be seen in exciting close-up through the clear, domed plastic.

The aquarium boasts all the facilities expected of the modern exhibit, from disabled toilets to a hot meals café, but it also has many displays of interest to aquarists. These range from an invertebrate tank to a coral reef ecosystem aquarium.

For the visiting tourists, divers swim into the large tank (called the 'Underwater Safari') to hand-feed the fish every hour. Talks are given at intervals by staff in the rockpool exhibit and there is a fully qeuipped A.V. theatre, plus educational material for schools.

Deep-Sea World has won the Oscar for best new visitor attraction of 1994 from the Scottish tourist Board. Although the aquarium is expecting to pass the million visitor mark soon, it plans to attract visitors back regularly by continuously changing the displays and featuring 'themes'.

The theme for 1995 is 'Scottish Pirates'.

It has always been assumed that famous (or infamous) pirates of old were English. In fact, many were Scottish. Captain Kidd, for example, came originally from Greenock and the author of the most famous pirate tale of all — Treasure Island — was Robert Louis Stevenson from Edinburgh.

The story of piracy is featured throughout the aquarium. Display posters tell these stories, both of historical and modern-day piracy. To read all the data offered would take a day-long visit.

In adddition, there are life-sized and very life-like, models of famous pirates throughout. These were modelled by the Spitting Image people of TV fame especially for Deep-Sea World. Their Long John Silver greets you at the entrance and Barbary Pirates are fighting a battle at the entrance to the Underwater Safari.

If you cannot visit Scotland to view their new National Aquarium, the Deep-Sea World's way of displaying marines may be coming to you. Plans have been made for an aquarium in London and another in the north-west of England. Whether the Scottish Pirates will also invade England remains to be seen...!

LEFT **— Long John Silver and Jim Hawkins in a treasure trove-filled cave at the entrance to the aquarium.**

BELOW **— Scottish pirate Captain Morgan lunges at visitors as they enter the Underwater Safari!**

BOTTOM **— Crowds at the National Aquarium are warned on the display about dangerous animals — but the skull & crossbones mean more than aquatic creatures: see Travellers Tales in next month's issue of *Aquarist & Pondkeeper*.**

COLDWATER JOTTINGS

BY STEPHEN J. SMITH

Turning turtle

'Help! My fish are dying!' This seems to be the SOS issued loud and clear throughout the past summer (once it arrived, that is). Right from the middle of June, I have been receiving queries from people who, understandably, have been concerned about their fish gasping at the pond surface, or dying, or missing, or even 'turning turtle'.

The main cause was, of course, the increase of water temperatures. While it is all very well for us to 'seek the sun', for fish, the opposite is the case: the quantity of dissolved oxygen decreases as water temperature increases. So, throughout the summer, when our Goldfish, Koi, Orfe, or any other fish for that matter, are feeding voraciously (and consequently producing more toxic wastes), the water is holding less oxygen, and breathing becomes more difficult for the fish.

There are several points to ponder. Here are the three main ones:

1 Don't overstock your pond.

The fewer fish the better is a good rule. While my own 'rule of thumb' is one average-sized fish (say 4-5 inches in length) per square foot of surface area to provide a safe maximum stocking level, I would be happier reducing the number of fish by about one third during the warmer season.

2 Beware of 'oxygenating' plants.

My own hobbyist Goldfish-rearing ponds are completely bare — not a plant in sight. Shading is provided by means of a rustic pergola constructed over the ponds and I know that my fish are not going to have the problem of further reduced oxygen levels caused by cessation of photosynthesis during the hours of darkness, which causes the severe 'gasping' experienced by many fish early on summer mornings.

3 Provide supplementary oxygen to your pond and filter.

The simple and inexpensive expedient of incorporating a fountain or cascade (or both) will help to agitate the surface of the water, thus not only increasing the oxygen content of the water, but also enabling toxins to escape. The principle is used by fish farms in warm climates, such as Israel, by using a motorised paddle (see photograph). An air supply through a large airstone will help too, while the air pump can also be used to supply air to the filter to benefit bacteria within the filter system.

Israeli motorised paddle-type pond aerator.

Tangerine dream

The vast number of Goldfish varieties available provides 'something for everyone', and new and intriguing varieties are being introduced almost monthly by imports from the Far East. However, one of my most enduring (and endearing) favourites is the Pearlscale.

To the newcomer, this could be seen as an 'odd-ball' — or should I say, golf-ball — because that is just what it looks like!

Pearlscales today are usually calico (dappled colours on a light-blue background) or orange-and-white. While these are very attractive, my personal preference is for a 'self-coloured' variety; that is, the overall colouring is tangerine, albeit with matt, rather than metallic, scaling and, of course, with the characteristic pearl 'snow-peaks' on each convex scale.

But where can I find such specimens? The last I saw were on the show benches at Aquarama in Singapore a few years ago. Even then, they displayed white finnage, where I would much prefer the finnage to be the same colour as the overall body colour.

What are your thoughts? Do you have a particular favourite Fancy Goldfish variety (or even one which you simply cannot abide)? Perhaps you have developed your own variety? Do let me know, c/o **Coldwater Jottings.**

Just Daphnia

"Nature's gift to fishkeepers" is a phrase which has survived with me since the first time I heard it uttered to me many years ago by the late Tommy Sutton, arguably the world's greatest Goldfish breeder. The subject of this particular philosophy was *Daphnia*, the waterflea.

Where would the great spawnings of the last several decades be without that gift? What on earth would we use? To use a fish-house without a supply of good clean *Daphnia* is rather like trying to grow tomatoes without feeding and watering them! The result is weak wilting specimens which will never 'bear fruit'.

I set aside one of my rearing pools specifically for producing *Daphnia*, and, happily, I am able to harvest this rich food source by the netful throughout the summer months. Rich in protein, finely-sifted *Daphnia* should be fed to fry at the earliest opportunity. The immediate result of the high-protein content of these creatures is a deepening of the 'bellies' of the fry and a significant development of fin rays and, subsequently, scales, assisted by the high calcium content in the carapace or 'shell' of the *Daphnia*.

This shell also provides a certain amount of 'roughage' and, hence, *Daphnia* acts as a laxative and is an ideal food supplement for more mature fish.

But do make sure it is clean. If you collect *Daphnia* from natural ponds, ensure that there are no fish present in the pond (thus, there will be no fish parasites, as they will not survive without a host). Even then, use your supply to start your own culture by 'seeding' a small pond, old bathtub or sink, or whatever, to provide you with a continuous supply. It is also worthwhile quarantining any *Daphnia* which you buy.

Daphnia need water with a high oxygen content, so an airstone in your culture is a good idea. As I related earlier, I have had much success in producing *Daphnia* in quantity. I put much of this down to the high ratio of surface area to volume (in my case, 50 square feet to a volume of only 30 cubic feet), which enables the water to absorb more oxygen.

There, there!

What is the most effective way to treat abrasions on your pond fish? Why, put a plaster on it, of course! This was just the advice given to one of my pondkeeping colleagues at a well-known pharmaceutical store recently. Apparently, with the aid of a proprietary antiseptic ointment and a sticking plaster, the wound was healed...

I understand that there is no truth in the rumour that the trade is working on developing gold-coloured plasters for pondfish!

Moor beginning to go "brassy" in the belly.

Midas Moor

An item which might have been destined for the 'strange but true' section is the tale of the (Black) Moor which turned Gold and the Blue Orandа which turned white. But then, is that so strange?

In the case of the Moor, not at all. We all know that Moors are black (that's why they are often called 'Black' Moors, after all). But if you take a close look at the underside of a Moor, you will see that it may be slightly 'brassy'.

Now, this trait presents a challenge to serious Goldfish breeders, who try to ensure that future generations are devoid of any 'brassiness', instead showing the characteristic 'sooty' colouration all over. This is not easy to achieve and, even when it is achieved, as a specimen gets older, some brassiness may well begin to show. If the fish is quite brassy to start with, it may even turn gold.

As for the Blue Orandа turning white, strange as it may seem, this is exactly the same effect. So look out for the 'Midas touch' in your pond or aquaria.

SOAPBOX

Insurance against trade losses

Protecting our valuable fish, not to mention the plants with which we keep them, is a major concern among all hobbyists. And the concern is even greater among the pet trade, whose livelihoods depend upon ensuring that their livestock is kept in the very best of condition. Thus, insurance against such calamities as accidental plant breakdown and even deliberate poisoning of fish (unfortunately, it happens), has become a vital element of successfully running any aquatic outlet.

I was therefore delighted to encounter a company which provides a service specifically to the pet trade — and includes the aquatic crises mentioned above. However, you just cannot help some people, and I was appalled with the company's rude and negative response to my recent telephone call; they were most unwilling to provide any information.

So, unfortunately, I am unable to pass any details to you about the pet trade insurance services provided by **Roberts & Davis Schemes**, of Soham, Ely, Cambridgeshire, which is a pity.

However, even if they aren't willing to let me tell you about their services for your (and their) benefit, I am sure there are other organisations with similar schemes who would be more than willing to help me... to help them... to help you...

Wot, no pond?

Overhead in an aquatic retailer, as a proud new owner of a beautiful 10-inch Koi gazed at his newly-bagged specimen, his wife remarked, "Well, now you've bought it, I suppose we'd better find something to put it in!"

Why No Fishy Bedtime Tails?!

Susan Brewer rues the almost total lack of hero fish in children's books

Cartoon by the author

"Read us a story, dad." Eagerly (this is a fictional scenario!), the doting aquarist father rushes to the bookshelf to search for a suitable book to read to his offspring; a book with a dashing Discus, handsome Halibut or gallant Guppy as the hero – but he is disappointed. Sadly he returns with the adventures of Timmy Teddy or Dippy Dog.

So, why don't authors write fictional books about fish, reptiles or amphibians? Could it be that as they find these creatures unappealing, they assume that their young readers will be of the same opinion?

Maybe that is why so many adults go into raptures over cats, dogs and bears, but shudder at the sight of snakes, tremble at the thought of toads and glare glacially at Goldfish. Perhaps if cold-blooded creatures were treated sympathetically in children's books, then as these children grew to adults, they would develop an affection for fish, reptiles and amphibians, as well as fluffy creatures.

Heroes

There are a few authors who have created amphibian heroes, of course. Who can ever forget Kenneth Grahame's wonderful pompous Mr Toad? 'Poop poop! O bliss! O my!" He was the comic relief in the magical *Wind in the Willows*.

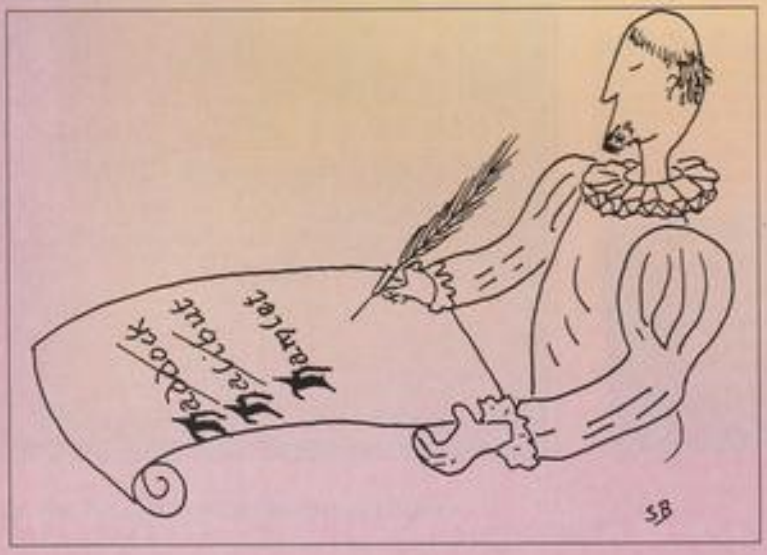
Beatrix Potter was wonderfully sympathetic towards our amphibian and reptile friends — she devoted a whole book to the froggy Jeremy Fisher, and even gave passing mention to his acquaintances, Alderman Ptolemy Tortoise and Sir Isaac Newton (a newt, naturally.)

She also wrote exuberantly about the disgustingly wonderful Mr Jackson, the toad, in the tale of Mrs Tittlemouse. All toad keepers will instantly sympathise with the description of Mr Jackson at lunch, when he opens his mouth 'most unnecessarily wide — no teeth, no teeth!'

Non-heroes

Lewis Carroll mentions quite a few 'cold-bloods' in *Alice in Wonderland*, including the hapless Bill Lizard who managed to get stuck in the chimney, the mournful mock-turtle, the frog and fish messengers and the various lobsters, porpoises and whiting who danced the quadrille on the beach, though none of them can be described as heroes by any stretch of the imagination.

Captain Hook was terrorised by a ticking crocodile in James Barrie's *Peter Pan*, until that fateful moment when the ticking stopped and the crocodile caught his victim. Mowgli was hypnotised by strange Kaa, the snake, in Kipling's *Jungle Book*, and a cobra was killed by the brave Indian mongoose, Rikki Tikki Tavi.



Hissing Sid and friends

Aesop let the tortoise triumph over the hare, of course, in his famous fable, though his tale about a bursting frog is rather stomach-turning. The brothers Grimm allowed kissed frogs to turn into handsome princes and Anderson wrote of a toad with a jewel in his head. He also wrote the slightly fishy tale of the little mermaid! A Bree Terrapin is mentioned in Uncle Remus's *Tales of Brer Rabbit*.

More recently, Roger Hargreaves created Snap the crocodile, Hiss the snake and Croak the frog in his excellent *Timbactoo* animal series, while Jeremy Lloyd wrote about the rather stupid Timid Toad and the evil Hissing Sid (snake) in his narrative poem. Roald Dahl created Esio Trot (say it backwards), while that brilliant author of animal books, Dick King-Smith, told the story of Lightning Fred, a tortoise who was caught in a storm and subsequently turned into a mini speed-freak.

Fish are almost totally ignored in children's books, though a few, notably a kindly salmon, crop up in Charles Kingsley's *Water Babies*. Fans of the *Jennings* books by Anthony Buckeridge will remember with glee the saga of Elmer the Goldfish who was allowed to exercise in the school's swimming pool and escaped through the filter.

A few years ago, we had the dubious craze for the pizza-eating, hip-talking Teenage Mutant Ninja Turtles, so, who knows? At this very moment, somewhere in lonely garrets, penniless authors could be striving for success as they pen their first children's novel.

If any one of these creations is called *The Watery Adventures of Super Scat, Wonder-Whasse and Fearless-Flounder*, all aquatic-loving parents will rush out to buy a copy!

The Philippines
wake up to Conservation

As Jack Jackson shows, not all marine stories coming out of the Philippines are laden with gloom and doom.

Photographs by the author

Scientists believe the triangle formed by the Philippines, Peninsular Malaysia and Papua New Guinea, is where most of the Pacific's marine organisms evolved and then spread out to colonise other oceans. This area certainly has the widest variety of marine species in the world.

Twenty years ago the Philippines was a world-class diving destination and supplier of aquarium species. Then came blast, cyanide and Muroami fishing, together with the export of shells and corals. Local politicians even repealed a marine sanctuary, initiating its destruction; divers and aquarists subsequently lost interest.

Changing mood

Fortunately, things are now changing. International hotel chains now feel safe to invest in the Philippines tourist industry and, together with dive operators, realise they must save the reefs for their businesses to survive. To this end, they have set about educating and employing local people. As a result, many of those who fished destructively in the past, now earn more money from tourism, so they police their own reefs against outside fishermen.

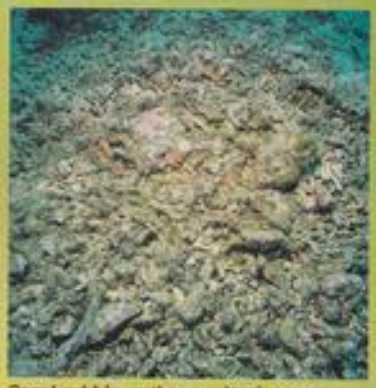
Some resorts have got together to regenerate local reefs, while, in some areas, commercial pearl, lobster and fish farms police their domains with armed guards.

Most reefs around shore-based resorts have not seen destructive fishing for several years and in warm waters with strong currents, soft corals and *Acropora* stony corals, grow much faster than used to be thought. Many reefs are therefore visibly regenerating, albeit with different species.

Cyanide detection centres have also been set up at Manila and other airports used for exporting marine species for the aquarium trade.

Active conservation

American oceanographer Steven Koch came to the Philippines in 1978 with the US Peace Corps. Leading aquaculture and coral research with the Bureau of Fisheries, he was hired as consultant to the Ministry of Natural Resources for a nationwide review of the National Park system and the establishment of a National Park in Leyte, one of the country's first marine reserves.



Coral rubble — the result of recent blast fishing damage.

Later, he collected a group of local marine biologists together to form ORCA, Inc — Oceanography, Research, Conservation, Analysis — actively to encourage marine preservation.

ORCA developed systems for evaluating the health of reefs and creating rapid coral recovery. Commencing on a reef with less than 5% live coral cover, they can produce 60% stony coral cover in two years. Obviously, these are the fast-growing species such as Table Corals; it would still take up to 100 years to produce a climax reef, but 60% cover is good for fish and other marine organisms to prosper and attractive for diving and snorkelling.

Government projects often stall due to lack of funds and bureaucracy, but the larger resort groups in the private sector have much to gain financially from marine conservation, so it was to these that ORCA turned for funding.

Starting with Alegre Beach Resort in Sogod, Cebu, they developed a total marine recovery package. Tree planting and landscaping, run-off management, curtailing blast and cyanide fishing, declaring a marine sanctuary, removing tonnes of mud and rocks, seeding Giant Clams and other species now extinct in the area, transplanting fully grown coral colonies into the area from outside, protecting from predators such as Crown-of-Thorns Starfish and soliciting the support of the local fishing community.

Soft corals, starfish and other invertebrates making a comeback on regenerating reefs off Coron Island.

Currently, they are working for the Shangri-La Mactan Island Resort, where in addition to the techniques used at Alegre, they have introduced a water circulation system, using large limestone caverns to keep the near-shore area free of silt, thus helping coral growth.

In southern Leyte, they mapped over 200km of near-shore marine habitats, making recommendations for their management. At Dapitan (Mindanao), they are working with Dakak Resort, to develop two small healthy coral islands, home to pelagic fish and dolphins, into a marine sanctuary. Blast fishing has been curtailed, but there is heavy fishing pressure.

In Davao, they are working with the Insular Hotel to save and develop what is left of the reefs. The biggest problem is siltation from logging, but there is diverse coral cover in those areas not smothered.

Using the incentive of high-paying tourism-related work, ORCA work with local government and local communities to encourage local fishermen away from destructive fishing methods and into eco-friendly vocations.

Steven Koch has formed the Professional Association of Cebu Divers to help regulate the diving industry and organise divers behind various conservation projects. He is also working with the Mayor of Mactan and the Cebu Government on a master plan for the development of this popular international resort area, including forming a marine park.

In addition, he is organising divers and dive tour operators to work with the Philippines Department of Natural Resources on the protection of the Tubbataha Reefs. These are legally protected, but exploited by illegal fishermen, some from other countries.

Reef & forest project

The Philippines Reef and Rainforest project was launched by David Bellamy OBE at the Stratford-upon-Avon Butterfly House, on 29 March 1994.

This is the third project of the World Wide Land Conservation Trust, a non-profit making Registered Charity, which, through the generosity of its supporters, has already helped save large areas of tropical forests in Belize and Costa Rica.

Luxuriant invertebrate growth on a fast-generating reef in Danjugan.

Situated in the Sulu Sea, 3km west of the small town of Bulata, on the island of Negros, the little island of Danjugan is surrounded by coral reefs and still retains most of its original forest cover on hills rising to 600m (nearly 2,000ft).

These reefs were a paradise until a nearby copper mine was temporarily closed down. Local fishermen found the explosives and used them for blast fishing instead. There has also been recent typhoon damage to the shallow-water areas.

Diving around the island with the Philippines project leader Gerry Ledesma and his conservation volunteers, I saw the damage done, but I also saw clearly how beautiful the undamaged reefs are and how quickly the faster-growing corals regenerate, once destructive fishing is curtailed.

There is a profusion of leathery corals, colourful soft corals, Gorgonians and sponges. Sizable areas of large Plate Corals and Lettuce Corals are common, while Staghorn and Table Corals are regenerating over the damaged areas.

There is small-scale subsistence fishing, but the fish life is varied, with shoals of Moorish Idols, bannerfish, pennantfish, damselfish, Sergeant Majors, jacks, fusiliers and Anthias. Chevron and Copperband Butterflyfish, Titan, Clown and Redtooth Triggerfish, pufferfish, Vlaming's Unicornfish, surgeonfish, and nudibranchs. Anemones with clownfish are plentiful. Colourful sea stars, sea urchins and sea cucumbers are found on the sand.

The project has now purchased Danjugan island and is turning it into a wildlife sanctuary, removing alien species, assisting the natural regeneration of original species, patrolling the reefs and setting up an education centre.

The work involves the World Wide Land Conservation Trust's expertise in managing tropical forest projects and fund raising, while Coral Cay Conservation, with their extensive experience of coral reefs and their conservation, will develop the management of the marine environment.

Scientists from the Negros Forests and Ecological Foundation, the Philippines Wetlands and Wildlife Conservation Foundation, Silliman UNiversity and Coral Cay Conservation have made initial surveys. Further, a permanent base camp has been set up and marine youth camps held to teach young people about coral reefs and their conservation.

Volunteers are being sought to help with phase one of the marine surveys which began in August and will run until November 1995, with more surveys being planned for 1996.

In the UK, the project is raising money for the continued production of Danjugan Island by offering limited edition shares to "founder-owners" at £25 each.

Many schools, clubs and individuals have already subscribed and School Packs are available free of charge to teachers.

The Philippines are, as I hope to have shown, waking up to conservation and beginning to take appropriate action. It is now up to us to support them as best we can. **ARP**

As the reef recovers — as in this instance — invertebrate colonies, such as Fire Coral, once more attract the reef's original fish inhabitants (in this case, one of the Moorish Idol species, *Zanclus cornutus*, Squirrelfish, butterflies and others).

WANT TO KNOW MORE?

If so, then further information and a brochure are available from:

John A. Burton,
UK Representative,
Philippines Reef and Rainforest Project,
PO Box 99,
Saxmundham, Suffolk IP17 2LR.
Tel: 01986-874422
Fax: 01986-874425

Within the Philippines contact:

Gerry L. Ledesma,
President — Negros Forests and Ecological Foundation Inc.,
South Capitol Road,
Bacolod City 6100,
Negros,Philippines.
Tel: 34-26308
Fax: 34-25007

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 addressed.*

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.

KOI

Fungus or Pox?

One of my Koi seems to have some 'fungussy' growth on its nostrils. The fish is some three years old and still has an appetite and follows the other Koi about.

I've put some treatment in the pond (which is quite small and also holds frogs, but no pump) but can't see any improvement.

Raised waxy lesions typical of Carp Pox

LANCE JEPSON

Fish or Carp Pox creates growths which feel like candle wax to the touch. They can appear anywhere on the body.

It is extremely difficult, often impossible to diagnose accurately the cause of many ailments at a distance, even though you may have supplied as much detailed information as possible. The best one can do in circumstances such as this is to offer good advice which should, at the least, be meaningful, without further risks to your Koi.

I am a little concerned that what you describe may be a slight infection of Fish Pox and not a fungal infection. The way to identify the difference is to feel the infected area. If it feels hard like candle wax, it will be Fish Pox and should cause no real problem. There is no cure for Fish Pox and, eventually, all Koi will overcome such a problem. Fish Pox does not kill and should not be disturbed at all.

Most signs of fungus on Koi can easily be treated by giving the patient a quick 3- or 4-minute dip in a salt bath, containing 2-3 ounces of cooking salt dissolved in a suitable sized container. Always observe the patients while in any form of dip bath treatment for signs of distress. Koi have a habit of jumping out when in this bath treatment, so be warned! You may repeat this treatment in 5 days or so if you find no improvement.

Finally, I notice your pond has no pump at all. You Koi and other fish will benefit from some form of extra aeration, especially during very hot weather (which we can still get at this time of year). Besides, the sound of a small waterfall or fountain can also sound relaxing.

Erratic swimming

From time to time, one of my Koi takes off at a tangent, curves its body and swims sideways, seeming to 'twist in' on itself. It's also lost some scales.

I've treated it with acriflavine and (later) with acriflavine and anti-fluke + Myxazin, because I suspect an infection.

Some parasites can cause immense irritation and create erratic swimming behaviour. Your Koi's scales will not grow back, but the skin will heal over, leaving some slight scar tissue.

Abnormal swimming behaviour can also be caused by a number of other factors. For example, excess overdosing with organic phosphates can create malformation of the backbone and (at times) can destroy a Koi's nervous system.

Electric currents in the water at any time will also create erratic and snake-like swim patterns. Swim bladder infections are another cause of unusual swimming behaviours. Chemical overdoses are uncurable as, indeed, are swim bladder problems.

My advice is to be very vigilant of any new Koi introduced to the pond. Also, observe all your fish carefully for any further signs of parasite infections once treatment has been administered.

PLANTS

CO_2 supply

I am looking at the various methods of delivering carbon dioxide to my plant tank. What are the advantages of using a compressed bottle system as opposed to a fermentation system (other than the difference in price which is so large)?

Compressed bottle systems have the advantage of a sophisticated delivery system controlled by a highly accurate needle valve. This enables the user to calculate and deliver precisely the right amount of gas to the aquarium.

Although the initial system is expensive, the gas itself is very cheap and lasts (according to the size of the bottle) for some months before it needs refilling.

Aquarium Top Ten

What would you say are the most popular plants for freshwater tropical aquaria?

Although firm figures are not available regarding sales of individual types of aquarium plants, I think that the following Top Ten is pretty accurate:

1. Cabomba (*Cabomba* spp)
2. Vallis or Tape Grass (*Vallisneria spiralis*)
3. Broad-leaved Amazon Sword (*Echinodorus paniculatus*)
4. 'Densa' (*Egeria densa*)
5. Water Star (*Hygrophila polysperma*)
6. Red Ludwigia (*Ludwigia mullertii*)
7. Giant Red Rotala (*Rotala macrandra*)
8. Water Wisteria (*Hygrophila difformis*)
9. Pygmy Chain Sword (*Echinodorus tenellus*)
10. Cryptos (*Cryptocoryne* spp — small species)

Cabomba caroliniana — possibly still the most popular freshwater tropical aquarium plant.

U.P. • C. PEDDER

TROPICAL

Light panic

Six months ago, I set up an aquarium with in-built fluorescent lights. From the outset, every time I switch on the lights, the fish dive for cover.

I have tried leaving the lights on for long periods but the fish still stay out of sight. However, when I switch the lights off, they all come out and swim happily in the dark. Why is this?

Fish expect the light you put on to be the same as the sun rising in their natural world. In the tropics, this happens at a set time every day of the year. In the temperate or cold zones, it varies with the seasons.

Many fish actually breed at certain times of the year, based on light and temperature (see the recent articles by Dr David Tipping entitled *Light-sensitive spawners*).

If you switch the tank light on at all kinds of odd times, it comes as a shock. They then remember the shock and react in the same way every time.

To cure the problem, revert to natural lighting, i.e. connect the light circuit to a timer (any DIY shop) set to switch on at daybreak and off at night-time, at a specific time; the fish soon learn to anticipate it and develop a diurnal rhythm, just like us humans.

If you are away during the day and prefer evening viewing, you can set their 'daytime' as 5 pm to midnight, or whatever.

If you have real plants, note also that these have a daily rhythm too — but this must be set at 12 hours day/12 hours night, so set the timer to have a half-day on, whatever actual time that is.

Once set, keep the times constant.

Scale-less Corys?

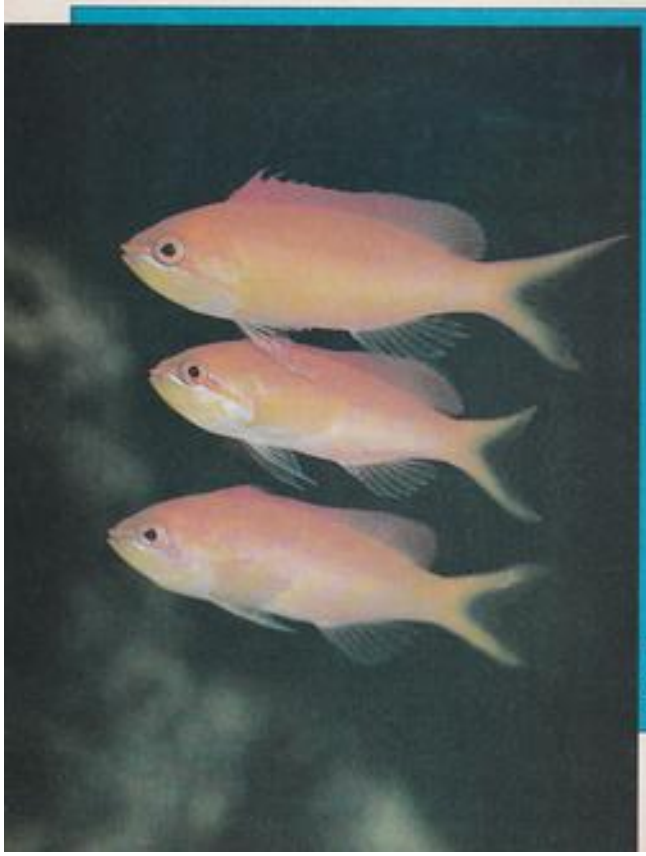
Are *Corydoras* catfish and their relatives (*Brochis*) classed as scale-less fish for medication purposes (eg) for White Spot?

No! Some *Corydoras* and *Brochis* species *look* scale-less but, in actual fact, they are more heavily scaled than most community tropicals. They are classified as 'Mailed Catfishes' in scientific literature because their scales are overlapping 'plates', rather like the armour of knights. Therefore, they can be given standard doses of medication if needed.

If the reason for treatment is White Spot or a similar ecto-parasite, note that Corys (in fact, most catfishes) keep their skin clean by 'wallowing' in sand. If you have a gravel base, prepare an area or give the fish a shallow tray of river sand for them to 'wash' in.

DAVID FORD

***Corydoras* and *Brochis* catfish have a 'coat' of thick armour plate.**



BILL TOMEY

MARINE

Sex-changing Wreckfish

I would love to buy a fish I've seen called a Wreckfish. It is a lovely orange/pinkish colour. What can you tell me about it?

I can tell you that this little beauty is called *Anthias squampinnis* and that it is a grouper.

It should never be kept as a single specimen, as these will pine and waste away. This species loves the company of its own kind and should be kept in a group of 5 or 6, space allowing.

You will note that a definite male will emerge, as this species is hermaphroditic and the largest individual becomes a male. If he dies or is removed, then the next fish in line changes sex and becomes a male.

Do not buy a single specimen, even if it is a beautiful looking male, but wait until you can buy a group — and THEN only if you have a large enough aquarium.

An excellent trio of Wreckfish.

Persistent red slime

I have an abundance of red slime algae in my aquarium. I hate it! It looks horrible, but however much I siphon out at water change time, it keeps coming back. What can I do?

Red algae are the result of either the wrong type of lighting, or an over-abundance of nutrients — for example, nitrates, phosphates and the like.

Make sure that the light which you supply is of the correct spectrum (i.e. read some books) and ensure that you cut down on feeding.

Remove detritus and uneaten food. Perform a large water change and initiate a more stringent aquarium management regime in future.

HERPETOLOGY

Lizards in the garden

If I were to release Common Lizards into my garden, are they likely to stay there or will they wander off?

The garden is heavily planted with native species and there are two ponds. I have also built a hibernating chamber out of bricks. It is 2 × 2 ft in size. How many lizards are likely to occupy such a chamber without any disputes breaking out?

Finally, is it legal to remove lizards from a site that has long been developed?

Common Lizards do not have the same measure of protection as do Sand Lizards, Smooth Snakes and Great Crested Newts. They are, of course, protected against unlawful killing, but as far as can be ascertained, you are allowed to release them into your garden.

It is difficult to say if the lizards would stay put. If their new home was to their liking with adequate food and basking sites, then they might. You may have to cordon off part of the garden to prevent them roaming, though. One problem could be domestic cats entering the garden and hunting the lizards.

The hibernation chamber should house a large number (about 20 or so) of the lizards – 'disputes' are usually seen only in the breeding season — but they may not necessarily use it. In our enclosure, our lizards have often chosen unsuitable hibernating places, such as under flat stones, etc, only an inch (2.5 cm) deep, which does not give them frost protection.

Common Lizards seem to have a habit of emerging to bask on mild, sunny days during the hibernation period and may rapidly become too chilled to return to the chamber when the sun drops. It may be necessary to replace them if this happens. If the site you mention is being developed, it is worth trying to save some of these lizards.

Handling Fire Salamanders

I would like to keep Fire Salamanders but I have read that they are poisonous. How dangerous are they if I need to handle them?

Fire Salamanders (*Salamandra salamandra*), like many amphibians, can produce quite a strong toxic secretion from glands in the skin to deter predators. The toxins ooze from the skin only when the salamander is attacked. However, they have been popular vivarium subjects for many years and there are no reported cases of anyone being harmed by them.

Amphibians should not be handled unless necessary, as they do not like hot, dry human hands. In fact, holding them too long is likely to prove more harmful to the amphibian than the keeper. The only time they need to be handled is when transferring them to a different vivarium.

If handled gently there is no problem, but if you are still worried or have cuts on your fingers, disposable plastic gloves can be worn. Gloves or bare hands should be wet, as this causes less trauma to the creature's skin.

After handling amphibians, or indeed, any animal, hands should be washed. As a precaution, household pets and young children should be kept away from reptiles.

The dramatically marked Fire Salamander.

BOB & VAL DAVIES

COLDWATER

Goodbye Pauline... and Thank You

After many years serving our readers through her Question/Answer column and her occasional articles, **Pauline Hodgkinson** has decided to pass on the reins to someone else to allow her to concentrate on her many other activities.

Coldwater aquarists and pondkeepers, from both the UK and overseas, have benefitted enormously through Pauline's sensible, valuable and well-informed advice and her regular contributions will be missed by all her fans.

We thank Pauline most sincerely for everything she has done for us so efficiently and promptly over the years and we look forward to publishing her articles, which she has promised to submit whenever inspiration strikes.

As from next month, all coldwater queries for **Question Time** will be handled by another *A&P* favourite, **Alex Stephenson**. Therefore, from now on, please address your letters to **Alex** c/o *A&P*.

John Dawes

Home-made foods

1 Egg yolk diet

An old fishkeeping friend has told me that he always used boiled egg yolk to feed fry. This sounds an easy, cheap method.

Does it work, and if so, how much should be offered at each feed?

Yolk was, many years ago, one of the only alternatives to infusoria and brine shrimp. Feeding egg yolk did have its risks, though, because it very quickly pollutes the water and so, too often, caused problems, encouraging bacteria. As a result, many spawnings were lost.

Now, of course, these old risky methods have been replaced with more suitable foods which are safer, less messy and really not a great deal more expensive.

You can, for example, purchase liquid food in a tube, which is an ideal first food after the fry have hatched... and much safer to use than egg yolk.

2 Complete food recipe?

I am seriously thinking of making up some of my own recipe fish food to give to my collection.

I have seen several suggestions in books and magazines for home-made fish foods and wonder what, in your opinion, are the best ingredients for a complete recipe.

To tell you the truth, I think that while home-made fish foods were the only option many years ago, they cannot match today's commercially prepared foods.

The amount of research which has gone into establishing all the necessary ingredients to maintain a good, nutritious, balanced diet will ensure that you offer the best possible healthy diet for your fish.

However, I do think that it is important to offer variety and the occasional feed of live foods, which might include, earthworms, white worms and *Daphnia*. All provide a treat and extra vitamins to a fish's diet.

Growing Tips

BY BARRY R JAMES

Algal control

Among the problems confronting the aquatic plant grower, the proliferation of, and infestation by, algae is the one that causes the most frustration and annoyance. Part of the problem lies in understanding these organisms and what makes them tick.

Among the algae, we find some of the simplest (in structural terms) of plants. There is little doubt that each of the three great groups arose from unicellular, ciliated, free-swimming forms not unlike the ones that today cause 'Green Water' blooms. Although their earliest ancestors had factors in common, there were three separate and independent lines of evolution.

In no other division of the plant kingdom have there been so many 'experiments', many of which lead into blind alleys. *Chara* a common alga in freshwater is an example of this. These plants have remained unchanged for untold millions of years.

In the green and brown algae, there can be traced improvements in structure and reproductive methods from which we can only conclude that one or other of these groups gave rise to the higher plants of today.

With so many factors in common, it is not surprising that finding foolproof selective ways of eradicating algae, while enabling the growth of 'the higher plants', has proved such a problem.

I like to think of algae as the 'weeds' of the aquarium. Confronted with the same problem in the garden, one puts in groundcover plants to smother them and other plants, such as shrubs, to deny them light, nutrients and space in which to survive.

The same technique is used in aquaria, using floating and bottom-rooting plants to achieve the same ends.

Other techniques such as altering the chemistry, the physical attributes, temperature and turbulence of the water and altering the duration, special content and intensity of the lighting can also be used to limit or eradicate algae, while maintaining the growth of aquatic plants.

There is another method of destroying algae which is familiar to most aquarists: that of using algae-grazing animals to eat the stuff.

Bacteria and viruses and other simple organisms which prey on algae, as they do on all other organisms, cannot at present be employed, simply because we do not know enough about them. However, molluscs, crustaceans and fish all offer possibilities as weapons to control algae.

① Molluscs

Of the molluscs, the Red and Black Ramshorn Snails (*Planorbis* species) can do a useful job and are quite gentle on the plants. Other species, however,

ABC of Plants

Anubias species belong to the family Araceae which also contains the genus *Arum*, the well known Easter Lilies. All the members of the group are easily recognised by the characteristic spathe formation of the inflorescence.

Anubias are confined to the African continent and, in particular, the tropical western side. In recent years, due to a stirring of the entrepreneurial spirit among native West Africans, many species of *Anubias* have become available in Europe.

There are perhaps up to a dozen species which make up this genus and while they do not display a great diversity of characteristics, they do come in a variety of sizes, which makes them useful in all areas of the aquarium.

If ever plants could be described as "easy" *Anubias* certainly would fit the bill. They will survive in poor light, poor substrate, need few nutrients and will even put up with savage drops in temperature which would annihilate other species. They can also put up determined resistance against herbivorous fish with their wiry roots, tough stems and thick glossy leaves.

M P + C PIEDNOIR

Dwarf Anubias in bloom.

BARRY JAMES

The Lance-leafed Anubias

① *Anubias nana* (may be a variety of *A. barteri* (*A.b. 'nana'*).
Common name: Dwarf Anubias.
Distribution: Cameroon and adjacent countries.
Description: An amphibious marsh plant, reaching a height of just 4 in. (10 cm) in length. Very suitable for the foreground, where in time, it will form a dense carpet.

② *Anubias barteri*
Common name: Barter's Anubias.
Distribution: Generally distributed throughout West Africa, from Gambia to the Congo.
Description: This species exhibits much variation in form throughout its range. In the Gambia I have collected specimens in which the leaves were sagittate (arrow-shaped). Further east they may be distinctly cordate (heart-shaped). Taller than *A. nana* it can grow as high as 12 in. (30 cm) but much dwarfer forms are known. This species also climbs over rocks and bogwood. Suitable for foreground to middleground planting, depending on the form obtained.

③ *Anubias lanceolata* (may be a form of *Anubias barteri — A.b.* 'lanceolata'.
Common name: Lance-leafed Anubias.
Distribution: Cameroon to southern Nigeria.
Description: This species represents the 'other' taller growing species distinguished only by height and width of the leaves. Reaching a height of around a foot (30 cm), the leaves are some 2 in. (5 cm) wide and 6 in. (15 cm) long. The stalk makes up the other 6 in. The creeping rhizome is slower growing when submersed than in the previous two species, but being taller, it is suitable for the middle or background, depending on the height of the aquarium.
Cultivation: All *Anubias*, ideally, need a laterite substrate enriched with humus, medium light levels and a temperature of 75-86°F (24-30°C) for optimum growth.

can devastate aquaria, polishing off both algae and plants in quick order.

Many aquarists have, for example, bought the huge Apple Snails (*Ampullaria*) attracted especially by the golden variety. However, these voracious beasts can cause terrible havoc.

② Shrimps

Takashi Amano in his new book which has the strange title of *Nature Aquarium World* (see August's **Growing Tips**) advocates the use of tiny shrimps native to Japan to control string and beard algae. These, however, have (to my knowledge) never been introduced into Europe.

③ Fish

There are many species of freshwater fish, particularly catfishes and loaches, which have exploited algae as a foodstuff. These generally live in running, rather than stagnant, water.

Here is a case of parallel evolution. The mouthparts have been modified as sucking mechanisms which prevent the fish being washed downstream by strong currents. In addition, they possess rasping teeth or teeth-like structures which they employ to tear the algae from the rocks to which they are attached.

In South America, there are many catfishes specialised in this way. Diminutive genera such as *Otocinclus* are eminently suitable as algae removers in aquaria. Larger ones such as *Hypostomus* and *Ancistrus*, while doing a more thorough job, can also damage plants.

In South East Asia, their place is taken by the loaches. *Gyrinocheilus aymoneri*, known in the UK as the Siamese or Chinese Sucking Loach, will eat the algae which cause green and brown films on glass and rocks. The Siamese Flying Fox (*Crossocheilus siamensis*) is reputed to eat the Red Beard Algae (*Audouinella*), which have become the worst algal pest in aquaria.

Two more genera, namely *Epalzeorhynchus* (and *Garra*, called Flying Foxes or Stone Lappers, are also algae eaters.

The ubiquitous species known as the Hong Kong Pleco is, however, not an algae eater. It clings to the side of the tank by its modified fin structure, rather than its mouthparts.

In my experience, I have found that, while useful in helping control algae, none of these fish are panaceas for this problem, but must be used in conjunction with environmental methods of control

FASCINATING FISH FACTS

An expensive snack

You either love it or loathe it, but there's no denying that caviar is one of the world's most expensive foods. A female Russian Sturgeon caught in 1925 weighed more than 1200 kg (nearly 2,650 lb) and yeilded 245kg (540 lb) of high-quality caviar, representing a fifth of her total body weight. If sold today, this would fetch more than £175,000.

A (little) cheaper alternative, is the related Sterlet, which is also prized as food. This time, the whole fish, and not just the eggs, is eaten.

In common with the Sturgeon, Sterlets have an extendable mouth. This can be shot out to form a tube through which its favourite foods of worms and molluscs are sucked up from the bottom.

I wonder what a Sterlet would make of caviar!

Linda Lewis

Sterlet: cheaper alternative source of caviar.

LINDA LEWIS

FISH by design

Danubian Catfish showing swim bladder located near the centre of gravity of the body.

LAWRENCE E. PERKINS

Remarkable bladders

PART FOUR

Roy Osmint takes a close look at a fish organ that is rarely, if ever, seen, but which can sometimes be heard

Previously in the series, I have looked at how the vital organs of fishes are, in many ways, not dissimilar to those of land animals and that, fundamentally, they share the same requirements for subsistence.

But there are, of necessity, some basic differences which enable fish to function with maximum efficiency within the varying conditions of their underwater home. One such contrast is the existence (in most species) of an air-filled swim bladder.

Neutral buoyancy

The majority of modern fishes possess within their body cavity an ingenious mechanism consisting of a hydrostatic bladder which fulfils an extremely important role in connection with maintaining attitude, position and equilibrium in the water.

By means of the swim bladder, a fish is able to render itself the same weight as the water in which it is suspended. This effectively produces a weightless state and affords neutral buoyancy, ensuring that, without desire and effort, it will neither float nor sink.

The size, shape and position of the swim bladder varies quite considerably among species, and, in some instances, has undergone remarkable modification to enable it to fulfil additional functions, while in other examples, the bladder can be completely absent. As with all other aspects of the fish's design, this bladder is totally determined by 'need' — and has evolved to suit specific requirements of habit, habitat and behaviour.

The bladder itself usually contains a predominantly oxygen-based gas, the volume of which is automatically adjusted as the fish ascends and descends. This effectively compensates for fluctuations in water pressure.

By the use of special glands, the fish is able to alter its own buoyancy by increasing or decreasing the volume of gas within the swim bladder and, thus, control its depth in the water.

Off-centre bladder

The interesting and curiously amusing Upside-down Catfish (*Synodontis nigriventris*) presents a good example of how an unconventional swimming practice can be supported by the position of the swim bladder. In this species, the bladder tends to be located a little off centre and assists the fish achieve and maintain an inverted attitude.

This unusual behaviour allows the Upside-down Catfish, which has all the standard design characteristics of a bottom dweller, to feed from the surface with ease, as well as from the underside of leaves and branches, thus enabling it to exploit food sources that may be overlooked by other, less acrobatic, species.

The Upside-Down Catfish's off-centre bladder allows it to swim and feed in an overturned position, as this specimen shows.

M. P. & C. PIENAAR

Sinking fish

Certain fish have a very small swim bladder in relation to their own size, while, in others, it can be completely absent or become ossified.

In general, these tend to be fish that spend most of their time relatively dormant on the bottom in fast-flowing water and, consequently, have much less need for buoyancy.

The Banded Characidium (*Characidium fasciatum*) and the African Blockhead (*Steatocranus casuarius*) are suitable examples.

In apparent contradiction to this generalisation, marine sharks, among the most active of all species, do not possess any form of actual swim bladder, though in terms of buoyancy, balance and control in the water, they approach perfection.

This is possible not only by superb body design but also (in most cases) by remaining almost constantly on the move throughout their lives, as they roam the great seas and oceans of the world in never-ending search of their prey.

Sharks also store copious quantities of oil in the liver which, to some extent, helps compensate for the absence of a swim bladder.

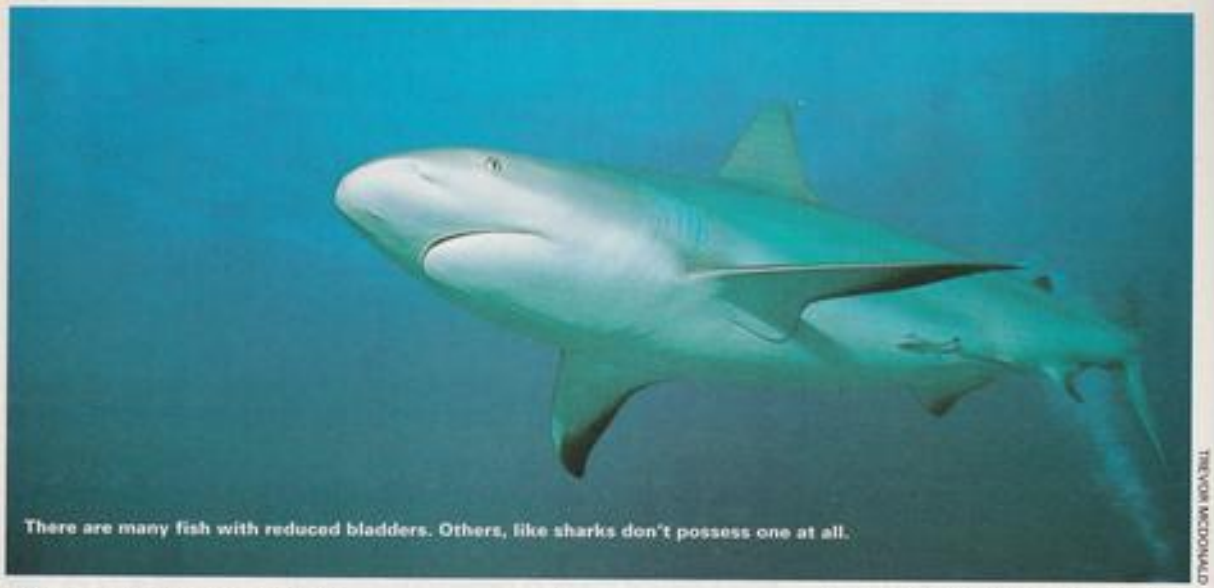
Breathing and sounds

Such is the diversity of construction and development of the swim bladder, that it has, in many instances, evolved remarkable specialisations not exclusively associated with equilibrium, although this frequently remains its primary function.

The bladder has some similarities in structure to that of a lung and certain fish species do use it as an accessory breathing organ. The Reedfish (*Calamoichthys calabricus*) has this ability, as does the Bowfin (*Amia calva*).

These fish are able to channel atmospheric air to the swim bladder, from where oxygen can be absorbed directly into the bloodstream. In the case of the latter species, the bladder is developed in this respect to such a level that the creature can survive out of water for anything up to twenty four hours.

The versatility of the swim bladder does not stop here, though. Many fish utilise it in a variety of remarkable ways associated with



There are many fish with reduced bladders. Others, like sharks don't possess one at all.

TREVOR MCDONALD

the creation or intensification of sound.

As we have previously seen, fish, generally speaking, have a highly developed sense of hearing, and none more so than those belonging to the superorder Ostariophysi.

Although, perhaps, this group may be apparently unfamiliar to many, it does, in fact, include the vast majority of freshwater fishes in the world and therefore also contains most of the popular species found in aquaria, including tetras, danios, barbs, catfish and many others.

Fishes from this huge order clearly represent an enormous diversity of characteristics, but one unique to them all is the presence of a complex mechanism known as the Weberian Apparatus, named after its discover, Ernst Heinrich Weber.

This most complicated structure, of which there is undoubtedly still much to learn, provides a connection between the swim bladder and the inner ear, and is formed from a modification of the first four vertebrae behind the skull. From these vertebrae a number of fragments, or ossicles, have become detached and effectively create a chain, the first link of which is in contact with the inner ear, and the last with the swim bladder.

Although the precise nature of the structure can vary among species, the mechanism acts as an organ of hearing by allowing vibrations to be transmitted along it. Sound waves in the water have an effect on the volume within the swim bladder. Resultant pressure changes are then amplified as they pass through the Weberian Apparatus to the inner ear.

Noisy fish

Often, fishes are also producers of sound and, in many instances, the swim bladder will be instrumental in this process. Members of the catfish family the Doradidae — the so-called Thorny and Talking Catfish — are suitable examples, producing a low grunt by means of a specially adapted and compartmentalised bladder. The sound can be achieved both in and out of the water.

SUE ASHURST

The Weberian Apparatus is a highly sophisticated 'hearing aid'.

Noises produced by minnows result from air being passed along the pneumatic duct between the digestive tract and swim bladder, while in some members of the Drumfish family, the Sciaenidae, sound is created by contractions of extrinsic muscles, either attached or positioned around the swim bladder. These cause the bladder itself to vibrate, generating a resonant beat, which, at its most intense, is audible some two metres above the surface of the water.

Sound production among fishes serves a number of possible functions, and although there is still much for us to learn about its precise nature, it is clear that, in terms of communication and recognition, it provides an invaluable aid to many species, especially in connection with reproduction.

During the breeding period, certain fish will use sound as a means of distinguishing a possible partner of their own species from that of a closely related one, particularly in water where visibility is poor. Sound may also be used as a means of communicating warnings of imminent danger, or as a signal to assist schooling fish assemble and maintain a shoal.

Formed from an outgrowth of the oesophagus (gullet) during the earliest stages of the fish's development, the swim bladder is a truly remarkable organ in every respect — not least for its extraordinary diversity of adaptation and modification in structure and purpose. FPP

One of the best-known sound producers among aquarium fish is the appropriately named Talking Catfish (*Amblydoras hancocki*).

JOHN DAWES

SHORE WATCH

BY ANDY HORTON

Warm, wet and windy is used to describe the sea and shore conditions during the month of September.

Warm, because water has a high specific gravity compared to air, which means the vast volumes of the seas and oceans take longer to heat up and cool down. The sea temperatures recorded offshore will only be slightly lower than during the warmest month of August.

Wet, because the rockpooler may have to endure showers or even steady rainfall during this month. Rain can also dilute the upper shore pools, making them unsuitable for marine life.

ANDY HORTON

The large red Pea Crab is the female which can hardly crawl while the fawn-coloured males are active swimmers.

ANDY HORTON

The Lesser Weever buries itself in the sand. Bathers stepping on the venomous spines should treat the wound with hot water.

Winds

Most noticeable in September are the negative effects of the wind. Even the slightest breeze will ripple the surface of a windward pool and make observation difficult. Furthermore, the wind will whip up the sediment and make the pools and shallow seas murky. This can make the prospect of a visit to the shore in September uninviting.

However, the inclement weather does not make a great difference to the fauna during this month. The juvenile fish and crabs will have grown since August and the largest and fittest will have survived. Prawns will reach their largest size found between the tides, with the edible species *Palaemon serratus* reaching a succulent 10 cm (4 in), with an occasional larger specimen.

The wind also has a direct effect on the fauna found on westerly coasts. The jellyfish-like animal called By-the-Wind Sailor actually uses its sail-like float to catch the wind and propel it along. It is purple with stinging cells that are still active when it becomes stranded on the beach. In 1992 they were particularly prevalent.

ANDY HORTON

By-the-Wind-Sailor washed up on a west coast beach.

Equinox effects

The Autumnal Equinox occurs on 23 September 1995. Four days after this equinox, some of the highest tides of the year occur. When the tides are the highest, they also recede the furthest, uncovering rocks and pools that may only be seen for a few hours every year.

These pools may contain sedentary animals like the soft coral known as Dead Man's Fingers and the solitary hard coral known as the Devonshire Cup Coral. Both of these species are animals of the shallow sea, rather than the intertidal zone.

Taken together with the small fish and other animals that have bred earlier in the year and spent their formative months feeding on the rich shore fauna, these corals make the month of September the most interesting of the whole year.

The fawn Long-legged Spider Crab is about the size of a Daddy-longlegs and usually appears crumpled up in a prawn net where it is easily overlooked. In an aquarium without predators, it is a fascinating exhibit, swimming with a curious bicycle-like motion. Like other spider crabs, it decorates its body with scraps of weed.

Rolling sand creatures

Strong currents, combined with the wind and tide, can result in depositing shores, where sand from below the low water mark is deposited on to the beach. This usually occurs after a steady period of offshore winds.

A common inhabitant of the shore is the scavenging gastropod mollusc, the Netted Dogwhelk, which is more common just below the surface of the sand and can be rolled in by the waves.

Other sand dwellers include the venomous Lesser Weever fish and the Masked Crab. Various flatfish, like the Sole, venture into very shallow water.

Offshore dredging is often responsible for deposits of sand and silt on the shore, together with their associated animals. The sand can also smother and diminish the fauna of rocky shores. However, these deposits often bring surprises, with the burrowing prawn called *Axius* and a sea anemone called *Sagartia troglodytes* that decorate the floor of sandy pools.

Estuarine visitors

High tides funnel up estuaries, often forming an uppermost marine layer over the outflowing freshwater. This gives the land-based shore watcher a view of the marine world of the surface waters from a jetty or pier not normally possible without venturing out in a boat.

Careful observation when the water is clear produces a list of fish and other animals so long that it will only be possible to mention the most interesting.

With the human's (other people's) disregard for the environment so fixed in our minds, I first assumed that an 'object' which I spotted recently was a discarded pot of paint. However, it turned out to be a colourful Compass Jellyfish that spent a whole week drifting in and out with the tides in the Adur Estuary, Sussex. This species acquired its popular name because of its attractive orange lines that radiate from the centre to all points of the compass. It acquires its other common name of Sea Nettle because the long trailing tentacles produce a sting. Exactly how powerful this sting feels to humans, I was not willing to test!

The Compass Jellyfish attains a diameter of 30 cm (12 in) and because it drifts in the surface waters, is immediately noticeable. The sight of one can spark off an interest in marine fauna that can stay with one for the whole of his, or her, life. Jellyfish can be killed

SEPTEMBER CHECKLIST

Because the tides rise so high up the shore and also recede the furthest during September, almost any plant or animal recorded in the popular identification shore guides could turn up in the month of September.

Cnidaria (Jellyfish, Hydrozoans, Sea Anemones, Corals)

By-the-Wind-Sailor	*Velella velella*
Compass Jellyfish	*Chrysaora hysoscella*
Devonshire Cup Coral	*Caryophyllia smithi*
Dead Man's Fingers	*Alcyonium digitatum*

Mollusca (Marine Snails and related animals)

Netted Dogwhelk	*Hinia sp*
Common Mussel	*Mytilus edulis*
Squid (one of several species)	*Alloteuthis subulata*

Crustacea (Crabs, Prawns, and lots of smaller creatures in the plankton)

Burrowing Prawn	*Axius stirhynchus*
Long-legged Spider Crab	*Macropodia rostrata*
Pea Crab	*Pinnotheres sp*
Masked Crab	*Corystes cassivelaunus*

Fish

Lesser Weever	*Echiichthys vipera*
Sole	*Solea solea*

The most useful pocket guides for the serious rockpooler are:

1 *The Hamlyn Guide to the Seashore and Shallow Seas* by Dr Andrew Campbell. ISBN: 0 600 34096 0 (paperback.), 0 600 34019 8 (cased).

2 *Collins Pocket Guide to the Seashore* by John Barrett and C.M. Yonge. ISBN 0 0 219321 3.

3 *Readers' Digest Field Guide to the Water Life of the British Isles*, edited by Dr Francis Dipper and Dr Anne Powell. **Hodder and Stoughton** (1984). ISBN: 0 276 36008 7.

The definitive and expensive guide to British marine life is: *Marine Fauna of the British Isles and NW Europe*, Vols. I and II, edited by P.J. Hayward and R.S. Ryland. **Clarendon Press** (1990). ISBN: Vol. I: 0 19 857356 1. £85.00; Vol. II: 0 19 857515 7. £95.00.

There are many general books on the British seashore and shallow seas. For further information and the latest publications please write to **Andy Horton, British Marine Life Study Society, c/o *A&P***, enclosing stamps to the value of 43pence.

if captured in a net, or if they are stranded on a beach.

Another interesting invertebrate that can make an appearance in the inshore surface waters, including estuaries, is the squid. This mobile mollusc belongs in the same class of animals as the octopus. It drives itself along by jet propulsion and possesses ten tentacles which it uses to capture its prey of prawns.

Night watching

Under the light of a tilley lamp or electric light, the life that can be observed during the hours of darkness can be even more astonishing than during the day. The reason for this is the multitudes of zooplankton that well up to the surface waters and can be seen clearly under the torchlight.

Shoals of small fish feed on the plankton and shoals of larger fish prey on the small fish. Many of the zooplanktons (microscopic planktonic animals) are large enough to be captured in an aquarium net, and if enough are caught in a special plankton net, they can provide additional food for both Pipefish and Sea Sticklebacks which inhabit these shallow seas and are most likely to be observed around the Autumnal Equinox.

A small fawn pea-sized crab can be observed in estuaries swimming in the surface waters among the plankton. This is the male Pea Crab; it is only the male that is the most active swimmer of the British crabs.

The female is only just about able to crawl. It does not need to move because it spends its whole life imprisoned inside a mussel or other bivalve mollusc, obtaining nutrition when the mussel opens to filter phytoplankton (planktonic plants). The male crab is small enough to swim into the mussel opening to fertilise the female.

British Sea Temperatures*

SEPTEMBER	°C	°F
Thurso, North Scotland	12.2	54
Newcastle	12.2	54
Donegal	14.4	58
Brighton	15.6	60
Plymouth	14.4	58
Gibraltar	20.0	66

* Sea Temperatures recorded at the surface (inshore). Inshore Temperatures may be 2°C higher.

FROGS AND FRIENDS

By BOB and VAL DAVIES

CITES News

At the 1994 Cites Meeting in Florida the Golden Toad (*Bufo periglenes*) was placed on CITES Appendix I. This seems rather ironic, as an article in 1991 reported that this creature had been wiped out!

This extremely attractive toad was found only in the Monteverde Cloud Forest Reserve in Costa Rica. It was formerly evident in large numbers in the breeding season, but suddenly disappeared.

At the time, the probable cause was thought to be the effects of the El Niño current on rainfall and precipitation of mist, combined with deforestation of the Pacific slopes of Cordillera de Tilaren and possibly with global warming. Since that report, we have heard nothing as to whether or not any specimens have survived: hopefully, some may have done so.

It is a pity that breeding groups were not held in captivity at the time.

Venomous snakes

Keeping venomous snakes can be an expensive business. To conform with the law, the would-be keeper needs to apply for a Dangerous Wild Animals' Licence from the Local Authority. There is no standard charge at the moment — it is at the discretion of the Authority and at least one amount of £850 p.a. has been reported.

The licence is only granted after inspection by a veterinary officer appointed by the Authority, who has the power to insist that various security arrangements (locking cages, etc) are installed. In addition, the applicant must be fully insured against liability for any possible claims which might arise.

Slow-worm sighting

Having mentioned in **Frogs & Friends** (May) that no baby Slow-worms had been seen, one three-inch specimen (last year's) was found under a piece of crazy paving.

Popular vivarium subject

BOB & VAL DAVIES

The Eyed Skink — an ideal vivarium subject for beginners.

Many older reptile keeping books, with their limited coverage, mention the Eyed (or Ocellated) Skink (*Chalcides ocellatus*) as being fairly easy to maintain. This species has a wide distribution: Greece, Italy, various Mediterranean islands, North Africa, Arabia and into Pakistan, but imported specimens tend to come in from North Africa. Having been a vivarium subject for many years, captive-bred specimens are often available.

They are sometimes referred to as Barrel Skinks because of their cylindrical body, which has a total length up to 30 cm (12 in). The limbs are relatively small compared with the heavy body.

Their native habitat is usually semi-dry sandy regions, where they can rapidly dive for cover into the loose substrate. As with many 'sand swimmers', the scales are very small and smooth, giving a polished effect; the head is fairly small and pointed. The coloration is light-brown to greyish with numerous small, white-centred, dark spots (ocelli). Some races may display a striped effect on each side.

Captive needs

A vivarium for these skinks should have some 6-8 cm (2.4-3.2 in) of coarse sand (horticultural type, not builder's sand which is too fine) as a substrate. Dry conditions are essential, and localised heating providing a temperature up to 32-33°C (90-92°F), falling to 18-22°C (64-72°F) at night is needed.

These skinks will bask in the day-time, so full-spectrum lighting is recommended. Because of burrowing activity, any rockwork must be situated firmly on the vivarium floor to prevent it sinking and trapping the animals. Cork bark, being lighter, is probably more suitable.

Similarly, drinking bowls must be positioned so that they cannot be overturned. Drinking is seldom observed, so a very light spraying each morning may cause the skinks to lap from the furnishings.

Initially, *C. ocellatus* may dive for cover when approached, but they soon become accustomed to their keeper. They will take the usual insect fare, which should be dusted with vitamin/calcium supplement three times a week. Many specimens will eat tinned dog food, but this should only be offered occasionally, as it is rich in vitamins, too much of which can be harmful.

Breeding

Mating can occur at any time of the year; if required, a cooler winter period can be provided but is not essential. Eyed Skinks are better kept in pairs to prevent aggression. Females tend to have a plumper body, although other sexual differences may not be obvious.

Being ovoviviparous (livebearing) makes captive-breeding easier, and anything from three to eleven young can be expected. The young should be removed to prevent the possibility of cannibalism and raised in a similar set-up to the parents and fed on small crickets.

Eyed Skinks can be thoroughly recommended for anyone who wants a relatively easy species of lizard to keep and breed.

Out-of-doors

The first clump of frogspawn appeared in our garden pond on 17 March, by which time we had had reports of earlier spawning in Cumbria (north of here) and on the Wirral to the south.

Four days later, spawning began in earnest — fourteen pairs of frogs were observed in amplexus accompanied by eight or nine unattached males. Huge amounts of spawn were produced and due to the hot weather in early May, development was extremely rapid, although a subsequent cooler spell seemed to slow it down.

Tadpoles which had over-wintered had developed hindlegs by mid-May, after which they were lost in the teeming numbers of the others.

Since spawning occurs immediately after hibernation, the frogs cannot have eaten much (if anything) before commencing. After spawning, they looked quite emaciated and climbed out onto the land where they spent the days basking in full sun throughout the 'heatwave'.

This raises the question: do frogs benefit from basking as do lizards in the synthesis of vitamin D3 and calcium metabolism? The weather was hot enough for sunburn warnings to be issued.

BOB & VAL DAVIES

Common Frogs in spawning embrace (amplexus). Note the difference in colour between the sexes.

Bargain Iguana book

Green Iguanas: Their Captive Husbandry and Reproduction
By: Dave Blatchford
Practical Python Publications
(1994)
ISBN: 1-897965-07-9
Price: £3.95

The forty-six pages of this booklet are packed with information; it is, in fact the most concise and informative work on Green Iguanas that we have seen and can be unreservedly recommended.

The most common cause of death in Iguanas in captivity is probably metabolic disease brought about by incorrect feeding and maintenance; these subjects are dealt with in minute detail.

Other topics include selection, handling, housing, disease, reproduction, etc. Several black and white photographs and line drawings complement the text to provide guidance.

The author is an experienced herpetologist and this book is a must for anyone keeping or considering keeping Iguanas. It is usually available in retail reptile outlets and, at £3.95, is a bargain.

Bygone days

Some old price lists from the late 1950s and early 1960s unearthed recently make interesting reading. They contain many species which are not available today e.g. Mississippi Alligators at £4.50 and Australian Frilled Lizards (*Chlamydosaurus kingi*) at £17.00. Spur-thighed Tortoises were "from 22/6 p", which was less than a Slow-worm at 37/-p.

Several snakes were priced according to length — Anacondas: 35p per inch, Boa Constrictors: 25p per inch.

Venomous species were available without restrictions, except that they were "To Order Only" — Russell's Vipers: £10, Gaboon Vipers 50p per inch, Rattlesnakes (*Crotalus* sp.): £5-£11 and various Pit Vipers (Crotalidae), such as Copperheads and Moccasins (*Agkistrodon* sp.): £5.50.

The now-protected Sand Lizard (*Lacerta agilis*) cost 25p, while Stumptail Skinks (*Tiliqua rugosa*) were £9.50. One was advertised last year at £500!

(All prices in current decimal coinage)

Herp Fact File — Arrow Poison Toxins

The Arrow Poison Frogs (Dendrobatidae) are well-known for the toxic skin secretions and the accompanying aposematic (warning) colours, although the degree of toxicity varies from species to species and not all are brightly coloured.

The common name stems from the use, by Colombian native Indians, of some three species of the genus *Phyllobates* to tip blowgun darts. The Terrible Arrow Poison Fry (*Phyllobates terribilis*) is thought to be one of the most poisonous animals on earth — an adult frog contains almost 2 milligrams of batrachotoxin which could kill ten adult male humans! As yet, no antidote is known.

Its closest relatives, *P. bicolor* and *P. aurotaenia* (no common names), are much less toxic, but have also been used for darts. Scientists who 'tongue-tested' a fourth species, *P. vittatus* (again, no common name), reported numbness of the tongue and tightening of the throat.

Apparently *P. terribilis* toxin causes a burning sensation on human skin as it can penetrate the pores. Ingestion of this species by animals is also known to be fatal, but direct introduction into the bloodstream is the most lethal method of poisoning. The toxins are powerful alkaloids, more than 200 different types having been identified from Dendrobatid frogs.

Experiments have shown that, in captivity the toxins of wild-caught specimens start to reduce over successive generations and the offspring contain no detectable traces of alkaloids.

The answer lies in the different diets. In the wild, the prey consists of insects and invertebrates which have been found to contain alkaloid poisons, probably originating in plants. Many of these toxins are found in Dendrobatids, but other different alkaloids occur also, thus pointing to synthesis of certain types within the frogs.

The captive diet consists mainly of small crickets and fruit flies which do not contain alkaloids. This leads to reduction and eventual absence of toxins.

Studies have also shown that different alkaloids occur in populations of one species from different geographical locations. A totally new alkaloid was found in the Green Arrow Poison Frog (*D. auratus*) introduced into Hawaii in 1932. This particular one does not occur in other *D. auratus* from native mainland populations.

A newly-discovered substance has recently been isolated from the Ecuadorian species *Epipedobates tricolor* which could possibly be a non-addictive, non-sedating pain-killer much more powerful than morphine. It has reportedly now been synthesised, but still remains toxic. If the toxic nature can be eliminated, it should be of immense value in medicine.

So is the Dendrobatid keeper in danger keeping these frogs? There is no recorded case of keepers being affected. The majority of specimens in captivity are captive-bred and therefore do not possess toxins; very few wild-caught specimens enter Britain at the moment.

In any case, handling of frogs (of any species) should be kept to a minimum as hot human hands are likely to be injurious to them. If the keeper still has any qualms then, on the rare occasions that Dendrobatids have to be handled (i.e. moving to another vivarium or in the case of escapes), disposable plastic gloves could be used or the frogs carefully caught up in a small plastic container.

BOB & VAL DAVIES

Terrible Arrow Poison Frog — perhaps the most toxic animal in the world

NEWSDESK

STAN McMAHON/PETER BURGESS

Tobago Guppies collected by Stan and Peter.

Successful Guppy search

Stan McMahon and **Peter Burgess**, two fish experts from the University of Plymouth, have recently returned from an expedition in the Caribbean islands of Trinidad and Tobago, on a search for wild descendants of the Guppy (see **News** *A&P* May 1994) and have brought back living examples from the original site, St Ann's River, Trinidad, which are now happily breeding in Plymouth.

Stan, a fish biologist at Plymouth University's Department of Biological Sciences, told **News Desk**. "The expedition was staged with the assistance of colleagues from the Zoological department of the University of West Indies and enabled us to monitor and photograph Guppies at several sites throughout Trinidad and Tobago. These included St Ann's River, at the Trinidad capital Port of Spain, where the Reverend Guppy made his historic find. We also sought the fish everywhere, from highland rainforest rivers to lakes, streams and lowland coastal drainage systems."

Added **Dr Peter Burgess**, a post-doctoral researcher in fish parasitology (and occasional contributor to *A&P*): "We expected the St Ann's River to be environmentally impoverished through the urbanisation of this part of Port of Spain over the past 130 years since the time when the Reverend recorded his first Guppy. In reality, however, even though the river has been diverted and there are buildings on either bank, on sampling the river water, we found conditions to be reasonably good."

According to Stan, the Guppies found in the St Ann's River were much larger than those located at other habitats in Trinidad and Tobago: "They showed a remarkable similarity to the originals kept in the Natural History Museum in London, which were collected by Rev. Guppy himself. A small number were brought back to Plymouth from the historic site and these have already been bred successfully in the University aquarium."

He concluded: "The purpose of our expedition, sponsored by **Aquarian** and backed by the **University of Plymouth**, was to investigate, illustrate and record the potential fragility of certain habitats and the necessity to monitor these populations as a vital exercise in conserving the gene pool."

Stan and Peter will be writing about their Guppy exploits in a forthcoming issue of *A&P*.

Forward in time for Anna

Fourteen-year-old **Anna Steward's** interest in marine fishkeeping has earned her a place in history — at the **National Sea Life Centre** under construction in Birmingham.

Anna, from Worcester, showed a keen interest in plans for the £5m development near to the National Indoor Arena and was invited by the centre to bury a commemorative time capsule to mark the start of the construction.

Anna's own aquarium system is a TropiQuarium 68, manufactured by **Rolf C. Hagen**, who responded to her request for a photograph of her own tank in the capsule. **Deborah Gair**, of Hagen, was delighted to help out, remarking: "It would be quite interesting to see the reaction of someone in the future when they see just how advanced the TropiQuarium tank was 'way back in 1995'. Not only does it provide full support for the fish's environment, but it is also so versatile — by taking out the heater it is perfect for coldwater fish too!"

The National Sea Life Centre is due to open in 1996 and will feature more than 3,000 sea and freshwater creatures in 30 high-tech displays. Over 50 British species will be on view, the centrepiece of which will be a stunning deep ocean display with a walk-through acrylic tunnel.

Anna Steward buries her Hagen TropiQuarium for future generations

Leaflets from SE Water

Two leaflets *Looking after tropical fish* and *Looking after your garden pond* have been issued by **South East Water** as the latest in a series of leaflets under the general heading *Water in your life*.

Both leaflets provide brief guidance on their specific subjects, including problems with tapwater, chlorine, thermal shock, establishing a natural balance, stocking and routine maintenance.

The leaflets are available individually or as part of a *Water in your life* information pack, free of charge, from: **Customer Services Department, South East Water, 14 Upperton Road, Eastbourne, East Sussex BN21 1EP. Tel: 01323 411411; Fax: 01323 411412.**

STEPHEN SWIFT

Fish and pond advice from SE Water

Diagnostic display helps pondkeepers

A pond diagnostic display has been developed by **Interpet** to help pondkeepers find the right product for their needs.

The display is intended for use in retail outlets and allows customers to cross-reference their specific pond problems, such as green water, or fish diseases, such as fungus, with the relevant solution from the company's range of treatments.

Adrian Exell, brand manager at Interpet, said: "To make remedy selection easier, Interpet has a display stand which incorporates Interpet's entire pond treatment range. This makes Interpet stockists into a one-stop advice centre for all pond problems."

For information, contact **Adrian Exell, Interpet Ltd., Vincent Lane, Dorking, Surrey RH4 3YX. Tel: 01306 881033; Fax: 01306 885009.**

'Dry' pets as well at Weston

Appreciation of pet animals other than fish will be incorporated into this year's **Supreme Festival of Fishkeeping** (3-5 November, Sand Bay Holiday Centre, Weston-super-Mare), sponsored by **Hagen** and **(*Continued on page 88*)** ▶

Hooked by a prawn

At home in Cornish waters.

There's no end of routes leading into fishkeeping. In Jon Miller's case, a humble bait prawn did the trick and converted him from angler to aquarist.

I grew up by the sea, which was unfortunate for my father who lived in perpetual terror of my being drowned. For this reason, he wouldn't allow me to go out in a boat, so I used to fish from the shore. Although this made me furious at the time, it turned out to be a blessing in disguise. If I'd been allowed out in a boat in those days, I'd probably never have noticed the complex behaviour of various fish.

Where we lived, in Sussex, a sandy beach sloped gently out to sea, disappearing into the 'rough', which was only revealed at low spring tides. The 'rough' was fairly flat, in spite of its name, being a mixture of shingle and large flat stones with small sandy patches in between.

'Smoke' screen trick

The variety of fish found in these waters during the summer months was large. Among those that came close inshore that I encountered were flounders, sole, skate, brill and plaice. I've revisited this area several times during recent years and, whether due to pollution or over-fishing, or both, the quantity and variety of fish are no longer there.

As the tide came in, so did the flatfish, and I used to get plenty of sole and plaice for dinner with a hand net. I soon noticed that sole and plaice behaved in very different ways when disturbed by my oncoming net.

In about half a metre of water, I could see the 'smoke' screen of sand as the fish rushed away from me. At first, the obvious thing appeared to be to go to where the 'smoke' screen suddenly ended and look for the fish there. That worked well enough when chasing a sole, but with plaice, it was a very different matter. Look for a plaice at the point where its 'smoke' screen ends, and you'll find nothing.

JON MILLER

Even from a very young age, tiny plaice (the larger fish) will backtrack and confuse you if you are not familiar with their in-built trick; sole don't.

It took me some time to figure out what was happening. At first, I thought the plaice were simply taking off from the bottom and speeding away above the sand and so not disturbing it. That was what I was *supposed* to think.

In fact, the plaice, at the point where the 'smoke' screen ends, doubles back on its track and settles about halfway from the start. By the time the sand has settled on it, it will be quite invisible from above. So I started probing for the fish halfway along the 'smoke' screen and found that was where to find them.

It's only too easy to think of this behaviour as being intelligent, as though the fish had worked this scheme out for itself. In fact, it's purely instinctive. Even plaice a few weeks old, when they change from being pelagic to true flatfish, show this behaviour.

Chameleon plaice

When I used to supply the London Zoo with baby plaice, knowing about this evasive action saved a lot of time. The Zoo used my baby plaice to demonstrate their colour changing abilities. Plaice change their colour, chameleon-like, according to the colour of the ground they are on.

Baby plaice change much quicker than adult ones. They also grow rather quickly, which was good for me as it meant a continuous supply was required. They were exhibited in a tank, the bottom of which was half covered in a dark sand and half a light one. Plaice could be seen to change colour as they moved from one end of the tank to the other.

Plaice don't use this evasive method over coarse sand or gravel that doesn't leave a 'smoke' screen. In that case, they behave just like sole. This means that it's their disturbance of the sand that triggers this particular behaviour.

I used to experiment with baby flatfish in aquariums and found the same reactions. A sole would rush off to the other end of the tank when prodded, but plaice would rush off and then double halfway back, just as they do in the sea.

The conversion

It was, however, bass that must claim the credit for finally changing me from a fish murderer to an ardent aquarist. One of the first forms of rod and line fishing at which I became quite proficient was — naturally enough in the days when I was forbidden to

TREVOR McDONALD

Plaice will only generate their 'smoke' screen over sandy bottoms.

go out in boats — bass fishing from the shore.

As bait for the bass there was nothing, in my opinion, to equal live prawn, so I kept a permanent supply of live prawns for the purpose in a tank. I found they were very easy to keep. They need little oxygen and will eat practically anything. Even in unchanged and practically opaque water, they continued to thrive. There was no need for an aeration pump, so long as I changed the water about once a week and, providing they were fed every other day, I had a permanent supply of fresh live bait ready for whenever the weather suggested bass fishing.

The rot set in one sunny morning when the breakers were rolling in high. I was about to collect some of my prawns for another attack on the bass. The sun was shining through the tank (of course, no aquarium should be left in direct sunlight, but in the case of my doomed prawns it didn't really matter very much).

They were feeding and it was possible to see them, as it were, in X-ray. I was fascinated. It suddenly became quite impossible to even think of using them as bait. I had become much too interested in them. Without realising it, I had changed from fisherman to aquarist. Firmly hooked indeed!

Retired opportunities

Now retired and living in Cornwall, I still have plenty of opportunities to watch fish. Maybe not so many of the baby flatties I was brought up on, but now there are a great variety of larger fish to see.

There are Basking Sharks around here, generally in June and September, about which we still have a lot to learn. Occasional summer visitors like Sunfish, Triggerfish and Portuguese Men-O-War all add spice to my life.

I still return to my old fishing grounds in Sussex now and again, but how it's changed since I lived there in the 50's. The baby fish are noticeable now by their absence. There's no longer masses of wrack weed where I used to find the prawns. Perhaps all the fish have now grown up and followed me to Cornwall!

I don't keep tropicals, but concentrate on local marine specimens during the summer months. As well as fish, I sometimes keep animals, such as barnacles and watch their tentacles collecting food. School kids that I show these to are always amazed.

I keep my summer specimens in fresh seawater (not recommended for tropical specimens, where a made-up solution is safer) and release them in the autumn, the inedible ones that is. The main problem with keeping coldwater marine fish is keeping them cool during hot weather. One good way is to set up a cooling system as used in pubs for beer.

Now that I can go out in boats, I see many more species than I could during my wading days. But I wouldn't have missed those days for anything. But for them, I suspect I would still be just an angler. AAP

ANDY HORTON

Prawns — as this article proves — have tremendous powers of conversion.

◀ **News Desk**
(continued from page 86)
organised by the **Federation of British Aquatic Societies.**

The full list of attractions to date are as follows:

1 Activities

FBAS Supreme Championship: The national final involving winners of 1995 FBAS championship trophies.

British Masters Open: An open competition for fish, plants, furnished aquaria and aquascapes.

Society Competition: Presentations by societies depicting their overall activities.

Furnished Aquarium Race: Completely furnish an aquarium in 20 minutes!

2 Things to see

AquaChamp Final: Watch the 'masterminds' of the hobby perform in the big black chair.

Guest speakers: **Dr Chris Andrews** (National Aquarium of America), **Heiko Bleher, Les Holliday, Dr David Pool, Deborah Gair** (Hagen).

Specialist societies: Informative displays, and mini-lectures where appropriate. International Water-lily Association AGM and lecture (Friday pm).

FBAS Information Centre: Publications, advice and aquatic society finder service.

Trade exhibits: Demonstrations of latest equipment, setting up aquaria, helpline centres, fish phone-in, bookstalls.

Painting competition: Children's depiction of the underwater world.

3 Other events

Bristol Zoo: Get close to the animals.

Hamsterdam: The complete Hagen Habitrail System.

Mobile Petz: Unusual animals.

Geoff Capes: Whether it's budgerigars or tug o' war, Geoff's the man!

Tricky Tykes: Amazing dog display team.

Bluebell sett wildlife appeal: Brock the Badger and other endangered species.

Foreign Bird League: Flying marvels in their aviary.

Marine artist exhibition: Meet **Wincey Willis** and you can win a special dolphin painting.

In addition, the organisers are running a fancy dress competition, darts contest, children's events and competitions, as well as a dinner and cabaret on the Saturday evening. Draws will be held daily, and each resident will receive a £20 Hagen voucher.

Enquiries and bookings should be addressed to: **Colin Richards, Beechwood Cottage, Long Grove Farm, 234 Chartridge Lane, Chesham, Bucks HP5 2SG. Tel: 01494 773094.**

International Directory Part II

The second edition of the annually-updated *International Directory of Aquarist Organisations* has been published by the **Aquatic Conservation Network.**

According to ACN, the directory has been developed to facilitate worldwide communications in the aquarium hobby, and between the hobby and professional aquarists. Corporate sponsorship for this edition has been provided by **Aquarium Products, Ekk Will Waterlife Resources, Novalek Inc, Rolf C. Hagen Inc, and Wardley Corporation.**

Listed in alphabetical order are more than 1,200 organisations in 34 countries, with listings also being categorised by country, specialisation, newsletter title, society name, abbreviation and by whether or not the society has a conservation programme.

Cost of the directory is $20 ($15 for ACN members), plus postage and handling ($2 in Canada, $4 for US orders, and $8 for other international orders). Payment can be made by cheque or money order in either Canadian or US currency.

ACN has also published a 62-page document entitled *Captive Breeding Guidelines* (ISBN 1-895655-02-1). This document has been developed by volunteer conservation aquarists and, according to ACN, expemplifies the role that non-scientists can play in the conservation of aquatic life.

The *'Guidelines'* are edited by **Rob Huntley** and **Roger Langton**, and provide fundamental advice for conservation aquarists, as well as a protocol for participation in ACN programmes.

Additional information was provided by **Dr Chris Andrews, David Armitage, Dr Peter Burgess, Henrik Hornhaver, Timothy Hovanec, Russ McAndrews, Tim McCarthy, Joe Norton, Dr Gordon McGregor Reid, Allen Scher, Phil Sponenberg, and Doug Warmolts.**

For further details, or to apply for membership of the ACN, contact: **Rob Huntley, General Manager, Aquatic Conservation Network, 540 Roosevelt Avenue, Ottawa, Ontario, Canada K2A 1Z8. Tel: (613) 729-4670. Fax: (613) 729-5613. Internet: rob@pinetree.org OR ag508@freenet.carlton.ca CompuServe: 71022, 3537.**

WRITE BACK

The show must go on

Arnold Chadwick.

As organiser of the British Aquarists' Festival, the longest running and one of the most popular in the aquatic calendar, I would like to contribute to the ongoing debate on shows by passing on my views on the 'Ten Thoughts' and add a further one: Finance.

1 Finance

The first British Aquarists' Festival was visited by 17,000 people, including many famous aquarists from overseas; this was on 2-5 May 1951. Carpenters and show fitters were hired by the sponsors to erect stands for society members to display their fish (no tableaux).

The show, from the public point of view, was a fantastic success, but alas, in spite of all the planning, enthusiasm and unpaid effort, it was a financial disaster. The cost of materials, transportation and hired assistance had exceeded the income and the sponsors were left with a bill of four figures. Despite the loss, Mr Charman, the then owner of the *Aquarist & Pondkeeper*, expressed his wish that the British Aquarists' Festival should continue, but expense needed to be trimmed.

As you can see, the expense of putting on the Festival was a problem from the beginning, just as it is very much so today. However, there has been success in many years where a suitable profit has been rolled over into the following year's Festival. We receive sponsorship in a number of areas, but it is, in the main, the Federation's (Societies') money that puts on the show, and in most cases loses it, to further the hobby.

2 Tableaux

Three years later, the Festival made its biggest change after so much achievement by those stalwart individuals who, after a full day's employment, worked at night, some giving up their annual holidays in order to stage the show. The faithful 'gang', who worked like Trojans and gave their all, felt they could not carry on year after year.

They therefore came up with the idea: "Why not let the societies do all the heavy work by building artistic displays and the 'gang' organise the remainder." Thus, the tableau was born.

The first year tableaux were featured was in 1955 and they have existed ever since. So why drop them now? Yes, they should carry a theme; yes, they should be safe etc; yes, they should be good enough to house fish in a healthy environment for four days. If only all the societies could find sponsorship or the Federation could give more financial help, yes, you would find first class tableaux again.

3 Fish competitions

No matter where you house them (as long as the environment is right), these will be of interest to the general public. They offer visitors the opportunity to see top quality fish and they are of interest for the entrants as well, since competition provides the spur to greater endeavour. When you begin to gain awards, the incentive to do better in the future is overpowering.

JON MONTGOMERY

BAF '95 will have a conservation theme, so we can expect more displays along the lines of this one from Chester Zoo photographed at last year's Festival.

4 Furnished aquaria

These should be part of the show and, in my opinion, there should be more of them on display. But from history again, when it was compulsory to have a furnished aquarium in each tableau, we found societies would not enter; the cost of building materials, transportation and the additional cost for a furnished tank was just too much. Sad, but true.

5 Activities/ trade involvement

I link the two together, because it has always been my belief that some of the activities should be displays of pond pumps in action, aquarium pumps on working displays, filters, water testing, etc, by the trade on their stands.

It is difficult for the Federation to put on a demonstration using one trader's equipment without upsetting another trader. This, we do not wish to do, as it is the traders we rely on to help pay our bills.

For example, we could put on a demonstration of tank making, but why, when there are many first class tanks on display and for sale from the traders? Unless you get volunteers to provide the demonstrations, you can only put on what your budget allows.

Children's activities are a must, but it is the other activities that bring in the punters who are most needed.

6 School parties

These are encouraged through junior painting classes, and parties are offered 20% discount on the entry fee. This discount is offered to any party, school, society, firm etc.

7 Show discounts

Within the Rules and Conditions for the traders at British Aquarists' Festival, this is taken care of, as all in the hobby need the use of the local shops. I think the comment "becoming like a car boot sale" in John Dawes' original article in March was not directed at the discounts, but at the way in which some traders were displaying their goods and lowering the appearance of the show when other traders had put on upmarket individual stands.

One of the main moans we receive as organisers is: "There are no bargains". We believe they are there if you have a close look, but it is generally the fact that the purchase they wish to make is no cheaper than at their local shop. As organisers, we

JON MONTGOMERY

Furnished aquaria and aquascapes (this one from Darwen was exhibited at BAF '94) are always good crowd pullers.

encourage local shop owners to visit the Festival so they can meet with the traders and make contact for future business.

8 Advertising

You cannot have enough advertising, but this has to be kept within your budget authority. Radio and TV are now very expensive, but the free advertising through societies, trade, magazines and assistance through societies' local press releases helps. National newspapers will also, from time to time, print your articles.

9 Appearance

Upmarket, we would all like, but the stereo standard shell scheme, no. We need a clean, presentable, business-like, open plan exhibition, where all can see what is going on, and this will bring about the spontaneous 'fun activities'. The atmosphere of the Belle Vue days is needed, where everybody arrived to have a good day... and did.

10 Aquatic societies

Not only are the crowds to major shows reducing, but so is membership of the aquatic societies. This is a problem that is worked on throughout the year by the Federation, who stage events to encourage the beginner.

Every effort is being made to encourage more societies to put their stands on display, but here again, it comes down to finance. I am sure, however, the general and specialist societies will support the major Festivals as best they can.

11 Trade involvement

Yes, this is a very important part of any Festival, and we do our best to have the traders involved. Many assist us with our advertising, for which we are very grateful. There is always an open invitation for sponsorship. I feel that sponsorship from outside the aquatic trade would also help.

Let's all pull together in whatever way we think the best and let's get the crowds of the Belle Vue days back, as there are plenty of people out there who want to talk fishkeeping. We, the Federation of Northern Aquarium Societies, have a number of changes in hand for this year's Festival and a number of people have been asked for assistance with these changes. The support we receive will determine the number of changes we make this year.

Already agreed, and in our plans for this year, is a Festival theme: Conservation. There will also be a children's play area throughout the show and a newly sponsored children's painting competition, together with its own display stand.

There will be more, so watch this space. The show will go on, so let's not get the breeze up... let's have a knees up!

See you all at the shows.

Arnold Chadwick
B.A.F. Organiser

"There's nothing wrong with your throat — you're supposed to croak"

WATER'S EDGE

BY DICK MILLS

You've been framed!

Turn your all-glass aquarium into a classically-framed masterpiece using TANK TRIMS from **REMANOID.**

No need to 'cut and try' each moulding, for these smart additions come ready-made, ready to stick on for 12 sizes of popular standard-dimensioned aquariums. Based around aquariums measuring 12in front to back, the sizes available are — 24×12in, 24×15in, 24×18in, 30×12in, 30×15in, 30×18in, 48×12in, 48×15in, 48×18in. Each kit comprises one front and two side frames, plus fixing adhesive.

Additionally, strips of Tank Trim are available for D-I-Y treatment of non-standard tanks: trims are available in 18, 24, 30, 36 and 66in packs. Metric packs, together with multi-lingual instructions, are also obtainable.

Details from: **REMANOID LTD., Unit 44, Number One Industrial Estate, Medomsley Road, Consett, Co Durham DH8 6SZ. Tel: (01207 591088. Fax: 01207 502612.**

Fountains and purifiers

The name **AL-KO** may not be familiar to you but it represents a new range of high-quality in-pond FOUNTAIN PUMPS. Single 'snap-on' strainer-equipped (for pump protection only — not for pond filtration purposes) models PA500S, PA1000S, PA1500S and PA1800S pass volumes of water (litres/hour) corresponding to their model number, but this will also vary with any extra 'head' or height of lift required.

DICK MILLS

Multi-cartridge pre-filter models 1501, 1801 and 3501 provide improved clarity and water conditions, while at the same time taking up minimal pond space. Each model comes with 3 metres of HO7 cable (to full outdoor safety specification) and consumes between 8 and 50 watts depending on size.

Ideally suited to the smaller, shallower pond (up to 800 gallons and water depths of 2-3 feet) the units are guaranteed for one year, are reliable and easy to maintain with components being readily available. If a hidden, 'in-pond' type filter is required then the Al-Ko range seems to be the perfect answer.

The recently-launched O.ZONATOR has been joined by a 'Big Brother' version for pond use. Because of the high voltage existing in this equipment, it should be treated with care and always housed in a completely weatherproof box.

The MARINA range of pumps is also available (250S and 350S models), each with or without automatic float switch variants.

Details from: **AQUAVITA CENTRE, 1 Lane End, Old Uxbridge Road, Rickmansworth, Hertfordshire WD3 2XU. Tel: 0189 582 4556; Fax: 0189 582 3663.**

Marine aids

Just when you might be thinking envious thoughts that those lucky mariners were having things all their own way – fantastic fish, wonderful invertebrates, stunning corals etc — comes news that they could be threatened by a pest in their tanks — Rock Anemones.

Aiptasia, to give the scientific name, can proliferate quicker than news of the latest *A&P* competition, and can literally take over a healthy reef system. The release of the ROCK ANEMONE ELIMINATION KIT from **REEF TECH AQUATICS**, contains all the necessary equipment and chemical and comprehensive instructions; it is totally safe (and easy) to use without any noticeable side-effects to the rest of the aquarium's inhabitants.

That marine keeping is a science is a belief held by many and the volume (and nature) of products aimed at keeping water conditions at their optimum seems to bear this out. Just look at the following treatments:

CALCIUM HYDROXIDE SOLUTION (KALKWASSER), REEF IODINE, REEF STRONTIUM, WATER DECHLORINATOR, BIOLOGICAL STABILISER, REDOX-UP, REEF ACTIVATED CARBON, REEF ULTRA CARBON, REEF KH CARBONATE BUFFER, REEF pH BUFFER, REEF PHOSPHATE REDUCTION MEDIA.

All are specially formulated for the marine and reef aquarium using British Pharmaceutical high-grade chemicals and purified water (so no nitrates and phosphates), but there's more. Along with keeping the water pure and up to specification, there is a whole new range of electronic monitoring and switching systems under the name of **AQUATECH ELECTRONICS.** These include AUTOMATIC WATER TOP-UP UNIT, AUTOMATIC PUMP MANAGEMENT SYSTEM WITH ALARMS, 4- or 8-WAY AQUARIUM SWITCHING UNITS, REMOTE TEMPERATURE UNIT (WITH HIGH and LOW AUDIBLE ALARMS), TEMPERATURE AND MAINS POWER FAIL SYSTEM.

Finally, just to bring you down to earth again, Reef Tech also produce that basic of aquarium needs — MARINE FLAKE FOOD.

Details from: **MARINE CARE PRODUCTS (REEF TECH AQUATICS), 40 Aikman Avenue, Leicester LE3 9JA. Tel: 0116 233 9000; Fax: 0116 233 9005.**

(See next month's issue of *A&P* to find out how you could win an **Automatic Water Top-up Unit** courtesy of **Reef Tech Aquatics**).

New Koi foods

When a senior researcher at an aquaculture research centre gets on his feet to talk about fish nutrition to the UK fish farming industry, you can bet what he says is pretty important. Phrases such as "digestible protein/ digestible energy ratios" tend to get bandied about and everyone nods wisely. However, the end product (if you'll forgive the pun) does concern the fishkeeper and especially, in this instance, Koi keepers.

When **Trouw Aquaculture** acquired (through **Nutreco** their holding company) **BP Nutrition**, one of their highest priorities was to shorten the time needed to bring new products to the market. The result is two new feeds for Koi from **PROAQUA** called KOI ELITE and PROAQUA KOI SUPREME.

Both foods are designed to float so that any uneaten surplus can be seen and removed before pollution sets in. Because Koi are continual feeders unable to store food, daily feeds are intended during periods when water temperatures are above 10°C (50°F).

Koi Supreme has been formulated to ensure fastest growth rates to full potential size, while maintaining the natural healthy shape. **Koi Elite** is a complete balanced diet designed to provide everything mature Koi need to keep them in perfect condition.

Both foods have been designed with high palatability and high digestibility, so that the fish pass less waste, thus keeping pondwater conditions in better shape too. Each food contains special ingredients to enhance colour intensity and give improved vigour and shine to skin and scales.

Details from: **PROAQUA, Far Brex, The Brex, near Bacup, Lancashire OL13 8NN. Tel/Fax: 01706 220578.**

New UV cleansers

It is well appreciated that one thing affects the efficiency of the UV lamp as used in conjunction with clearing green water — the longer the exposure time to the UV, the better. This can be best achieved by slowing the water rate passing the lamp, although fitting a more powerful lamp will also help, as the UV rays have a greater immediate effect.

TROPICAL MARINE CENTRE have approached things slightly differently, particularly with larger ponds in mind, with their new PRO-CLEAR UV CLEANSERS. Available in 36 watt and 55 watt units, they will perform efficiently at much higher flow rates: the 36 watt, suitable for ponds up to 6,000 gallons (27,000 litres), can cope with flows up to 2,000 gallons (9,000 litres) per hour, while the 55 watt lamp, suitable for ponds up to 10,000 gallons (45,000 litres) can handled 4,000 gallons (18,000 litres) per hour.

Both models have translucent collars to provide a visual indication that the lamp is working. The strong mounting bracket allows movement of the inlet and outlet manifolds (1.5 in) for easy plumbing.

Details from: **TROPICAL MARINE CENTRE LTD., Boteobridge Lane, Chorleywood, Hertfordshire WD3 5SX. Tel: 01923 284151; Fax: 01923 285840.**

Flora's the name

It is important that aquatic plants remain healthy if they are to do their part in maintaining the biological balance in the aquarium... and they look nice too. Three new products in the AQUAPLANT range from **TETRA** will ensure that both these criteria are met, working together to provide a complete plant care system.

FLORASTICKS is a gravel additive which creates a fertile environment, allowing fast plant growth without clouding the water. FLORATABS contain all the iron and essential elements in a compound form to encourage healthy luxuriant growth with increased root formation. FLORAPRIDE is another iron-rich fertiliser which supplies nutrients (and therefore strength), while simultaneously producing luxurious green coloration by the formation of chlorophyll.

All three products supplement each other, without encouraging unnecessary algal growth, and the instructions are quite simple to understand. What more could your plants ask for? Look out for the **Tetra AquaPlant** display (at competitive prices too) at your local aquatic store.

(See also this month's **Tomorrow's Aquarist** for our special AquaPlant Competition).

Details from: **TETRA INFORMATION CENTRE, Lambert Court, Chestnut Avenue, Eastleigh, Hampshire SO53 3ZQ. Tel: 01703 620500; 24-hour Helpline on 01703 643339.**

New colour food

Containing no fewer than eight natural products rich in ß-carotene and other carotenoids, such as astraxanthin (for yellows and golds), KOI KOLOR, an expanded pelleted food, is designed to replace 15% of the daily food allowance, ie, it is not a complete meal substitute or alternative diet.

The pellets do not break up in water and are slow-sinking. An improvement in body colour and vitality of the fish should be noticed after 14 days.

Details from specialist feed ingredients company: **PARK TONKS LTD., 46 North Road, Great Abington, Cambridge CB1 6AS. Tel: 01223 891721; Fax: 01223 893571.**

Koi trickle filter

Despite being an important factor in water purification processing, trickle filtration is not a 'stand alone' treatment, but rather, a supplementary system depending, as it does, on clean, 'solid-free' water reaching it, if it is to perform to its best.

Water for Koi can now benefit from even better water treatment, thanks to the new TRICKLE FILTERS from **NITRITECH**. A typical example is to couple up the trickle filter with Nitritech's TASKMASTER VORTEX settlement chamber, an arrangement which is then reported to produce excellent results.

The trickle filters (basic single-stage and multi-stage models are available) can be supplied with choices of filter medium and are now obtainable 'off the shelf' at good specialist Koi stockists.

Details from: **NISHIKIGOI INTERNATIONAL LTD., 7 Canterbury Avenue, Lowton, Warrington, Cheshire WA3 2HA. Tel: 01942 726864; Fax: 01942 723914.**

THE ZEBRA DIET

We are all familiar with *Daphnia* as livefood... but baby Zebra Danios? Alex Stephenson thinks it's logical, and offers some suggestions on how you can ensure a constant supply.

LINDA LEWIS

There is a well known saying: "The best food in the world for big fish is little fish". Some aquarists discover this fact accidentally when smaller fish 'go missing' and larger fish grow rapidly. In severe cases, this can result in the 'community tank' becoming a 'single specimen tank'.

Most fish species will attempt to eat anything bite sized which moves. In the wild state, this can include all manner of things, such as worms, insects, larvae, crustaceans and, of course, other fish. There are some species which specialise in eating little else except other fish. We think of these as predators. The truth is that almost all fish are predators; it's simply the size of the prey which varies.

Importance of livefoods

Every successful fish breeder knows the value of suitable live foods foe rearing fry. At first, the food may need to be microscopic, in which case, infusorians and diatoms are either cultured or obtained from a reliable source. As a second stage (or first stage for larger fry), things like brine shrimp and microworm are used. These are usually followed by Daphnia or gnat larvae.

It is very important to have ample quantities of appropriate food constantly available, otherwise the brood will stop growing and begin to die off. Unfortunately, all this food provision takes time and effort.

So, once the young are past the critical stage and readily accepting prepared dried foods, this is often all they get. If the live food supply can be maintained, the difference this makes to growing fish can be considerable.

Although most hobbyists seem quite happy to provide things like Daphnia on occasions, how many, I wonder, would consider using small fish to feed larger fish? If this thought shocks you, ask yourself, is it ethically any different to using any other form of live food? Surely, if it is morally wrong to use small fish in this way, it must be equally wrong to use brine shrimp, mosquito larvae, Tubifex worms, etc.

Just because you like fish but don't like worms, this is no excuse for prejudice. Furthermore, for anyone who thinks baby fish are not born to be eaten, why do you suppose fish produce such huge numbers of offspring? The vast majority, if not eaten in the egg stage, are eaten soon after they hatch.

Look at it logically. Any two fish only need to produce two replacements within their lifetime for the population to remain the same. The rest are taken by predators, which can include the parents.

Whatever your views, the reality is that big fish do very well on little fish, and have done so for millions of years. What could make more sense than to incorporate this fact into our fishkeeping?

Once upon a time, before my interest in Goldfish pushed out everything else, I dabbled in keeping various fish species. Like many hobbyists, I went through a period of breeding things like Angels. It was common in those days for amateur breeders to keep a few Guppies 'about the place' to provide the necessary live food. I expect this is still the case.

Zebra solution

Prolific though these fish may be, I quickly realised that my Guppies had no chance of keeping up with the demands of a batch of growing Angels, or whatever. Furthermore, Guppy fry are comparatively large and, ideally, I needed something smaller in oeder to feed very young fish.

The solution had to be an egglayer; not just any egglayer, but one which was easy, undemanding, and whose main aim in life was to 'perform on request'. The obvious choice was the Zebra Danio.

I obtained some young Zebras, put the males in one tank and the females in another. This is important if you are to maintain any sort of control. These stock tanks were run at a temperature of 65°F (18°C).

A spawning set-up was prepared. This consisted of a thoroughly cleaned 24 x 12 x 12in (60 x 30 x 30cm) tank, a 100w heater linked to an outside thermostat and an airline with a fine air-stone on the end. For reasons which will shortly become clear, the thermostat was 'marked up' for the different temperature settings required. There's nothing worse than having to fiddle about for an hour or more making adjustments.

Purpose-built trap

The most vital piece of machinery, the spawning trap, had to be purpose-built. I made this from a piece of plastic sheet already perforated with holes of approx 1/10in in size; large enough to let the eggs through, but too small for the fish.

To make the trap so that it neatly fitted into the top of the tank, the perforated sheet was cut to shape, the sides bent upwards and the corners sewn up with nylon thread.

A little spare material was left at the top to form a lip which sat on the top rail of the tank. (Tanks had angle iron frames in those days). This lip supported and held the trap in the correct position. (See diagrams.) A cover glass topped off the whole assembly. It is essential always to provide a cover when spawning these fish, otherwise you will find them all over the floor.

Zebras seem to enjoy fresh water, so the spawning tank was filled 'straight from the tap', air turned on, and the heating set for 65°F (18°C).

When selecting prospective parents, I normally used two 'plump ladies' and half a dozen 'likely lads'. These would be placed in the honeymoon suite just before 'lights out' in the evening, and the thermostat tweaked up to 68°F (20°C).

Next morning, by the time I got to the fish house, spawning was usually over. The parent fish, smiling broadly, would be ready to go back to their respective quarters, while the bottom of the tank would have a nice covering of eggs.

Should this not be the case, as was found occasionally, a little persuasion was used. This entailed a trip to the house for a two-pint jug of cold water, then back to the fish house, whereupon the water was poured into the spawning tank. That usually did the trick. Unlike us, it seems a cold shower has an amorous affect on Zebras!

Once the eggs were laid and the fish removed, the heating was wound up to 75°F (24°C) in order to speed up the incubation period. (As I recall, about a day and a half at this temperature.) More often than not, the fry were used for food as soon as they were free-swimming and could be moved. Those not immediately required, were fed on a few drops of egg-yolk suspension.

It was rare for me to have any fry around long enough to need 'second stage' feeding, but sometimes I wanted them larger, in which case any finely powdered food was used. Had I been trying to produce show standard Zebras, I'm sure I could have provided a better diet. These days, it would probably be Liquifry, followed by newly hatched brine shrimp.

If anyone is going to try spawning these or similar fish, be advised, growing them to any reasonable size requires more tanks for rearing. The method which I have described produces several hundred youngsters. So, unless quantity is important and you have unlimited space, it is better to keep just a few.

Except for the odd failure from time to time, the set-up worked well for me, and I organised two more 24 x 12 x 12in tanks to ensure a more or less constant supply of live food.

Useful tips

Don't forget, any production system like this needs 'down time' for servicing. Ignoring this fact will reduce your success rate.

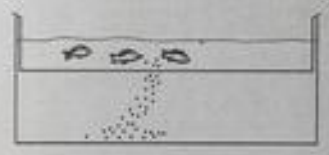
Cleanliness is essential, in order to reduce the risk of 'wipe-outs' due to bacterial and other infections. Between each batch, clean the tank and all the equipment, then let everything dry thoroughly. Don't attempt short cuts, like using the same water for the next crop. Above all, never feed dead or dying fry to other fish.

Zebra Danios are definitely one of the easier fish to breed, and many different techniques have been used. If you have failed previously, give this method a try. Should you still be unsuccessful, change the parent fish; yours may be too old, or possibly inbred to the point of extinction.

If your fishkeeping is practised in an outside fish-house, winter spawnings can be more difficult to obtain. The prime factor here is probably shorter daylight hours. I have found a light suspended over the spawning tank helps. The bad news is, you have to get up at five in the morning to switch it on.

No matter what type of fish you intend to breed, remember they have been reproducing themselves for countless aeons without any assistance from us. If we provide the right conditions, the fish will oblige. All they need is a chance. Good luck! AP

About 2in depth of water inside the trap is sufficient.



DON'T FORGET THE COVER GLASS

Koi Cameos

Midorigoi

Midorigoi are green Doitsu Koi and are an extremely unusual and rare variety. **Midorigoi** are not specifically bred but usually produced in **Kawarimono** spawnings with Doitsu (scaleless) Koi and often with **Chagoi** parents.

Their characteristic green skin is very striking and is more a pale green yellow colour, but excellent examples do, indeed, have a distinct green hue.

Their show classification is **Kawarimono**. The specimen shown in the photograph is one of the finest examples ever seen in the UK. It was recently found and imported by John Cook of Shirley Aquatics and is even more impressive by virtue of its size. It is unusual to find **Midorigoi** at all, let alone good **Midorigoi**, but to find one this good at 60 cm (24 in) renders the fish even more impressive.

Nigel Caddock

Gin Rin Soragoi

Soragoi are single-coloured non-metallic **Kawarimono** varieties, in this case the single colour being grey. On the surface, the single-coloured **Kawarimono** varieties are a tad uninspiring, but a quirk of nature more than redresses this apparent imbalance.

Not only are **Soragoi** and their single-coloured cousins by far the fastest-growing of all Koi varieties, but they also display some of the most endearing qualities of responsiveness of all Koi.

As a variety, **Soragoi** are gregarious, extrovert and very easy to train to hand feed. **Gin Rin** versions like the one photographed, are especially attractive, although the standard Koi are also extremely attractive. With their propensity for fast growth and amazing personalities these fish make great pond Koi.

Nigel Caddock

European Aquatic Fair '95

Out & About

By Pat Lambert

JOHN DAWES

The EAF's approach to society stands provides excellent opportunities for a friendly, informative chat.

On two beautiful days in July, I went to the fair. Over the weekend of 1/2 July the Association of Aquarists held its own aquatic fair. This took place in Dunstable town centre in the exhibition hall adjacent to the market.

The venue was ideally located for ease of access from motorways. The main hall was very light and pleasant. I particularly liked the arrangement of the club stands around the inner circular hall. All these displays had been mounted by A of A clubs and specialist societies, which exhibited killifish, rainbows, gobies and viviparous fishes (livebearers) and were manned through the weekend by club members who willingly answered questions from the public.

There was also a display of well presented show fish on a special stand. The fish were judged by a team of A of A and Federation of Norther Aquarium Societies judges on the Friday. Other show fish were to be found in the club displays. These displays were information stands, not tableaux.

Aquarian put on an interesting display in association with Chester Zoo, centring on the Lake Victoria cichlids and homing in on conservation issues. The stands were manned by representatives from Chester Zoo, Dr David Sands and his wife, Amanda Jane, and Dr. David Ford (who seems to pop up everywhere) also did his bit as usual, ably supported by his wife, Dorothy, who rarely (if ever) gets a mention.

Our editor John Dawes was there as well, ably supported by his wife, Vivian, who also rarely (if ever) gets a mention, but there were very few trade stands and it is doubtful if those who attended this time will be there again.

An innovation at this show which really made a difference was that breeders were selling their own home-bred fish and there were some very unusual species available to the customers. Breeders discussed the fish on offer with the public, gave buyers lots of helpful advice and, at last, came into their own. A percentage of these sales went to the A of A and so was ploughed back into the hobby.

Upstairs was the herpetology section which was very successful, particularly with the youngsters. Several came to show me their newly acquired pets (a couple even buying TFH herpetology books from the super collection of books I was looking after). These stands were run by a couple of societies dedicated to herpetology. Other stands upstairs included spiders, snails and strange creatures of many different kinds.

The furnished aquaria, sponsored by Tetra, were also upstairs. It would be, however, better for these to be downstairs in a prominent position for a greater impact. The Bonsai stand, for example, made a very attractive feature as you came in through the entrance.

There were lectures throughout the weekend, including contributions from John Dawes, Dr David Sands and Dr. David Ford. Brian Walsh gave one of his special audio-visual programmes (If you missed it here, I'm sure he'll be on again at the British Aquarists Festival).

The European Aquatic Fair is not a big festival show and I am glad. In my view, there is room in the hobby for this type of fair, which is not highly commercialised, where you are counting in hundreds of barely thousands, rather than tens of thousands through the door. At this fair, the sellers and advisors have time for the visitors and British breeders have an opportunity to show their worth.

JOHN DAWES

Some society stands had specialist displays like this attractive catfish set-up.

MALCOLM GOSS

One of the visitors to the show (courtesy of Interpet) was Robert Cannon, winner of the first-ever Interpet/*A&P* Challenge Trophy, seen here receiving his award from *A&P* editor John Dawes.

JOHN DAWES

An innovation at this year's show was the inclusion of displays of home-bred fish, in this case, an excellent selection of Fancy Goldfish produced by Basingstoke member Arthur Marshall.

TRADE "TALK"

Tetra News

1 Whispering years

Tetra's Whisper range of aquarium air pumps have proved to be highly reliable and long-lasting — with some continuing to aerate tanks for the past 14 years.

Dr David Pool explained: "We are continually receiving calls and letters from people who have been using their Whisper air pump for years, many of them bought at the time when the product was first manufactured. One lady asked us to service her pump after 12 years' service and she couldn't believe that it has never caused her any problems."

He added: "Whisper pumps are the only aerators with Silaflex valves, which add years to the pump while remaining 'whisper' quiet." Eleven different sizes are available from Tetra, ranging from the Whisper 100 for tanks up to ten gallons, to the Whisper 1000, which is suitable for medium and large tanks with a combined volume of 200 gallons.

2 POS for traders

Tetra has also produced a range of Point-of-Sale material for garden, pet and aquatics retailers.

These include window-stickers, shelf-ends, flyers and advisory posters. All literature outlines the benefits and directions for using Tetra products. Retailers can request a free POS pack from: **Lisa Hamilton, Tetra, Lambert Court, Chestnut Avenue, Eastleigh, Hants SO53 3ZQ.**

New fish, plants at KB

King British has introduced new fish varieties to its fish-house, following its sales mission to Singapore.

The company was the only British exhibitor at Aquarama '95 in Singapore in May and was able to enhance the quality and variety of fish imported to its Bradford headquarters following visits to a number of fish farms and breeders in Singapore.

"Now that we have broadened the range of species in our fish-house, we are able to strengthen our ability to take full advantage of our research and development facilities in testing King British food and water treatments on our own fish stocks," explained managing director **Michael Sinclair**, who was accompanied on the Singapore trip by Customer Services Director **Mike Cole** and Sales Office Manager **Sharron Brennan**. Among the additions to the fish-house are Two-Spot (Elegans) Rasbora; Clown Rasbora; Red Rainbows (New Guinea), Feather Fin Rainbow (Werneri); Red Fin Mono Angel Fish and Spotted Puffers.

"The company has also brought in the exceptional Delta-tail Diamond Guppy and Diamond Angel Fish. Fish of this quality are rarely seen in the UK.

"In addition, we have also secured a range of unusual plant species from Singapore. They are all in extremely large and attractive bunches, especially bunched with foam to protect the stems from plant weights and providing an instant revamp for any aquarium," Michael concluded.

Major expansion at Merrist Wood College

A wildlife rehabilitation centre, a new entomology department and a small-scale trout farm are just three of the expansion projects either recently completed, or under way, at the **Animal Care Unit at Merrist Wood College**, near Guildford, Surrey, as student intake continues to rise.

According to **Andrea King** at the college, student intake for animal care courses this year is twice that of last year, as interest from the trade has increased dramatically. "To accommodate the increasing numbers, the animal care unit is expanding. The wildlife rehabilitation centre will not only provide help for injured wildlife, but will also provide a valuable learning aspect for students in areas such as animal health and safety, welfare, security and quarantine."

Highlight of the development is a trout farm with a 1.25 tonne recirculated water system to enable students to understand the commercial aspects of fish farming, especially water management, disease control, feeding and compound growth of individual breeds, such as Rainbow Trout.

For information contact: **Dr Paul Bryant, Merrist Wood College, Worplesdon, Guildford, Surrey GU3 3PE. Tel: 01483 232424; Fax: 01483 236518.**

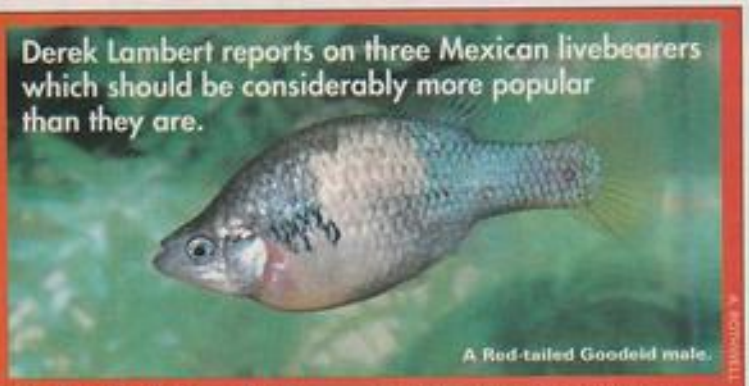
Gardner goes for ponds

Pond and aquatics manufacturer **Interpet** has appointed **Brian Gardner** as sales representative for the Midlands and East Anglia.

Twenty-four-year-old Brian, from Ruddington, Nottingham, is a keen fishkeeper and joins the company with considerable sales experience, having previously been an assistant manager at Halfords in Nottingham, following work in a pet shop.

Commented Interpet's sales director **David Palmer**: "Brian's knowledge of the local area, sales and the pet trade will be of great value. Having someone with direct experience of working in a position where he meets a large number of customers will also be of great benefit."

Derek Lambert reports on three Mexican livebearers which should be considerably more popular than they are.



A Red-tailed Goodeid male.

Red-tailed Goodeid

Scientific name: *Xenotoca eiseni* (Rutter, 1896).
Etymology: Named in honour of Dr Eisen of America.
Synonyms: *Characodon eiseni* Rutter, 1896. *Xenotoca variata* Hubbs & Turner, 1939.
Scientific description: Rutter, C (1896). Notes on fresh water fishes of the Pacific slope of North America. *Proc. Calif. Acad. Sci.*, (2) **6**: pp. 245-267.
Type locality: Rio Grande de Santiago, near Tepic in the State of Nayarit, Mexico.
Standard length: Males 5 cm (2 in); females 6 cm (2.4 in).

Standard length is the measurement from the tip of the snout to the base of the caudal (tail) fin.

AThe beautiful iridescent scales of this Jewelled Goodeid are clearly appreciated in this shot of an adult male.

Jewelled Goodeid

Scientific name: *Xenotoca variata* (Bean, 1887).
Etymology: Variata is Latin and refers to the variety of body colours.
Synonyms: *Characodon variatus* Bean, 1887. *Characodon ferrugineus* Bean, 1887.
Scientific description: Bean, T.H.,

introducing t

Among the species forming the family Goodeidae, there are many which have good potential for the aquarium hobby. Unfortunately, most of them have been overlooked by the commercial fish breeders in the Far East and Florida. Therefore, finding them in your local aquarium shop may prove impossible.

However, one species, the Red-tailed Goodeid (*Xenotoca eiseni*) does regularly turn up, while the other two species in the genus can be obtained through specialist societies and club auctions.

Red-tailed Goodeid

The Red-tailed Goodeid is widely distributed in the Rio Grande de Santiago and its tributaries in the State of Nayarit, Mexico, as well as several rivers in the state of Jalisco, including the Rio Tamazula on the Pacific coast and a reservoir near the town of Ezatlan.

It is found in a wide range of habitats, including flowing rivers and streams, as well as still water ponds. Some of these habitats go through very wide temperature fluctuations during the course of the yearly cycle (from 15 to 32°C –59 to 90°F) and even on a daily basis.

In body shape this is one of the deepest-bodied of all the Goodeids, with both sexes developing a distinct hump behind the head and pigeon chest as they age.

The female is an overall brown coloration with a strong gravid spot and whitish stomach region. Mature males have a lovely blue coloration in the middle region of the body and a pale yellow to bright red caudal peduncle. In the strain from Ezatlan Reservoir, there is a bright golden saddle of reflective scales down the middle of the male's body. His dorsal fin is also enlarged compared to the female's and the anal fin has a notch.

Unfortunately, the Red-tailed Goodeid has the reputation of being an aggressive fin nipper when placed in a community aquarium. However, this is only the case if it has been reared by itself. Those youngsters which are reared with fry of other species can make perfect community aquarium inmates.

Certain strains seem to be more of a problem this way than others. Diet also has some bearing, since a hungry fish is more likely to nip the fins of its tankmates than a well fed animal.

Otherwise, this is an undemanding species which does well in most aquarium conditions, provided the tank is large enough and plenty of food is made available. There are no special dietary requirements, but the addition of some live food every week is appreciated if only flake food is fed at other times.

The fry are born on a 6-8 week cycle and can number up to 50, although 20 is the average. These are between 12 and 17 mm (0.5–0.7 in) long and soon lose their trophotaeniae (structures through which they absorb nourishment from the mother while they are developing).

Fry should be fed on a mixture of baby brine shrimp and growth food. They are sexable within four weeks of birth by the notch in the anal fin of the male.

Jewelled Goodeid

The Jewelled Goodeid probably has the widest range of any species of Goodeid. It is found in many habitats throughout the Rio Lerma Basin in Guanajuato State, as well as in the Rio Santa Maria in San Luis Potosi State. It can also be found in Lake Chapala and the Rio Grande de Santiago near this lake in the states of Jalisco and Michoacán, as well as the Rio de la Laja drainage in Queretaro State, Mexico.

It lives in a wide range of habitats, ranging from flowing streams and stagnant ditches, to large lakes and ponds. It is, however, most often found in clear open water in large shoals with other Goodeids. This is certainly the case in Lake Chapala

DEREK LAMBERT

(1887): Descriptions of five new species of fishes sent by Prof. A. Duges from the province Guanajuato, Mexico. *Proc. U.S. Nat. Mus.*, **10**: pp. 370-375.
Type locality: Only given as Guanajuato State, Mexico.
Standard length: Males 6 cm (2.4 in); females 6 cm (2.4 in).

DEREK LAMBERT

A robust-looking Blue-bellied male.

Blue-bellied Goodeid

Scientific name: *Xenotoca melanosoma* Fitzsimons, 1972.
Etymology: Named for the dark body coloration.
Synonyms: None.
Scientific description: Fitzsimons, J.F. (1972): A revision of two genera of goodeid fish from the Mexican Plateau. *Copeia*, 4: pp. 728-756.
Type locality: Rio Tamazula, 5km south of Ciudad Guzman in the state of Jalisco, Mexico.
Standard length: Males 6.5 cm (2.6 in); females 7.5 cm (3 in).

The xenotocas

where it can be found with *Chapalichthys encaustus* and in Zacapu where it is found with the Zoe (*Zoogeneticus quitzeoensis*) and *Goodea atripinnis luitpoldi*.

The Jewelled Goodeid is similar in body form to the Butterfly Goodeid or Ameca (*Ameca splendens*), with the dorsal fin set towards the rear of the body. With advancing age, the body deepens and the fish may develop a hump behind the head.

The body colour is olive green on the back, paling to a yellowish white on the belly. Along the lateral line, there is a dark stripe and below this, there are a few isolated black spots on the female.

The male has the most beautiful iridescent reflective scales on his back; in poorly coloured strains there are only a few of these, but in some strains, the whole body is covered with them. It was these reflective scales which gave this fish its common name of Jewelled Goodeid.

The fins of the female are a uniform clear to greyish brown, while the male's have a yellow band on the edge of the caudal fin and a less noticeable one of the dorsal fin.

This is a strong robust species which will fit in well with other fish of a similar size and temperament. They adapt well to most aquarium conditions, but prefer a large tank with some cover and good filtration. They are not fussy with regard to temperature and thrive in any temperature from 19 to 25°C (66-77°F).

They eat all foods, but do best on a diet of live and frozen foods with regular feeds of flake food. Additional feeds of vegetable matter are unnecessary to the well being of this fish.

Broods are born on a 6-to-8 week cycle and number up to 40 fry, with 20 being the average. The babies will vary in size from 10 mm (0.4 in) to 15 mm (0.6 in), depending on the size of the brood. Large numbers of fry usually mean smaller, often weaker, babies.

Brood size seems to be correlated to the size and age of the mother, with young females producing smaller numbers of robust fry, and large old female tending to produce large numbers of small fry.

Blue-bellied Goodeid

The Blue-bellied Goodeid is a widespread species, being found in the Rio Tamazula, Rio Grande de Santiago and the Rio Ameca Basin in Jalisco State, Mexico. It is found in streams, rivers and still water ponds with heavy plant growth. In common with many species of Goodeid, it has to tolerate a wide temperature range in the wild.

This is a robustly built fish, with the male's dorsal fin enlarged when compared to that of the female. The body colour is olive green on the back, becoming sandy yellow on the belly. This is overlaid by dark mottling, particularly along the lateral line. The fins are dark and become almost black at night. Dominant males develop iridescent scales across much of their body and the mottling pattern fades.

In the aquarium, this is an undemanding species which will tolerate a wide range of conditions. While it can be maintained with other fish of a similar size and robust nature, slow-moving or timid species may have their fins nipped.

The aquarium should be large and contain some cover near the bottom. Filtration or large regular partial water changes are important, but otherwise, Blue-bellied Goodeids are very hardy. They eat all foods and will even do well on a diet of flake food only. However, some live food is an asset in any fish's diet.

Broods of about 20 are born every eight weeks during the summer months, but this species often fails to reproduce during the winter months. The fry are born at about 15 mm (0.6 in) in length and grow very quickly if fed on a diet of live baby brine shrimp and growth food. They are sexable in under two months. AAP

This green form of *Mantella crocea* is only seen rarely in the UK.

Mantella Frogs Captive Care

(*Part 1 was published in May*)

The varying climate of Madagascar increases the complexity (and the challenge) of keeping and breeding Mantellas and leaves much scope for investigation and experimentation, even though some species have been bred in captivity. Certain breeders have been successful using particular methods, but later attempts, under the same conditions, have often failed.

There is also some conflicting information on recommended temperature ranges, hatching periods etc. Mantella eggs were once thought to be light-sensitive as they are mostly laid undercover, but they have been hatched successfully, even when exposed to daylight.

THE VIVARIUM

Mantellas can be kept in groups, as they are fairly sociable creatures, and since they are not always easy to sex, a group of six or more should (hopefully) contain both sexes. From past experience, however, imported frogs may often consist of large numbers of males, which are more easily located by their calling during capture.

1 Light & temperature

An aquarium with a cover glass and suitable ventilation mesh is used for housing the frogs; in a dimly-lit position, some extra light will be needed. The Golden Mantella (*M. aurantiaca*) has bred successfully in a vivarium near a window which received a short period of sunlight but, obviously, too long a period would cause the fatal 'greenhouse effect', so caution must be exercised.

Recommended temperature ranges may vary according to species, but probably should not rise above 75°F (26°C) for most species, although *M. laevigata*, if obtainable, might possibly tolerate temperatures up to 82°F (28°C).

Heating and lighting methods will depend on individual circumstances — in a warm room, light alone may be needed. Full-spectrum lighting is not considered necessary, but we have used Tru-lite® tubes with both the adults and the young.

2 Size & substrate

The size of the vivarium will depend on the number of occupants; too small an area will soon become fouled with possible fatal results. Good ventilation is absolutely essential. Smaller species such as the Golden Mantella and *M. crocea* have done well and bred in a 24 x 12 x 12in (60x30x30cm) vivarium containing six or seven individuals, but a larger vivarium would be better at coping with the waste material that this number of frogs will produce.

Different substrates have proved suitable:-

① A mixture of soil/loam-based potting compost and chopped or crumbled dried fern/oak leaves and moss.
② Soil-based compost overlaid with a layer of short Sphagnum moss.
③ A mixture of soil and leaf litter.
④ A 2in (5cm) deep layer of moss on 2in (5cm) layer of bark chips.
⑤ A 1in (2.5cm) layer of aquarium gravel topped with a layer of shredded garden bark.
⑥ Damp peat covered by Sphagnum moss.

Moss usually needs a reasonable light level to thrive in a vivarium.

3 Water & branches

A small water area can be provided by means of a glass strip silicone across the vivarium to divide it. One part has a layer of aquarium gravel sufficient to produce a depth of water equal to approximately half the frog's height when in a sitting position, as Mantellas tend to be poor swimmers and drowning in deep water is not unknown.

Alternatively, the water area may be several depressions in the substrate.

Small branches or plants can be used to provide climbing facilities should the frogs need them.

4 Feeding

Mantellas will accept all the usual insects: crickets, fruit flies (*Drosophila*), waxmoths and their larvae, green aphids (winged and wingless when available), houseflies, hedge/meadow sweepings of appropriate size and smooth green caterpillars. Larger species can manage bluebottles (blow flies). Cultured foods are dusted with a fine, good quality multivitamin/calcium supplement two or three times week.

BREEDING

The vivarium needs some permanent degree of humidity to avoid dessication, but breeding is often stimulated by increasing the temperature (up to the maximum) after a slightly cooler, drier period of six to eight weeks. The increase in temperature is accompanied by daily heavy spraying to raise the water level in the substrate. Surplus water can be siphoned off when necessary.

Towards the end of the cool, dry period light spraying for a week or so is followed

Maintenance tips

Temperature: 68-75°F (20-24°C) according to species.
Substrate: Moisture retentive.
Conditions: High humidity, but Mantellas are susceptible to poor ventilation.
Breeding: Rest period — cooler, drier conditions for two months to stimulate breeding.
Food: Insects.

by two weeks of heavy spraying with no extraneous light. Additional lighting is then provided; this method induced breeding in both the Golden Mantella and the Painted Mantella (*M. madagascariensis*).

The males then start calling. The call can vary from a low click in *M. crocea* and the Golden Mantella, to a more audible sound in the Green Mantella (*M. viridis*). Females tend to be slightly larger and more rotund; males can be identified by the extended throat pouch when calling.

The males of the Golden Mantella, having a pale underside, can be sexed by catching a specimen up in a clear, narrow container containing a few drops of water. When it presses up against the side of the container, two thin, whitish lines can be seen along the abdomen in males.

Eggs & tadpoles

The spawn may be laid under small shelters, such as half a coconut shell with a small entrance cut out. Pieces of cork bark, pieces of 1in (2.5cm) diameter x 3in (7.5cm) length plastic tubing and rolled up pieces of capillary matting have all been used. However, the eggs are commonly deposited in small burrows in the moss or other substrate.

The number of eggs varies with the species and clutches as large as 100 eggs have been claimed for the Golden Mantella, but in our experience, clutches have been much smaller, up to twenty eggs. In one successful breeding of this species, the plastic tubes were angled down into the water. The frogs had access to them from the moss islands and as the water level slowly increased, the tadpoles made their own way down into the pools.

The tadpoles are removed to small plastic aquaria containing 2in (5cm) of aged water, 50% being siphoned off every two days and replaced with water which has been allowed to stand for 24 hours and is at the same temperature. For all water changes, and for spraying, fresh tapwater should not be used, because of the chlorine content.

Mantellas are easy to feed. This Golden Mantella (*M. aurantiaca*) is just about to pounce on a waxmoth larva.

In the wild, the rising water level due to the heavy rain, tends to wash the eggs/tadpoles into pools. Hatching is quite rapid — ten to fourteen days, according to species and temperature.

Other ways of dealing with the eggs have been tried: *M. crocea* eggs were carefully scooped up together with a thin layer of the substrate and placed in 4ml water in a plastic tub. The tadpoles, on hatching, made their own way into the water.

Since they are not cannibalistic, they are kept together, but must not be overcrowded to avoid water pollution; about 8-10 tadpoles in a margarine tub is adequate. Larger numbers can be kept in small aquaria.

Feeding

Tadpoles of some species are very small and difficult to detect against a dark substrate. We feed the tadpoles on a mixture of Reptomin and fish flake food ground to a powder. Some reports say they will eat *Tubifex*, but, as any aquarist knows, these can be suspect.

As the tadpoles near metamorphosis, sufficient bark chips are added to provide a land area of approximately one third of the base. The froglets leave the water very quickly, even before the tail has disappeared, so it is advisable to cover their container with mesh at this stage to prevent escapes.

The froglets, which can be as small as 5mm (*M. crocea*), are observed to feed on small mites which are on the bark chips. They can also be fed on micro-crickets, wingless fruitflies, springtails, waxworms etc. Once feeding they are transferred to a small, fairly moist vivarium similar to that of the adults.

Using the above methods, either singly, or in a combination four species namely the Golden Mantella, *M. crocea* and the two Painted Mantellas, *M. 'cowani'*, and *M. madagascariensis*, have been bred successfully.

The future

The number of *Mantella* species in the pet trade has increased dramatically over the last few years. Official figures show only 240 Golden Mantellas exported from Madagascar in 1980. By 1990, exports had increased to 20,000 for this species. No matter how prolific a species may be, it is doubtful that wild populations can sustain depletion at this rate.

Because of concern over the export figures, it was agreed at the last CITES conference (November 1994) that *M. aurantiaca* will now be placed on Appendix II. Other species are not affected.

As with certain other herptiles once classed as difficult or impossible, it is now possible to breed Mantellas, although more research is still needed to find the most successful means of doing so. They are quite prolific creatures and organised captive breeding could reduce the need for imports.

Much of Madagascar's natural forest has already been destroyed and destruction, according to reports, continues at an alarming rate. This habitat destruction makes it even more important that anyone keeping Mantellas should make serious attempts to breed them. However, until the classification is sorted out, keepers should be careful with regard to hybridising — only breeding from frogs which are obviously of the same species. **AAP**

The belly of the same *M. crocea* specimen shown on the previous page.

Simple set-up suitable for Mantellas. This vivarium has been allowed to dry out a little to simulate a winter period. It shows a choice of two types of spawning site; both have been used by our frogs.

In this vivarium set up for Painted Mantellas (*M. madagascariensis*) the water level has been raised and a female is seen inspecting a spawning tube.

SOCIETY WORLD

Strathclyde Festival

Fishkeeping societies in the Strathclyde region will be staging the third **Strathclyde Fishkeepers Festival** in October (20-23).

The event will incorporate advice and displays to show fishkeepers, from novice upwards, how they can enjoy the hobby and avoid some of the pitfalls. Hundreds of aquaria will display typical breeding set-ups of different types of fish, with people on hand to answer questions.

Derek Lambert and **Allan** and **Barbara Brown** are among the programme of speakers during the event, and refreshments will be available from a cafeteria.

Details: **H. McGuinness, 10a Mill Road, Cambuslang, Glasgow G72 7QG.**

Reduced rates for FBAS trophies

Member societies of the **Federation of British Aquatic Societies** can receive generous discounts for society trophies and promotional wear following an agreement organised between the FBAS and **Bullseye Trophy Centres Group**, the official trophy supplier to the FBAS.

On production of details of current society membership, a society will receive a 20% discount and free engraving on all trophies ordered, while a 12.5% discount will be available for non-affiliated societies.

A selection of the range of trophies and printed garments available from Bullseye can be seen at the **Supreme Festival of Fishkeeping** (3-5 November, Sand Bay Holiday Centre, Weston-super-Mare), where over 1,000 trophies will be available with a 50% discount, on a 'cash and carry' basis. In addition, there will be a free draw at the show for lead crystal presentation bowls.

For details contact: **Chris Field, Bullseye Trophy Centre Group, 180 South Ealing Road, London W5 4RJ. Tel: 0181 568 1405; Fax: 0181 847 5150.**

Search for missing trophy

The **Federation of Northern Aquarium Societies (FNAS)** is appealing for assistance in tracing **The Hammond Trophy** for the cold-water breeders' classes at the British Aquarists' Festival.

Explained **Arnold Chadwick**, BAF organiser: "The trophy was donated by one of the founder members of the festival, and we know it was returned in 1988, and was won by **T. Thompson** of **Rainbow AS** that year, which was the last year it was presented.

"Our records show that the trophy was awarded in 1989 to **Mr & Mrs Dockrey** of **Sunderland AS**, and that the trophy was signed for on their behalf."

He continued: "It is understood that Mr and Mrs Dockrey never received the trophy. This appeal is not a hunt for whoever has held it for so long, but we would only like it to be returned, even if it is broken or damaged. This is an attractive and unusual trophy and if anyone can help in tracing it, please would you let the FNAS know of its whereabouts?"

Contact: **Gill Briggs, 8 Wheatley Court, Mixenden, Halifax. Tel: 01422 349872;** or **Barbara Colley, 11 Chatsworth Street, Oldham OL4 5LF. Tel: 0161 620 7607.**

Attractive and unusual trophy at this year's B.A.F. was this 18 in. tall carving of a telescope eye variety on fishe mouse wood, presented by Mr. and Mrs. C. Hammond of Doncaster, for the most outstanding effort by a goldfish breeder

A 1953 photo of the missing BAF Hammond Trophy.

Koi Cameo

Gin Rin Goshiki

Goshiki means five colours. Personally, and in common with most Koi observers, I have always had a problem differentiating the white, black, blue, dark blue and red which are supposed to identify Goshiki, but if you look carefully, they are there, even if they are sometimes well blended.

The simplest description of **Goshiki** is to imagine an **Asagi** with white or grey base skin with *hi* (red) pattern overlaid. The reticulated pattern often appears blurred, as it runs through the sumi blue or dark blue; it also often runs through the length of the entire pattern.

Often confused with **Ai Goromo** and **Sumi Goromo**, the key difference is that on the above-mentioned, reticulation is restricted to the *hi* pattern, whereas in **Goshiki**, it also runs through the white areas.

The photograph is of a stunning **Gin Rin** example. **Goshiki** is a non-metallic Koi, but there is also a metallic version which is called a **Shochicubai Goshiki**.

Nigel Caddock

KODAMA KOI INTERNATIONAL

DIARY DATES

AUGUST

Sunday 27
Bournemouth AS — *Open Show*, Community Centre, Pelhams Park, Kinson. Details: **M. Lester**. Tel: 01202 732739.

SEPTEMBER

Sunday 3
Dunstable and DAS — *Open Show*, Queensway Hall, Dunstable. Details: **Don Sheaf**, 33 Rudyard Close, Luton, Bedfordshire LU4 9QD. Tel: 01582 505364.

Tuesday 5
Gloucestershire — *Meeting*. The Bell & Gavel Pub, Cattle Market, Gloucester (8 pm): *An evening of fish diseases*. Details: **Andy Ramsbotham**. Tel: 01452 521609.

Saturday 9
Bristol Aquarists Society — *Goldfish Open Show*, St. Ambrose Church Hall, Stretford Road, Whitehall, Bristol. Fish auction: 1pm; Show open: 3pm. Full details from **Bob Jones**. Tel: 0117 949 6447.

Hounslow & DAS — *Open Show*, Youth Centre, Kingsley Road, Hounslow. Midds. incorporating *Hounslow International Siamese Fighter Championships and FBAS Trophy class J. Rasboras*. Details and show schedules: **Trevor Butler**, 17 Roborough Road, Maidenhead, Berks SL6 7BJ. Tel: 01628 419579.

Sunday 10
Northern Area Catfish Group — *Open Show and Auction*, Asquit Civic Hall, Asquit, nr Wigan, Lanca. Details: **Mrs S Pye**. Tel: 01942 707774; **J.T. Morris**. Tel: 01942 242366; **Danny Blundell**. Tel: 01524 853424.

Sunday 17
Association of Midland Goldfish Keepers — *Meeting & baby fish show* (members only), Foleshill Community Centre, Foleshill Road, Coventry (2 pm). Details: **Mrs Anne Bloor**, 10 Barnett Crescent, Woodford Halse, Daventry, Northants NN11 3SP. Tel: 01327 61186.

Mid-Sussex AS — *Open Show*, Portslade Town Hall, Victoria Road, Portslade, Hove, Sussex. Details: **A. Shoesmith**, 6 Hunters Road, Southgate, Crawley. Tel: 01293 513406.

Six Towns AS — *Auction*, Heron Cross Sports & Social Club, Grove Road, Heron Cross, nr Fenton, Stoke-on-Trent, Staffs. Booking in: 11 am; Start: 3 pm. Details: **Alan Rothwell**. Tel: 01782 317741.

Sunday 24
Darwen AS — *Open Show*, Library Theatre, Darwen (3 pm). Details: **I. L. Crompton**, 93 Sudell Road, Darwen, Lanca BB3 3JA.

Otley AS — *Annual Open Show*, Prince Henry's Grammar School, Otley, North Yorkshire. Raffle, auction and judging of 36 classes of fish. Details: **Simon Metcalf**, Show Secretary, 23 Riverside Drive, Otley, N. Yorks, LS21 2RU. Tel: 01943 464 632.

Saturday 30
Bristol Tropical Fish Club — *34th Annual Open Show*, Shirehampton Community Centre, Benching: 9am-12noon; Fish auction: 1pm; Show open to public: 3pm (approx). Details: **Tony Hatcher**. Tel: 0117 932 4983.

OCTOBER

Sunday 2
Bishop Auckland & Wear Valley AS — *Second National Charity Auction*, Crook Junior School, Croft Street, Crook. *All proceeds will be donated to the BBC Children in Need Appeal*. Details: **John Corrigan**, Show Secretary, 8 Clifton Green, Sunnybrow, Crook, Co Durham. Tel: 01388 745874.

Sunday 16
Solway AS — *Third Annual Open Show*, Georgetown Community Centre, Georgetown, Dumfries. Doors open: 10.30 am. Benching: 11 am-1 pm. Details: **John Cowan**, "Elmuvell", 7 Wigworthill Road, Greenlea Cottn, Dumfries DG1 4PW. Tel: 01387 750606.

West Cornwall Fishkeepers —*Open Show*. Details: **Gary Shaw**, 3 Potter Avenue, Hea moor, Penzance, Cornwall TR18 3EG. Tel: 01736 763 713.