

JANUARY 1990

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# AQUARIST

AND PONDKEEPER

SPOTLIGHT ON  
REPTILES

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HEATING

TOP TEN  
CORALS

FREE  
PIRANHA  
POSTER



# AQUARIST AND PONDKEEPER

JANUARY 1990  
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## COVER STORY

### WHITE'S TREE FROG

(Photograph: Rod Williams/  
Bruce Coleman Ltd.)

White's Tree Frog (*Litoria caerulea*) is a rarely seen species from Australia and New Guinea. Captive-bred specimens of this 7-10cm (2.8 - 4in) bright-green frog are occasionally available and make good vivarium subjects, feeding on a wide range of livefoods such as locusts, moths and crickets. Large specimens are also capable of taking small mammals and other frogs. Up to 300 eggs can be laid in one go. These hatch within a day and, with good feeding, the tadpoles will grow up to 5cm (2in) in two or three months. Water and (later) air temperatures between 25-30°C (77-86°F) should be provided for this impressive amphibian.

# SPELL-BINDING DISAPPOINTMENT

Have you ever been spell-bound and disappointed... both at the same time? I have. The most recent occasion was last November. The cause of these simultaneously conflicting emotions was a double dose of the "Amazonitis".

I refer, of course, to **The Flooded Forest** — two superbly filmed TV programmes which set out to show us the diversity of life in and around these specialised watery Amazonian habitats.

I was absolutely knocked out by the brilliant underwater photography showing us giant Pacu, Arapaimas, River Dolphins and the like. And those Arowanas! It was never quite like that when I was there some three years ago. But then, I was in the Rio Negro — a blackwater river — and not in the clearwater rivers and floodplains in which **The Flooded Forest** was apparently filmed.

We ate Arapaima (Pirarucu) and Pacu (Tambaqui), but never got to see any live ones. We also saw lots of "live" dolphins (plus one dead one) but, never as clearly as in these films. It was truly spellbinding stuff.

So where did the disappointment come in? To me, it arrived with the realisation that we were not going to see any of the other fish we know and love. Where were the Cardinals, the numerous other gorgeous tetras, the hundreds of small catfishes, the Pencilfishes, the cichlids (Oh yes, we got a fleeting glimpse of some Discus, a *Cichla ocellaris* and a Festive) ... and all the others? What an opportunity missed!

I'm off to the Rio Negro again later this month. Perhaps I'll have better luck with some of the goodies I missed out on last time. Either way, watch this space.

**The Flooded Forest and Fish People** (screened on Christmas Eve) — both the very good bits and not-so-good ones — gave us, aquarists and pondkeepers, more to delight our palate than most other programmes have done for a long, long time. I wonder what 1990 will bring.

David Sands, I know, has his own, uniquely-personal views on both these programmes — so watch out for his next instalment of **Reflections** next month (it's good stuff!).

And talking of David, I am delighted to be able to announce that he's taken on **Tomorrow's Aquarist**, our re-launched monthly series aimed at the ever-increasing band of young A & P readers. Absolutely unmissable.

Welcome to 1990!



John Dawes  
Editor



Were you one of the winners  
of our  
**BLEHER'S COMPENDIUM  
COMPETITION?**

See page 50 for full details

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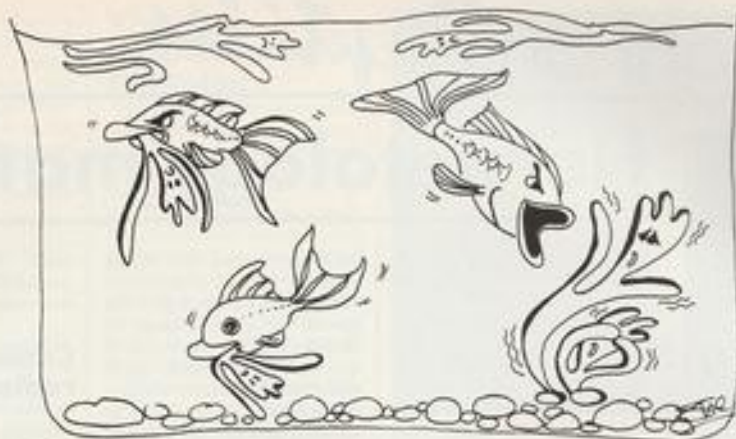
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## GREEN WARFARE

... or Jason Endfield's desperate tale of a despairing aquarist with "horticultural" aspirations

I really don't know why I bother — you'd have thought I'd learned by now, and yet, I persist in trying to mix my fish with plants — and it never works. Now, the types of fish I have are not renowned as being plant eaters, but that's exactly what they do, and with my tank having been a 'plant-free zone' for several months, I decided to try once more.

A beautiful selection it was — some splendid Amazon Swords (*Echinodorus* sp.), Water Ferns (*Ceratopteris* sp.) and many other 'hardy' species. One by one I carefully and skillfully arranged them. Wonderful! It looked just like one of those pictures you see in the fish food adverts — all lush, green and perfectly balanced. What a difference!

The fish were delighted too — they just couldn't contain their obvious pleasure as they uprooted each plant in turn and dragged them all across the tank from one side to the other. I'll swear the plants 'looked' terrified! Within minutes my display was floating and drifting higgledy-piggledy, watched by my highly satisfied aquatic friends (perhaps that should read 'fiends').

"Right!" I shouted through the glass at one of the fish, "If you think I'm replanting them you're mistaken!" ... the fish always know they've won an issue when I resort to yelling at them through the glass.

To be fair, they have left one plant in each corner which, I suppose, makes for a geometric arrangement if nothing else; the sad fact is that I know they'll be gone too within a few days.

So I expect it'll be back to plastic plants again. I've actually got nothing against the artificial variety, but they do have one major drawback — they don't grow, and for someone who enjoys the added challenge of maintaining plants alongside fish, it tends to make things a trifle too easy. I've seen displays where the plants are separated from



the 'enemy' by a glass partition, but however carefully this is done, it seems to me to always appear artificial. And anyway, I need all the space there is in my tanks at the moment.

So what's the answer? Triffids? No they wouldn't stand a chance. ... Aquatic Cacti would be the ideal solution, but that's kind of a contradiction in terms and, as such, was never included in the great evolutionary plan. Perhaps it should have been — I mean, if the Duck-Billed Platypus qualified ... but I digress.

I looks like I'll have no choice; I'll have to make do with plastic, which occasionally fools humans if not fish, or those peculiar silk creations, which don't even fool humans, but add 'interest' to the display ... I suppose. I don't know.

I once resorted to painting green plants on the outside of the back of the tank, which because of my renowned artistic ability (or lack of it) startled fish, observers and all — well, I mean, how does one explain haphazard bright green swirls quite obviously painted on the glass in permanent gloss

paint? That tank had to go. I've even tried being inventive with a plant-free display, using rockwork and bogwood, but the result was always, well, sort of 'brown', when in my heart I wanted it to be green. I was nearly tempted to get the green paint out again, but thankfully, resisted the urge.

It's very frustrating to see those beautifully perfect displays with dense, verdant vegetation and jewel-like, well-behaved fish gliding serenely by. It makes me 'green' ... with envy. I get the urge to drop one of my fish in there and delight in watching the ensuing chaos; but really I'm a nice person — honest ...!

It's hard not to get a tiny bit jealous of such harmonious set-ups, and so, intermittently over the years, I have tried the real thing. After a long barren period a year or two ago, I had hoped that the fish would have forgotten what a plant was, but they hadn't. War was declared and the defenceless plants lost. That's when I first resorted to plastic substitutes, and although the fish couldn't actually destroy them (they tried), they did rearrange them in their own particular way — mainly across the water's surface.

And now history has repeated itself as I foolishly tried to re-introduce some unfortunate envoys from the plant kingdom. Yet again, the fish have won the battle hands (or fins?) down.

But I console myself with the feeling that, ultimately, I have, in fact, won. You see, I have found a plant that grows really quickly, costs nothing and which, most importantly, the fish don't touch — they'll let it grow forever. It's not the most attractive plant, but I have succeeded in maintaining green plant life alongside my fish.

Something of a personal first? Well, no, not really. My miracle plants are ... algae. But I have won — they are plants and they are thriving ... some victory ...!

# Spotlight on Reptiles

## Herpetology matters



By Julian Sims

### Mysterious scientific names

The method of systematically naming plants and animals was developed by the Swedish biologist Carl Linnaeus more than 200 years ago. His *Species Plantarum*, published in 1753, and the 10th edition of his *Systema Naturae*, published in 1758, have formed the basis for describing plants and animals by scientific rules which are still in use today.

Linnaeus used two Latin names to describe every animal and plant, then known. As new animals and plants have subsequently been discovered, they have also been given two names, usually in Latin, although Greek and Latinized English are sometimes used.

This method of using two names is called BINOMIAL NOMENCLATURE. The first name in the pair (written with a capital letter) is known as the generic name or GENUS and the second name (always in lower case) is the specific name or SPECIES.

The European Common Toad has characteristic features found in many other toads of the world. It is known as the "type species" and has been given the binomial *Bufo bufo*. Other toads are compared with the Common Toad to see if they also belong to the genus *Bufo*. The European Green Toad is

similar in appearance and is therefore included as a member of the genus *Bufo*, but due to its green coloration is given the specific name *viridis* — Latin for green, and a word from which all of the following have been derived: verdant, verge and verdigris (the green film which forms on copper pipes).

The reasons for allocating other Latin names are not always as obvious as for *Bufo viridis* but are, nevertheless, very interesting.

The Gila Monster (*Holodera suspectum*) from the southwestern United States was first described in 1859 as a separate species because it was "suspected" of being different from the Mexican Beaded Lizard (*H. horridum*) which was already well known.

The Common or Gray Treefrog from North America has the binomial *Hyla versicolor*. The specific name refers to the fact that like many other treefrogs, it is able to vary its colour quite considerably. However, as one of its popular names suggests, *H. versicolor* is usually gray, and this helps to conceal it when sitting on lichen-covered branches and tree trunks.

The Spur-thighed Tortoise (*Testudo graeca*) is often

incorrectly called the "Greek Tortoise" because of its specific name *graeca*. Linnaeus gave this species its name because he thought that the patterning of the carapace (upper shell) resembled the patterns of a Grecian mosaic. The specific name certainly does not relate to geographical occurrence — Spur-thighed Tortoises have only a very limited distribution in Greece. They are found at Palea Epidavros on the Greek mainland and on the island of Salamis in the Saronic Gulf.

Two other species of Chelonia with easily identifiable names are the Large Headed Terrapin from eastern China (*Chinemys megalocephala*) and the North American Common Musk Terrapin or "Stinkpot" (*Stemotherus odoratus*). The latter example gets its name from the habit it shares with many other species of terrapin. When Musk Terrapins are picked up they release a strong-smelling liquid from glands in their skin. After a short time in captivity, most Stinkpots become used to being handled and don't release their "musk" when lifted out of the water.

Finally, the all-female populations of parthenogenic Rock Lizards from the Cau-

casus Mountains in the southern USSR are named *Lacerta unisexualis*.

### Caribbean snake rediscovered

*Chironius* is a genus of Colubrid snakes found in Central and South America and on some of the islands around the Caribbean Sea.

The Black Snake (*C. vincenti*) has a particularly limited distribution, only occurring on the island of St. Vincent (as its specific name indicates). However, as a specimen had not been found since 1894, the species was thought to have become extinct. The cause for this loss was attributed to the Mongoose — a mammal which has been deliberately introduced to the West Indies. Mongooses are notorious predators of snakes.

Fortunately, *C. vincenti* has recently been rediscovered, inhabiting an isolated forested area of the island. The Black Snake, together with Cook's Tree Boa (*Corallus erythra cooki*), which is also found on St. Vincent, are both arboreal or semi-arboreal and, thus, they have escaped total eradication by the introduced hunter.



The Spur-thighed Tortoise, *Testudo graeca*, so-named because the carapace (shell) markings were considered to resemble a Greek mosaic.

Even so, the severe reduction in the distribution and numbers of St. Vincent's snakes demonstrates the very real problems caused by "introductions" from other parts of the world — especially onto an island where evolution by Natural Selection has taken a unique path.

## Rattlesnake suicides

"The rattlesnakes are committing suicide" — an interesting point to contemplate and a descriptive phrase often used in conversation, as, for example, in the recent film, *Mississippi Burning*. But do rattlesnakes really commit suicide, using their own venom, which they deliberately inject into their bloodstream by biting themselves?

In truth, the biological evidence does not support this widely held belief. Venomous snakes (and lizards) have a high degree of tolerance to their own venoms. This protection is known as "auto-immunity" and is verified by observations made by many herpetologists. Numerous rattlesnakes have been seen to bite themselves and other snakes of the same species without fatal results.

However, three specific circumstances must also be considered when evaluating the evidence:

[1] When a badly injured snake, writhing in pain, is seen to bite its own body in its frenzy and death subsequently follows, the "suicide" theory is apparently upheld. This does not take into account the possibility that the snake might have died anyway from its original injuries, nor does it consider whether or not the biting was deliberate during what was otherwise a series of un-coordinated movements caused by agony.

[2] The second circumstance is much more definite. If vital organs such as the heart or brain are penetrated by the fangs, then death usually follows.

[3] Finally, a Diamondback Rattlesnake which was observed to bite its own tail, died 24 hours later from symptoms similar to those induced by snake venom. As with all good science fiction, there is always the exception which gives credibility to an otherwise improbable idea.

## Vivarium temperature controller

Two problems can occur when traditional Bi-metallic thermostats are used to control environmental temperatures in a vivarium:

[1] The bi-metallic strip inside the thermostat expands and curves away from an electrical contact as the required temperature is achieved. The electrical circuit is broken and power is immediately cut off from the heating element.

This loss of power is sudden — there is no gradual reduction in voltage. Thus, if lamps are wired into the heating circuit, they are also turned on and off throughout the day and night. There is no gentle dimming of the lights as animals would experience in the natural environment with the sun being obscured by a cloud or when the sun sets in the evening.

Unnatural on-off lighting is a source of stress for livestock.

[2] Secondly, temperature control is not consistently accurate and may vary by several degrees. It takes some time for the bi-metallic strip to cool down, contract sufficiently to re-establish electrical contact and so complete the circuit again.

Vivarium temperatures could drop by five or six degrees during this time. "Solid state" thermostats are much more accurate and control temperature to within + or - 0.5°C. However, the Vivarium Temperature Controller, or VTC, adds a refinement to this precise control of environmental temperatures.

The VTC varies the electrical supply to heaters and lamps by altering the voltage. Thus, when the required temperature is reached, the power supply to the heater is gradually reduced. When environmental temperatures have cooled and further warmth is required, power to the heater is slowly restored.

The VTC can take a maximum loading of 500 Watts and is suitable for controlling a heating pad, infra-red heat sources or submersible aquarium heaters.

The Controller has three long leads: one for mains supply, one for connection to the heater and a long cable ending in the temperature sensor. This sensor can be positioned at one



Vivarium Temperature Controller (VTC) with infra-red source: an excellent approach to accurate environment control.

end of the vivarium with the heating pad and / or infra-red source at the other end. This allows for the creation of "hot-spots", basking areas and cooler areas with a temperature gradient in other parts of the vivarium.

If the inhabitants all congregate in the cooler regions, then the setting of the Controller is too high and must be reset at a lower temperature.

Lamps can also be wired into the heating circuit controlled by a VTC. As the power is gradually reduced, the lamps fade out; as voltage is restored, illumination returns. This gradual fading up and down also increases the life of heating elements and the life of filaments in light bulbs. Fluorescent tubes must not, however, be included in circuit with the VTC.

If lamps are wired into the heating circuits, PHOTOPERIODISM cannot be controlled, i.e. the lights are being turned on and off throughout a 24-hour cycle without any prolonged period of night-time darkness.

Thus, a separate heating circuit must be provided for night time use only and this might be operated using a time-clock. An instruction booklet is supplied with the VTC which gives some suggested wiring diagrams incorporating time switches and night heaters.

The Controller is manufactured by Novotech Ltd. and is distributed by: Bio-Pet, 55 Boundary Road, London E17 8NQ. Telephone: 01 509 1021.

## Calcium for Terrapins

Captive terrapins need a regular source of calcium from their diet to ensure the healthy growth of their carapace and plastron (upper and lower halves of their "shell") together with the development of strong bones in the limbs. Adult female terrapins also need a good calcium supply to form the yolk and shell of any eggs they lay.

An entire cuttlefish bone (as sold in pet-shops for cage birds) placed in the terrapin tank or pond provides an excellent source of this essential mineral. Terrapins bite into the cuttlefish bone, whether it floats or sinks, and remove "half-moon" shaped pieces with their sharp jaws.

Another possible source of calcium in the diet is the shell of hen eggs. Before being dropped into the terrapin tank, the half egg shells must be thoroughly washed with HOT water to remove all traces of dirt and bacteria from the outside and any remaining egg albumen (which might also contain bacteria) on the inside.

Terrapins are, unfortunately, often cited as a potential source of *Salmonella* bacteria which can be transmitted to humans, especially children. Yet, if terrapins are carriers of *Salmonella*, they first have to be infected with these bacteria — spontaneous generation does not occur!

With all the current controversy about "eggs and *Salmonella*", it seems prudent to take extra care that infection does not occur from egg shells. Therefore, I now only provide my terrapins with cuttlefish bone as a supplementary source of calcium.

# Spotlight on Reptiles

## ADVANCES IN THE CARE OF RED-EARED TERRAPINS

David Alderton presents an up to date guide to the captive care of these popular reptiles.

(Photographs by the author)

**M**ost aquarist stores offering fish also have a tank housing hatchling Red-eared Terrapins (*Trachemys scripta elegans*). These attractive North American reptiles are about the size of a 10p piece at this stage. Many are bred on turtle farms in the United States, although a number are also now being hatched and exported from the Far East.

In the past, these juvenile Red-eared Terrapins could be difficult to rear successfully, because of a combination of unsatisfactory environmental and dietary factors. But now, largely because of the availability of specially-formulated diets, they can be kept in good health for many years.

### Basic requirements

When planning to keep these reptiles, remember that hatchlings, in particular, will grow quickly. It is therefore sensible to purchase a large aquarium for them at the outset. Start with a tank measuring at least 36in (90cm) long. You will also need a reliable heater-stat, to keep the water temperature in the range 24-30°C (75-86°F). This will ensure that the young terrapins maintain their appetite and should remain healthy. It may be advisable to screen the heater-stat in plastic netting, as the terrapins may otherwise rest directly on the glass casing and burn themselves.

As an alternative to a heater-stat, the thin Ultratherm heaters which are produced in a range of sizes and fit under the tank's base can be used quite satisfactorily, although in this case, you will need to purchase a separate thermostat. These heaters obviously afford the terrapins more swimming space, and make their quarters easier to clean. In addition, the water level can be varied as required, whereas with a heater-stat, this must be positioned under water at all times when operating, preferably in a vertical position.

Red-eared Terrapins require a dry area in their enclosure, where they can bask beneath

a suitable light. This can be achieved quite easily by sticking a sheet of perspex of the appropriate height across the width of the tank, using an aquarium sealant for this purpose. You can then fill the land area behind with dry aquarium gravel. Avoid using wet stones, because inevitably, water will congregate at the bottom, and will start to smell.

The height of the barrier should be about 9in (23cm), and for this reason, it is best to choose a tank which is 15in (38cm) in height. The barrier should extend for a similar distance from one end, so the small terrapins can actually walk about on land. This serves to tone up their muscles — terrapins which

live most of their time in water otherwise find it difficult to support their weight when on land.

You can add gravel to the floor of the tank where the terrapins will swim. In this case, you should wash it thoroughly first, because otherwise, you may well have a dirty scum on the water's surface when you finally fill the tank. But avoid any dyed gravel. This is because the terrapins, especially once they start growing, may well start eating pieces of gravel. While small stones themselves may

The safe way to handle a terrapin — Red-eared or otherwise!



not be harmful, simply passing through the digestive tract, a dye could have toxic effects.

There is actually no need to include gravel in any event, although it does contribute to a more natural appearance in the aquarium. It will, however, be much easier to keep the water clean as the terrapins become bigger if there is no floor covering.

In addition, although you may be recommended to have an undergravel filtration system at first, this will soon be overtaxed by the terrapins' excretory output. The best solution from the outset is to use a power filter which attaches to one of the corners of the tank.

### Correct diet

There is also little to be gained by adding plants to the set-up, since the terrapins will soon uproot them, and may even eat them. As an alternative, you can provide a little greenstuff, such as spinach, occasionally, as part of their diet.

But young Red-eared Terrapins, in particular, tend to be carnivores. In the past, people used to resort to feeding them raw mince, heart, liver and other offal. Aside from polluting the water very rapidly, such foods are nutritionally very unbalanced. Mince contains very low levels of Vitamin A, so terrapins fed on this as the major part of their diet would frequently succumb with eye trouble. In fact, the Harderian glands surrounding the eyes became enlarged and, deprived of its sight, the terrapin would no longer be able to eat, with death then being inevitable. Other effects on the body, such as swelling in the limbs (oedema) became apparent in the terminal stages.

The calcium:phosphorus ratio is also excessively wide in meat, and this, coupled with a deficiency of Vitamin D3, resulted in the other major killer of young terrapins — soft shell.

By providing a good variety of foods, including some fish, such as whitebait and invertebrates, including worms and snails, terrapins could be kept in good health. The key was to offer sufficient variety, dosing the food with a vitamin and mineral supplement as well.

Today, these nutritional diseases should be a thing of the past. Specially prepared, balanced foods in pelleted form are now widely available. These provide a sound, basic diet for terrapins, and should not be confused with "ants' eggs" and similar products, which are of relatively little nutritional value. The two brands which usually prove acceptable are Tetra's *Reptomix* and Sera's *Raffy-P Turtle and Cichlid Food*.

Sprinkle a few pieces on the surface of the water, and the terrapins will soon be attracted here to eat them. As with fish, don't overfeed since this will simply pollute the water. Instead, you can offer a smaller quantity twice a day, providing sufficient for the terrapins to consume within a few minutes. You will soon be able to judge how much they require, and obviously, as they grow larger, their appetites will increase.

A second, incidental bonus of these diets is that the faecal matter tends to break down more readily in the water, and can be



As the terrapin grows, the shell scutes ("scales") lift off.



Top view of head showing the "ears" that give this species its popular name.

absorbed rapidly by a power filter. Terrapins fed mainly on meat produce much more bulky stools which may not pass through the entry point of one of these filters.

### Salmonella warning

If you are feeding raw meat, especially chicken, to terrapins, then you will almost inevitably infect them with *Salmonella* bacteria over a period of time. These bacteria will populate the reptile's gut, and cause relatively few, if any, clinical signs.

But there is then a risk that if you touch the terrapins or the contaminated water and then handle food directly, without washing your hands, you could become infected in turn. You are then likely to suffer the usual symptoms of what can be severe food poisoning.

By offering a prepared diet, however, this risk is virtually eliminated. Nevertheless, it is still sensible to take precautions, by wearing rubber gloves when cleaning out the terrapins' quarters. Also, avoid pouring water from their tank down a sink where you may wash either food or cutlery. Instead, tip it directly down the outside drain.

When you carry out a partial water change, about every fortnight or so, be certain not to siphon out of the terrapins' tank by sucking it directly through a piece of rubber tubing in the first instance. Instead, use one of the commercially-available siphons for this purpose, to prevent any risk of picking up an infection by this means.

### Benefits of sunlight

In the wild, Red-eared Terrapins bask in sunlight to obtain Vitamin D3, which regulates their calcium and phosphorus stores. Provide one of the lighting tubes which offer light of a similar spectrum in the hood of their quarters. They will bask here, on the dry area, with the warmth also helping to loosen the scutes over their back. These transparent patches are shed as their shell grows.

During the summer months, you can transfer Red-ears of a reasonable size outside, so they can have the direct benefit of sunlight. Bring them in at night before the temperature cools down, although in milder areas, large Red-eared Terrapins can be kept in well-fenced ponds outdoors, at least during the summer months.

It may well then be advisable to keep them in the warm for the duration of the winter, rather than allowing them to hibernate outside. You can set up a small indoor pool for the terrapins, perhaps in a conservatory, with a heater-stay and power filter, if they are too big for a tank.

Adults may grow as large as 12in (30cm), and it is actually quite easy to sex them. Males develop long front claws, with which they fan water in front of a prospective mate, and then anchor themselves on to the sides of her shell, while mating takes place.

Red-eared Terrapins will soon become very tame, and will even accept food from your hand. With a lifespan of twenty years or more, they should prove long-lived companions. They have even been bred successfully in this country, when housed in spacious surroundings.

# Spotlight on Reptiles

## SHARPER THAN A SERPENT'S TOOTH

The much maligned and misunderstood adder receives welcome and deserved praise from one of its fans,

Dr Gareth Evans.

(Photographs by the author)

One of the best ways to ensure that a "No Trespassing" sign is taken seriously is to add the warning "Beware of Adders". This device works superbly well — even in areas where no self-respecting member of the clan would ever consider living! Such is the reputation of Britain's only venomous — and much maligned — snake.

### Threatened habitats

In many people's eyes, the adder, or Northern Viper, *Vipera berus*, has a rather sinister image. The reality, however, is somewhat different, these animals suffering far more as a result of Man's activities than vice versa. Aside of out and out persecution by the vicious or ill-informed, these snakes have been, and continue to be, greatly affected by human land usage and agricultural practices. The threat to a wood a few miles from my home in rural Staffordshire illustrates this situation all too well.

This area, within striking distance of the Potteries, is one of outstanding natural beauty. In addition to supporting a sizeable adder population, it contains Common, or Viviparous Lizards, *Lacerta vivipara*, and slowworms, *Anguis fragilis*, as well as being home to many different species of birds and mammals.

The potential disruption to this idyllic spot has resulted from an application to quarry sand and gravel from an extensive site in its midst, necessitating inevitable damage to the habitat, both for the quarry site itself, and in the provision of new routes for the transport of the material. With the usual round of public meetings and inquiries, the result hung in the balance — and with it the future of one group of these remarkable snakes.

### Widely distributed species

The adder has one of the widest distributions of any snake species, and the most northerly, extending well into Scandinavia. Found throughout temperate Europe and Asia, eastwards to the Pacific, its southern



The rusty brown base colour identifies this specimen as a female.

limits run from the middle of the Iberian peninsula, through central Italy and the Balkans to the southern Urals. It is absent from Iceland, Ireland (from whence St Patrick is reputed to have expelled it, and all other serpents) and the islands of the Mediterranean.

Moreover, although in the south of its range the adder is very largely restricted to the more mountainous areas, extending up to 3,000m (10,000ft) in Britain and elsewhere in its northern territories, it is remarkably successful at exploiting a wide variety of habitats. Thus it may be encountered on moors, heaths, salt marshes, sand dunes and woodland. However, though it swims well if the occasion demands, it is seldom found near water — despite warnings to the contrary often seen beside private fishing lakes!

### Vital statistics

A fairly short (50-65cm, 20-26in), stout-bodied snake, its typically bold and attractive patterning make it unlikely to be mistaken for any other British animal (though on the continent, near relatives like the Asp Viper, *Vipera aspis*, and Meadow Viper, *Vipera ursinii*, can make identification less straightforward).

The broad head and snout are flat, and a clearly defined neck separates it from the rather thick-set body. The tail is short, accounting for only some 1/6 of total body length in the male and 1/8 in the female. Typically, there is a "V" or "X" shaped mark on the back of the head, with a black zig-zag stripe extending along the dorsal midline to the tail. A further interrupted line of irregu-

larly sized spot runs along each side of the body.

Unlike the majority of snakes, the adder exhibits sexual dimorphism, the sexes usually being of different coloration — males with clear black markings on a pale greyish background, and females with a rusty brown colour, and less distinct patterning. However, many variants to these general rules exist; some animals, especially from northern Spain or Portugal, have a straight vertebral stripe rather than a zig-zag, and totally black individuals are not uncommon.

In any case, young adders are usually brownish, only assuming their final adult colour schemes after 2-3 years (and becoming sexually mature about another 2 years later). (See full-page photograph basking young adders).

### Breeding

As the temperature rises to 10°C (50°F) in March or April, the snakes emerge from hibernation, and are often easiest to observe at this time of year, basking in the weak rays of the sun for a morning warm-up. Breeding takes place in late April or early May, preceded by the "dance of the adders", a ritual courtship in which males actively compete for the attentions of the females.

Unlike most reptiles, the female adder does not lay eggs, but retains the developing embryos, each contained within its own individual membrane, inside her body. In August or early September, some 5-15 young, around 15-20cm (6-8in) long, are produced and immediately burst free of their encapsulating sheath.

This phenomenon, known as ovoviviparity, occurs in three other of our reptile species, the Common Lizard, the Slowworm and the rare Smooth Snake, *Coronella austriaca*. It has been suggested that it may be an adaptation to life in more northerly climes where lower temperatures might make eggs more vulnerable. However, since Grass Snakes, *Natrix natrix*, and Sand Lizards *Lacerta agilis* (the latter, admittedly, rare) use the traditional egg-laying method, and Boa Constrictors and their kin are ovoviviparous, the issue is not exactly clear cut!





Soon after birth, the youngsters slough their skin, and though possessing fully functional venom and fangs from birth, they have little opportunity to feed before entering hibernation in late September or October. This usually takes place in holes in the ground, or under large tree stumps, the relative scarcity of suitable sites in many areas dictating that the snakes often have to travel some distance to their winter quarters. Moreover, fairly large numbers can be found together in these places — human interference in and around these hibernation dens thus having the potential for a disproportionately large effect on the local adder population.

### Adder diet

In the main, food consists of mice and Common Lizards, though voles, slowworms, frogs and young birds may also be taken.

The eyes, with their vertical, cat-like pupils (a legacy of their nocturnal, and more southerly, ancestry) are very sensitive to movement. Once thus alerted to the presence of prey, the snake uses its tongue (see "In Fact and Fiction") to locate its meal. Armed with a very effective venom and 4-5mm long fangs, which are replaced every few months, the adder strikes when in range, quite literally, faster than the eye can see.

The fangs in a resting snake lie folded backwards in a protective sheath of skin, rather like a closed penknife blade. In use, the mouth is opened very wide to allow the fangs to flick forward and deliver their shot

of poison. The reptile then simply waits for its unfortunate victim to succumb to the dose, tracking it over the short distance it has run before overtaken by death, again, using the tongue.

### Infrequent encounters

The adder has a number of natural enemies — crows, large birds of prey and hedgehogs all featuring the snake in their diets. However, the greatest threat comes from Man, through ignorance, prejudice or thoughtlessness.

These animals have been accused of lying in wait for people or livestock. In reality, most potential "confrontations" are avoided, the snake slipping away quite unnoticed. All



Spurious signs like this one are quite common in so-called adder-infested habitats.

snakes, though deaf, are sensitive to ground vibrations, and warm adders, warned of human approach, move away very quickly indeed. In addition, the eyes, so swift to see prey movement, also readily serve to alert the creature. Even when their exact position is known and a "close encounter" actually sought, they are not easy animals to sneak up on!

It is true that bites do occur, but although they are not something to be described as pleasant, only very exceptionally do they prove fatal. Pet dogs, though, with their habit of pushing their vulnerable noses around in the undergrowth are at more risk — usually in spring, when the cold makes the snakes slower to move off, and more irritable. However, only a fool takes unnecessary risks with potentially dangerous animals. Any creature surprised, cornered or maltreated may bite — the adder being no exception.

Like most of our native species of reptiles and amphibians, the adder finds co-existence in too-close proximity to human disturbance difficult, and unlike many birds and mammals, does not readily adapt to Man-made changes in its habitat.

An attractively marked animal, though neither cute nor cuddly, it remains an important part of Britain's wildlife heritage. I am glad that, in one case at least, "green" sense in the end triumphed over the forces of Mammon, and that one particular population of these fascinating snakes will be free to live out their lives in peace.

## SNAKES IN FACT AND FICTION

"The snake slides malevolently towards its cowering, petrified victim, inches separating her shapely form from certain death." The oft-repeated scene is a familiar one. All that remains is for the hero to shoot it with his trusty six-gun (if wearing a Stetson) or decapitate it with his equally trusty knife (if loinclothed clad), just in the nick of time. But life just ain't like the movies!

Despite the widespread conviction to the contrary, all snakes are not poisonous. In fact, of some 2,700 species, only a third are venomous, and of these, only 60 or so are dangerous to Man (about 2% of all snakes). Additionally, the effect of envenomation depends on a number of factors over and above what sort of animal did the biting.

The age, size and general condition of both serpent and victim play their part, as do precisely how much, and where, venom was introduced, individual susceptibilities, and how near to replacing its fangs the animal was. Further, poisonous snakes do not invariably inject venom — and it has been known for people to die of fright following bites

from totally harmless snakes. Predicting the effects of snakebite is not always so cut and dried as might be supposed.

The fact remains that a number of people do die each year as a result of bites — though mostly in the Third World, where the locals habitually walk barefoot and the native (and highly venomous) fat-bodied vipers take great exception to being trodden on. The widely encountered British fear of our only venomous snake has very little basis in reality — though a healthy respect is something altogether different.

### Venom

Venom in animals originally arose in response to two basic pressures: defence and the capture of prey, though some creatures which first evolved toxins which they employ for the latter purpose also use them defensively.

Into this category fall the venomous snakes. With a long thin body, and swallowing their food whole, a fairly good supply of saliva is a useful lubricant to help the business along. Saliva contains enzymes, those special proteins which affect the process of digestion — and it is a fairly small step from here to evolving super-enzymatic saliva (venom) produced from modified salivary glands, and start the digestion before the animal has been consumed!

Indeed, in some less advanced snakes,

instead of the efficient hypodermic-like fangs of the adder, the teeth are simply grooved, down which the venom dribbles into the wound.

### The Forked Tongue

On first acquaintance with non-venomous snakes a number of people recoil in horror from the flickering tongue, believing themselves about to be "stung". In reality, the forked tongue enables the animal, literally, to taste the air.

The scents picked up are carried to a special sensory pit, the organ of Jacobson, located in the roof of the mouth. In unfamiliar surroundings, or when actively seeking prey, these tongues dartings increase in frequency — rather like a dog sniffing around a new area.

### Supernatural Serpents

In many ancient religions snakes were revered and given mystic attributes — this "other worldly" link continuing in the old British country beliefs that snakes can only die at sunset (false) and that dead ones can still bite (true — at least, sometimes), their nervous system, which can cause apparent posthumous activity being responsible for both of these.

However, as Man's persistent fear and fascination show, venomous snakes clearly have enough of interest about them without invoking the supernatural!

# Spotlight on *Reptiles*

## COLLARED DENIZENS OF THE DESERT

As Robert and Valerie Davies discovered, Collared Lizards are not the pugnacious, "unadaptable" species they are made out to be.

(Photographs by the authors)

**T**he arid and semi-arid areas of the U.S.A., from roughly east and central Missouri, through central Texas, west to Utah, Arizona and Sonora, are home to an attractive and engaging species of lizard — the Collared Lizard (*Crotaphytus collaris*). From what little information we could find concerning the Collared Lizard it seemed to have a reputation for pugnacity and for devouring other lizards. Despite this somewhat off-putting behaviour, we obtained a pair of wild-caught specimens several years ago.

### Basic statistics

Collared Lizards are about 20-35cm (8-14in) long, with a head and body maximum of 11.5cm (4½in). The back legs are somewhat longer than in other lizards.

In some areas Collareds are known as 'Mountain Boomers' in spite of having no voice. The other, more common, name comes from two black collar markings, but the coloration and pattern are variable.

In the males the dorsal surface is mainly green, especially in the breeding season, with a series of dark crossbands covered with light spots. This pattern extends onto the back legs, but the forelegs are unmarked. The lower jaw is off-white, with small, dark blotches. The head is greyish, the throat is yellow, and there is a faint yellow coloration along the sides of the body. Older males tend to have comparatively large heads and the dark crossbands seem to fade with age, although the light spots and collar remain. The ventral surface is a pale green.

Females are brownish-grey on top, with a paler underneath. They possess the light spots and collar, but the dark crossbands are not as obvious as in males. Gravid females develop orange markings along the sides and on the neck.

The young measure about 8cm (3in) at hatching. Their coloration tends to resemble that of the female but the dark crossbands and light spots are more apparent. Some youngsters also develop quite profuse orange markings which disappear as they grow.



### Housing

When we initially obtained our pair of wild-caught specimens we housed them in a 60cm (24in) x 30cm (12in) x 30cm (12in) glass vivarium with a mesh top and heated by a 40 Watt spot bulb. The floor was covered with 2cm of coarse, gritty sand with cork bark and stones for hiding and basking.

Once the lizards had settled down and were feeding well, they were transferred to their permanent vivarium where they now live. This is made of wood and measures 60cm (24in) x 60cm (24in) x 48cm (19in). One third of the back panel is fine plastic mesh for ventilation. Since Collareds are sun-lovers, a thermostatically controlled spot bulb in a 45° battern socket is beamed onto the rocks for basking.

In addition, an 18in (45cm) Philips TLD 09 fluorescent tube is fitted, since this is reputed to give off ultra-violet rays which desert animals must, of necessity, be subjected to.

### A beautiful adult male Collared Lizard.

The substrate is coarse sand. Furnishings consist of several pieces of tufa rock and cork bark, stone, pieces of dried moss, dried grasses and plants. Although a small water dish is supplied, on only one occasion have we observed a Collared Lizard drinking. A small plastic food tray containing damp sand is buried to substrate level for egg deposition.

The thermostat is set to give the vivarium a daytime temperature of 34/35°C (94°F). The night temperature can be allowed to drop considerably. This hot, dry atmosphere seems to suit Collared Lizards. They emerge in the morning, clamber onto the rocks under the spotlight and spend much of the day basking. The lights are switched on at about 8.15am. By about 5pm the lizards have retired for the night, so the lights are switched off at 6pm.

## Feeding

Food consists of the usual insect fare — crickets, mealworms and locusts. Collareds are particularly fond of waxworms, which, although generally known to be fattening, do not have this effect on the lizards, possibly because they are very active.

We usually feed our specimens around midday, the food being dusted with multi-vitamin supplement. Small pieces of cuttlebone are also scattered on the sand. These are frequently picked up and eaten.

## General behaviour

As already stated, much of the Collared Lizards' time is spent in basking. The legs are often stretched out at seemingly unnatural angles to the body. During basking they seem almost doped. Early morning basking takes place with all four legs extended to raise the body as high as possible.

In the wild, if disturbed in the open, Collareds run, first on all fours but then, having attained a considerable speed, run in an upright position on their rear legs only. This bipedal motion is not seen in captivity since they are in a restricted space and soon become tame anyway.

Once they are warmed up, Collared Lizards punctuate their basking with periods of activity in which they run about, leaping from rock to rock and climbing up the cork bark.

Contrary to what we had been led to believe, our original adults, although wild-caught and initially a little skittish, did not actually bite when handled, merely opening the mouth wide to expose a dark throat lining.

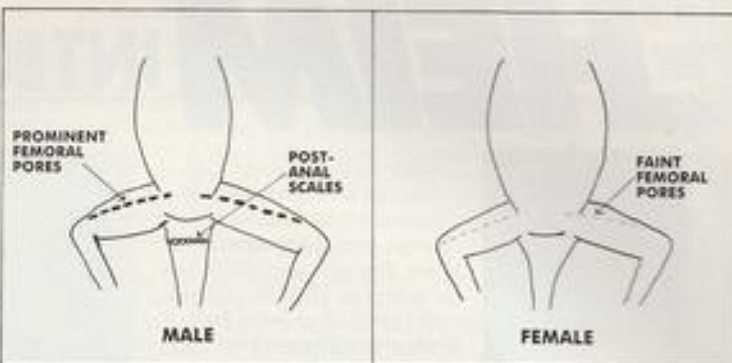
When the vivarium was approached they would scurry wildly at the cage sides or dive for cover. The male (especially) couldn't get used to glass and we became worried that he would damage his snout by constant rubbing. However, after removal to a glass-fronted wooden vivarium this behaviour receded considerably.

These wild-caught adults are now very tame, can be handled easily and feed from one's fingers. Instead of dashing for cover when we approach the vivarium, they will now come to the glass front and watch us. Frequently, when being hand-fed, they climb onto our hands and run along our arms before returning to the vivarium.

We have seen no signs of aggression towards each other except for occasional 'head-bobbing' from the male. Among the babies we bred, three males have lived together quite amicably, even when maturing. Young Collareds are very tame, love to be picked up and prefer to be hand-fed, rather than pick their own food from the dish.

## Breeding

Sexing is quite easy because of the male's colour, but males also possess a row of post-anal scales and prominent femoral (thigh) pores. A mature male also exhibits a hemi-penal swelling behind the cloaca (genital aperture). Females possess only faint femoral pores and no post-anal scales.



Male and female features compared.



Females, while still attractive, are not as spectacular as males.

We have never observed actual mating of the Collareds, but the first clutch of eight eggs were laid on 1 September, 1987 and hatched 61 days later.

The eggs are elongated and measure approximately 1.8cm (0.7in). They have a leathery shell and were incubated in moist sand at 30°C (86°F). Two of the clutch were females, the others males. Other clutches have given a 50/50 mix of sexes.

On two occasions the eggs have been deposited, not in the tray of moist sand, but at the side of the water dish and only partly buried. On one occasion a female developed the orange markings which later disappeared without any eggs being laid. Another female was obviously swollen with eggs but did not develop the orange markings, and, in February 1989, dropped eight eggs which proved to be infertile.

Since the males begin to develop breeding colours round about April we assume that



Two-day-old Collareds are beautifully marked.

the main breeding season is spring and summer, which would seem to be normal.

When hatched the young Collared Lizards are kept in a 45cm (18in) x 30cm (12in) x 30cm (12in) vivarium with newspaper substrate and plenty of hiding places. A shallow dish of water is always supplied. Although we have never seen them drink, they will lap water dripped onto their snouts with an eye-dropper (a useful method of providing vitamin supplements).

Our young were reluctant to take food from a small dish, so powdered cuttlebone was spread liberally over the newspaper and the food items dropped onto it. They soon began to take food from forceps, then from fingers. They have hearty appetites, and so, grow quickly.

When about half-grown, we transferred them into a set-up identical to that of the adults. Our first males were mature at about 12-14 months of age.

## Conclusion

From the bit of literature available concerning this species, it seemed to have a reputation for pugnacity and a tendency not to adapt successfully to captivity. However, since obtaining our original wild-caught pair several years ago, we have become attached to Collared Lizards and found them to make ideal, undemanding, interesting and, certainly, engaging vivarium subjects.

These wild-caught specimens have proved their adaptability to captivity by becoming very tame and producing viable clutches of eggs . . . so, clearly, not all the published 'rules' concerning this species apply at least, not all the time.

# Seaview



by Gordon Kay

## Exhaustible resources

I promised you last month that I would tell you about some nasty things happening in the Gulf of California. Well, in last September's issue of the American magazine *Freshwater and Marine Aquarium* there was an article on the Sea of Cortez which made me feel very depressed and angry.

It told of the way that the area's wide diversity of marine life is being seriously depleted by a well-developed fishing industry. The article, by Alex Kerstitch, reported that, in the last ten years, there has been a serious decline in the numbers of many marine creatures, including Sea Turtles and even Sharks. Totoaba and Turtles have taken such a beating that they are both now endangered.

The object of the piece was to expose some of the abuse perpetrated by an increasing number of Mexican fishermen — both local and commercial — and to stimulate an awareness of the consequences resulting from the destructive utilisation of the Gulf's marine life and the attitude of the Mexican fishermen that the Gulf has inexhaustible resources.

Apparently, Government fishing regulations are not enforced — with the result that (the) foreign vessels come in and take huge quantities of fish. The capture of turtles, such as Ridley, Loggerhead, Green and Leatherback, is now illegal and yet fishermen are killing them and selling their meat in local markets. This is being ignored by the authorities.

Commercial divers, diving at depths of 40-80 feet, are taking everything in their wake. With no regard to size, clams, conches, octopuses and lobsters are being taken in alarming numbers.

Kerstitch told of seeing a Mexican pick-up outside a fish market completely loaded with Spiny Lobsters, the majority of which were only 3-5 inches long! He states that where, until recently, it was easy to find schools of Hammerhead Sharks, it is now rare to find even an individual.

One particularly sickening thing for me, however, was the use of Sea Lion flesh for bait by shark fishermen. Kerstitch related stories of seeing butchered carcasses along the beaches and in the sea.

There is plenty of other horrifying stuff in the article, such as overfishing of shrimps and the wasting of over 1.5 billion pounds of fish every year because of shrimp trawling, but I won't go on. Suffice to say that it was all very depressing and does seem to point to what the article calls "the beginning of the end of the Sea of Cortez."

I don't want to go on about this, I've just reported on it to

make you aware. However, I was appalled to read the article and I hope that you will feel the same to a man (or woman).

## Snippets

Let's lighten up a little with some snippets:

[1] The lovely Marine Betta, *Callopleuropterus alvarius*, is actually a Grouper. Hard to believe, but true!

[2] The Moorish Idol (*Zanclus cornutus*) may look like an Angel but it is related to the Surgeons and Tangs.

[3] Ascidians, or Sea Squirts do not have many external features to indicate that they are animals. They sometimes spontaneously close one or the other — or both — of their two funnel-like external openings and will always do so if disturbed.

However, usually, they are absolutely still, with both apertures wide open and water — which they filter for food — passing continuously through their bodies.

Octopus are reportedly being taken in vast numbers in the Sea of Cortez.

They are fixed firmly and usually permanently to the substrate or other ascidians by an adhesive, outer protective coat made of mucus, which has a molecular structure similar to the cellulose of plant cell walls. The ascidian lies inside the test, connected to it around the openings and also where it is penetrated by blood vessels from the body wall.

Many ascidians secrete minute, star-shaped calcareous spicules that strengthen the test. These are the closest thing to a skeleton known in this group of animals.

[4] Peanut Worms, which grow rapidly to a length of 50mm (c 2in), bore deep into dead coral substrate, keeping an opening to the outside through which food can be collected and waste products released. They can only bore into dead coral and only in the larval stage. If an adult worm is dislodged from its burrow, it cannot make another one.

[5] The ancient ancestors of the octopus, squid and cuttlefish had external shells just like other molluscs do today. Five hundred million years ago, before fishes evolved, the nautiloid and ammonoid shelled ancestors of today's Cephalopods were the major marine carnivores.

Today, only a few shelled Cephalopods survive and the best known of these is the Chambered Nautilus (*Nautilus pompilius*). This species, which grows to 200 mm (c 8 in) in diameter, is found throughout the tropical West Pacific. The animal can control its own buoyancy by changing the amount of gas and fluid in the chambers which divide the shell.

[6] Soon after dusk, along the channels and edges of the reef where currents are good, the massive fans of Basket Stars — up to a metre across (39 in) — are used to trap unwary plankton.

Unlike the rest of the Ophiuroids, the arms of these animals fork repeatedly to create fishing nets. When a small animal strikes the net, the arm tip bends and encircles the prey that is impaled on the numerous tiny hooks on the underside of the arms.



SNOWBALL 3 276/10747

# Tomorrow's Aquarist



## By David Sands

Young fishkeepers are the flag carriers for the future hobby!

When our editor, John Dawes, tentatively asked me to write this column last year, the aforementioned fact was uppermost in my mind.

### Help wanted

I would sincerely like this page to be the best in the magazine and, to attempt that, I will need your help. In case you require encouragement (which I don't think you will really need!) I can state in your defence that young fishkeepers can be about the most enthusiastic hobbyists around, and that this pure enthusiasm can generate extremely interesting thoughts and observations on virtually any subject one can think of.

Fish behaviour, such as territorial aggression, pre-spawning rituals and parental care, make fishkeeping a marvellous pastime and, who knows, maybe there is a budding ichthyologist (fish scientist) or ethologist (a scientist who studies animal behaviour in a natural environment) out there. I sincerely hope so!

I have extremely fond memories of two young lads who used to travel on the train with Steve Pritchard and me from Euston to Hemel Hempstead after attending the first ichthyological course at the British Museum in the late 1970s. They had so many questions and so much enthusiasm that my mind worked overtime to learn more in order to answer some of the more difficult questions they kept throwing at me.

Sections of the course such as those that detailed osteology in fishes (bone structures) had us all struggling to remember, but

one of these boys seemed to have the most incredibly retentive memory for that sort of thing. I always believed that he would become a fish scientist, but last year a surprise letter from him said otherwise.

I feel sure there are some young *A & P* readers out there who fancy studying fishes, so there's no better time to start than today!

A few months back I read in the *Guardian* newspaper of two places offered in the fish section

of the British Museum. I suppose the head of the fish section would have chuckled if I had applied.

I had little formal education (not a lot of people know that!) and left school early to become articled to a local firm of chartered accountants. It was that, or accept the other job offer — which was to be an apprentice at Hawker Siddeley in engineering. Can you see me as a lathe turner? (I can't!). These days you can go on and study if you have the ambition.

I want to hear from those of you who have thought about a career in fishes or marine biology. I would also like to know what unusual behaviour you notice in your own aquaria, especially in the fishes you most enjoy keeping, and I'm sure the editor and I can come up with a prize or two for the most interesting letters.

Have you had any failures or

wonderful successes, or have you accomplished something interesting such as collecting native fishes from freshwater or the seashore?

### Some other things about me

Another few things that a lot of people don't know about me are that:

- (1) I photograph clouds as well as tropical fish;
- (2) I write poetry;
- (3) I once sang and played guitar with Cat Stevens in his concert dressing room;
- (4) I'm only slightly dotty!

What do you do besides fishkeeping, or is there little time to do anything else after schoolwork and suchlike?

If you have written any poems about fish, or know of any, I would like to see them.

### The Bulldog Plec

Fishes are odd animals  
—not like the dog or budgie  
They live in a different world  
—to other pets you see!  
Fishes may like salty water  
—warm or cold and fresh  
They shoal when it seems to suit  
—and guard the latest creche.  
Fishes 'kiss', swim upside down  
—they often fight and fuss  
They hardly ever seem to sleep  
—and never quite like us!  
Fishes have the strangest names  
—bulldog plecs can't bark  
But then they don't need 'walkies'  
—and they never mess the park!

I'm sure you can do much better than this...



Are you watching... or are you being watched?

### Your comments wanted

Does your school have an aquarium or vivarium, or interesting projects to do with aquatics? Do they have any problems that we could help with?

What would you like to see in *Aquarist & Pondkeeper*? Is there something missing, or do you like it just the way it is? If there are subjects you would like to see covered, or certain fishes that you can never find information on — let me know.

Do you use your library to investigate about fishes? If so tell me the books you read besides the normal community tank books.

See you next month.

# KOI POOL HEATING

## FACTS & FIGURES

Midland Koi Association member, David Twigg, counts the cost of providing winter warmth for his Koi.

(Illustrations by the author)

Since my wife and I became Koi-keepers (as against general pondfish keepers) we have made it our policy to have one major pond project each year. I had given thought to (and certainly had been hankering after for sometime) heating my pool. A couple of questions which kept cropping up were:

- (1) What is to be gained by heating the pool? and
- (2) If I do heat the pool, should I give the fish a "winter" anyway?

The answer to (1) was, I believed, that the almost all-year-round feeding would produce good growth, improved skin quality, colour and health. The answer to (2) was a little more difficult for me to arrive at, even after many hours of discussion with dealers and hobbyists alike.

It would be extremely difficult and costly to mimic the Japanese water temperatures all

year round and, also, I was encouraged to believe that a "not-too-long" period without food could possibly be beneficial for my fish. My conclusions were arrived at in the spring of 1989 after a great deal of talk and trial and error and will be outlined later.

### Early deliberations

It was therefore with great interest that I looked forward to seeing the dealer stands at the 1988 BKKS National Show at Billing in August which sold some form of pool heating. The great debate was whether to use gas or electricity. Which is the cheapest way of warming such a large volume of water?

I outline here some of the thoughts which went through my mind, contributing to my final decision to "Go Electric".

There were many factors to take into account such as initial price of heater, cost of installation, running and maintenance, together with size of pond (surface), volume of water and location to name but a few.

### Present pool set-up

In my case, I have 6,000 gallons in a system with pool surface area, nominally, 20ft x 10ft, a 6ft x 2ft settling bay (in the last part of which I have brushes) and an external above-ground filter from which the water is gravity-fed back to the pond. The settlement bay and filter tanks are kept covered to reduce blanket weed growth in summer. This, of course, has a secondary function in that it removes the "wind chill" element of both summer and winter weather.

Between the settlement bay and the filter proper is an in-ground pump chamber. I therefore pump "dirty water" to the filter, rather than "clean water" back to the pond. As I was pushing 700 gals/hr through the filter and the remainder of the Dab Nova's output direct to the pond (having received only "physical" filtration), it seemed logical to me not to disturb the filter rate (found by many months of careful monitoring and "tweaking") but to utilise the direct path back to the pool for a heater.

### Installation

After speaking with many dealers at Billing I decided to purchase a 6KW electric swimming pool heater. Installation was carried out by a qualified electrician who was also a fellow Koi-keeper. This involved laying a separate mains feed from my house to the end of my garden using 6mm cable to prevent a large volt drop along the way when drawing 6KW (25 amps) from the supply.

This cable was taken from the "user" side of the Earth Leakage Circuit Breaker (elcb) and terminated in a 3-way domestic fuse box which allowed for provision of lights and power points for the pool.

In order to assess the cost of heating my pool accurately I developed a unit using a clock, relay and two hour counters; one each for Economy 7 and normal day units. The heater was to be left on thermostatic control 24 hours per day.

### The big switch-on

I had been hoping to get up and running before the water temperature fell below 12.8°C (55°F) in order to reduce the initial start-up cost. However, for several reasons, this was not possible, so by the time of the big switch-on, the temperature had dropped to 11.3°C (52.3°F) and this meant that I was about to prove or disprove the rule of thumb that a 6KW heater, running continuously for one hour, would raise the temperature of a 5,000 gallon pool by 0.5°C (0.8°F).

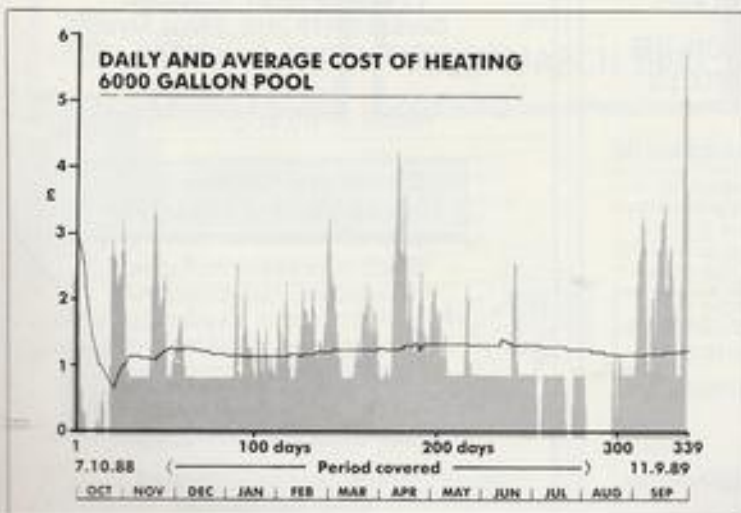
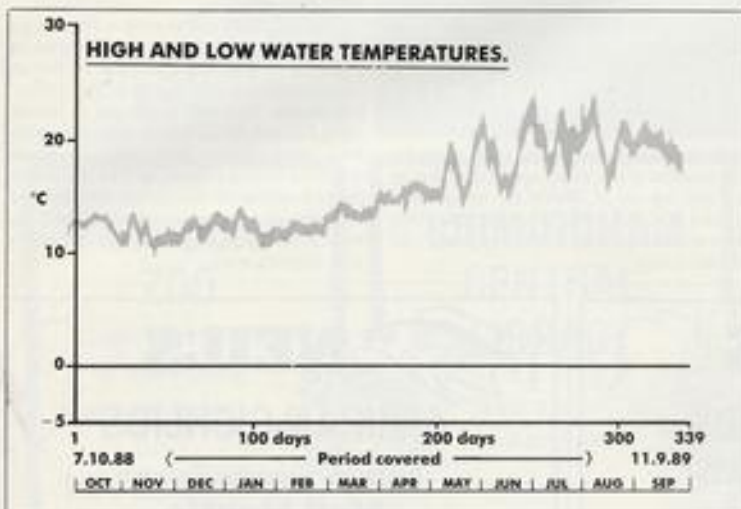
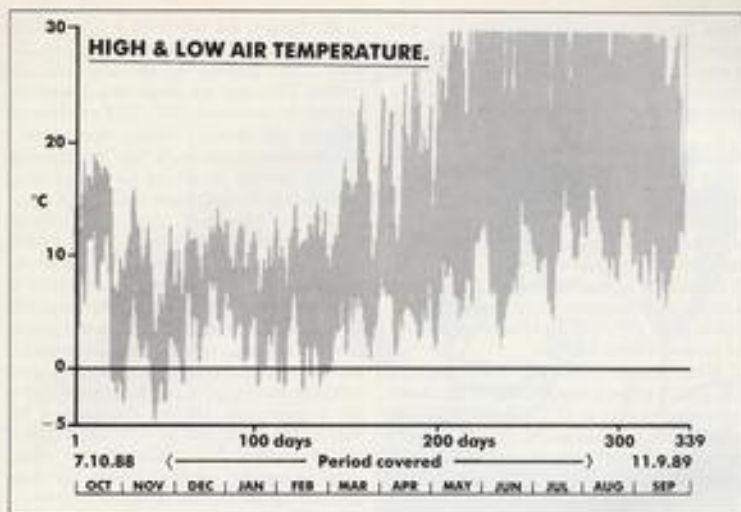
In practice, the switch-on came at 2 pm on Friday 7 October, 1988, and by 8 pm the



My pond in summer.



My pond with winter cover in place.



water temperature had risen to 12°C (53.8°F), thus disproving the theory mentioned above by quite a considerable margin. Obviously, I expected to get less temperature rise due to my extra 1,000 gallons, but I had not, of course, reckoned with the sudden fall in air temperature and high winds experienced over the first five days. Anyway, the result was that the rise of 0.8°C (1.5°F) over six hours averaged out at 0.14°C (0.25°F) per hour.

I allowed the temperature to stabilise at this level over the first night just in case of it getting "tropical" by the time I awoke in the morning. My meters kept ticking away, though, and it was with horror that I calculated at 9 am the next day the cost of my first 19 hours... £4.02 !!! (9.8 day hours @ 34.62p per hour and 5.1 Economy 7 hours @ 12.42p per hour = £3.39 + £0.63 = £4.02).



The 6KW heater installation.

#### Daily log

I decided that an accurate log was essential in order to keep an eye on the cost of giving my Koi a warm winter home, and that log has been kept ever since. At time of writing, 340 days have elapsed. My log charts daily movement in HI and LO water temperatures, HI and LO air temperatures, daily and total cost to date, as well as a remarks column. Weather conditions, feeding routine, changes of any nature, pond treatments, as well as fish health and wellbeing, are recorded in this column.

It soon became apparent from my emerging results that I would have to take some action to prevent heat loss. I decided that the first and easiest thing to do was insulate my four external filter tanks (each 200 gallons) with 1in-thick polystyrene sheeting (as in the cold water tank in the loft) and put my home-made covers onto the pool.

Reference to Graph 2 shows that minimum water temperature was maintained at 12.8°C (55°F) until 30 October and then gently lowered over seven days to 11.3°C (52.3°F). I stopped there because I wanted to keep my fish as warm as possible and therefore eating, for as long as possible. Observation was telling me that, as the temperature approached 11°C (52°F), the fish were not so keen to take food.

At Day 30 (Graph 3) my average daily cost to run the heater on a thermostatically controlled basis throughout the day was £1.15 and I concluded that, one month into the exercise, I had collated sufficient data to prove that maintaining the heater on this continuously controlled basis was going to get considerably more expensive as the



colder weather set in. Maximum water temperature swing during this period under continuous thermostatic control was 0.6°C (1.1°F).

A minor change to my controlling/monitoring equipment on Day 30 meant that I could now run the heater continuously through the Economy 7 hours and under thermostatic control during the 17 hours of expensive electricity. This meant that I was guaranteeing myself a bill of at least 87p (now 93p) per day, and higher if the heater came on during the expensive hours, should the water temperature fall below 11°C (52°F).

This minimum temperature was maintained throughout Nov/Dec/Jan and Feb and then I began "nudging" the thermostat up on a regular basis during March to bring the spring in a little earlier than would otherwise have been the case. The result of maintaining 11°C (52°F) during this cold spell, as the cost graph shows, was to put my daily average heating bill up to £1.28. I considered it well worthwhile, though, when I saw how well the fish fed and how healthy they looked.

It really is an awfully long winter in England from the Koi-keeping point of view. I put the covers on and started heating my pool on 7 October 1988 and SIX months later, with covers still on, snow was lying on the ground and low air temperatures (Graph 1) dragged down my water temperature from the tropical 16.2°C (61°F) on 2 April to 14.8°C (58.6°F) three days later.

As spring progressed I decided to keep the water heated during the "summer" months,

using the Economy 7 period daily. It was hoped that this would slowly push the water temperature up sufficiently high so as to emulate the Japanese temperatures in late summer and autumn more closely.

### Main conclusions

For those of you who are giving serious consideration to installing an electric heating system in your pond, it may be of interest to consider the following general points based on my observations:

1 A heater of at least 1KW per 1,000 gallons is required to maintain water temperature at higher than 10°C (50°F) efficiently during the coldest winter months.

2 When using 1KW per 1,000 gallons, Economy 7 alone is insufficient to maintain water temperature at 12°C (53.6°F) if the air temperature falls below 2°C (35.6°F). Thermostatic control during the day is required to complement Economy 7.

3 For five of the six winter months, because water temperature was above 11°C (52°F), the fish were eating almost as much as would be consumed during the "summer". An additional expense!

4 Vacuuming off continues during the cold, wet, winter months.

5 The figures plotted on the graphs are minimum and maximum temperatures in each day. No allowance has been made for the duration of any warm or cold spell during the day, e.g. on 31 March the temperature peaked at 22.6°C (72.7°F); this may have been only momentary... I know it wasn't for several hours!

6 My figures are based on a 6,000-gallon system in a north-facing, low-lying position with 1,000 gallons of above-ground filtration. This cost me about £9 per week on average to maintain 11°C (52°F) minimum over the six months. During this period I did, however, temporarily "up" the temperature on several occasions for a variety of reasons (e.g. introduction of new fish, etc).

7 On the plus side, the much shorter, warmer, winter means less chance of the fish succumbing to disease in the spring. In my case, the couple of fish which are prone to "jelly blobs" remained completely clear, and all my fish have benefited from the longer growing season... a big bonus. Skin quality was excellent throughout and this must surely be attributed as much to the food as to the temperature. During February, I fed only boiled wheat and the occasional treat of boiled garden peas. Wheatgerm pellets (sinking variety) were, of course, the main diet during the coldest months.

### The future

I am currently developing a data logger and associated software which will be taking a sample of the temperature at 30-minute intervals during the day "à la Met Office" procedures. This will enable me to control when I switch on my heater more accurately for a more efficient heat input, i.e. heater comes on during a warm spell in the day, so that it is aiding the sun, rather than fighting to maintain the temperature against the frost. Hope that makes sense. But that will be next winter's story.



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# Books



## Pierre Brichard's Book of Cichlids

(And all the Other Fishes of Lake Tanganyika)

By: Pierre Brichard  
Published by: T.F.H. Publications, Inc  
ISBN: 0-86622-667-2  
Price: £49.95

Measuring some 12½ x 9½ in, containing 544 pages, over 1,000 photographs ... and weighing half a ton(!), this massive volume is the latest in the series of TFH blockbusters to hit the market. And, like all the other blockbusters, it's bound to sell very well indeed.

Pierre Brichard and Lake Tanganyika cichlids are almost synonymous, so to get such a comprehensive book from such a famous and respected writer is a treat indeed. The contents (in addition to a bibliography, a glossary, an appendix, an index, and a 13-page section entitled *A Few Hints to the Hobbyist*) are pretty exhaustive, embracing all manner of relevant topics such as: Lake Tanganyika — Geography, History, Climate, Properties of the Water; Life in the Lake other than Fishes; Ecology and Distribution of Fishes; Survey of Lake Tanganyika Fishes and their Endemism; Ecological Barriers, Impact of Isolation, Fords, Speciation, Local Intralacustrine Endemism; The *Tropheus* Species Complex and the Geographical Races; Reproduction and Breeding Behaviour; Predation — Offensive and Defensive Adaptations; Keys to the Cichlid Genera; Descriptions of the Cichlid Species; and — finally — The Non-Cichlid Fishes.

Now, you can't get much more comprehensive than that; and when well-informed, interesting text is accompanied by maps, superb photographs of biotopes, underwater photographs of both habitats and fish, plus a huge array of aquarium-type portraits, you know you are dealing with a book that's really worth having.

I was therefore somewhat surprised to find that some of the names were quite out of date. For instance, I would have expected to have found *Lamprologus brichardi* listed under its now widely accepted name of *Neolamprologus brichardi*. The same, of course, goes for other former *Lamprologus* species. *Anatolapia burtoni* is still listed under *Haplochromis* with the statement:

"According to Greenwood, the Lake Tanganyika species should be allotted as follows ...

... *Haplochromis burtoni* becomes *Anatolapia burtoni*."

The way in which this is presented, allied to the comment that the status of the haplochromines "has been reviewed recently (1979) ...", suggests to me that a considerable amount of time has elapsed between submission of the original manuscript and its eventual publication. If this is indeed so, it would be a bit of a shame, since even a period as seemingly short as five years is a long time in taxonomy ... particularly in Rift Lake Cichlid taxonomy.

Whether my assumption is correct or not, I have no way of knowing, but the above examples, plus a few others which I spotted (plus any others which eagle-eyed cichlid specialists may be able to pick out), leaves me feeling that a great book such as this one undoubtedly is, would have been even more impressive if a judicious bit of updating had been carried out.

Having said this, I still feel that Pierre Brichard's massive tome, given the full TFH treatment, represents unbeatable value for money, and a major contribution to our understanding of the varied and fascinating fishes of Lake Tanganyika.

John Dawes

## The Freshwater Fishes of Europe

Vol 9: Threatened Fishes of Europe

By: Anton Lelek  
Edited by: European Committee for the Conservation of Nature and Natural Resource — Council of Europe  
Published by: AULAG-Verlag GmbH, Luisenplatz 2, Postfach 1366, D-6200 Wiesbaden, West Germany  
ISBN: 3-89104-048-2

Price: Approx. DM236 (write to publishers for exact details)

At 343 pages, the price tag of DM236 (or

thereabouts) for this volume may appear somewhat prohibitive for the average aquarist. However, for your £80 you get the best documented account there undoubtedly is on all those European fish species that are under some form of threat ... and there are quite a few.

From those which are known to be extinct or endangered in the wild, to those which are common now, but may not be so if further deterioration occurs, they are all there — along with details of their worldwide distribution, European distribution, distinguishing characteristics, ecology, existing population, reasons for decline, conservation measures taken and conservation measures proposed. In short, this Volume represents an absolutely indispensable reference work for anyone who is interested in conservation of fish species.

At first sight, some entries may appear a bit odd. For instance, why include the Goldfish (*Carassius auratus*) when it is known to be so widespread? However, it is stated that the habitats required by this species (e.g. vegetated, slow-moving bodies of water) may undergo changes in the foreseeable future, in which case, the existing populations would be influenced adversely. This, in fact, is what has happened in the case of the Crucian Carp (*Carassius carassius*) which is now officially classified as "rare to vulnerable".

**Threatened Fishes of Europe** is both fascinating and depressing at the same time. It is fascinating because it contains so much interesting/important information on so many species. It is depressing because there are so many species "worthy" of inclusion, and because so little seems to have been done in so many cases.

However, the picture is not all black. Some measures have been taken in some instances with, hopefully, more to follow. The setting up of special bodies, such as the Freshwater Fish Specialist Group of the IUCN under Dr Chris Andrews' chairmanship (and to which I am pleased to belong) may well add further support to this vitally important cause of species conservation. As stated in the introduction to the book: "In spite of all the setbacks which we have experienced there is some room for optimism left. The environment and the fish fauna itself have not universally deteriorated. However, if something is not done soon, all attempts to restore them may be too late".

**Threatened Fishes of Europe** should be regarded as essential reading by all concerned aquarists and members of the aquatic trade, as well as all researchers and scientists involved in any aspect of conservation. The high cover price may well put it outside the scope of individual hobbyists, though. If so, I would strongly suggest that pressure be put on local lending and reference libraries so that this important work reaches the large readership it so richly deserves.

John Dawes

## Coral Reefs

By: Les Holliday  
Consultant: Dr Elizabeth Wood  
Published by: Salamander Books Ltd  
(available through Interpet)  
ISBN: 0-86101-463-4  
Price: £16.98

"This book celebrates the stunning variety of life that abounds in the warm waters of the world's coral reefs."

**Coral Reefs** most certainly does this — and how! It is a gorgeous book from cover to cover, packed with superb pictures taken by some of the best photographers around — including well-known *A & P* contributors like Arend van den Nieuwenhuizen, Bill Toney and David Allison — as well as the author, Les Holliday himself.

However, before you run away with the idea that this is primarily a picture book, I must stress that, magnificent though the illustrations are, they form just one part of a much larger whole.

Well written, "balanced" and eminently readable chapters on topics including the nature of corals themselves, the quality and diversity of life on reefs, and reef conservation, add an extra and informative dimension often missing from other books.

By comparison, the section entitled **Creating a Coral Reef Aquarium** is, in my opinion, no more than adequate. It could be argued, of course (with considerable justification) that this is not a practical guide to aquarium care. That being the case, then a

short, but carefully selected, bibliography would have helped to rectify the shortcomings of this section.

In Part 2, Les Holliday really goes to town, drawing on his vast experience of diving virtually everywhere (it seems) that coral reefs are found. The Caribbean, Maldives, Red Sea, Kenya, Great Barrier Reef and Hawaii are all presented in glorious colour and masterful text, with useful details such as "Diving Profiles" which include climatological, diving and conservation data on the various localities thrown in for good

measure.

Each of these sections also includes some advice on the aquarium care of selected organisms which, while not totally overcoming the shortcomings I referred to earlier, certainly do help to provide background information on some of the fish and invertebrates that are already well-known in the hobby.

All in all, **Coral Reefs** is a peach of a book, worth every penny of its £16.98 price... and some more besides.

John Dawes

## Derek



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# Coldwater jottings



Stephen J. Smith

## Goldfish fry in winter

The above heading might suggest to some what we are in for a continuation of the high temperatures which were an outstanding feature of the 1989 season. But, alas, in the far from temperate regions of the British Isles, coldwater fishkeepers are faced with a problem almost as great as that of the high temperatures of the summer: the low temperatures of the winter. None more so than in relation to rearing fry from the late spawnings of last season.

Three major factors in the successful development of young Goldfish are: warmth, light, and plenty of food. Unfortunately, this time of the year provides precious little of any of these.

However, perseverance and continued patience are the order of the day and, with a little luck thrown in, some worthwhile results can be achieved.

### Growth

There is a school of thought which believes that it is preferable to overwinter fry outdoors as this will result in greater growth. From my own experience, I have found that such measures only serve to stunt the growth of the fish, thus slowing down their future development and leading to slower-growing subsequent offspring.

Alternatively, several fishkeepers resort to keeping fry in indoor aquaria over the winter

months — heated to almost tropical temperatures. Such measures will result in some spectacular growth, but there is a hidden danger in returning the fish to the cooler waters of the pond in spring, which will cause stress and subsequent stress-related diseases.

I have found that by far the best option is to take a middle course, so the majority of my fry are brought into unheated indoor aquaria situated in the garage, where they can enjoy the gentle ambient heat from the house — without being fried!

Such a situation provides the advantage that I can keep a constant watchful eye on the condition of the fish, water temperature, feeding and, most importantly, cleanliness of the tank.

Livestock is, in my opinion, essential for the successful development of young fish; with *Daphnia* as the optimum choice. That's fine, you may say, during the summer, but where can I obtain *Daphnia* at this time of the year? The answer to this is to culture it yourself. Of course, this is not something which can be achieved at a moment's notice, but over a short period of time, it is possible to develop your own rich supply of *Daphnia* right in your own back garden!

### Transformation

This was achieved by allowing one of my rearing ponds to lie "fallow" following the removal of its Goldfish inhabitants. Not only was this one less pond to clean out prior to the winter, but within a few days, an initial culture of live *Daphnia* had soon become a major colony which quickly transformed a green-water pond to a clear-water pond coloured red with masses of good-quality, high-

protein, clean livefood.

Even now, that same pond is thick with *Daphnia* and, every few days, a quick swirl with a fine net is all that is needed to collect a plentiful supply of fresh food for the developing fry. This is graded through a plastic mesh sieve; when the fry are small they are fed with only the fine grade *Daphnia*, with the larger grade returned to the pond. As they develop, the reverse is the case.

Collected *Daphnia* is kept in a well-aerated and filtered holding tank, adjacent to the fry aquaria, and a small amount is fed to the fry on a regular basis. Growing fry are forever hungry (a good sign of healthy fish) and I leave a main light on in the "fish-house" 24-hours a day to ensure continuous feeding.

It is surprising how a fresh supply of *Daphnia* administered last thing at night can be completely consumed by first-thing the following morning.



A female *Daphnia*, with future brood inside — the ideal food organism for both young and adult fish alike.

If you've ever thought of keeping your Koi warm over winter but have wondered how much it would cost, make sure you read David Twigg's article: **Koi Pool Heating (Facts & Figures)** in this issue of *A&P*.

## Cleanliness

An important further thought on keeping fry in the aquarium: remember the Golden Rule — Cleanliness is next to Godliness.

Regular partial water changes are essential or, alternatively, I prefer to rotate the use of a number of aquariums using one or more "spare" tanks.

Used water is siphoned away completely from this spare, which is cleaned thoroughly, including filter sponge, before filling with fresh water. The newly-maintained tank is then allowed to stand for at least 36 hours to allow chlorine and similar impurities to dissipate and to enable temperatures to equalise.

Following this procedure the fry from the "least clean" tank are moved to the newly-cleaned tank and the procedure is repeated.

When feeding, remember to use clean livefoods wherever possible. This may be supplemented with proprietary foods specifically designed for fry or young fish. But be wary of so-called "trout-pellets" which are extremely popular among enthusiasts: such pellets lose their vitamin and protein value very quickly after being exposed to air, so avoid using pellets which have been stored for sometime.

In addition, over-feeding can cause the water to foul; while the effect of a lowering of temperatures can cause the food to rot undigested in the gut of the fish (members of the Goldfish family do not have a stomach).

Despite the pitfalls, rearing fry can be an extremely rewarding experience, so, if you are debating what to do with the rest of last season's spawnings, despite the vagaries of the British winter, you may well be looking forward to next winter so that you can do it again.

## Tailpiece

I wish all readers and correspondents, friends and associates throughout the hobby, belated Seasonal Greetings and a Very Happy New Fishkeeping Year.

## PRODUCT ROUND-UP BY DICK MILLS

### PRODUCT PROFILE: *POWERHEADS*

For many years there was a seemingly-unsurmountable gap between the flow rates of air-operated filters and 'power' types: it was just a case of one or the other — the choice being decided by that simple factor, money. Some parity could be arrived at by using large-bore uplift tubes with very much larger airpumps, but that was all.

The real breakthrough came when someone noticed that the impeller on the top of interior submersible filters could be easily detached and used on its own or, more accurately, be used in conjunction with the wide-bore uplift tubes from biological (undergravel) filter systems.

**TAKE NOTE:** Removing the top plate and motor assembly from just any power filter will not provide a ready-to-use powerhead: the powerhead must be one that is designed to work submerged!

The most immediate benefit from fitting a 'powerhead', as these separated impellers are now known, is a much-improved flow rate through the filter bed, but before I look at

some other advantages, I ought to explain how the unit works.

The impeller is mounted on a vertical spindle held between two low-friction bushes: this spindle passes through the centre of a cylindrical permanent magnet and the whole assembly is surrounded by coils which carry the electrical current (but don't worry, these coils are well insulated, usually sealed in resin, away from the aquarium water!). When switched on, the current sets up a magnetic field which, in turn, causes the spindle and impeller to turn.

Generally, the rotational speed is fixed, with flow-rates being altered by an adjustable restrictor, but more sophisticated models may have a 'variable-speed' facility which is adjusted electronically. The unit is connected to the uplift tube by means of a multi-sized adaptor supplied by the manufacturer.

When used in small tanks, it may be advisable to fit a spraybar to disperse the pressure of the outflowing water, thus preventing the aquarium plants taking up a permanent 'lean' due to the water currents. Alternatively, by turning the unit around, the output can be directed into the corner of the

aquarium so that the water is then deflected around the perimeter more gradually.

In addition to variable-flow rates, many powerheads offer the facility to introduce aeration into the returning water flow, but here, a word of caution must be given. Too much air (or running the unit too near the water surface) may cause the motor to run more 'dry' than normal, with the effect of increased wear on the bearing and, maybe, overheating of the motor (remember, the design of the filter makes use of the surrounding water to cool the motor).

Can you use the impeller in 'reverse-flow' systems? The answer is 'yes', providing you choose a type that can be attached via an adaptor directly to the sub-gravel filter plate. Taking the impeller out and reversing the spindle won't reverse the rotation — the magnet is polarised from the centre to outside (believe me, I've tried it!).

Maintenance is no problem, so don't neglect it. Removal of the impeller is easy (SWITCH OFF THE POWER AND UNPLUG THE UNIT FIRST!); the two halves of the motor usually just unclip;

remove any accumulated algae from around the impeller if necessary; the bearings need no greasing.

Powerheads are useful things to have, even if they're not always powering filters: they can be used to empty ponds (the 'lift' available in even quite small units is around 2ft) and the accompanying illustration shows an experimental biological pond filter made from a perforated, gravel-filled ice cream container, a wide tube and a power head — it worked too, until the tube came loose! Now, where was that sealant?



Powerheads are versatile pieces of equipment. In this case, I used it to drive a small experimental pond filter.

## NEW PRODUCTS

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**MONSANTO GARDEN CARE**, Thames Tower, Burellys Way, Leicester LE1 3TP.

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the rectangular's 7 watts) and, depending on style, in 4- or 6-lamp sets; extra lamps can be added up to a maximum total of 12 rectangular or 8 round lamps, although a mixture of lamps (including the Tier, and Shaded Tier lights) can be used on any system, providing the total wattage capacity of the transformer is not exceeded.

Coloured lenses are included in Round Lamp Sets and also as optional extras for Rectangular Sets. Surface bases and mounts, swivel joints and extra cable. For complete automation, the transformer has an auto-timer built in. Details from:

**BESA LIGHTING LTD**, Unit 1, Mill Hill Industrial Estate, Flower Lane, London, NW7 2HU.

### BETTER WATER GARDEN PRODUCTS

The November 1989 edition of *Product Round-up* included an item on part of BWG's range of pond products. Unfortunately, we inadvertently quoted the wrong prices for some of the featured products.

We apologise to any readers who may have been inconvenienced by this and, of course, to Better Water Garden Products for any embarrassment we may have caused them. For full details of the complete BWG range, please contact: **BETTER WATER GARDEN PRODUCTS**, Blagdon Water Garden Centre Ltd, Bath Road, Upper Langford, Avon BS18 7DN. Tel 0934 852973. Fax 0934 852998.

# FILIPINO CRYPTOCORYNE

Dr Josef Bogner of the Botanical Gardens in Munich introduces a very attractive *Cryptocoryne* from the Philippines.

(Photographs by the author)

In June 1983 I collected *Cryptocoryne aponogetifolia* on the south end of the island of Luzon in the Sorsogon province at the foot of Mount Bulusan in the Philippines. I found this species growing in a stream containing basalt rocks, with the plants thriving between the stones or in the black volcanic gravel and sand. The water was up to 1.8 metres deep at the collecting point. The plants were found growing practically always underwater, but some were also collected at the edge of the stream.

During my visit, the water level was very low as it had not rained for a long time and the monsoon was still expected. Presumably, during the rainy season, all the plants grow underwater.

This species is a genuine underwater plant. It must be emphasised that even submerged and emerged leaves are strongly bullate,<sup>1</sup> the latter, though, being shorter. *Cryptocoryne aponogetifolia* was also found by other collectors on Panay and Negros Islands. According to J. Schulze, this plant grows near Legaspi in southern Luzon, too. I have not found it in the river in question, however. Presumably, the water is too heavily polluted these days so the plants may have already disappeared.



*Cryptocoryne aponogetifolia* Merrill in its natural habitat. These plants are growing underwater from cracks in basalt rocks.

## Description of *Cryptocoryne aponogetifolia* Merrill

Rhizome creeping, very strong, up to 1 cm thick, with strong runners up to 30 cm long. Leaves in a rosette. Petiole 8-50 cm long (depending on depth of water) and 2-4 mm in diameter, dark green, with a short (about 1 cm) sheath at the base. Leaf-blade narrowly elliptic, 12-50 cm long and 2-3 cm wide, dark green, and very strongly bullate; middle vein very strong, on each side with 2-3 primary lateral veins.

Peduncle 4-9 cm long; spathe 13-25 cm long, outside reddish; kettle<sup>2</sup> 1-1.5 cm long; tube 7-18 cm long; limb of spathe<sup>3</sup> 5-6 cm long, upright, with a long tail, twisted several times; inside purple, wrinkled on the surface, throat equally purple but smooth; collar lacking.

A dense clump of *A. aponogetifolia* growing near the banks of a stream. A single spathe ("bloom") can be seen in the centre of the photograph.



Male flowers small, numerous, cream-coloured; 6-8 female flowers in a circle at the base of the kettle, ovaries cream-coloured, stigmas reddish and located between the female flowers, with olfactory bodies. Inflorescence (syncarp) ovoid to almost globular, 1-1.5 cm in diameter, dark green, warty, with the old hooked styles and stigmas. Seeds numerous, 6-7 mm long and 1.5-1.8 mm thick. Chromosomes<sup>7</sup>,  $2n = 34$ .

Distribution: Philippines, Panay Island, Capiz province; Luzon Island, Sorsogon province, Mt. Bulusan; Negros Island. The Indigenous name for *C. apomogenifolia* on Luzon is 'Margaha'.



Close-up of the spathe showing its long twisted tail. The strongly bullate ("puckered") nature of the leaves are well illustrated in this photograph.

## DEFINITIONS OF SCIENTIFIC TERMS

- 1. Bullate** — "blister-like" i.e. puckered, like the leaves of a Savoy cabbage.
- 2. Kettle** — "chamber" at the base of a *Cryptocoryne* "bloom" (which in reality is a spathe — see below).
- 3. Spathe** — a large enveloping leaf (resembling a tubular petal in *Cryptocoryne*) protecting the spadix (the inflorescence, or real flowers consisting of small individual blooms located on a succulent "spike").
- 4. Stigma** — part of the female flower which receives the (male) pollen grains.
- 5. Style** — part of the female flower which supports the stigma.
- 6. Inflorescence** — an inflorescence (flowering parts) which has matured into a fruit.
- 7. Chromosomes** — the minute structures which carry all, or most, of the genetic material of an organism. Chromosomes exist in pairs and are found inside the nuclei of living cells.  $2n$  refers to the total number of chromosomes (e.g.)  $2n = 34$  in *C. apomogenifolia*;  $2n = 46$  in humans, etc.

## Aquarium suitability

Living plants of *Cryptocoryne apomogenifolia* have been imported into Europe several times, first in 1960, but exact details of where these plants were found are not available. According to one statement, they are to be found on the south end of Luzon near Sorsogon.

This species is an excellent aquarium plant, growing very well and being very pleasant to look at owing to its strongly bullate leaves. The bullate leaf structure is retained even in cultivated plants. On account of its height, *C. apomogenifolia* is suited only to bigger aquariums.

## Closing remarks

Some authors considered *Cryptocoryne apomogenifolia* Merrill and *Cryptocoryne asteriana* Engl. as being identical. However, I was able to collect *Cryptocoryne asteriana* on Guimaras Island (after a break of eighty years following the original description) and was able to prove that they are different, and separate, species.

For creative suggestions on how *Cryptocorynes* and other plants can be used to optimum effect in aquaria, watch out for **Going Dutch** — a three-part series by Arie de Graaf on the setting up of Dutch aquaria — starting in the February issue *Aquarist & Pondkeeper*.

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## BLEHER'S COMPENDIUM NEWS

Water Features Publications Ltd have been experiencing a few small problems in obtaining Bleher's *Compendium of Freshwater Fish*, the long-awaited treasure of information and photographs that will change the image of aquatic literature.

The good news is that these problems have now been resolved by the author, world-famous explorer, photographer and aquarist Heiko Bleher, and the book is now back in production.

Further good news is that,

owing to a requirement to re-work one or two chapters anyway, the opportunity has been taken to include the very latest information, and also to incorporate material that would have appeared in the first supplementary volume. This means that the book will now be a massive 1,400+ pages long, contain over 10,000 full colour photographs, as well as dozens of full colour maps and charts, in addition to numerous text drawings.

Those people who have already ordered the book will

have the new enlarged version sent to them at no additional charge, and Water Features Publications Ltd have promised to honour all orders placed up until the end of April, 1990, at the current price of £100 for the standard edition. In May, when the book is finally expected to appear, the price will rise to £120.

A beautiful leather-bound edition is also available, six copies of which are destined for lucky *Aquarist & Pondkeeper* competition entrants. There are still a few of these limited edi-

tion volumes unreserved, but demand will almost certainly mean that all 750 will be sold out by the time the book is ready for delivery!

Water Features Publications Ltd can assure all its customers that it offers a no-quibble refund option on orders prior to despatch, and that it adheres to the Clearing Banks' rule in not encashing credit card vouchers until goods are despatched.

Water Feature Publications Ltd can be contacted on Red-bourn (0582 85) 3555.

### T.F.H. MOVE

As from 2 January 1990, T.F.H. Publications will be moving to larger premises at the following address:

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**A & P SUPPLEMENT NEWS**  
THE FIRST OF OUR 1990 SUPPLEMENTS —  
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WILL BE PUBLISHED NEXT MONTH.

### Underworld's load of marbles

A simple competition aimed at creating an imaginative name for a new shop, drew a constant stream of contestants to the Underworld stand at the British Aquarist Festival held recently in Manchester.

All that the entrants had to do was guess the number of marbles in a 24in tank, and then think up an original name for an aquatic shop.

Three contestants came up

with the figure 800 — just three marbles above the actual number of 797. Top prize went to Karl Holland from Naylor's-field in Liverpool for his tie-breaker shop name: L'eau Life!

Quite an appropriate name don't you think? L'eau Life... Underworld... get it?

Karl won £200 worth of Underworld Products of his own choice. Second prize (£50 of Hobby Products) went to Zoe Murphy of Hale in Cheshire, while the third prize (a Visijet 100 Powerhead worth £20.99) was won by Keith Smith from St Annes in Lancashire.

### Supreme Festival of Fishkeeping 10-11 November 1990

"The biggest educational and social event ever to be held for the aquatic hobby will make its 1990 debut at Pontins Holiday Camp, Sand Bay, Weston-super-Mare."

Sponsored by Interpet and organised jointly with the Federation of British Aquatic Societies (FBAS), the Supreme Festival will place its emphasis on the educational and question-and-answer format and will not feature retail selling.

The main 'hobby highlight' will be the final round of the FBAS SUPREME CHAMPIONSHIP. As all participating fishes will have qualified by previously taking 1st-3rd places in FBAS Championship Trophy Classes held at Open Shows

during 1990, or have gained a 'Best in Show' during the same period, the eventual winner will surely be a Supreme Champion.

The many specialist societies will be in attendance to present their own particular expertise and display their own favourite species; audio-visual presentations by eminent aquarists will be arranged throughout the weekend. Regular demonstrations will show how to set up an aquarium and, of course, with the large Trade presence, there will be plenty of opportunities to ask the experts to solve all those nagging aquatic problems.

The organisers hope to make it an all-family occasion and the full facilities of the Camp will be open to all although, as Sand

Bay is primarily an Adult Camp, supervised entertainment for 3-10 year olds is not available and for this reason accommodation for this age group cannot, regretfully, be offered. It is also hoped to provide daytime excursions to local places of interest for the 'fish widows/widowers' as a respite well away from the aquatic events at the Camp.

With the help of Pontins Holidays, the Supreme Festival 'Weekender', costing £45 per person, will provide accommodation from Friday evening to Sunday afternoon (including full English Breakfast on Saturday and Sunday), together with dinner/cabaret on Saturday evening. Limited accommodation is offered for younger hobbyists aged between 10 and 18 at £25 per person based on a parent-accommodation sharing

basis. Infants under 3 will be accommodated free of charge. Day tickets to the Festival will be available at £1.50 per adult, 50p for children and Senior Citizens.

Further details and Trade advance bookings can be obtained from: Mike Clarke on 0306 881033, or by post from: Mike Clarke, Interpet Ltd, Vincent Lane, Dorking, Surrey, RH4 3YX.

Accommodation bookings enquiries to: Colin Richards, 3 Uplands Avenue, Chesham, Bucks.

Specialist Societies bookings enquiries to: Andrew Waller, 32 Hamilton Road, Heath Park, Romford, Essex.

Supreme Championship entries and enquiries to: Alan Henderson, FBAS Trophy Officer, 5 The Nook, Corby Village, Northants.



# Koi Talk



by John Covelier

## Noble resolutions

A popular way to while away the time between you waving farewell to Santa's sleigh and the arrival of the first of the many January bills is to compose all those New Year resolutions which we all make but seldom stick to!

Koi-keepers do have a certain advantage over the rest of the peasantry in that our hobby (obsession?) presents us with an opportunity to make many more noble promises to ourselves, thus increasing the amount of pleasure available as we happily proceed to forget about them within a very short time.

You know the kind of things I mean:

Giving up the 'ciggies' and the booze; spending the money saved upon more Koi; telling the truth about what such and such cost you; not cheating anymore when hosepipes are banned; keeping the pool clean whatever the weather; speaking nicely to your neighbour's cat when it casts an evil eye on your fish; you know you're overs-socked, but just one more won't hurt, and so on...

Wouldn't life be miserable if we all became such paragons of virtue? Me, I'd sooner stay as I am, an amiable (I hope) slob!

## Slack water diving

Got chatting to a lady Koi-keeper the other day at one of these centres that seem to be blossoming everywhere.

Would you believe a fan? I only mention that 'cos they're a bit thin on the ground!

Anyway, the lady had been doing some serious reading and was worried because her pool was of a very irregular design and every book she read had mentioned slack areas of water and the dangers thereof. I did try to put her mind at rest by telling her that, personally, I think this problem can be overstated as the mere action of fish movement within a pool will tend to ensure good mixing.

However, she would not be convinced and wanted suggestions as to how she could check the actual water distribution within her pool.

To an old hand like myself, the method is completely obvious, but for anyone interested in learning a little more about water movement in a pool, here's what you do! Prepare a fairly weak solution of Malachite Green in an ordinary watering can, using a concentration of one gram per 1200 gallons of pool capacity (this concentration is well below normal antiseptic strength and will do no harm at all).

Having mixed it well, all you do is pour the mixture into your pool, either at the feet of your waterfall (if there is one), or just in front of your venturi, again, if you have one. Provided your's

isn't a lake, you will be able to follow the cloud of colour around your pool, and any area of slack water will be immediately evident.

Needless to say, this will only work in pools with constant movement taking place thanks to filtration, and with reasonably clear water. Be prepared for some surprises as water can behave in peculiar ways; for example, you will be able to see how much faster the water will move the further away from the pool wall it is. Do, however, remember that Malachite is a wonderful dye for stonework, so don't spill it. You have been warned!

## "Aspirin" removal

As this is being written (late November), my Koi have finally called it quits and retired to their winter quarters, only coming out to cruise around a bit after dark.

We have had our first 'white over' frost of the winter and the initial heavy fall of leaves. We have a large Cotoneaster and an even larger Weeping Willow quite close to the pool, so this time of year brings the problems of leaf fall to the fore.

The willow, of course, is the main problem, as theory has it that willow leaves exude aspirin

into the water, although I can't say I've noticed any ill effects upon my fish over a twenty year period. Mind you, I do religiously remove all leaves at least twice daily, practising what I preach as regards good house-keeping and, let's face it, my Koi don't seem to suffer from headaches!

Whatever trouble the chore of leaf removal can cause, it is more than compensated for by the beauty offered by the trees all year round. However much we love our pools and fish, a garden is not a garden without a few trees. Our major problem comes from our neighbour's fence of twenty-foot conifers whose falling tips are fished out by the bucketful but, so what, it's a marvellous windbreak.

## Illuminated Koi

I recently treated myself to one of those waterproof torches, and guess what was the first use it was put to?

Until you've lashed one of these to a pole and held it horizontally under water you haven't seen your Koi properly. It really is a different view and what's more, the Koi swam close to investigate this odd thing which had invaded their home, although the novelty wore off fairly quickly.

As has often been said, you don't have to be mad to keep Koi, but at times it does help!

## Baffling failure

You may remember that, earlier in the previous season, I mentioned the unsuccessful first spawning of my Koi. The second spawning was no better, as none of the eggs were fertile.

I'm completely baffled as to what went wrong but can only, again, put it down to the fact that the very high temperatures which dogged us in '89 were to blame. Either that, or somewhere someone has opened up a vasectomy clinic for Koi!

Very disappointing in view of the fabulous results of our previous year's spawning marathon, the results of which are some really nice Shiro Bekko and mixed 'blues' of varying hues which have grown at a tremendous rate, the largest already being eight inches in length. We look forward to '90 in the hope of better luck.

## FRED THE PIRANHA.



© 87 PETER Mc GROUGH.

# BALANCING THE SCALES IN LAKE VICTORIA

Keith Harrison, Oliver Crimmen, Robert Travers, James Maikweki and David Mutoro investigate the complex and disturbing effects of introducing the Nile Perch into Lake Victoria.

(Photographs: courtesy of the British Museum, Natural History)

In recent years much attention has been given in the popular scientific press to the proliferation of the Nile Perch, *Lates niloticus*, in Lake Victoria (e.g. Payne, 1987). The introduction in the late 1950s of this predatory fish has been considered a disaster for the lake's endemic species. In particular, the numerous small brightly coloured fishes

that once dominated the fauna are reported as having been decimated or in places even eliminated by the newcomer. This is a subject of deep concern to biologists for whom the rapid evolutionary changes among these fishes have been the focus of intensive and rewarding study.

The introduction has also had far-reaching effects, not only the overall ecology

of the lake, but also on the lifestyle and livelihood of the local people, mainly fishermen. The Nile Perch has thus become a controversial and emotive subject.

Lake Victoria, the second largest lake in the world, lies in the Great Rift Valley of East Africa on the borders of Kenya, Tanzania and Uganda. During the 750,000 years of the lake's history the fish fauna has come to be dominated by one family — the Cichlidae. Although the lake contains almost 40 species of fish belonging to other families, it is the cichlids which underwent an evolutionary explosion, producing hundreds of endemic species.

## Significance of Lake Victoria cichlids

Cichlids can conveniently be divided into the larger "tilapiine" species (popular food fish of the genus *Oreochromis* and its relatives) and the smaller, brightly coloured "haplochromines".

The majority of cichlid species in Lake Victoria are haplochromines and this group has been studied for many years as a model of speciation and evolution (e.g. Greenwood, 1974). Indeed, it has been said that for studies in this field "the cichlid fishes of Lake Victoria are considerably more important than the finches of the Galápagos Islands" (IARCEC, 1988).

Throughout the first half of the twentieth century tilapiines constituted the dominant fishery of Lake Victoria; the much smaller haplochromines, although more abundant, were not exploited commercially on a large scale and were viewed by colonial fisheries officers as "trash fish".

## Nile Perch debate

With increased fishing pressures and improvements in the efficiency of fishing gear the catches of tilapiines, initially high, fell steadily for 50 years. In the 1950s the idea of introducing Nile Perch to Lake Victoria began to be taken seriously by certain fisheries organisations.

The Nile Perch occurs naturally in most river systems of northern and western Africa and in Lakes Albert and Turkana, but is not native to Lake Victoria or its tributaries. The argument for introduction, first suggested in 1929, was that the Nile Perch would prey mainly on the abundant haplochromines,



A large, but by no means fully grown, Nile Perch being held up by a researcher from Leiden University.

converting these underexploited fish to a form of protein more readily accessible to local fishermen (a large Nile Perch may weigh 150Kg, more than 1,000 times heavier than a haplochromine).

This proposal caused considerable debate, with different colonial organisations taking opposing views. It was argued that Nile Perch would damage the important tilapia fishery and Fryer (1960) indicated it was poor economics to culture predators as it took many kilograms of prey fish to produce one kilogram of predator, and predators were always less numerous than their prey.

### First introduction

In 1960, while the debate was still in progress, fishermen began catching Nile Perch in the northernmost Ugandan waters of the lake. How these fish came to enter Lake Victoria is still not clear, but once it was evident that a breeding population had established itself, fisheries officers added more Nile Perch brought from Lakes Albert and Turkana. Since then Nile Perch have steadily colonised the lake, spreading clockwise around the Kenyan and Tanzanian shoreline, reaching the southwestern waters in the early 1980s.

The rapid increase in the numbers of Nile Perch has been accompanied by reports of drastic reductions in the numbers of haplochromines, especially in offshore waters. It is this decline in the number of individuals, and probably the number of species, that has been hailed as an ecological disaster, with the headlines: "Lake life destroyed by cannibal fish in food blunder" (*Daily Telegraph*, 20 December 1985) and "Lake Victoria cichlids face extinction" (Dawes, 1986).

Determining precisely the effect of the Nile Perch on the other fish of the lake is extremely difficult, partly because many of the endemic species have never been accurately described and virtually nothing is known of their biology. Some of the hundreds of haplochromine species thought to be unique to Lake Victoria may already have disappeared without ever being known to science.

In 1986 a team under the aegis of the British Museum (Natural History), with assistance from Leiden University's Haplochromis Ecology Survey Team (HEST), the Tanzanian Fisheries Research Institute at Mwanza, and local support staff, sampled a wide area within the Tanzanian waters of the lake.

### Unexpected results

Their collection of numerous haplochromine species from a variety of habitats appeared to contradict reports of widespread large-scale extinctions, at least for inshore waters. In 1988 a joint study team from the National Museums of Kenya, the Kenya Marine and Fisheries Research Institute, and the British Museum (Natural History) surveyed the Kenyan waters of the lake. Working with the help of scientists from the Fisheries Department, the Lake Basin Development Authority, and local fishermen, they sampled the nearshore and deep



Four freshly-caught and prepared haplochromine cichlids (some probably never seen before) — a tiny sample of the large range of species still existing in Lake Victoria, but for how long?

# OBITUARY

## RODNEY JONKLAAS

When I learnt of the recent passing of Rodney Jonklaas, my immediate reaction of deep shock was replaced with the sudden thought that, if it were as all possible, Rodney would, no doubt, be inquisitively interested about the whole business — such had been his enthusiastic curiosity about all things in life.

I met Rodney six years ago during an all-too-brief holiday to his home country, Sri Lanka. In response to an advance letter (and a telephone call once on the island), he made me most welcome to his home in the village of Ja-Ela, a few miles from the capital Colombo. Deep in the heart of the countryside he pursued his two loves — the culturing of exotic foliage plants for export and his fishes.

This pure-bred Dutch Burgher, whose ancestors came from Holland over 200 years ago, was born and raised in the old capi-

tal hill-town of Kandy. The income from spear-fishing was put to good use in funding studies in botany, geography and zoology at the then Ceylon University. He took up his marine underwater activities once more to good effect photographing and collecting the reef fish which abound in the surrounding sea. Many articles based in these experiences have appeared in 'Skin Diver' magazine and in his 1975 work 'Collecting Marine Tropicals'.

A marvellous host, Rodney was always keen to exchange aquatic information with anyone: *A & P's* Editor was more than pleasantly surprised at being greeted with a completely-unsolicited 'Hallo John', during his recent Singapore trip — of course, it was Rodney!

At home, his constant companions were his four dogs, Liam, Lillian, Linnberger and another 'L' whose name, I'm sorry to say, escapes me. Together with his 'boys', he ran a successful fish-breeding pro-

gramme, usually in terra-cotta bowls containing nothing but water, Hornwort and a pair of very willing fishes!

Rodney was also consultant and conservationist for NARA (Sri Lanka's National Aquatic Resources Agency), and, despite his own profound knowledge of all things aquatic, he still felt it would benefit fellow-members of NARA to listen to my modest accounts of what happens to all the fish they so diligently collect and export, once they reach our shores.

His zest for spreading knowledge of Sri Lankan culture was enjoyed by many thousands of non-fishkeepers too, as another outlet for his writing talents was 'Serendib' the in-flight magazine of, yes you've guessed it, Air Lanka.

It is fitting that while aquarists everywhere mourn his loss, his name will live on attached to two species of his much-loved native fishes — *Lepidocephalus jonklaasi* and *Sicyopterus (Gobius) jonklaasi*.

Dick Mills

## COMPETITION WINNERS

### BLEHER'S COMPENDIUM COMPETITION

Thank you for your tremendously encouraging response to our October '89 Bleher's Compendium competition sponsored by Water Features Publications Ltd.

Out of the many hundreds of correct entries we received, the six lucky ones came from:

Ian Harris, Montrose. Mrs Phylliss Zirrow, Stoulton.  
Mrs Lynn Barker, Derby. Maurice White, Basildon.  
Malcolm Davies, Swansea. Mrs Elizabeth Franklin, Pershore.

Each winner has already been contacted individually and each will receive a personally endorsed, autographed and numbered copy of the leather-bound Limited Edition of *Bleher's Compendium of Freshwater Fish* direct from Water Features Publications Ltd.

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# Letters

## Double start

Firstly, let me apologise for what may seem like a long-winded letter, but I feel my experiences in the few short months I have been involved in the hobby may act as words of precaution to any beginner who reads your wonderfully informative magazine.

My interest stemmed from a friend who had a community tank which was 24in x 12in x 12in. Then, in August of last year, with some spare cash available, I purchased a 36in x 18in x 12in tank, and, on the advice of the dealer, a Rena 225. The dealer told me to leave the tank for a week, "and you should be ready to start stocking up after that".

I was nearly heart-broken, when within a fortnight, I had lost 11 fish and was clueless as to why. It was then I found a work-mate who also kept tropical fish.

"No underground filter? — Oh! My gawd!" — with these words (as well as words of advice and encouragement), my enthusiasm was rekindled.

One of the best tips he gave me was to check the dealer's tanks around 11 am when thinking of purchasing. Any dead fish by that time and you can forget it.

I then purchased an Aqua Clear 301 powerhead and an Algrade undergravel filter from Al Aquatics here in Biggleswade. The advice and help I received from Ian, the proprietor, was a Godsend. Since then, only two fish have been lost. I have discovered water treatments and have at last succeeded in my dream of keeping a healthy community tank.

I would like to take this opportunity to thank Colin (my work-mate) and Ian of Al Aquatics for all their assistance.

**I. M. Cook,**  
Biggleswade,  
Bedfordshire.

## Praise for Water Zoo

I would like to mention one of your advertisers, the Water Zoo at Peterborough. While their premises may not be quite as large as their name appears to suggest, no praise given them could be high enough. I visited then recently and

found that every aquarium was immaculately kept and every fish was disease-free. They also had a good range of accessories and books, an 800-gallon tank and many other items... I could go on and on.

Being only interested in cold-water fish, you will appreciate that it is not always easy to find that something a little bit different but, at Water Zoo, I purchased a Black Lionhead. I also resisted buying the last Ranchu they had and only wish I had more space to accommodate some of their excellent Koi and Orandas. I did, however, buy a small Chocolate Oranda. There was no overcrowding in any of the tanks.

The staff were extremely helpful and, to my dismay, pointed out that I was unfortunate, as they were expecting a delivery, including Ranchu, within a couple of days. Needless to say, I shall be going back!

**D M Sanders**  
Milton Keynes  
Bucks

## "Furnished" YAF plans



I read with great interest Peter Cairn's letter in the November issue of *A & P* (he was responding to your article Singapore packs them in — why can't we?).

Those of us who are concerned with the success of the 1990 Yorkshire Aquarist Festival, to be held at the Doncaster Racecourse over the weekend of 31 March and 1 April, have also spent endless hours discussing what additions or deletions we should apply to the Festival to

try and show the ordinary person in the street, who may at some time have considered just the one furnished aquarium in the home but really does not know where to start, just what can be done.

An exciting new feature to be included in the 1990 Festival is a free-standing furnished aquarium competition. This will be open to absolutely anyone who cares to enter, and it will not be judged to professional standards, merely by the staff at the Racecourse who will point tanks on the basis of what they like the best. We do not intend to give them any kind of tuition as to what, or what not, to look for, just simply to judge the furnished aquaria to the standard of what they would like to have in their own homes. We are hoping for some surprising results and the 1st prize will be a minimum cash prize of £300, plus four substantial cash prizes for the runners-up, there will also be a magnificent trophy (to be held for a year), donated by the Doncaster Exhibition Centre.

There will, of course, be the usual furnished aquaria housed within the tableaux, but we do strongly stress that these are an entirely separate entity to the new free-standing furnished aquarium competition, and subject to different rules and regulations.

The rules for the free-standing furnished aquarium competition have been kept to a minimum to attract the general public to exhibit. All that we ask is that they provide their own tank, stand and/or cabinet, and that the finished product must contain fish and be capable of supporting the life and well-being of those fish. We will supply 1 x 13 amp socket and all electricity free; the competition is also free.

There you have it — we know it has been done before, but it does give everyone the opportunity to enter, without being a member of a society or an affiliated society. We hope that the method of judging and the substantial cash prizes will encourage exhibitors.

Entry forms and further details can be obtained from me on request.

**Marie L. Harrop,**  
Secretary,  
Yorkshire Aquarist Festival,  
Croft View,  
Oldfield, Honley,  
Huddersfield, HD7 2RL.

## Dreamy suggestion

I would like to congratulate you on helping readers like me to remain fascinated by our hobby. I would also like to thank you all for all the enlightening information you give us to keep our fishes (and herptiles) in the best possible condition. I'm sure I express the sentiments of all other *A & P* readers when I say that your magazine is eagerly devoured by us each month.

A suggestion I'd like to make stems from the fact that we fishkeepers are, basically, dreamers. We have good imaginations; we dream of having that fifty-tank fish house, that five-hundred-gallon marine set-up, and that forty foot by ten foot garden pond.

I'm also sure that something we all imagine, from time to time, is being in a position similar to that of Dr. Chris Andrews, Assistant Curator at London Zoo Aquarium, so please could you continue giving us more articles focussing on those privileged aquarists who possess such set-ups? It would be interesting to have a regular article, perhaps every month, by Dr. Andrews, giving us an update on all the goings-on in the Zoo in general, and the Aquarium in particular, similar to the interesting article he wrote in the November issue.

So please help us to become, in our minds, the proud owners of these large fish houses, marine tanks and ponds, and help us all to become curators of Aquariums in Zoos, etc... after all, as the saying goes, we can all dream.

**Paul Hardy**  
Sheffield

## Editor's Note

Thanks a lot for your "dreamy" letter, Paul. We've already contacted Dr. Chris Andrews and hope to keep bringing you regular updates on the Zoo and Aquarium, as and when they become available.

**John Dawes**

# Naturalist's notebook

By Eric Hardy

## Herpetological mixed bag

Autotomy, the ability of many lizards to shed their tails as an escape mechanism, is well known. In Israel, work by A. Bouskila at Jerusalem University has suggested that two desert geckos which seldom practice this, *Stenodactylus doriae* and *S. perii*, probably evolved this retention of the tail because they use it to block their burrows.

A new sub-species of the Blunt-nosed Viper, of Europe, Asia and Africa, *Vipera lebanica transmediterranea*, has been described from North Africa by two University of Göttingen zoologists, Nilson and Andren.

A new species of false Arrow-frog, *Eleutherodactylus inckohni*, has been described from Minas Gerais in south-eastern Brazil by Caramaschi and Kistemanacher of Rio de Janeiro Museum. The Antillean False-arrow, *E. johnsoni* is already a pet in the USA.

Two new tree-frogs from the Amazon basin of southern Peru are *Hyla alstonorum* and *H. koachini*. Another new tree-frog from Honduras, found by Miami-Dade College biologists, is *Psychoblyla meraxi*.

The Australian Olive Python, *Liasis olivaceus* has been successfully bred in captivity by Peter Moran of Mornington, Victoria. Naturally hybridising populations of Natterjacks and Green Toads have been found on the Swedish island of Utklippan. Several island populations of Natterjacks exist off the Swedish west coast.

## Alpine introduction

Before and after the war, a friend and I unsuccessfully tried to establish the Alpine Newt in Cheshire. Its first successful colonisation in this country was at Bream Brook at Newdigate in Surrey. Then it became established in Berkshire, Sussex and Shropshire, even though Chinery's otherwise excellent 1982 *Natural History of Britain & Europe* states "not in Britain".

In Shropshire David Bell tells me he not only established Alpine Newts in three cottages

garden ponds at Norton in Hales, in 1974, where they survive with Smooth Newts, but also more recently near his home at Market Drayton. Specimens from the Norton introduction had moved to ponds 15 metres away.

They've certainly not brought the ecological consequences of introducing Barbel into the lower Ribble and Zander to West Midland canals, discussed at September's West Midlands and NW England Freshwater Biology Group's meeting at Chester. Deliberate introduction without licence would now be illegal, but anglers are still introducing fish as are aquarists disposing of surplus material.

## Miscellanea

Although Salmonella species are normal in the intestines of lizards, London Zoo vets found abscess-forming strains developed during acclimatisation in Desert Lizards introduced to last year's new exhibit, with high mortality rates.

Breeding endangered Lake Victoria cichlids is part of the Zoo's conservation programme. South American Poison Arrow frogs, Japanese Giant Salamanders and several rare snakes and lizards also depend for their future on conservation breeding in captivity. However, conservation laws forbid the sale of some surplus rarities bred at Chester Zoo.

If you thought £100 pricey for the English edition of Bleher's lavish *Compendium of Freshwater Fish*, how about £700 for Aula-Verlag's new 9 vols English monograph on the *Freshwater Fishes of Europe* at £77.10 per volume? The price of books continues to climb but at the other end of the scale, Pat Wisniewski's *Newts of the British Isles* in the Shire Natural History series of up-to-date, informative paper-backs at £1.95 is a very economic buy.

While the little Palmate Newt of the Pennines and Welsh llynau is not nearly so montane in its distribution as books used to state, providing its haunts are acid, the Crested Newt is not nearly so scarce as has been proclaimed in some conservation publicity.

## Algal menace

1989's long, sunny summer brought the great algae problem, first on Rutland Water in the Midlands, then Rudyard lake on the Cheshire-Staffs border, from which Rudyard Kipling the poet received his name, and finally, town parks like Birkenhead Park lake where an elderly woman was nearly drowned trying to walk over what she thought to be a lawn.

In shallow water, algae reduce the oxygen and, dying, give off poisonous toxins, like algal blooms on the sea, causing death of fishes and even dogs which came to drink. Algicides containing chlorine or copper sulphate will kill fish, varying with species, temperature and hardness of the water. 0.1 ppm of the former is markedly toxic to Rainbow Trout.

The alga *Synura* causes the well-known cucumber taste of drinking water. In canals on the Continent great growth of *Aphanizomenon gracile* produced toxins, a "habit" which, presumably, helps it to overcome rival species. Its outbursts and rapid decline in Windermere was thought due to using up the nutrient salts.

*Pymonidium parvum* kills carp in fish-ponds when abundant. Maybe the dogs at Rutland Water ate Cyanophyceae, which are poisonous. Fish died during the hot summer in shal-

low Liverpool Park lakes with insufficient aerating plants after overstocking with fish for angling.

Decomposition of mass growths of algae produces a fall in oxygen that is fatal to fish. The bottom of big lakes in summer, sealed off by the upper warm layer, experience this phenomenon.

## Dragonfly summer

The hot summer brought many dragonflies in range. Over 200 Darters were counted one August day at Cabin Hill pool on Formby dunes, Merseyside and only the second ever Southern Hawker was found at Leighton Moss, Silverdale.

After its appearance the other year in south Lancashire, the spectacular Emperor was found in Cheshire in August in ponds at Matchpoint Tennis Centre, between Cheadle Hulme and Handforth.

New Cheshire haunts of the Hairy Dragonfly, *Brachytron pratense* were the Weaver at Vale Royal and Billinge Green Flashes, Northwich, and Four-spotted Libellulas were everywhere by June. This may have accounted for the larger than usual number of late summer hobby falcons, which prey on them.

Last year's long, hot summer was great for dragonflies.



# Your questions answered

Having problems? Send your queries to our panel of experts who will be pleased to be of service. Every query receives a personal answer and, in addition, we will publish a selection of the most interesting questions and responses each month.

Please indicate clearly on the top left hand corner of your envelope the name of the experts to whom your query should be directed. All letters must be accompanied by a S.A.E. and addressed to:

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

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

## Exclusive Sunfishes

Is there a book that deals exclusively with Sunfishes? I am interested in these fish but can find very little information on them.

The Sunfishes (family Centrarchidae) do get a mention in several textbooks including Dick Mills' *Coldwater Fishes* (published by Salamander) though I have been unable to find one which deals exclusively with this group.

There are about 32 species, all of them occurring in freshwaters, and most of them in the eastern part of the U.S., ranging into Canada or Mexico.

The Blue Spot Sunfish (*Enneacanthus gloriosus*) is one of the more delicate ones, though inclined to become a bully when full-grown.

*Lepomis gibbosus*, the Pumpkinseed, is one of the more popular Sunfishes, probably because it is more easily available to the British aquarist.

*Lepomis humilis*, or the Orange-spotted Sunfish, is a finely coloured fish; also beautifully coloured are *Lepomis megalotis* and *Lepomis punctatus*. *Enneacanthus* (*Meso-*

*gonomus*) *chaetodon*, the Black-banded Sunfish, is one of the smaller, more peaceful species.

These fish are carnivorous. Offer insects, *Daphnia* and mosquito larvae; other livefoods such as snails and worms, white worms and earthworms are also eagerly accepted.

Your fish should be given plenty of living space and the tank should be well planted up to give adequate cover. As they mature and grow you may find that Sunfishes will not necessarily get on too well together, for some are inclined to be more bossy than others. The more aggressive ones might therefore be more suited to single species set-ups.

Besides, many of them can grow to quite a good size. For instance, the Pumpkinseed can reach a length of 10in (25cm) so you will need to provide more room if you intend to keep quite a few of these fish.

They appear to be happiest at temperatures between 60-75°F (15.5-24°C). Therefore, an unheated aquarium at room temperature will be fine.

## KOI

### Improper pick-up

I have installed a sand pressure filter in my Koi pool. I have angled the outflow from the deep end of the pool across to one of the shallow corners. This creates two areas of slack water in one of which I have installed the pick-up for the sand filter — at a depth of 6in (15cm). Is this OK?

When you refer to the "pick-

up" I assume you mean the take-off point for the sand filter.

Personally, I would like to see this set in the deep end of your pool away from the return (outflow). I would position it 12in (30cm) or so above the bottom of the pool rather than near the surface, as you currently have it.

## COLDWATER

### Cold Comfort



Goldfish of any type (this is a Bristol Shubunkin) will tolerate the sorts of temperatures normally experienced in unheated rooms during the winter months.

I have a two-foot tank by the window in my bedroom. It contains Shubunkins, Redcaps, Common Goldfish and Moors. My room gets fairly cold at night — so I wondered if this would affect the fish.

There is no need to concern yourself that the temperature in your aquarium will be too cold for your goldfish. Being situated in your bedroom, even without central heating, the tank water will probably be maintained somewhere between 50 or 60°F (10-15.5°C) during the winter months which is perfectly comfortable for your fish.



*Elassoma evergladesi*, the appropriately named Pigmy Sunfish.

As a matter of fact, goldfish have been known to survive after periods under ice, even though the depth of water unfrozen was very shallow. Problems occur due to over-long cold spells when fish have to endure temperatures of below 40°F (c 4.5°C) for months on end. At these temperatures the fish are not feeding and, therefore, gradually becoming weaker, so that their resistance to infections eventually becomes practically nil.

Another point to remember is that rapidly fluctuating temperatures — a problem easily affecting small volumes of water, particularly during the summer months — badly affect fish. During the day a tank positioned in a sunny place, say on a window sill, might have water which could reach a temperature of 80°F (27°C) or even higher. Night temperatures could see the water fall below 50°F (10°C). In a small aquarium this drop could happen quickly and the fish would suffer as they would be under a great deal of stress.

## HERPETOLOGY

### Newt spawn puzzle

*I have a breeding colony of Smooth Newts (Triturus vulgaris) in my garden pond. I sometimes see the tiny gilled larvae swimming about in the summer, but I never see large clumps of newt spawn. Can you explain this please?*

British newts, like our frogs and toads, are amphibious and reproduce in water by laying eggs covered in an envelope of protective jelly. However, unlike female frogs and toads (which lay clumps of spawn and long strings of spawn respectively), female newts lay eggs individually.

These eggs tend to be deposited on or under the leaves of water plants. Fewer eggs are

laid by this time consuming individual placement but, because they have been carefully concealed from predators, e.g. sticklebacks, a high percentage hatch. Thus, fewer eggs have to be laid to ensure continuation of the species.

### White Advice

*I am considering buying some White's Tree Frogs and would therefore welcome some advice on this species.*

Adult White's Tree Frogs (*Litoria caerulea*) — see our superb cover picture — are relatively large, averaging from 7-10cm (2.8-4in) body length.

They are not very active amphibians but like to climb up plants, resting on branches or in the axils of their leaves.

Thus, a fairly tall vivarium is recommended. Plants should be rooted in soil held in terracotta flower pots. Suitable plants include vascular ferns, ivy (supported on a framework of canes) and long-leaved monocotyledonous plants such as irises and lilies.

Pieces of bark on the floor not only look pleasing, but also provide additional hiding places. Bark also helps to conceal one of the best base coverings for vivaria used for housing amphibians — foam rubber. This has two advantages:

- it is easy to clean regularly, and
- it holds water, helping to maintain humidity. Unfortunately, it does not look very attractive.

The vivarium should contain a "pond". A thermostatically-controlled submersible aquarium heater (75 watts or lower) can be used to maintain an environmental temperature of 82°F (28°C).

The vivarium must be well ventilated to reduce the amount of condensation forming on the glass which makes the frogs difficult to view. Humid conditions also promote the growth of fungi.

White's Tree Frogs feed on a wide variety of invertebrates, e.g. mealworms, crickets, spiders, flies and moths. The vivarium must, therefore, have an insect escape-proof lid.

The vivarium can be illuminated by day using a "TRUE-LITE" fluorescent tube.

## MARINE

### Compatible selection

*I intend to set up a 42 x 18 x 18in marine aquarium tank with a sub-gravel filter and external canister filter. The fish I intend to keep are a small Snowflake Moray Eel and Dwarf Lionfish and either a Clown Triggerfish or one of the larger Angelfish, possibly a Queen or French Angelfish.*

*Please could you tell me if these fish are compatible? Is it advisable for a beginner to marine fishkeeping, to keep these fish? What sort of food will the fish be best suited to? All the fishes which you mention are compatible together — provided you buy only small to medium-sized specimens. However, I would caution you against buying a Dwarf Lionfish. These fishes rarely learn to eat gamma-ray irradiated lancefish and have to be fed with small live Mollies (or something similar) throughout their lives. You would do much better to buy a young specimen of the *Pterois volitans* Lionfish (= Dragonfish = Turkey Codfish) which soon learn to eat dead food such as the lancefish chunks mentioned above.*

A raw beginner should be able to keep the species you are interested in since they fall into my classification of "indestructible showfish", together with

groupers. However, it is vitally important that: (a) you buy NO FISHES WHATSOEVER until you have matured the filterbeds with a maturing agent such as Sea Mature; (b) that you learn as quickly as possible to feed extremely *meanly* and that you master the golden rule of feeding: "NEVER EVEN ONE UNEATEN MORSEL OF FOOD MUST BE ALLOWED TO FALL TO THE BOTTOM OF THE TANK UNEATEN".

You must remember that very few coral-fishes will eat food off the coral-sand floor of the tank.

All the fishes which you have mentioned (except the omnivorous Angelfishes are flesh-eating predators. Ideal foods, which must all be gamma-ray irradiated to prevent disease, are lancefish, cockle, whole-shrimp, *Mysis*, etc.

The Clown Trigger — a tough, "compatible" but expensive species.



### Snowflake Moray

*Would you please supply me with some details on the Snowflake Moray Eel?*

The Snowflake Moray Eel (*Echidna nebulosa*) is an Indo-Pacific fish which can grow to a little under 2ft (60cm) in length.

Like all morays, this species is a carnivorous predator and, as such, should only be fed once, or at the most, twice each week on a piece of food about the size of a garden pea. These predators are very lazy fishes which expend hardly any energy at all and thus go long periods between meals.

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## TROPICAL

### Challenging Elephant Noses

I have recently acquired a pair of Elephant Nose Fish (*Gnathonemus petersi*). I am feeding them on flake, freeze-dried Tubifex, dried Daphnia and, once a week, on live Daphnia. Is this OK? I would appreciate some information on these fish since I would like to attempt to breed them.

*Gnathonemus petersi* is a delicate fish not really suitable for the community aquarium. In the wild it lives in African muddy waters, so its nose is used to "see" by grubbing around in the mud seeking worm-like food. In brightly-lit aquaria, it will be stressed and may hide all day, venturing forth only when the lights are out.

Gravel is not a suitable medium for its sensitive nose either, although a well established tank may have a mulm layer for the fish to browse through.

Diet is OK but make sure that the *Daphnia* are cultured; wild *Daphnia* can contain gut parasites, waiting to infest the fish. Perhaps it would be better to use non-aquatic livefoods such as small red earthworms, crushed land snails and non-sprayed Greenfly, etc.

There are no obvious sex differences and breeding has not been reported by any home aquarists. In fact, you will have to consider the special needs of the fish very carefully in order



to keep it any length of time in your tank (i.e.) dull lighting or hideaways, sandy or mulmy base, worm diets, etc.

### Sexing Corys

Can you tell me how to sex *Corydoras* catfish. What sort of water conditions do they like, particularly for breeding?

Male *Corydoras* catfish are slimmer, and generally smaller, than females, particularly when the latter are full of eggs. Most Corys are happier in a group, so to breed them, several should be housed in a large tank (36in or more) with large-leaved plants.

Water should be neutral (pH7) at 24°C (75°F). A partial water change (with cool water) often helps to stimulate spawning. Feed on worm-like foods,

as well as standard flake, to condition and a pair will soon form. Eggs are laid on a leaf on the front of the tank, at which point, the shoal can be removed. The eggs take a week to hatch, when freshly-hatched, Brine Shrimp should be ready as a first food.

A pair of *Corydoras paleatus* spawning. The differences between the sexes can be clearly appreciated in this photograph.

## DISCUS

### Medicine chest

I would like to obtain a selection of remedies and treatments which you mention in your book "Discus Fish: The King of all Aquarium Fish" (which, by the way, I think is excellent). Do you know of any supplier of these products: Aquabiofood U, Cilex, CQD, Disciamin, Disciamin Powder, Ferrogan, Flagyl, Leukomycin, Ofloxacin, Protovita, Tetracycline and Vitamins?

Thank you for your kind comments about my book. Most of the items you mention are Discus-specific products which are obtainable from outlets which specialise in Discus.

Leukomycin is the German trade name for Chloramphenicol (Chloromycetin). Ofloxacin is a Japanese broad-spectrum antibiotic. Chloromycetin would work just as well and will be more easily available in England. Tetracycline, another antibiotic is often used in the Far East. All these antibiotics are available from your vet. Protovita is a water-soluble vitamin complex and can be purchased from some of the larger chemists.

## PLANTS

### Water Poppies

Have you ever come across a plant known as the Water Poppy and can you give me any information on it?

Water Poppy is the common name for a group of plants belonging to the family Alismataceae and grouped in the genus *Hydrocleys*.

*H. commersonii* is the species most frequently available. I imported this species some years ago and grew it in an unheated pond in a greenhouse kept at a minimum of 60°F (15.5°C) in the winter. The pond in question is below ground and therefore the water temperatures can be up to 10 degrees cooler than this.

A beautiful aquatic, it is a perennial plant with thick, oval,

floating deep-green leaves which arise from a trailing stem creeping along the bottom mud. The flowers which are borne from the end of May to October are light yellow, 2-2½in (5-6.4cm) across, with three petals.

They stand well clear of the water and, although only lasting for one day, a constant succession of blooms ensures a steady drift of colour. This plant can be grown out of doors in favoured spots in the British Isles but will succumb to all but the mildest winters. Propagation is by cuttings.

The plant is native to Brazil but has been introduced into many tropical countries.

## NEXT MONTH

Keeping up the momentum generated by our last, and highly successful, series of Supplements, next month sees the launch of our 1990 campaign with the first colourful installment of the year: **TROPICAL FRESHWATER AQUARIA**.

Presented in concise, easy-to-follow Question/Answer format, this year's crop of Supplements will tackle all the vital questions that every new aquarist and pondkeeper needs to know about in order to get things right from the start.

The team for **Tropical Freshwater Aquaria** consists of Tetra's Dr. David Pool, Aquarian's Dr. David Ford, Dick Mills and A & P editor John Dawes. Between them, they'll cover pumps, plants, filters, fish, health problems, lighting, heating, quarantine, aquarium maintenance... and all the other essentials of tropical aquarium keeping.

Also in February:

- Arie de Graaf on setting up Dutch Aquaria
- Andy Horton on environmental health for native marines
- Peter Cole on pond installation
- Our regulars, plus our now-customary selection of specially commissioned articles from top UK and overseas authors.

**Don't miss out on the best advice going. Book your February copy now!**

# ENLIGHTENING THOUGHTS

Dr Robert Goldstein answers all the questions on aquarium lighting you've always wanted to ask (plus some more) . . . but never dared to!

**T**here's more to light than meets the eye. Light plays a critical and determining role in any aquarium, yet we treat it with little thought. Is it because we don't know how light works, or because we don't understand the technical terms, or because we cannot get consistent results? Perhaps it's all of the above.

Aquarium textbook information ranges from non-existent to incomplete. For example, Carol Bower and Stephen Spotte's marine books, and Gunther Sterba's Encyclopaedia, all handle light about as thoroughly as did Alfred Morgan, a big notch below William T. Innes. Albert Thiel's approach is deliberative but incomplete, slow, and pedantic.

I'm pedantic too, but I hope not so agonisingly slow. Bear with me and all will be revealed. I'll cover, in turn, physics, needs and choices.

## PHYSICS OF LIGHT

The principal types of commercial lighting are incandescent, gaseous and fluorescent.

Incandescent light results from pushing electrons between the anode and cathode (positive and negative poles) through a resistant filament so that the filament burns and gives off energy as heat and light. In normal bulbs, that's done with cheap tungsten as the resistant filament, surrounded by an inert gas like nitrogen or a virtual vacuum to slow down filament destruction. Incandescents burn out when their filaments burn through.

Gaseous lights keep the anode and cathode separated, and replace the inert gas or vacuum with an "excitable" carrier gas. The carrier gas glows a particular colour when charged, and it's charged when it's transferring electrons from one side of the bulb to the other. Neon, for example, glows red when charged. If you charge other types of excitable gas, you'll get other colours.

Fluorescent lights work similarly, but the carrier gas doesn't glow. In a fluorescent bulb, the carrier gas is mercury vapour. When bombarded with electrons, it becomes excited and emits invisible ultra-violet light. The bulb is coated with a dry chemical powder that glows (fluoresces) when it is hit with ultra-violet rays. Fluorescents wear out by using up their coatings long before they burn out.

Those are the basic types of mechanical bulbs. As you can see, any type can be altered to produce different colours of light. Now, if we're going to talk about colour, we need to talk about waves.

## Light waves

Light can be described as waves of energy (by you and me) or as discreet particles of energy called photons (by physicists). It is really both, just as big ocean waves hit someone standing in the surf as individual punches, yet no wave is separated from its adjacent wave. (Remember too that the effects of that wave depend on how high it is, how fast it's moving, and how many waves are hitting you in a short amount of time.)

To you and me, light can be regarded as consisting of waves. The point is important because a wave can be measured.

The wavelength, or distance from peak to peak (or trough to trough), might be a metre long or only a thousand angstroms. You'll also see aquarium articles describing wavelengths in hundreds of nanometres. A nanometre is a billionth of a metre, and an angstrom a tenth of that, or one ten-billionth of a metre!

## Properties of light

The wavelength of light makes...a difference in whether you feel it, see it, are damaged by it, or depend on it. Very long waves can be warm or hot, and even start a fire. Radio, radar, microwaves and infra-red are long light waves (from 7,500 angstroms in the infra-red range to a metre or more long).

There are also very short waves, like ultra violet and X-rays which are about 3,500 or fewer angstroms in length. These waves don't produce heat, but are so full of energy that they can knock electrons off atoms. When electrons are knocked off, the affected substance carries a positive charge and is ionised.

Ultra-violet and X-ray waves are examples of ionising radiation. For example, when they hit DNA, (the genetic material in living cells), they knock off electrons. Because ionised substances don't stay that way, but react with anything nearby that can give them back their lost electrons, they are chemically active. Therefore, the chemicals in the DNA change, and, consequently, the genes change. That's how radiation causes mutations.

Can we see radiation? Yes, if it's in the right range of wavelengths. You've seen



Well-balanced lighting — both in quality and quantity — is essential for luxuriant growth of the kind shown in this excellent Dutch Discus aquarium.

sunlight split by the corner of a tank and splayed on a wall. The light breaks up and you see a part of it from roughly the violet to the red. You cannot, however, see the additional wavelengths that extend left and right of these colours. Although those wavelengths are often present, humans cannot see wavelengths longer than 7,000 angstroms (violet) or shorter than about 4,000 angstroms (red) in length.

Physical scientists and engineers use discrete wave lengths of light for specific applications, but the rest of us use the mixtures of wavelengths for aesthetic or horticultural applications.

### Changing qualities

Let's go back to the sunlight being split through the corner of the tank. Looking at it backwards, when all those colours are combined, you can't see them at all. That's how stage hands manage brilliant white light on actors. They illuminate them with red, blue, and yellow spotlights, and when those lights converge they produce white light.

Daylight is white (colourless) light. It's a combination of many wavelengths including radio waves (from stars), infra-red, red, yellow, blue, violet, ultra-violet, and X-rays (in small amounts). That mixture has a quality. If the mixture is shifted, as by atmospheric water vapour and dust, the light is less white and slightly yellow or red. That's why morning or evening is different from noon light.

This combined colour of various proportions of the primary visible wavelengths (blue, red, and yellow) is a quality that photographers measure in units called degrees Kelvin or colour temperature. Physicists use Kelvin degrees to measure absolute heat temperature, which is not the same thing, so don't mix them up.

There is a value of Kelvin colour degrees that resembles the mix of light emitted by the sun at noon, another mix that resembles sunlight in the morning and so on. Read the instructions inside a film package, and you will see Kelvin values for various daylight conditions.

The **Colour Rendering Index** of a light source is the similarity of that source to the Kelvin value of the sun at noon. A colour rendering index (CRI) of 100 would be equivalent to an exact replica of high noon sunlight. Of course, there is no artificial



The deeper one goes in the sea, the bluer everything appears, owing to the poor penetration of "non-blue" light waves. This is a Crocodile Fish photographed in the Red Sea.

light source that attains 100, and so light bulbs are ranked by how close they come. Expensive bulbs carry a CRI index next to the wattage. The higher the CRI, the closer the spectrum is to sunlight at noon.

### Intensity v energy

Intensity is not the same as energy. (When we talk about the *energy* of light, we really mean its wavelength.) When we talk about *intensity* of light, we mean the volume of radiation emitted all at once. Examples are low intensity 25 watt bulbs and high intensity 500 watt bulbs. The wavelengths or colours of the light are the same, but the bulbs differ in intensity.

Intensity of emitted light is measured in lumens. But the brilliance of a 500 watt bulb is different at one inch and at one mile. Put another way, the intensity or lumens of the sun is the same whether you're there or on Earth. But we can survive here, and that's why intensity makes a difference to us. It also makes a difference to aquarium inhabitants.

Suppose we have a high intensity light source of 500 watts located 500 feet away from the aquarium. Not much light will get to the tank, so intensity or lumens are not the whole story. The light that actually gets to the tank is the light that counts. This is called *illuminance*. The illuminance is measured in *lumens per square metre* of surface, and that ratio is known as the *lux*. So while lumens measures light emitted from a source, lux measures light received at its target. Again, illuminance is given in lux, which equals lumens received per square metre. Put another way, intensity at the source remains the same, but intensity at the target is proportional to distance from the source.

Now I know you're saying to yourself, lux, pux, shm--! Who needs it?

It's not so bad. Just remember that the closer you are to the source, the more light you'll receive. It's not the amount of wattage you put on a tank, but *how close the bulbs are to the water*.

You think lux is bad? The old measure was foot candles. That's a candlepower of light from one foot away. A foot candle is a little less than 10% of a lux. All of a sudden, lux doesn't look so bad, does it? Old lighthouses still report their power in candles of light.

Scientists hate this stuff. They prefer to measure the amount of light of a specific wavelength reaching a surface. They'll usually use irradiance, which is watts per square metre, but only of a particular wavelength. We don't use irradiance in aquarium lighting because we don't use a single wavelength, but keep the concept in mind for future applications.

### LIGHT NEEDS OF AQUARIUM INHABITANTS

Various kinds and ages of fish, invertebrates, and plants have different light requirements. These requirements vary in lux or quantity received of a certain mixture of wavelengths (Kelvin value), as well as the photoperiod, or hours per day of exposure.

If you think that's complicated, keep in



Shallow-water corals benefit from the yellow and red wavelengths found in the upper layers near the surface.

mind that water conditions (chemistry, turbidity, dissolved oxygen, pH, alkalinity, conductivity, nutrient levels) affect which wavelength has the greater influence on some dominating function. For example, in deep ocean water only blue light is energetic enough to penetrate at high intensity and many marine algae depend on it more than on the reds used by freshwater algae.

Many fishes see light differently. We see the colours centred around yellow and green, in-between red and violet, whereas the centre of the visible spectrum for many fishes is at blue. But how far left and right can they see? Do they see ultra-violet? Infra-red? What does it look like?

In fish, birds, reptiles, various classes of mammals, in plants, and especially in the invertebrates, there is no simple answer. Many fishes see colour, yet sharks and many tunas and billfish are relatively (compared to us) colour blind. Even people differ in the colours they perceive.

African Violets do great under Gro-lux lighting, but many crop plants do terribly. Some kinds of lights selectively stimulate blue-green cyanobacteria ("blue-green algae") at high phosphate concentrations, but normal green algae at high nitrate levels.

### Open mind

In short, recommendations for certain colours of light are based on common experiences, not science, or at least, not on anything scientifically understood. The rules for a reef tank, for instance, work for most people, but not for everyone. In the end it boils down to learning and using all you can, but keeping an open mind to the idea that the most authoritative advice available can still be rather primitive.

We know blues are important to symbiotic marine algae that live inside, and nourish, corals and anemones in deep (over 30 feet — over 9 metres) marine water, and are probably also important to some marine invertebrates. In shallow marine waters and in freshwater, yellows and reds are important. That's why shallow water *Caulerpa* and *Ulva*

benefit greatly from incandescent bulbs which put out a yellow light, yet reef tanks require supplemental blues.

Photoperiod and intensity are also important. Round-the-clock lighting doesn't bother some fishes, but seriously affects others. It can induce sexual activity by activating the pineal or other glands, or cause blindness or physiological problems.

High intensity lights can destroy fish eggs, ocular (eye) pigment, or ocular nerve cells, whereas low intensity can impede essential processes.

If there is a rule of thumb, it is that fish eggs should be kept dark, and fish and plants given 6 to 18 hours of moderately intense light per day, with 16 hours probably being optimal for fish and 8 hours for many plants.

Summer spawners need more light, and winter spawners less. Too much light causes stunted plants with densely packed chloroplasts, while lower light induces growth to provide more chloroplasts.

What's the recommended aquarium light intensity? Again the science is all over the map. A good rule of thumb (because it's mine!) is a minimum (not optimum) of two to three watts per US gallon (3.8 litres) of capacity for a normally shaped freshwater aquarium, and twice that for marine tanks.

#### CHOICES

There are no neon-type aquarium gaseous lights. The incandescent bulb choices are standard tungsten filament, tungsten quartz metal halides, halogen quartz metal halides,

mercury vapour (whose ionised components then hit fluorescent materials on the bulb inner surface), and sodium vapour. All of them provide brilliant illumination.

Standard tungsten filament has a yellow bias in the visible spectrum, a property shared with mercury vapour and sodium vapour. Halogen quartz bulbs offer a shift toward the blue, beneficial to marine invertebrates and algae. All the benefits of expensive lamps are found in ordinary tungsten filament bulbs of high wattage, except the blue shift. That can be provided by a supplementary plant-stimulating blue incandescent bulb, available at garden stores or a blue (actinic) fluorescent; the blue need not be intense, but merely present.

A Raleigh, North Carolina, US, aquarium shop (near where I live) provides an explanatory sign to customers which I'm plagiarising here, as it neatly summarises the six different groups of specialised aquarium fluorescents.

1 Pink and blue enhancers enhance fish colours (and have a high colour rendition index or CRI, which is an aesthetic character not related to biological benefits). Examples: Perfecta Lamp, Fritz Bio-Lamp, Aqua-Glo, Aquari-Lux, Sea-Lux, Vibran Sea, Gro-lux, and Radionic.

2 Wide Spectrum bulbs have yellow light simulating sunlight for a natural look. Examples: Sun-Glo, Natura-Lux, and GE Plant Light.

3 Wide Spectrum with Blue lightly enhance algal growth and provide good

daylight balance for marines. Examples: Ultralume 50, Northlight and GE Chroma 75.

4 Full Spectrum lights are closest to real sunlight, and excellent for freshwater plants. Examples: Vita Light, Spectra Light, True-light and Power Twist.

5 Full Spectrum with Blue lights are similar to the previous category, but add blue wavelengths required for corals and anemones and are excellent for reef tanks. Examples: Color Classer 75 and Luxor.

6 Blue lamps provide a supplementary wavelength for marine algae and invertebrates and are strongly recommended for reef tanks or any tank containing anemones. Examples: Philips Actinic 03 and Super Actinic.

7 Tri-phosphor High Output lights have spectra specifically developed to promote marine algae / coral and freshwater plant growth and well being. Example: Triton.

#### ACKNOWLEDGEMENT

★ I would like to extend sincere thanks to Adrian Exell of Interpet for his assistance in identifying some of the brands of fluorescent lights listed by the author. I am also grateful to him for supplying additional brand names.

John Dawes, Editor

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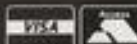
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# OUT AND ABOUT

## THE BRITISH AQUARIST FESTIVAL, 1989

By Dr. David Pool (Tetra Information Service)

The 1989 British Aquarist Festival, organised by the Federation of Northern Aquarist Societies in collaboration with the *Aquarist & Pondkeeper*, was held at Bowlers Exhibition and Conference Centre in Manchester. The widely held view by those attending was that the new venue was a great success, recapturing the atmosphere of the old "Belle Vue" shows, but without the less desirable qualities. Facilities at Bowlers were also excellent, with good catering and lecturing areas.

The attendance at the show, at approximately 7,000, was less than the organisers had hoped for, although the poor weather and move to a new venue will undoubtedly have contributed to this shortfall. Certainly, those fishkeepers that did not attend missed one of the best shows that I can remember.

Many of the manufacturers were present at the show to display and sell their products. This presented those people who came along with the ideal opportunity to view the full range of aquatic products available and seek advice from the people who manufacture or distribute them. In all, there were 18 trade stands and most commented on the success of the show. In fact, several sold out of the more popular items of



Putting the finishing touches to Water Features Publications' impressive exhibit — the Heikomobile owned by Heiko Bleher.

equipment, food or livestock and had to send for supplies before the show reopened on Sunday.

The lecture theatre at the show was well used throughout the weekend, with a range of lectures being presented by *Aquarist & Pondkeeper* editor John Dawes, Dr David Ford of the 'Aquarian' Advisory Service, Brian Walsh of the International Characin Association and by me on the Tetra side. In between the lectures the magician Ste-



Lecturing facilities at Bowlers were great.

wart Peters was on hand to keep the children entertained while their parents enjoyed the Festival.

The British Aquarist Festival is primarily aimed at promoting the hobby of fishkeeping. The high quality of the fish in the competition and for sale will certainly have helped to further this aim. The numbers of fish entered for the show was up by more than 100 on previous years at 698, with pride of place going to W Walker of Workington A.S. whose *Betta bellica* was awarded the title of "Best Fish in Show". Champion of Champions was a *Cichlasoma fenturum* owned by S. and T. Merrick of Merseyside A.S. Their fish gained 83 points out of a possible 100 and was only 1.5 points ahead of the *Polypiterus ornaticornis* owned by I. Legge.

The "Harry Penhall Memorial Trophy" is awarded to the best tableau in the show. This year it was deservedly won by Reading A.S. with their Zoo scene which included cages (= aquaria) containing "Tiger" barbs, "Zebra" Danios, etc. Second place in the competition went to Scorpion A.S. with their Greenhouse display. However, most attention was focussed on the C.A.S.T. 88 tableau where a male seahorse released its young on the Friday prior to the show.

The F.N.A.S. Show League culminates in the British Aquarist Festival. This year the title was, once again, won by Sandgrounders A.S. from Southport with a total of 642 points. Runners up were their close rivals Merseyside A.S. with 613 points.

At many aquarist shows comments may be heard regarding the lack of things to see or do. I am very pleased to say that this was not the case at the British Aquarist Festival and all of the comments I heard were very complimentary. Congratulations, and thanks, are due to the organisers of the Festival who spent long hours ensuring that the show was successful.



The deserved winner in the tableau section came from Reading & District A.S.

## MAJOR BAF AWARDS

### Champion of Champions

1. S. and T. Derrick (Merseyside)

2. I. Legge (A. of A.)

3. D. Irvine (N.R.A.S.)

### Tableaux

1. Reading

2. Scorpion

3. Wombwell

### F.N.A.S. Show League (Final Positions)

1. Sandgrounders

2. Merseyside

3. C.A.S.T. 88

### Best Fish in Show

W. Walker (Workington)

### Best Tropical Fish in Show

W. Walker (Workington)

### Best Coldwater Fish in Show

W. Finney (Macclesfield)

### Best Pair of Fish

C. Tynan (Merseyside)

### Best Breeders Team

T. Wheelwright (Halifax)

### Best Furnished Aquarium (Individual)

Mr and Mrs R. Walsh (Darwen)

### Best Furnished Aquarium (Society)

Darwen A.S.

### Exhibitor Gaining Most Points

Rob and Karen (D.H.S.S.S.)

## B.M.A.A. SEMINAR AT LONDON ZOO

By Dick Mills

*A & P* played host to nearly 200 marine-minded aquarists at the Nuffield Meeting Rooms at London Zoo on Sunday, 29 October. The occasion was a full-day seminar co-ordinated by the **British Marine Aquarists Association**. Visitors surprised at the lack of some familiar BMAA faces were quickly reassured to learn that 'the other half' was enterprisingly engaged at the British Aquarists' Festival in Manchester.

No fewer than four lectures were slotted into the day, two between a morning Extraordinary Meeting and pre-lunch Annual General Meeting, the remaining two in the afternoon. As if this wasn't enough, there was still the mandatory visit to the Zoo's aquarium to come, with the associated 'behind the scenes' diversion under the expert guidance of **Dr Chris Andrews**.

The first talk of the day was

presented by **Dr Lin Baldock** who brought the natural submarine world of invertebrates right into focus; the majority of her slides were taken on the reef itself, but any natural lack in clarity was more than compensated for by Lin's expert and very knowledgeable comments.

**Max Gibbs**, of Oxford's Goldfish Bowl, sent all amateur photographers off to lunch with massive inferiority complexes after a wonderful presentation of superb slides and how to take them. If Seahorses fascinate you, then you would have revelled in **Amanda Vincent's** exposé on these extraordinary animals; all the details of the male's responsibilities during breeding were intimately revealed, together with in-depth examinations of how (and whether or not) to keep them in aquariums — the consensus being that, unless marine-keeping experience is almost second nature, it is better not to try keeping these fishes.

A similarly responsible, and conservation-minded theme was expressed by *A & P's* **Gordon Kay** in his Butterflyfishes talk. Again, what fishes not to keep was stressed just as much as how to keep the more hardy species successfully.

BMAA chairman **Paul Davies** had the paradoxical experience of welcoming the large audience to the day, only to find the attendance at the 'Members Only' EGM and AGM severely decimated. A concerted effort, ably backed up by the world-wide acclaimed BMAA Journal *'Marineews'*, is to be launched to gain an increase in membership to reflect the increase in numbers of aquarists now taking the marine trail to aquatic happiness. As long as the BMAA continue to arrange such stimulating seminars there should be no problem in attracting new members during 1990, the Association's 20th anniversary year.

Details of BMAA membership can be obtained from the Secretary, **Roy Martin**, 20 Richens Drive, Carterton, Oxfordshire.



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Cup Coral (*Tubinaria* sp.), alongside two tubeworms.

## TOP TEN CORALS

Peter Bienias and Jane Tabern of Aquatic Design select their ten favourite corals.  
(Photographs by Peter Bienias)

**S**electing a coral for a miniature reef aquarium, whether it is to be put in a new set-up or as an addition to an already established system, is not always as straightforward as it appears.

Just as with fish, compatibility is important, not that corals disagree with each other (although they will compete for space — but that normally occurs in the wild) — it is with aquarium conditions that incompatibility arises.

Over the past few years we have adopted the theory that corals live in different surroundings and therefore will have a better chance of survival if their specific needs are met, and not all necessarily under one roof!

We have therefore compiled a Top Ten list of corals that are available to the hobbyist, with appropriate information and guidance on each one.

### Soft v hard

But first we'd like to take a look at the animal itself and briefly explain the differences between a "soft" and "hard" coral polyp.

Corals form the framework, both living and dead, of a reef. They are responsible for the breathtaking beauty of the reef and provide homes for nearly all of its marine life. Forming a variety of shapes — mounds, plates, branches and crusts, corals look more like rocks or plants than animals.

In what biologists call the "evolutionary scale" the coral comes between sponges and worms. It belongs to the phylum Coelen-



The delicate beauty of the Sea Fan.

terata: animals that catch their prey by stinging cells (called "nematocysts"), and having a simple body system with one opening that materials pass in, through and out of.

Basically, soft corals do not have a limestone skeleton. Instead, they have hard pieces in the form of limestone crystal strips or blocks called "sclerites", inside their body.

Their polyps are of a similar structure to that of a hard coral, but they have eight "hair-like" tentacles, whereas hard coral polyps, with a few exceptions, usually have a minimum of twelve "smooth" tentacles.

Also, hard corals are the real backbone of the reef, building massive "rock" formations; they are the only animal with this capability.

## TOP TEN CORALS

### 1 Sun Coral (*Tubastrea aurea*)

An extremely attractive coral that draws the hobbyist's attention with its bright orange exterior and its brilliant yellow polyp heads. Unfortunately, the only time you are likely to see the polyps truly open will be as a photograph in a book. This is because in their natural habitat they prefer a shady location, receiving no direct sunlight, ie, in caves, under overhangs, etc.

So, unless you can cater for this environment, it is unwise to purchase this coral species, for although they may appear to be surviving they are, in fact, slowly deteriorating and will leave a white carcase after about six months.

### 2 *Euphyllia* species.

Three varieties are usually available; *Euphyllia* (*Euphyllia*) *glabrescens*, *E. (Fimbriophyllia)* *ancora* and *E. (F.) divisa*.

Among the most elegant varieties of coral, these three species (although they are related) don't appear so to look at.

The graceful undulation of the stout finger-like tentacles (*E. F. divisa*), the thin snake-like tentacles (*E. glabrescens*) and the long U-shaped tipped tentacles (*E. F. ancora*) are mesmerising.

These corals appreciate good light, but not too high an intensity, or it will bleach them. Good water movement around the coral head is important. Any of the three will form an excellent centre piece coral and, in shades of green, grey, blue and pale brown, with white or green tentacle tips, they are among the more expensive corals.

### 3 Mushroom Coral (*Cycloseris actiniformis*)

At first glance it is hard to see the similarity between this coral and a mushroom. It is only when it is in its skeleton state that this becomes clear, as it resembles the underside of a mushroom.

With its writhing snake-like tentacles, this coral is not a strong favourite with some aquarists. We have often heard a variety of comments, normally revolving around its alien appearance and that it would attack your hand if you went near it! However, it doesn't have adventurous cannibalistic tendencies, we can assure you.

Although it has a large oral cavity, giving the impression of an easy feeder, it is an extremely difficult coral to keep. We have tried numerous environments but they all lead to the same, very sad, result. The longest we have been able to maintain this species for is six months.

### 4 Sea Fan (*Gorgonia* species)

The Sea Fan is a striking coral. With its rigid lattice-like construction, it is admired by many hobbyists.

In their natural habitat Sea Fans sway back and forth, enjoying the surging

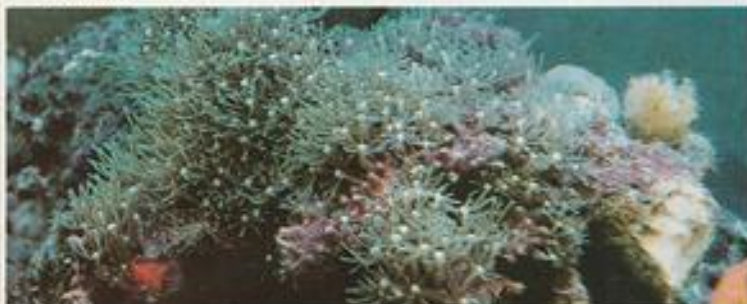
water movements of the sea. This is an important issue because this movement needs to be duplicated in some way if one intends to keep these corals healthy.

Colours range from purple to white, the most common two being red and orange. These colour shadings are relevant to the amount of light the coral needs. The darker the colour, ie, purple, the less light the specimen requires, and, of course, the lighter the colour, ie, white, the more light it requires.

When given suitable surroundings, this coral will live quite happily in a miniature reef system.

**4 Bubble Coral (*Plerogyra* species)**

The two varieties that are available are firm favourites with hobbyists. They are *Plerogyra simplex* and *P. sinuosa*, differing considerably in their external appearance.



*P. simplex* has an inflated mass of spherically shaped bubbles, whereas in *P. sinuosa*, the bubbles are irregularly shaped. These corals prefer good light and a constant flow of water across their expanded heads.

Bubble Corals like to be fed directly whenever possible, with previously thawed *Mysis* or *Artemia*. In "recommended" surroundings, this coral will survive well in the aquarium.

**5 Rose Coral (*Trachyphyllia* sp.)**

This beautifully shaped coral adapts well to aquarium life. Forming a variety of patterns it can be seen in shades of fleshy pink, brown and green. The green, in some cases, is very luminescent. When fully expanded, it resembles a "flat blancmange" (if one could be made!).

This species favours good water movement; enough to make the expanded coral head undulate. It also appreciates being near to an actinic blue light source.

**6 Sea Cauliflower (*Dendronephthya* sp.)**

The Sea Cauliflower is a particular type of soft coral. However, we think it is best to include in this description a few other species of soft coral because of their similarities. They are: *Nephthys* sp., *Sinularia* sp. and *Sarcophyton* sp.

The main difference, apart from the shape, is the light requirement of each species. This is a telling factor and, to help with this, one needs to note the colour of the coral at the time of purchase.

If it is a brownish colour then the specimen will appreciate good lighting (but not too intense) and a position on, or as near to, the bottom of the aquarium as possible. If it is a red/orange colour then it will need the same light protection described earlier for corals of a similar colour, or a very deep aquarium.

One final point, if the coral appears to be "drooping", like a plant without water, try taking the rock base the coral should be attached to, and wedge it in the aquascape so the coral is upside down. We think you will be surprised at the coral's response!

**7 Xenia sp.**

Sometimes called Star Polyp Coral, this is a very pretty and delicate-looking species with its short-stemmed flower-like "blooms".

Hungry polyps of *Xenia* bask in the "sun" of our reef aquarium.

It seems to thrive best in high light intensity surroundings. Providing the water conditions are good enough to prevent the growth of mat-type algae which will very quickly choke the polyps, this coral should have no problems surviving in the aquarium. It will even grow if conditions are especially good.

We have noticed that this coral is in abundance on the living rock we regularly import, which, like all good-quality living rock, should have some sort of growth on it.

**8 Goniopora sp.**

This is probably the favourite coral with marine enthusiasts. It has an extremely appealing nature with its long outstretched arms gently wafting to and fro.

The long-polyped variety is normally a shade of brown, while the small-polyped variety comes in shades of yellow, pink and cream.

They all like good lighting (but not too intense); slightly brighter lighting is preferred by the short-polyped type than the long-polyped one. Water movement is essential around the coral heads of both, especially if water conditions are such that algal mat growth is apparent, because, once again, the polyps will suffer under such conditions.

All in all, this is a good coral for the aquarium. However, do make sure that

environmental conditions remain fairly stable because *Goniopora* can be susceptible to changes.

**9 Coral Cup (*Turbinaria* sp.)**

The shape of this coral explains a great deal to the marine hobbyist about the type of environment it thrives in, with a structure that is designed to "hold" or "catch", as much sunlight as possible through its zooxanthellae (symbiotic algae). The more complex the coral shape the more sunlight it requires.

Moderate to good water movement around its polyps helps to prevent waste products and detritus from settling in the "passageways" which this species possesses.

Once this coral has settled in, it is a most splendid sight and will live for some time.



A Sun Coral in the recess of its man-made cave.

**CLOSING REMARKS**

There are many corals that we have not covered, but we hope to go further into this field at a later date.

What we have covered should, hopefully, provide a general outline of what to expect and what needs to be done to deal with these species.

In this article, reference has been made to "good light" and "good water movement". To clarify this:—"good light" refers to the coral being directly exposed to the light source. "Good water movement" means that there should be considerable movement of the expanded coral head. One need only watch a nature video of the sea "in action" over a coral reef, to see what is meant by this statement.

Just to re-cap on three important points:

1. Try to provide each coral with surroundings appropriate to its requirements.
2. Pay special attention to the light requirements of each species.
3. Never overlook water movement; this is of vital importance when caring for corals.



# News from the societies

## Cardiff's feast of fishkeeping

Aquarists from far and wide crowded into Splot's Star Leisure Centre, Cardiff, home of Cardiff & District Fishkeepers Society for their Annual Open Show and the 1989 F.B.A.S. Supreme Championship. Well over 600 fishes were on show, together with many stands of aquatic interest for the benefit of visitors. Additional attractions this year were made possible by the generosity of *Interpet* who not only had a strong show presence with Mike Clarke and their own display stand, but also sponsored three Guest Lectures by Adrian Exell, Terry Waller and Dick Mills.

The main interest of the day lay in which fish from the 44 entries was going to win the "Supreme" and it turned out to be an "action replay" of last year, with *Andy Feast's* *Bois sidhimunki* pulling off a great repeat performance.

*T. F. Hynes* took Best in Show and Best Coldwater with the same fish, while *Abertillery A.S.* fought off a great battle against the invaders from over the bridge, *Romford & Becontree A.S.*, to take the Highest Pointed Visiting Society Award. *Mike Smith*, of Hornchurch was the exhibitor gaining the Highest Points — for his fish you understand! A magnificent children's Painting Competition decorated most of one wall and the two winners *Robert Smith* (10-14) and *Vanessa Wood* (5-9) richly deserved their *TFH* Book Token Prizes, as did the three runners-up in each Class.

After such a hectic day, Cardiff still had the strength to say that, with the support of all the exhibitors, judges and visitors, they were looking forward to doing it again next year!

## Yorkshire Koi Society

The Yorkshire Koi Society's 13th National Open Show was held on Bank Holiday Monday, 28 August 1989 in the grounds of Harewood House, near Leeds. The show was again blessed with excellent weather, showing the 110 Koi entered off to their magnificent best.

*Louis Hawksby's* winning Koi was a spectacular Kindai Showa (Size 4), whose clear skin, strong colours and very striking head pattern made it the clear winner. *Louis* was highly delighted, although very surprised, that the Koi had scooped the prize for Grand Champion, as last December the fish had been so ill with a large sore that, at the time, he had seriously considered putting it down.

## Yorkshire Aquarist Festival

The YAF committee has appointed a new Show Secretary to take over the responsi-

## British Cichlid Association

The 5th British Cichlid Association Convention, held on Sunday 8 October at Amersham Community Centre, was reckoned by many of those who attended to be the best to date.

The first speaker, *Dr Gordon Reid* of the Horniman Museum, spoke about his recent expedition to Cameroun. The expedition discovered, among other fishes, a new species of *Pelvicachromis* which, to my mind, outshines even the showier forms of *P. taenianus*.



*Louis Hawksby* receiving his Grand Champion prize from *Lady Harewood*. The photograph was taken by Yorkshire Koi Society member, *Phil Peckitt*.

However, through *Louis's* meticulous care and attention, he brought it back to full health. No one viewing the Showa on the day would ever have guessed that there had ever been anything wrong with it.

*Louis* also collected the prize for 2nd runner-up to Grand Champion with the largest Koi — a 28in Kohaku. The prize for runner-up to Grand Champion went to *D Whiteley* for his classic Taisho Sanke (Size 4).

bilities for YAF 1990 forthwith.

All correspondence, requests for schedules, completed entry forms, and general enquiries should now be sent to:

*Mick Tomkinson*,  
54 Helston Walk,  
Middleton,  
Leeds.

To avoid the possibility of any confusion arising, anyone who has already sent in forms, requests, etc. to the former Show Secretary is advised to re-submit everything to *Mick*. Trophies should also be returned to him.

We were all disappointed to hear that *Gordon* hadn't brought back any live specimens for us!

Next, *Rainer Stawikowski* talked to us about Geophagines, and illustrated his talk with slides which showed us that this rather neglected group can, if properly maintained, rival the most gaudy Africans for beauty.

Finally, *Ad Konings* spoke about the Aulonocaras of Lake Malawi, again with superlative colour slides to illustrate his talk. *Ad* also briefly covered some of the other interesting cichlids to be found in this lake.

An auction was held throughout the day, during the

intervals between talks, and provided an extra attraction.

The meeting was attended by our president and most eminent member, *Dr Ethelwynn Trewavas*, and many of us enjoyed chatting about cichlids with both her and the speakers.

We would like to remind fishkeepers everywhere that non-members are very welcome to attend our auctions and conventions, details of which normally appear in advance in *A & P*. The next event will be our annual auction next spring (date to be announced).

*Mary Bailey*  
British Cichlid Association

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# OUT AND ABOUT

## The First International Livebearer Convention

By Dr David Ford ('Aquarian' Advisory Service.)

**VIVIPAROUS**, the Livebearer Information Service, held their first Convention at the Midland Hotel in Derby over the weekend of 21 and 22 October, 1989.

This was the first major show by this relatively new group, formed to help hobbyists interested in the technical aspects of keeping livebearers. Viviparous was founded by mother and son team, **Pat and Derek Lambert**, because there is so little information on the species in the usual hobby literature.

Forty hobbyists attended on the Saturday and over 50 on the Sunday, many staying overnight at the Midland Hotel. There was also a contingent from the **American Livebearer Association (ALA)**. A banquet was held on the Saturday evening with over 30 diners in a private room at the hotel.

The programme started on Saturday afternoon with a welcome address by **Derek Lambert**, Chairman of Viviparous. Then **Pat (Patrick) Hartman** of the American Livebearer Association gave a slide show on Goodeids.

The 18 genera of Goodeids were covered and some interesting facts revealed. For example, Goodeids will not tolerate *Corydoras* in their aquarium and attack them, shredding their fins. Many Goodeids eat their young but not for nutrition it is a territorial instinct making them attack newcomers to the tank. The genera can interbreed and a plea was made not to allow indiscriminate breeding because the pure strains were needed to preserve what is, generally, an endangered

family.

Goodeids have a long gestation period of some 60 days but, unlike the Guppy, they do not store sperm, so any uncontrolled breeding can be corrected by later spawnings. Examples were shown of *Skiffia francesae* which is now extinct in the wild.

One successful hybrid was shown . . . the **Black Beauty**, *Skiffia francesae* x *Skiffia multipunctata*, developed by **James Langhammer** of ALA (also at the Convention) and live specimens of the breed had been brought over from the USA for the auction. It was stressed that these species and other Goodeids are very sensitive to nitrogenous wastes, so the fish must be housed in large tanks for dilution of excreta, and the hobbyist must be prepared to undertake lots of partial water changes. The Americans stated they do 50% water changes twice weekly.

**Derek Lambert** then showed slides of his last three trips to Mexico and revealed the sometimes very beautiful natural home of the Goodeids. His methods of collection and shipping were revealed. Derek and Pat were returning to Mexico in late November/early December, equipped not only to collect rare livebearers, but also to measure water chemistry and make geological notes.

After the evening dinner the speakers at the Convention, **Pat Hartman** and **Jim Langhammer** of ALA and I were presented with gifts of English teapots! The Americans will need instructions on how to use them. . .

**Pat and Derek Lambert** were also given a scroll of thanks by members of the society and presented with the American Livebearer Association Breeders Award certificates.

The society also honoured member **Ivan Dibble** with a life membership and cut lead crystal glasses for his 20 years study of livebearers. Ivan is a member of all the livebearer societies and regularly ships rare species around the world. In his fish-house he keeps at least 100 of the known 350 or so species of livebearers.

Next day I gave a lecture on fish nutrition, with special emphasis on livebearers. I revealed techniques for collecting non-aquatic livefood and made a plea not to risk feeding wild *Daphnia* and aquatic worms of any type because of the risk of disease and parasites. A basic diet of a quality commercial flake was recommended and the method of preparation and testing of the 'Aquarian' range was shown.

The first auction then took place, with many livebearers changing hands at around £5 each. A pair of *S. francesae* went for £30 and a few pairs of the new **Black Beauty** Goodeid for £20. Sales went very briskly with the American style auctioneering by **Pat Hartman**. This method involves the auctioneer stating the price and the bidder just raising a hand, which, with the USA style of

rapid talking, can move up to 4 bags of fish per minute!

During a break in the auction **Jim Langhammer** gave a slide presentation on the methods of livebearing in many species of fish. These included the sharks and famous fish like the Coelacanth, to male seahorses. Jim knows a great deal about this subject as the ex-Curator of the Detroit Public Aquarium. He was also ALA's first Chairman and a founder member of the new Catfish Association of America (CANA). Currently, Jim breeds the **Black Angel** commercially — successfully too.

No.8 in the series of Society booklets 'Viviparous' was distributed, together with my paper on feeding *Poecilia reticulata* and raffles of 'Aquarian' fish foods and 'Atlantis' equipment helped make the meeting a financial success.

Viviparous now has nearly 300 members and is still increasing. The ALA has over 350 USA members and there is a similar organisation in Germany, so future plans include the first International Livebearer Convention. The second Viviparous Convention will certainly be taking place in the autumn of 1990. Livebearers are actually a fascinating part of the hobby and the work by members will help many endangered species, especially the Goodeids of Mexico.



This spectacular fish is the **Black Beauty**, developed by **Jim Langhammer** and brought over specially for the **Livebearer Convention**.

Anyone interested in livebearing fishes should contact the **Public Relations Officer** for Viviparous, **Nigel Hunter**, 60 Barry Way, Brighton Hill, Basingstoke, Hants., or telephone 0256 471568.