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

AQUARIST & PONDKEEPER

NOVEMBER 1995 £2.25

MINI-SUPPLEMENT:
TOP TEN TROPICALS: *Breeding Special*

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SUCCESSFUL POOL FILTRATION

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

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features

MINI-SUPPLEMENT

TOP TEN TROPICALS:

Breeding Special

Derek Lambert runs through the breeding strategies adopted by our most popular freshwater tropical fishes

SEE PAGE 42

Also in this issue

editorial

GIVE US A BREAK!

Did you hear the one about prime minister John Major's sunburnt Goldfish? It was in the papers and on TV. Even the leader of the Liberal Democrats, Paddy Ashdown, retold it with obvious gusto on screen.

In was the sort of non-story with the 'freaky-fringe' element that the press so adore but which makes fishkeepers cringe. Such stories are always presented as ostensibly humorous and with just the right touch of eccentricity that, while undeniably publicising fishkeeping, invariably link our hobby with a 'less-than-normal' or superficial approach to life.

Apparently, John Major has a pond in his Huntingdon home, and one of his Goldfish suffered from sunburn during the unusually hot summer weather we experienced a few months ago. The burn was duly treated.... but the story was still deemed worthy of national/international TV and press coverage. Even a member of staff at the shop that the prime minister patronises was interviewed, which is wonderful news for the shop, of course. Well done, Fishes Galore! We wish you all success.

As expected, though, the TV company just had to throw in the obligatory blunder for good measure. Having been told about the sunburnt Goldfish, we were shown (quite logically, of course?!).... yes, you've guessed it... Koi!

Koi, after all, are larger, more spectacular and more expensive than Goldfish. Besides, they look more impressive through a camera lens or on a TV screen. So put them in... perhaps no-one will notice! No, of course not!

Come on, powers that be. Isn't it about time you gave us a fair break?

John Dawes

Tomorrow's Aquarist

BY GINA SANDFORD

BUG OF THE MONTH

MIKE SANDFORD

Fish Louse on a Goldfish.

This month I thought I'd take a look at *Argulus*, the Fish Louse. I wonder just how many people have had this little pest affect their pond or aquarium fish and totally overlooked it.

My first encounter with Fish Lice occurred a long time ago. I'd not been keeping fish long and I purchased some Armoured Catfish (*Hoplosternum thoracatum*) from a rather dubious, scruffy little shop. They looked alright to my then inexperienced eye.

It wasn't until a couple of weeks later that I noticed something moving on the flanks of the fish. It looked just like a scale moving up and down... but catfish don't have scales...

I caught the fish and they were covered in these small, transparent, disc-shaped 'things'. Frantic searching through my limited library revealed that they were Fish Lice. They held onto their hosts with two disc-shaped suckers, while the mouth rasped away at the hosts' bodies.

Trouble was that nowhere could I find any information about how to rid my fish of this infestation so, with the fish in a dish of shallow, warm water, I proceeded to pick the lice off the catfish with a pair of tweezers. It took ages, but since then, I've found an easier way of getting rid of them.

Fish Lice are more commonly found on coldwater fish than tropicals. The small, reddish sores that the feeding adults leave on the fish should be treated with an antiseptic to prevent secondary infections from fungus and bacteria.

The life cycle of this pest has four stages. The one we are familiar with is the adult clinging onto the fish. Mature females fall from the host and lay their eggs on a hard surface; these gelatinous egg masses are a few centimetres in length. In warm conditions, they hatch in about four weeks, so it is easy to see how an infestation can appear quite quickly in the warmth of the tropical aquarium. The youngsters then go through several more stages before becoming adult.

Fortunately for us, it is possible to eradicate fish lice from ponds using metriphonate, an insecticide that needs to be handled with great care. This will kill both the adults and juveniles. The whole pond/aquarium should be treated using the metriphonate at a strength of 0.25-0.4mg/litre.

When it comes to aquarium fish, there are some, such as piranhas, that are very sensitive to this treatment, so these will need to be treated by using a bath of potassium permanganate (strength 10-20mg/litre) for 30 minutes. Again, be careful!

Whichever method you are using, be sure to follow the manufacturer's instructions or your vet's instructions to the letter.

Tasty barbels

Barbels often crop up in conversations when people are trying to identify a fish. "It must be a catfish, it's got barbels" is a familiar one. But just how far from the truth can this be, and what is the use of barbels anyway?

Let's think about what barbels are. They are appendages which are covered with taste receptors and fish use them when searching for food. Bear in mind that these are not the only places on a fish's body where the taste receptors are found; they can occur, not only in the mouth, but also externally on the head and body of some fish and the elongated fin rays of fish such as the marine Rocklings are also used to detect food.

Catfish are the obvious examples of fishes with barbels. They use them to sweep the substrate in search of morsels of food. Although the fish can smell food from a distance, taste requires contact with the item.

Many of the Cyprinids (carps, danios, loaches, etc.) also have barbels, usually small ones at the sides of their mouths, and you only notice them when the fish pushes its mouth forward to feed.

These are the two main freshwater groups that we, as aquarists encounter. However, if you start looking in the seas, you find that the cods, mullets and many of the deep-sea fishes, to mention just a few, also have barbels.

MIKE SANDFORD

An African Catfish (*Synodontis angelicus*) showing off its array of delicate barbels.

These external taste receptors really come into their own when you think about where fish live or the time of day that they are most active. Many species are active at night, when it is dark. The deep-sea fishes, on the other hand live in an environment that is dark all the time. Others live in heavily silt-laden waters where they cannot see very far.

In these situations, eyes become almost useless, but the sense of smell to detect food at a distance is heightened. Actually to find the food, though, the barbels are used.

Barbels are not just used for sweeping or grubbing in the substrate either. Fishes with long barbels are usually hunters which use their barbels to 'triangulate' on their midwater swimming prey items before lunging to swallow them.

So, next time you are trying to identify a fish, the barbels don't just tell you that it might be a catfish, loach, danio or whatever, they also tell you a whole lot more about where the fish is likely to live and its method of feeding.

TRINIDAD & TOBAGO Calypso Fishes

PART ONE — JUMPING GUABINES & FRIENDS

Professional fish biologists and members of Plymouth & District AS, **Dr Peter Burgess** and **Stan McMahon**, 'warm up' for their Aquarian-sponsored hunt for the wild Guppy with a search for some of T+T's other fishy gems.

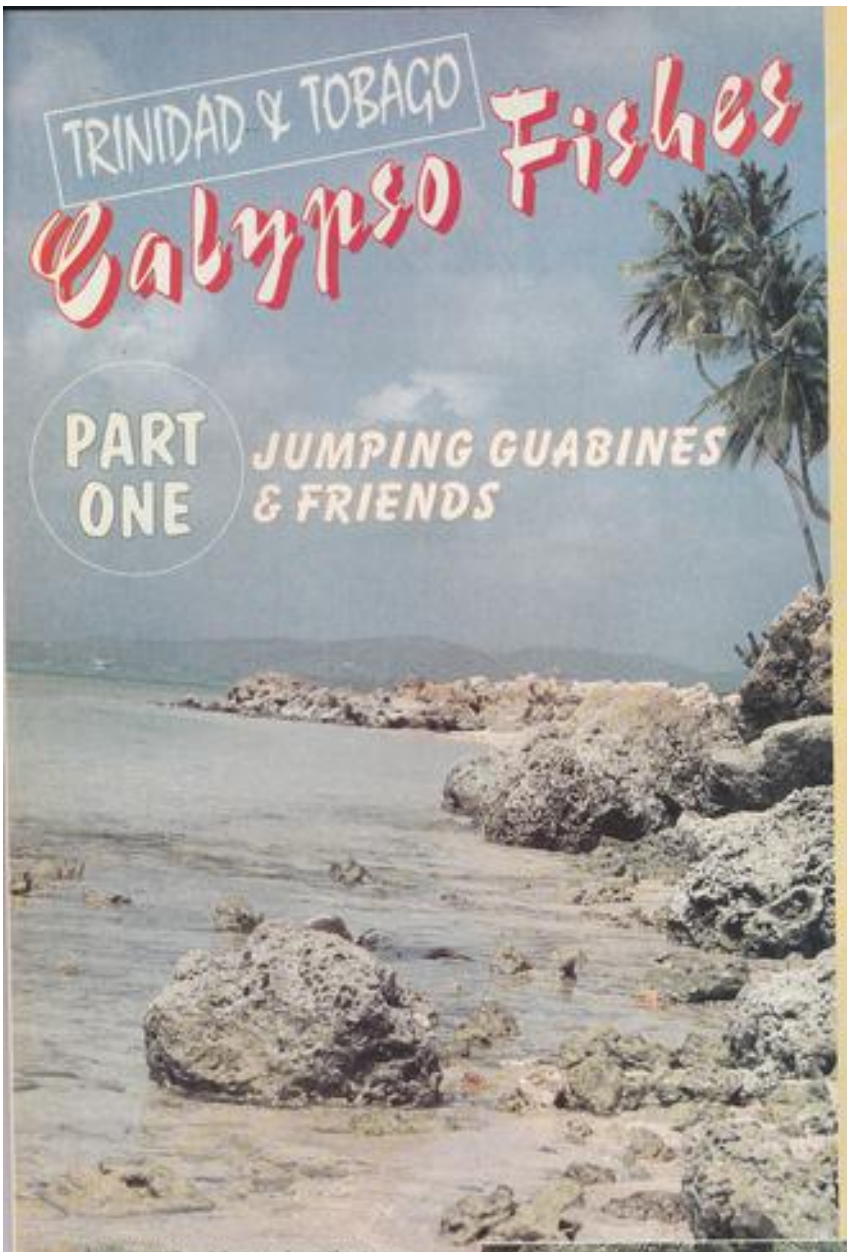
Photographs by the authors (taken on site)

This was the beginning of our Aquarian fish expedition and ahead of us were two major objectives:

① to survey and photograph freshwater and brackish fishes throughout the two islands, and

② to collect wild Guppies as part of a conservation programme. In this two-part report, we shall take a general look at some of the freshwater fishes we caught. Articles on the brackish water species and Guppies will follow at a later date.

We caught two freshwater gobies in the same stream.



MAIN PIC — It's tough at the top... you have to be able to tolerate locations such as this if you go collecting in the Caribbean!

RIGHT — This stream is home to the Jumping Guabine.

In May 1995, after some 18 months of meticulous planning, we set off for a two-week fish collecting trip in the Caribbean. Our destination was Trinidad and Tobago, two calypso islands which lie beneath the shadow of the great South American continent.

Laden with cameras, small aquaria, nets, test kits, and countless plastic bags, we finally arrived at Piarco airport in Trinidad, and here, sitting uncomfortably in the hot and humid night air, we waited for the arrival of the small island hopper plane.

Robinson Crusoe island

The twin propeller 'plane took us on the 25-minute hop from Tinidad to its smaller sister island of Tobago. When Daniel Defoe wrote *Robinson Crusoe*, he mentioned "an uninhabited island near the mouth of the Oroonoque". This may well have been Tobago, which lies not far off the Venezuelan coast in the path of South America's Orinoco River.

Tobago was to be our base for the fish surveys; peaceful and relaxing, yet within easy reach of the hustle and bustle of Trinidad. Base camp was the friendly Tropikist hotel, situated beside a palm-fringed beach where the warm Caribbean sea flopped its waves onto the shore just fifty yards away.

We knew that Tobago has a relatively poor fish fauna with just a dozen or so species including brackish gobies, pipefish, mullet and flatfish. Only three recorded species are of aquarium interest: the Armoured Catfish (*Hypostomus robinii*), Guppy (*Poecilia reticulata*) and a killifish (*Rivulus hurni*). Nevertheless, it was a good place to practise our fishing techniques while we recovered from jet-lag and adapted to the tropical sun.

Our visit was intentionally planned to coincide with the dry season, which usually runs from December to mid-May. At this

Pike Cichlids prey on all smaller fishes including Jumping Guabines and Guppies.

Freshly collected Jumping Guabine.

time, the rivers would be shallow and clear and the fish more concentrated, making them easier to observe and catch.

Travelling around Tobago we witnessed the full impact of six months without significant rainfall: over parts of the island, the rivers were dry and dusty and in the towns and villages, many roadside ditches bore little more than a trickle of dirty brown fluid.

By June or July the parched scenery would be altered, for the rains would have arrived, heralding new life to the island's vegetation and its fishes.

Jumping Guabines

It was in the hilly terrains of Tobago's forest reserve that we sampled our first freshwater habitat. We selected a promising locality along the Parlatuvier Road which cuts through lush vegetation.

Here, a small stream flowed under the road bridge and into dense forests. Its waters were clear and shallow and the substrate composed mostly of sand and stones — perfect for wading into. Water temperature was 25°C (77°F) and pH 7.1. Beside an overhanging bank, we blindly lunged our nets into thick algae and aquatic vegetation and after repeated attempts, we finally succeeded in scooping up several magnificent specimens of Hart's Rivulus (*Rivulus hartni*), both juveniles and adults, plus some large freshwater shrimps.

Hart's Rivulus is a large killifish; the Trinidad specimens generally reach 7cm (2.75in) in length, a few almost 10cm (4in). Along with cichlids and large characins, *R. hartni* is one of several species which preys on the island's Guppies — something to bear in mind if keeping this killifish in aquaria.

Its local name is "Jumping Guabine", so-called because it can leap out of water and adhere to the bank or aerial vegetation. We witnessed this strange activity at the Tobago site when a large specimen hurled itself into overhanging foliage, where it stayed for some time. This behaviour probably enables the fish to escape from predators such as the Pike Cichlid (*Crenicichla alta*), as well as kingfishers and the Trinidadian Fish-eating Bat (*Noctilio leporinus*).

We left the site nurturing a bag containing two handsome killifish specimens, along with a couple of freshwater gobies (possibly *Sicydium* sp.) which we had noticed darting between submerged rocks. We never saw *Hypostomus* catfish on Tobago, but we did eventually locate a roadside ditch which was absolutely teeming with Guppies. (*The discovery and capture of Guppies and other livebearers will — as promised earlier — be the subject of a future A&P article*).

Onward to Trinidad

Our fish collecting in Tobago was a good experience, but we knew that Trinidad held a far richer fish fauna comprising some 44 species. We boarded an island hopper from the local airport and, within minutes of being airborne, we were flying over the mountainous and fertile terrain of northern Trinidad.

We had arranged to meet up with zoologists at the University of the West Indies in St. Augustine. Two of the department's field technicians, Raj and Neil, would accompany us on our fish collecting trips over the next few days. Following a gruelling itinerary, we covered much of the island, visiting as many different aquatic habitats as we could manage: large rivers, streams, forest pools, and coastal regions. It was absolutely exhausting, but worth every roasting second!

Calypso cats

Our first stop was at a river which ran parallel to one of the island's major highways. Its slow-running waters were known to be inhabited by catfish. Trinidad is home to seven native species of catfishes, of which five are suitable for aquaria: the ever-popular Bronze Corydoras (*Corydoras aeneus*), two armoured loricariids (*Ancistrus cirrhosus* — the Bristle-nosed Catfish, and *Hypostomus robini* — a type of Plecostomus), and two bubblenest-building catfishes (*Callichthys callichthys* and *Hoplosternum littorale*).

Trinidad's two other catfish species are *Pseudauchenipterus nodosus* and *Rhamdia quelen*, both largish fishes which are infrequently seen in the hobby. Of scientific interest is a sub-species, *Rhamdia quelen urichi* which apparently inhabits the Guacharo cave in Trinidad and possesses degenerate eyes. However we could find no detailed information about this intriguing cave dweller.

The site we had visited was known to contain *Hoplosternum littorale*, (family Callichthyidae), an important foodfish on the island. Known locally as "Cascadu", *Hoplosternum* is sold by local fishermen who linger at the roadside displaying bundles of these 15cm (6in) long fish.

Cascadu apparently tastes delicious, which is why it is the most expensive fish on the island, commanding US$ 8 per kilogramme — an extravagant price for local people. No wonder there are plans to farm the Cascadu in order to meet local demand.

Of course, both *Hoplosternum* and *Callichthys* are also valued as aquarium fishes, though they are not commonly seen these days in the shops. Unfortunately, we never did see the Cascadu (or its bubblenests) in the river — not a very good start to our Trinidad expedition. However, although we didn't know it, our luck was soon about to change for the better...!

A&P

The Cascadu. We didn't actually see any in the wild — this specimen was kindly 'loaned' to us for this shot by our colleagues at the University of the West Indies in St. Augustine.

TRINIDAD FACT FILE

Location: one of the Lesser Antilles islands of the Caribbean.
Proximity to South America: seven miles from Venezuela at its closest point.
Area: 1864 square miles.
Size: 50 miles long, East to West.
Average air temperature: day 28°C (82°F); night 23°C (74°F).
Seasons: dry from December to May; wet from June to November.
Coastal sea conditions: 29°C (84°F)*, pH 8.1*, Specific gravity: 1.027*
Aquatic habitats: rivers, streams, pools, drainage ditches, swamps (at Caroni and Naviral, and coral reef (off Toco on the northeast coast).
Freshwater fish fauna: 44 native species recorded + 6 introduced species.

* measured by us at 9.15am, 3 May 95, the air temperature at this time being 35°C (95°F).

Acknowledgements

We are grateful to **Aquarian** for generously sponsoring the expedition. Thanks also to **Dr Indar Ramnarine, Raj** and **Neil** of the University of the West Indies, and to the staff of the **Tropikist Hotel in Tobago.**

Our thanks also to **Shane Batchasingh,** manager of **Nadens Court Guesthouse, Trinidad,** who took us to the best calypso bar in town! We are also grateful to the many aquarists and scientists who provided invaluable help and advice.

NEWSDESK

Match point for Stuart Turner

Six power filter units manufactured by **Stuart Turner** were at the heart of a dramatic water feature at this year's **Wimbledon Tennis Championships.**

The six pumps each produced jets of water one inch in diameter and 10 feet high, and were installed to create a display to help screen current building work taking place at Wimbledon's new centre court.

Oasis, one of Stuart Turner's largest wholesalers, supplied the pumps to **Reef World,** who constructed the temporary pools and installed the power filter units.

Carbon copy

A new blended carbon filter medium has been introduced by aquatics supplier **Interpet. Activated Aqua Carbon** is said to be a highly active filter carbon with a surface area of 1,000 square metres per gramme, which helps to make aquarium water clean and odour-free by removing toxic heavy metals and chlorine, organic waste and unwanted water treatments.

The product can be used with any type of freshwater or marine fish (one gramme of carbon per litre of water is placed within the filter canister), and is priced at just £1.79 for a 100-gramme pack.

For information, contact **Adrian Exell, Interpet Limited, Vincent Lane, Dorking, Surrey RH4 3YX, Tel: 01306 881033; Fax: 01306 885009.**

Seahorse grant

London Zoo Aquarium has been awarded a grant by the **Fisheries Society of the British Isles** for the project of conservation of seahorses in captivity by improved husbandry and captive breeding.

Steve Matchett, of London Zoo Aquarium explained that seahorses are not, at present, on display to the public, but the project has been running 'behind the scenes' at the aquarium for three years. "We have had some very encouraging results," he added. "A longevity of three years has been accomplished and offspring from the project have already reached over two years of age."

The grant will provide for an improved filtration system and extra rearing tanks, while the long-term aims of the project are to provide detailed information on successfu husbandry to enable seahorses to be kept for years, rather than months.

According to Steve, breeding and rearing large percentages of young to maturity, and an investigation into prevention and treatment of seahorse-specific diseases, will now form the bulk of the continuing research. "As seahorses are under considerable strain in the wild, any information which enables better techniques for keeping these fascinating fish as a hobby, or as part of a captive breeding programme, will be very welcome," concluded Steve.

Tetra draws crowds at Hampton

Over 1,000 visitors to this year's **Hampton Court Flower Show** entered a competition at the display by pond foods manufacturer **Tetra.**

No fewer than 120 visitors won prizes and, on the Saturday alone, the competition, which ran throughout the show, attracted a staggering 148 entries.

The competition was centred around a magnificent show pond, and entrants had to guess the total value of the fish in the pond. A main clue was provided by the company, who let it be known that one fish alone was worth £15,000. "Many people guessed very close to the actual value, which was £31,405," explained **Dr David Pool** of Tetra, whose book *Hobbyist Guide to Successful Pond Keeping* was the overall favourite prize.

An unexpected highlight of the Tetra stand was an exciting spawning display by the fish in the pond. Explained David: "The Tetra stand was on one of the main thoroughfares of the exhibition, so we guess that something like 150,000 people actually saw the stand. But the aisles were totally blocked on one day by crowds gathering to watch the Koi in full flight, making a tremendous noise as they splashed around in the water during spawning."

Tetra's Koi generated quite a splash... and masses of spawn at Hampton.

Marines on database

Over 1,860 species of coral reef fish have already been incorporated within a major database of over 33,500 geographic records being compiled and developed by the **IUCN Species Survival Commission's Coral Reef Specialist Group (CRSG).**

Data are being recorded as both geographic points and occurrence in a global grid devised by **Ocean Voice International,** with which CRSG is associated. The purpose of the database is to provide information on the distribution patterns of coral fish. A second layer of data is also being planned to include information on human activities that affect coral fish and their habitats.

CRSG is seeking funding to enable mapped distribution of coral reef fish available on CD ROM.

For further information, contact **Ocean Voice International, PO Box 37026, 332 McCarthy Road, Ottawa, ON K1V 0W0, Canada. Tel: +613 264-8986; Fax: 613 264-9204. Email: ah194@freenet.carleton.ca.**

Cascade goes 'Super'

Pond accessories manufacturer **Hozelock** has relaunched its highly-successful **Cascade** range of pond pumps, to incorporate new design features and additions to head a broad series of new products introduced into the company's portfolio. (**see Trade Talk** in last month's issue of *A&P*).

The retitled **Super Cascade** range includes five models, from the **Super Cascade 100** to the **Super Cascade 2000,** which are each available in both mains and low voltage versions; there is also a version for indoor use. All pumps in the range are manufactured to meet CE requirements and Hozelock believes it is the first company in the aquatic field to comply with this European standard.

Hozelock is the only company which designs and manufactures its own range of pond pumps in the UK. **Mike Pugh,** divisional manager of **Hozelock Aquatics,** remarked: "The company is now in a strong position as the leaders in the design and development of pond pumps. It is 15 years since the first Cascade pumps were launched and this dgsign, based upon extensive experience and success, is the standard bearer for the future generation of pond pumps."

For further information, contact: **Hozelock Aquatics, Haddenham, Aylesbury, Bucks. HP17 8JD. Tel: 01844 291881; Fax: 01844 290344.**

FASCINATING FISH FACTS

A Whale of a Cat

Catfish are versatile creatures. They are found in a huge range of habitats and exhibit an almost bewildering array of permutations based on the basic barbel-faced format.

Among perhaps the least catfish-like cats, are the Whale-like Catfish of the family Cetopsidae. They have (mostly) very small eyes, are scale-less, have three pairs of barbels (no nasal ones), a highly reduced swim bladder and no adipose fin. There are four genera containing only 12 species.

What makes Whale-like Catfish unusual is their predatory habits. Strong teeth and streamlined, smooth bodies allow them to open up large holes in the bodies of their prey, and it is quite common for large fish of other species that are caught by fishermen to contain one or more Cetopsids lodged inside the body cavity still voraciously feeding!

So much for the docile image of catfish created by the ubiquitous, well-loved Corydoras.

John Dawes

JOHN DAWES

Cetopsis sp. — a most uncatfish-like cat.

Name-taking fish

Here's something to think about! Many fish take their names from other kinds of animals — Zebra Danios, Catfish, *Tiger* Barbs, Parrotfish, Porcupine Pufferfish etc.

Try spending just a minute or two writing down any more that come to mind and you will find you can produce a long list with ease. Yet, how many mammals, birds, insects and so on are named after fish? Even after several minutes, you'll be hard-pushed to think of any at all!

Why isn't there a *Herring Wolf* or a *Shark Lion*? Perhaps it's because fish come in such a huge variety of shapes and patterns that it's inevitable that some resemble other creatures.

The puffer in the photograph is a perfect example. Ask someone who knows nothing at all about fish what it reminds them of. Most people will say, "a dog", so it comes as no surprise to find that its common name is — the Dog-faced Pufferfish.

Linda Lewis

LINDA LEWIS

The aptly named Dog-faced Puffer.

QUESTION TIME

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

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

Yellow Tangs do best as a shoal.

SIMON YOUNG

MARINE

Taking stock

1 I would love to keep a surgeon species, but have no algae in my aquarium to speak of. What can I do?

You say that you have no algae "to speak of". Well, as long as it is green, what you do have will probably be enough to satisfy a tang. However, you should offer spinach or lettuce at least twice a week as a supplement.

2 I cannot decide between a Yellow Tang or a Regal Tang for my next fish. I already have a clownfish with an anemone, a Bicolor Angel and a Bicolor Blenny. What do you think?

Either will be fine with the fishes you already have. However, the Yellow Tang looks its best when it is kept in a group, so the Regal Tang is probably a better bet for you.

3 I have a 50-gallon aquarium which houses a King Angel and a lionfish. Could I add a triggerfish?

Absolutely, as long as you don't overstock. Your tank probably contains around 40 gallons of water, so your maximum stocking capacity is 20in of fish.

4 Could I add a Queen Triggerfish to an aquarium housing a collection of invertebrates and one or two small fish?

Absolutely not! The trigger would eat not only the invertebrates, but the small fishes as well.

TROPICAL

Sandy bottoms

I was thinking of using sand in my tropical tank instead of gravel as a substratum.

If I do, will I still be able to grow plants? Are there any advantages in using sand as a bottom medium, in addition to its appearance?

In my opinion, sand is a lot better than gravel for tropical (and coldwater) aquaria. Plants, for example, will grow longer roots and thrive, the fish will sift the sand searching for food, and species, such as many catfish, will be healthier (some species need to wallow in the sand to keep their skin clean).

Sand is easy to clean because it can be siphoned out, and aquascaping looks very natural with partly buried rocks and logs etc.

The best (and, for once, the cheapest) sand is 'Play Sand' from The Early Learning Centre at £1.99 in a carry-home 10-kilo bag (enough for up to a 4-foot tank). This is specially selected, sterile, soft sand that only needs a rinse before use. Of course, some specialist aquatic shops will also sell excellent aquarium sand.

Tracking Aqua Zone down

Earlier this year, I read with interest your Traveller's Tales article regarding the Japanese Fish computer programme named Aqua Zone.

I have been trying to obtain a copy for months, but without success. Please advise.

I would also like to know what computer you, yourself, used... or did you just see it on an Apple-Mac?

The Aqua Zone program is on disks for the Macintosh PC (not IBM) and is only available (so far) in Japan. There is an English language version for screening reading, but the instruction booklet is still Japanese.

Copies are available in Tokyo PC stores, or write to **Cracker (Lits Compute & 9003 Inc), Keikoui Bld. 3F, 3-14-6, Sotonkander, Chiyda-Ku, Tokyo 101, Japan.**

Aqua Zone has continued to run in the background of the Mackintosh PCs in the Yorkshire office where Aquarian is manufactured and several 'generations' of fishes have 'been born' and 'raised' since the *Aquarist & Pondkeeper* article published last February!

Aqua Zone in action.

DR DAVID FORD

HERPETOLOGY

Snakes for beginners

My son wants to start keeping snakes but I am not sure which kind to buy. Can you advise me on a suitable species for a beginner?

Before venturing into snake keeping, it is advisable to read as much as you can. It is also a good idea to join a society and talk to other keepers. In addition, some societies provide care sheets on various reptiles.

A captive-bred snake would be easier for a beginner to manage than a wild-caught specimen. Many wild snakes will attempt to bite and may produce a nasty-smelling fluid in defence. Juvenile specimens are also more likely to become amenable.

The type of suitable food may determine your choice, so please read the following before you decide.

1 **Corn Snakes** (*Elaphe guttata*) are attractive and not difficult to keep, but you would have to have a supply of frozen mice in your freezer. This species is commonly available as captive-bred hatchlings. Adult size is about 120cm (4 feet).

2 **Garter Snakes** (*Thamnophis* species) are fish-eaters. The fish needs to be warmed for 15 minutes at 85°F (30°C) to destroy a certain enzyme (DO NOT MICROWAVE THE FISH!). Whitebait is frequently used as it is a complete meal. Captive-bred specimens are often available. Wild-caught specimens will sometimes become tame. Adults reach 60 to 70cm (24 to 28 in).

3 **Rough Green Snakes** (*Opheodrys aestivus*) mainly eat crickets. However, some people don't like crickets in the house, as they may escape and become pests. These snakes can move very quickly and may be difficult for a beginner to handle. They seldom attempt to bite, though. They are frequently imported, but captive-bred specimens are sometimes available. Size up to 80cm (32 in).

4 **Dekay's Snake or Brown Snake** (*Storeria dekayi*) feeds on slugs and worms. They are small (adults 33cm — 13in), harmless snakes which need only a small vivarium. Food must be pesticide-free and not all slugs are suitable: the best types are the soft-bodied, light brown or grey species. Do not use brandling worms. This snake is not imported as frequently as formerly, but is occasionally available.

Returning newts

How long does it take a Smooth Newt to mature and breed? Once they are old enough to do so, do they return to the same pond like Common Frogs and Common Toads do?

Finally, if they always return to the same pond, how does the species spread to new locations and what is the main thing that determines whether a new pond is suitable or not?

According to reports, the Smooth Newt may take anything from two, up to possibly five, years to mature to breeding age, depending upon which part of the country is in, summer and winter temperatures and food supplies.

Normally, the adult newts do go back to the same pond year after year, like the Common Toad and the Common Frog. However, some of the young of all three species emigrate after metamorphosis to colonise other ponds, otherwise overpopulation would ensue.

If their pond is destroyed, the adults will then have to seek out other suitable water, possibly delaying breeding until later that year or the following year. The suitability of a pond partly depends on the proximity of an appropriate habitat for the terrestrial stage. As a rule, the Smooth Newt tends to wander no further than about ten metres from its terrestrial hiding place.

Hatchling captive-bred Corn Snake.

BOB & VAL DAVIES

COLDWATER

Although Goldfish will spawn quite easily and frequently, raising the fry in a pond without protection is considerably more challenging.

JOHN DAMES

Raising fry

For several years now we have had a pond containing Goldfish and Shubunkins. In the past we have occasionally seen young fish which we assume are baby Goldfish. Unfortunately, none of them have ever made it to adulthood. How can we go about raising some of them?

Goldfish not only eat their own eggs, they eat their young as well. Most fish do. In order to rear these youngsters, you will therefore have to separate them from any fish large enough to swallow them.

This can be done in various ways. If you only have one pond, you can make a temporary pool. A good sized children's paddling pool is one solution. Alternatively, some planks of wood and plastic sheeting can make a very useful nursery. Be aware, though, that most temporary pools are very shallow and that, as a result, the daytime and night-time temperatures will be widely different.

Always provide shade to prevent the sun from overheating the water and cooking the contents. For the colder nights, some kind of cover is a good idea. A piece of clear polythene held in place will help slow down the temperature loss.

Make the pool 'comfortable' for your babies by providing some suitable plants etc. Also, I think it's good practice to change some of the water from time to time; perhaps a third of the water once a week.

This kind of outside accommodation is fine during the milder weather, but, by late autumn, the night-time temperature will be down in the 40's°F (5-ish°C). This is too low for young fish less than a couple of inches long. Some may survive, but most will die due to the fact that they stop feeding and gradually become weaker. Our winters are simply too long for all but the hardiest.

The alternative is indoors accommodation. If you don't have the facilities to set up an indoor pond, then a good-sized aquarium can be used instead. It doesn't need to be fully furnished unless you prefer it that way. A small power filter or, better still, an air-operated filter, will help to keep things healthy. You will, of course, still need to part change the water at intervals.

Don't try to rear too many fish. For a three-foot tank, I would select about eight or nine one-inch youngsters; fewer if they are larger.

Pond deaths

We have a pond measuring 8x4ft. It contains a water lily, lots of oxygenating plants and nine Goldfish. (we used to have 14).

Everything seems healthy. The water goes a bit green now and then, but it soon clears itself.

Earlier this year, though, we lost five of the fish. They didn't look sick or damaged, just dead.

Why do you think this happened... and how can I prevent it happening again?

For a pond the size of yours, nine Goldfish sounds about right to me. Much depends on the size of the fish, however. I find that for each 4 to 6in fish, about 3sq ft of surface area works well. For larger fish, much more space is required.

Losing fish at certain times of the year, eg. in the spring, is a common problem. As temperatures rise, disease-causing organisms start to multiply, but the fish, after a long winter, are in a weak condition and fall victim to these pathogenic creatures.

Some very good pond water treatments are available which will keep the 'bug count' down until the fish are fit enough to cope, so if your losses were spring ones, I would bear this in mind for next season.

There could be other reasons for your losses, of course. For example, I don't know how often you clean out your pond but, for smallish ponds, I would recommend a clean-out every year just before winter sets in.

KOI

Safe preservation

I am very concerned that I need to use a wood preservative on my filter covers and shortly intend erecting a pergola over my pond.

I have been informed that I must be very careful as to the type of preservative which I decide to use. Would you please recommend a suitable and reliable product?

Naturally, any treatment in close proximity to the pond needs careful consideration before applying, as many of the available products will create toxins and must therefore be considered dangerous if permitted to leach into the water.

What has to be considered is the residual effect of a specific treatment once it is apparently dry to the touch. For this reason, oil-based preservatives, including creosote, are unlikely ever to dry out completely. Most wood stains are, in fact, categorised as oil- or spirit-based products, so these need to be avoided whenever possible.

I have regularly used Sikkens Wood Treatment quite safely on my filter covers with no cause for concern. It is a translucent wood finish and gives good all-round protection without fear of toxicity. Most standard polyurethane varnishes, once dry, will give safe protection, but they do need good ventilation when initially applied. There are also a number of water-based wood preservatives that have been used in the past and are worth considering.

Apply the material away from the pond area. Once the final coat has been applied and is dry to the touch, then, as an additional safeguard, hose-pipe down all treated timber to remove any likely residue that may be present before placing the treated wood into final position.

If you need confirmation on any other wood preservative, why not telephone the manufacture direct for further advice? You will find their technical departments very helpful in such matters.

Quality solution to blanket weed

My small pond (500 gallons) is in full sun all day. It has no UV steriliser or other extras, but there is a Bullrush, a water lily and and the plant whose name I don't know. The water has not been changed for two years. Despite this, the water is crystal-clear and there's very little blanket weed.

I now want to build a 4,000-gallon Koi pool and wonder if I will be just as lucky with regard to blanket weed. Everyone I know has problems with these algae, so I am quite concerned and would welcome your advice on how to prevent the problem arising, rather than having to treat it.

For blanket weed to grow, it requires (1) sunlight, (2) nitrate from ammonia waste by-products, and (3) the presence of fish. It does not survive in neutral to acid pH water conditions, preferring higher pH readings around 7.7 and above. If you have not been changing water for two years and with rain water always being of acid pH composition, I would expect that is the reason for the reluctance of blanket weed to appear.

However, Koi do not prosper too well (growth, colour and pattern) in pH readings below 7.3. Other coldwater fish may be quite happy under such conditions and if that is your main consideration to keep blanket weed away, then do not keep Koi in acid conditions.

Most Koi keepers develop a filtration system to take care of all nitrogenous waste products and spend considerable time maintaining such a system. Sunshine — another factor — can be restricted quite easily in many ingenious ways. Besides, Koi will always seek shade rather intense light, so why not provide it for them?

JOHN DAWES

Blanket weed: a 'multi-directional' approach to its control should be adopted.

Fitting ultra-violet lamps (UV 'filters') will do absolutely nothing to control blanket weed growth. Overcrowding, overfeeding poor filtration and excessive light are all main factors that encourage blanket weed development. Refusing to change water is not the answer to your fears regarding the building of your new pond.

Investigate ALL the options for good filtration and water maintenance. This is where the secret lies: in top water quality and pond management.

PLANTS

Fearful advice

I would like to try growing *Nuphar sagittifolium* in my 30x12x15in aquarium. Would this be possible, and, if so, what advice would you give?

Often popularly known as The Cape Fear Spatterdock, this species is imported by the thousands from distributors in Florida. However, very few plants, in my experience, ever survive the transition to aquaria. This is a pity because it is probably the most beautiful species around and, coming from a sub-tropical region, the most suitable of the Nuphars for cultivation in tropical aquaria.

The plant has a fleshy rhizome (creeping stem) from which arise long, arrow-shaped, light-green, pellucid (transparent/translucent) leaves. The leaf blade is 30-40cm (12-16in) in length and up to 10cm (4in) in width. The petiole is only 10cm or so long. This species does not produce floating leaves.

It can withstand quite high temperatures up to 82°F (28°C). It seldom flowers in aquaria and is difficult to propagate. It requires a pH of 6.8-7.2, good lighting and a substrate consisting of fine sand and clay. Generous feeding at the rootstock will result in large plants.

The problem with propagation and trying to establish newly imported plants lies with the rootstock. When the rhizome is severed, the end quickly becomes infected with bacteria and fungi, leading to a progressive rotting until death of the whole plant occurs. This is a common problem in other Nuphars, but is a far more acute condition in this species than in the others.

My own remedy is to wrap the plant in damp newspaper and polythene, leaving the cut end of the rhizome exposed to the air. I then rub a mixture of sulphur powder and charcoal onto the cut end and leave it until dry. The plant has a better chance of establishing roots using this method.

BARRY JAMES

The elegant underwater foliage of the Cape Fear Spatterdock.

Eliminating the masses

My pond is fed by a small stream. Unfortunately, every spring, it is covered up by ugly brownish-green masses which, on sunny days, float to the surface, making a horrible mess.

After heavy rain, I have noticed that it usually disappears, only to return as soon as the sun comes out.

Once the aquatic plants have started to grow strongly in June, it is no longer a problem, but always reappears the following spring.

Can you shed some light on this problem and offer any solution? I obviously want to prevent the same thing happening again next spring.

Your problem is caused by the stream, which, during the winter, contains large quantities of silt and, consequently, introduces copious amounts of nutrients to the pool. This encourages the growth of diatomaceous algae which form in the rich silty layer that covers the bottom.

Under the influence of sunlight, these organisms release oxygen which, becoming trapped in the detritus, makes the masses float to the surface. Rainfall breaks up these masses up, releasing the oxygen and allowing them to sink.

The only answer is to build a silt trap between the exit point from the stream and where the flow enters the pool. Details of how to build these will be found in any good book on river management or trout farming.

Water in

Our native Yellow Flag is an impressive late spring/early summer flowering choice.

JOHN DAVIS

Marsh Marigold — one of the early bloomers.

JOHN DAVIS

Now is the time to lay down your plans for a gloriously colourful 1996 pond season, with a little help from **Susan Stephenson.**

Autumn and winter are very good times for planning your plants for next year's pond and margins. In fact, with careful planning now, it is possible to ensure colour and interest from spring right through to autumn.

Early candidates

For early spring colour, an ideal choice for margins is the King Cup or Marsh Marigold (*Caltha palustris*) with golden, buttercup-like flowers on branching stems and deep green kidney-shaped leaves. It will grow on any marshy soil or heavy loam and enjoys full sun. Double and white (*C. palustris alba*) forms are available and a second blooming can occur midsummer.

Some of the Irises, such as *I. reticulata*, which flowers from February onwards with violet-blue scented flowers, and *I. unguicularis* will give additional spring colour for the margins.

The Lysichitum or Skunk Cabbage species with their bright yellow or white flowers make an impressive mid-late spring show at the poolside, while the Water Hawthorn (*Aponogeton dimachyus*) is a desirable and attractive plant for any size pond, with its white flowers with black anthers forked from a single spike and delicious hawthorn fragrance. It has a tuberous rootstock which enlarges to the depth it is grown in, though the best range is from 45-60cm (18-24in) deep.

The leaves are oblong, lanceolate, bright green and float on the surface. It flowers in the spring and often again in the autumn with, maybe, a third showing during a mild winter spell. It will grow in ordinary soil and may be grown from seed or propagated by division of the tubers. Golden Club (*Orontium aquaticum*) will provide bright yellow colour in late spring.

A little delicate but very pretty is the Water Violet (*Hottonia palustris*). This beautiful oxygenating plant has attractive whorls of violet flowers in the spring and delicate underwater foliage. In the autumn, *Hottonia* forms winter buds which sink to the pond bottom and growth will restart in the spring.

Later choices

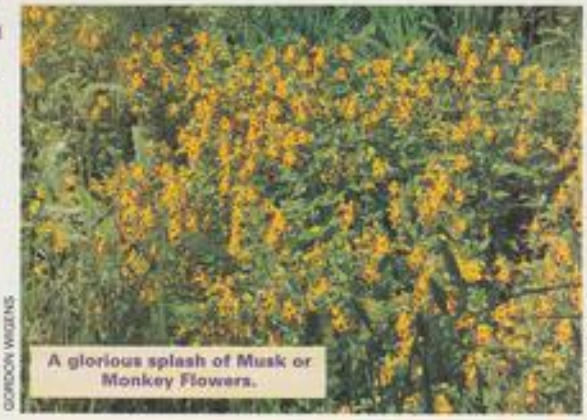
The native Yellow Flag Iris (*Iris pseudacorus*) will take over from the early blooms in late spring to early summer. These suit 2-3 inches (5-7cm) of water and clay loams. They are a clump-forming rhizomatous plant.

I. laevigata is a blue form and *I. alba*, a white. *I. laevigata* is attractive for gardens; it has variegated leaves and pale blue flowers. Irises come in many varieties now and, with their bold flowers and throat-spots, make eye-catching displays.

Water Forget-me-not (*Myosotis palustris*) is a British native growing in marshy ground by ponds and streams. Attractive, with its dark green glossy foliage and bright blue flowers appearing freely through spring and summer, it will grow either in mud at the end of a pool or scrambling right into the water.

It is shade-tolerant and although sometimes avoided because of its tendency to spread, this is easily controlled by thinning the shoots in spring. The variety *M. palustris* 'Mermaid' has brighter and larger flowers. *Myosotis* is ideal for covering

SUSAN STEPHENSON

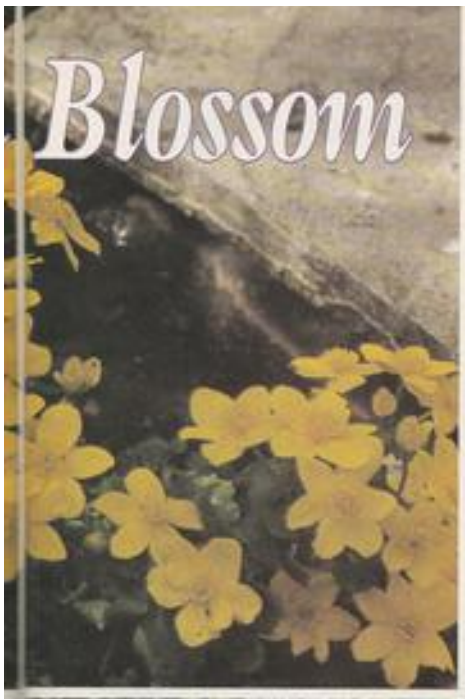


A glorious splash of Musk or Monkey Flowers.

GORDON WIGENS

GORDON WIGENS

Blossom



Iris, ferns and assorted other plants in typical June stages of growth.

concrete edges of the pond.

The Water Buttercup (*Ranunculus palustris*) will flower with clusters of white, small flowers in May. Bog Arum (*Calla palustris*) will flower in May and June and additional colourful interest is added in the autumn by the appearance of brilliant red seed heads.

Summer bloomers

Early summer is the flowering time for the Flowering Rush (*Butomus umbellatus*) with its umbels of rose-pink cup-shaped flowers on 90cm (3ft) stems. It likes water about 6 inches (15cm) deep. The Ginger Lily (*Hedychium gardnerianum*) is another summer flowering plant with its pretty yellow flowers with red stamens and is suitable for using outdoors in standing pots.

The Water Hyacinth (*Eichhornia crassipes*) is a pretty, showy summer-flowring plant with its floating leaves which have huge sausage-shaped petioles which act as floats. The flowers are violet-blue in colour with visible blue and gold peacock markings on the upper petals. This plant is killed by frost, so is treated as an annual in this country.

Musk (*Mimulus*) provides colour for the pond edges and a spectacular variety is *M. cardinalis* with large red flowers on branched stems from June to August. It is hardy in all but the very coldest parts of Britain. Only a light trim is required to encourage new growth.

Summer fragrance and colour can be provided by the Fragrant Water Lily (*Nymphaea odorata*). The floating flowers of 3-6 inches (c17.5-15cm) in diameter may be white or a glowing pink and they give a heady scent. The flowers only survive 3-5 days, but will keep coming until September. The leaves are attractive, large, fleshy, deep green with mauve undersides. They add class to any pond.

There are many varieties of water lily available now suiting smaller ponds, and growing them in submerged baskets or containers is an effective way of reducing spread. A good variety for small to medium sized ponds is *N. rose-alay* which is a hardy perennial. Varieties available now include the Pygmy Water Lily (*Nymphaea tetragona*), the Red Water Lily (*Nymphaea rubra*) and many more.

Many Lobelias (like *L. cardinalis*) have attractively coloured foliage (these specimens are just about to flower).

LINDA LEWIS

Water lilies have the added attraction of keeping algal growth to a minimum, as the leaves cover the surface, reducing the amount of light reaching the water. The plants also absorb many of the nutrients and minerals essential for algal explosions.

Later arrivals

Wampee or Pickerel Weed (*Pontederia cordata*) is another summer flower with its spikes of blue blooms with golden eyes on 60-cm (24in) stems appearing in August. It is a robust perennial preferring 6-12 inches (15-30cm) of water and heavy loam soil.

Arum Lilies (*Calla aethiopica*) are moisture-loving perennials suitable for the margins or edges of the water. They may be hardy in the south of England, but further north, need bringing inside over winter.

Other colourful water plants which will flower through summer include Bladderwort (*Utricularia*), Frogbit (*Hydrocharis*), Arrowhead (*Sagittaria*), Ragwort (*Ligularia*) and Hydrangeas (margins).

A slightly unusual flower for the margins with its deep blue trumpets of flowers from July to September is the Gentian (*Gentiana asclepiadea*). It likes damp soil without lime or much sun and so is ideal for a shady marginal bed.

Unsurpassed for their late summer and early autumn colour are the *Lobelia* family (Campanulaceae). There are many varieties, of which *L.*

There are hardy Water Lilies (this is *René Gerard*) for every type of pond.

GORDON WIGENS

Hostas (seen here with their feet in water) are becoming increasingly popular pond-edge subjects.

fulgens is probably the easiest to grow in the water garden. They are distinctive and stately water garden plants. They prefer a rich damp soil that does not dry out in the summer and will appreciate a 3-5cm (1.2-2in) covering of straw over winter to avoid the swings of temperature that can occur. The one protection Lobelias are almost guaranteed to need is from slugs, so pellets can be incorporated into the winter covering.

Bugbane (*Cimifuga*) are graceful late summer-early autumn flowering plants and hardy perennials. They thrive in moist, rich soil in light shady borders. In spite of the fact that most grow to over 4 feet (120cm), they rarely need support. They are easily propagated by division of the rootstocks in the autumn.

Planning tips

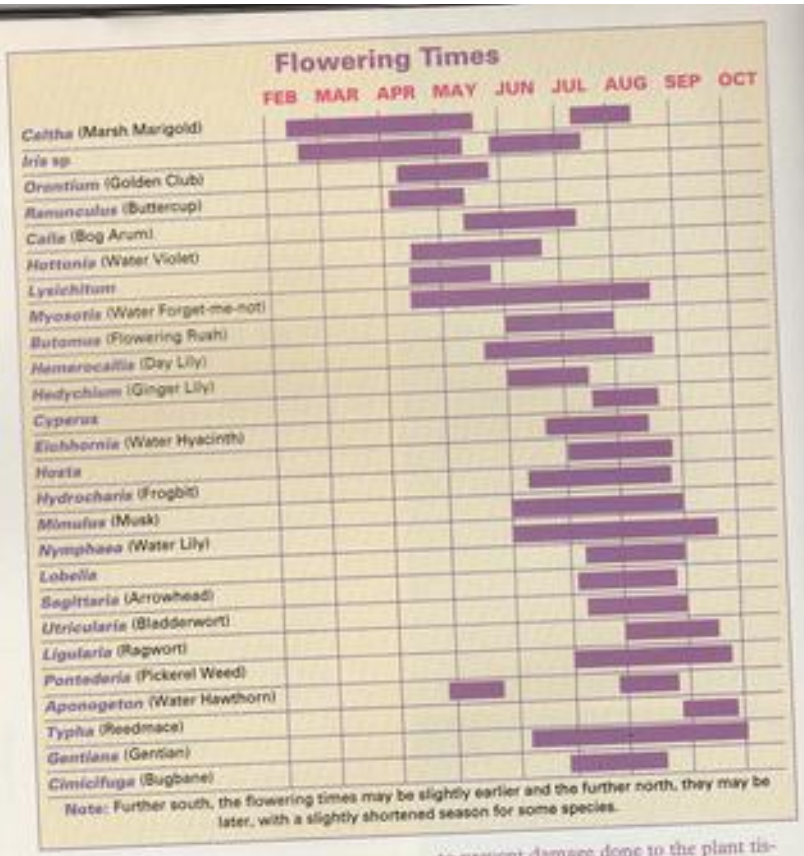
It is a good idea to plan your planting scheme in terms of both timing and colour and to include plants for the margins, as well as the pond itself. The chart shows a rough guide to the plants which will be in bloom at different times of the year. Of course, this cannot allow for variation with location, and plants in northerly ponds will be a little later than those further south.

Colour can be provided not only by the blooms of plants, but by the foliage and even the de-leafed stalks, such as those of the Dogwoods (*Cornus alba*) which can provide interest throughout the winter months with their red coloration.

Hostas provide solid leafy blocks and ferns can add extra interest to any pond margin. Varieties include the Royal Fern (*Osmunda regalis*) which has wide arching fronds that hang gracefully over the water and *Scolopendrium* species, which have glassy leaves and are evergreen.

When planning the colours in a pond you can either work to a theme of one particular colour (whites and yellows can be particularly effective in the water when shown against a background of green margins), or you can work to have a variety of mixed colours, where the pond always provides something starting to bloom as another fades.

Flowering Times



Note: Further south, the flowering times may be slightly earlier and the further north, they may be later, with a slightly shortened season for some species.

Winter care

Overwinter care need not be hard labour, but some basic precautions need to be taken to ensure survival of stock for next year.

1 For Arum Lilies, the water level should be reduced so that the rhizomes can lie dormant, unless they are totally submerged.

2 The fleshier leaves and crowns of marginal plants, such as the giant *Gunnera manicata*, may be covered towards the end of the year before the first frosts are likely, with leaves, ashes or straw to protect them throughout the winter.

3 Marginal plants should be trimmed back, even the hardy perennials, to keep the water free from excess debris and to prevent damage done to the plant tissues by trailing in freezing water.

4 Some plants which are known to be non-hardy, such as Umbrella Grass (*Cyperus alternifolius*) should be lifted in their pots and placed in a frost-free place before the first frosts appear.

5 Ginger Lilies should be treated similarly to Dahlias or Cannas and overwintered under cover.

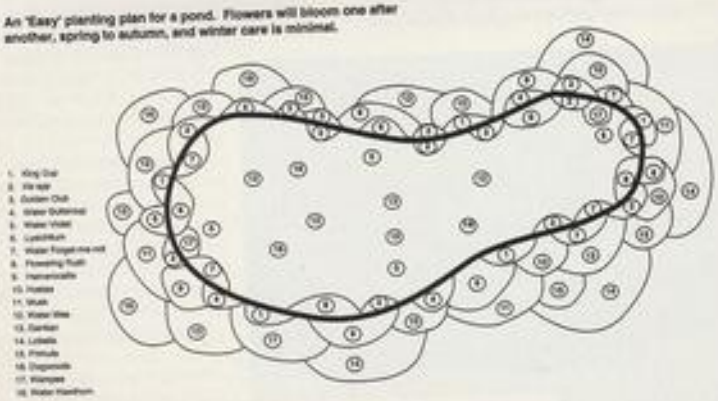
6 The Water Hyacinth is killed by frost, so some plants should be placed packed tightly together in a bowl of plain loam and kept damp in a light, warm situation over the cold months.

7 The hardy water lilies, such as the Pygmy Lily and Fragrant Lily, should survive the winter outdoors, as long as there is a minimum of 18in (45cm) of water covering them, but for less hardy types, such as the Red Water Lily, the tubers should be dried and stored in moist sand over winter.

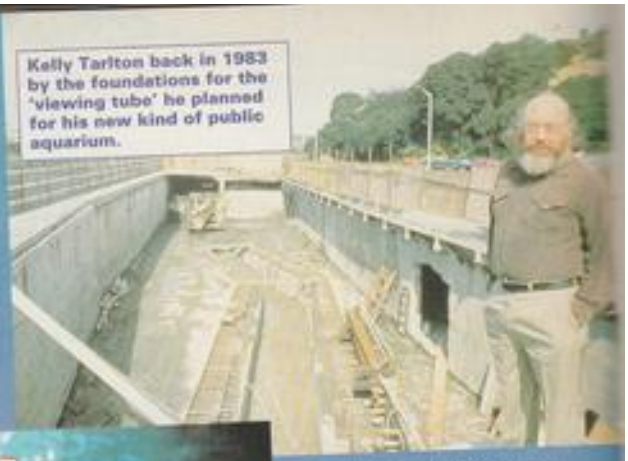
8 Frogbit and Bladderwort form turions (winter-buds) for the winter, and these should be collected before they sink and kept in a little water in a cool place until the spring.

Whether you wish to grow delicate plants, or stick to native flowering varieties, it is possible to plan the pond so that, as one variety fades, another bursts into bloom, thereby providing year-round interest and colour. And the great thing about it all is that you can do your detailed planning right now, while our aquatic plants and animals are just ticking over as late autumn and winter begin to extend their cold fingers over ponds and pondkeepers alike. AAP

An 'Easy' planting plan for a pond. Flowers will bloom one after another, spring to autumn, and winter care is minimal.



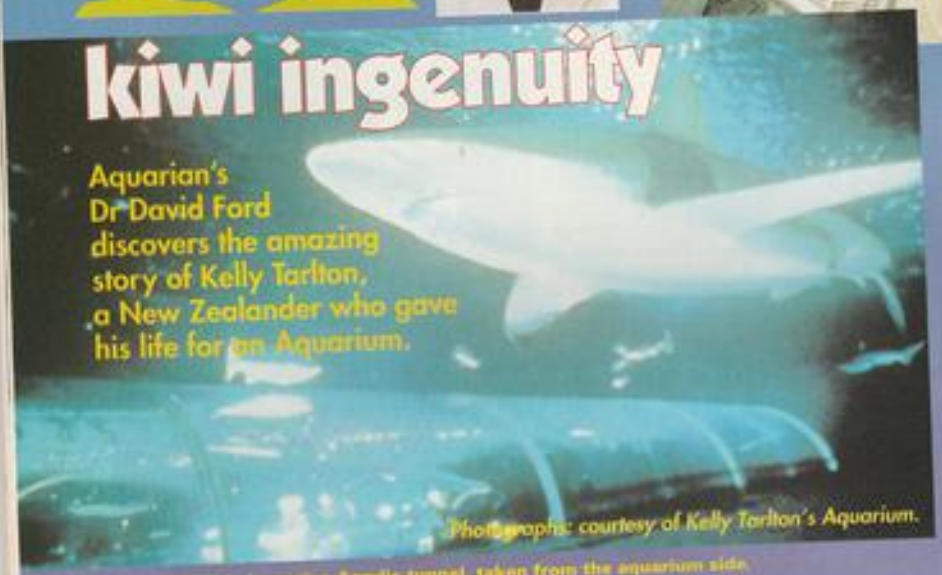
TRAVELLER'S TALES



Kelly Tarlton back in 1983 by the foundations for the 'viewing tube' he planned for his new kind of public aquarium.

kiwi ingenuity

Aquarian's Dr David Ford discovers the amazing story of Kelly Tarlton, a New Zealander who gave his life for an Aquarium.



Photographs: courtesy of Kelly Tarlton's Aquarium.

A view of Kelly's inovative Acrylic tunnel, taken from the aquarium side.

New Zealanders (or Kiwis as they are affectionately called) had to be inventors. As the last outpost of the old British Empire, settlers were so far from the mother country that ingenuity (and serendipity) were necessary to survive. To this day, more patents are granted to New Zealanders, as a percentage of population, than any other country in the world.

They invented things like disposable needles, electric fencing, reclosable lids, powered small boats and much more. Combined with Maori strengths, they are also world beaters in many sports, of course.

A Kiwi called Kelly

As a child, New Zealander Kelly Tarlton was fascinated by the Jacques Cousteau underwater films and vowed to be an underwater explorer when he grew up. With predictable ingenuity, he built his own scuba diving gear and soon became famous for his underwater photography and tales of the sea.

He made his fortune recovering bounty from sunken wrecks, many of which were famous, such as Captain Cook's lost anchor in Tahiti. He established the Museum of Shipwrecks at Whangaroa Harbour in the Bay of Islands, Northern New Zealand. But his one ambition was to bring the beauty of the underwater world to the public; he wanted to build an aquarium where visitors could somehow enter into the world of the fishes.

He chose a site called Takaparawha Point (once the home of the Maori Ngati Whatua tribe) in Waitemata Harbour near the city of Auckland, North Island, and started building Kelly Tarlton's Underwater World early in 1984. It was hard work, but also very stressful, because he wanted to build a tunnel through the aquarium and all the engineers he contacted said it couldn't be done.

Kelly Tarlton inspecting the completed acrylic tunnel for any leaks after filling the tank. It didn't — which confounded his critics!

His doctor also warned him that his heart could not stand the strain.

The acrylic tunnel

The solution to Kelly's problem for underwater viewing was to import huge flat 65mm thick sheets of plastic 'Acrylic' (from Germany) and bend them into a half moon shape. To do this, Kelly used Kiwi ingenuity, building his own special ovens that baked the plastic and allowed moulding into a dome.

The plastic sections were buried in redundant stormwater tanks once owned by the New Zealand Government. These sections were joined and sealed into a long tunnel through one tank and looped back to the start through a second tank. Even a moving floor was used so that visitors were swept through the aquarium with clear, dry and safe views of Kelly's World of the Sea.

He stocked the seawater-flooded tanks with 1,500 species of fishes from New Zealand waters, such as seahorses, reef fish, cave and schooling fish, with giant eels, stingrays and sharks in a separate tank. The aquarium opened in January (the height of their summer, of course) 1985 and was an immediate and huge success. Kelly saw the 100,000th visitor within five weeks of that opening when his heart gave up and he died, at only 47 years old.

The Kelly Tarlton Aquarium is now a monument to his dedication and ingenuity, with added attractions such as the Antarctic Encounter and Conservation Work, an Education Centre, a shop and cafe. This format has been copied throughout the world (including our own SeaLife Centres), and engineers and technicians from Kelly Tarlton's Aquarium have been consultants for acrylic tunnels worldwide.

All the modern pubic aquariums had to consult Kelly Tarlton's people because everyone said it couldn't be done. But Kelly did it... even though it cost him his life.

WRITE BACK

BIOPLAST LETTER OF THE MONTH

Challenging Sterlets

While I have a long way to go before I class myself as an expert, I feel that I am experienced in the keeping of most fish and inverts of the coldwater variety, both fresh and saltwater. However, I have discovered a fish that seems to have defeated me. I refer to the beautiful Sterlet.

Attracted by the sheer sleek beauty of these fish that are such a contrast to all other, more usually kept coldwater species, I have made three attempts to keep individuals and have had a miserable 100% failure rate.

In studying my attempts, I have ben able to come to the conclusion that what is required is cold, fast-moving water and plenty of live food. My fish seemed constantly restless, finnicky feeders that have succumbed at temperatures over 15°C (59°F). Although they will take some dried foods, they do not seem happy with it and are 'uncomfortable' at temperatures over 10°C (50°F).

These conditions can be provided by the determined fishkeeper. I expect (and would be willing) to hear from people who might say that I am wrong, but I see no cheap or easy way to maintain the correct temperature.

I would therefore conclude that these fish should be put on a self-imposed specialist, or even near impossible, list on a level with the Moorish Idol or Red-Tailed Cat, none of which are impossible, but best left to those with experience, space, time and plenty of spare money...

I am unable to say if the Sterlets that I have attempted to keep are wild-caught or captive-bred, but either way, the majority of the 50-60 fish that I recently saw for sale, would, I fear, be heading for an early demise. This is very sad in a hobby that, all too often these days, has 'do-gooders' looking over our shoulders. I therefore see no need for us to shoot ourselves in the foot.

There are plenty enough varieties of fish for us to enjoy without letting every one loose on near-impossible species, temptingly bought on impulse. Or have I just been unlucky?

Richard Friend,
Lowestoft,
Suffolk.

M.P. + C. FOUNDS

Sterlets and their close relatives, the Sturgeons (this is *Acipenser baird*) are challenging subjects for all aquarists and pondkeepers.

Thank you, Richard, for your thoughts. As the November BioPlast letter of the month, a parcel containing £30 worth of BioPlast products will shortly be on its way to you by kind courtesy of our sponsor, BioPlast (UK). Tel: 01535 630230.

Filtered points

I am writing with reference to the article on pond filtration by Barry Goodwin that appeared in the June edition of *Aquarist and Pondkeeper*.

I would like to comment on a couple of points in the article that I find misleading:

① The picture in the centre of the page shows a UV steriliser fitted to a wooden box. The position in which this unit has been fitted would lead to an accumulation of air in the body of the UV, which could render the unit at least 50% ineffective and could lead to permanent damage to the body of the unit by excess UV light. This would also have the effect of reducing the flow or could lead to the flow stopping altogether, as does an air lock in a central heating system.

② It is complete nonsense to state, "that too much UV can create an environment that is 'too sterile'". A UV steriliser fitted in any system can never be expected to kill every species of motile bacteria in that system, or even every individual of one species. The best that can be achieved is to reduce the levels of bacteria, thereby reducing the likelihood of the fish suffering from bacterial infections. For this reason the use of UV sterilisers can have no effect on the immunity of fish to organisms in the water in which they live.

③ The UV lamps that are used in sterilisers must be marked "germicidal lamp". To use the term "medicinal" is not only misleading, but also completely wrong. If you were to add anything to the water to cure a problem, then medicinal would be right, but UV adds nothing and can cure nothing; it only *prevents* problems occurring.

Andrew Curtis,
Luton,
Beds.

Barry Goodwin comments

I am sorry that Andrew Curtis found some of the points in my June article misleading. I will try to clarify these as much as possible, but I would point out, however, that the feature was not, as he states, about pond filtration, but about water purifiers and UVs.

① Regarding UVS mounting, the only instructions I have seen that say the pipes must not be fitted pointing downwards apply to a first-generation UVS at slow flow rates, which certainly does not come into our Koi pond equation. They also say that "it will operate in any position". Andrew could have a small point, of course, and what he says makes sense, but in my experience, air never causes a problem when the unit is positioned in the pumping stage as covered under 'Positioning and Design', and anyway, as stated in the caption, this photograph was only used to indicate rainproofing and not mounting.

To compare the water flow around a Koi pond pumping system to a central heating system is also unjust, as pond pumps are more sophisticated, with substantial heads of pressure. Even when central heating pumps are used, (which in some cases, is now frowned upon) the system's overall design is usually such that problems just do not occur. The UVS in question is in a system fitted with a 1/3 horsepower ITT external swimming pool pump, and it would be very unusual to get an airlock in the pressure line of one of these pumps.

② To say "it is complete nonsense to state...", is a rash statement that I would not care to make on anyone else's work myself.

It is true that Koi will build immunity to disease from organisms in the water about them, but if these organisms have been degraded by artificial means, then this 'natural' immunity will be more difficult to build up.

The article certainly was not intended to be a scientific paper on bacteria, and it was never meant to suggest that the environment would be depleted of all motile bacteria as Andrew Curtis appears to have understood, only that such organisms *may* be reduced to the point where conditions could prevail where immunity would be difficult to build. Who knows what this point really is?

I agree that it would be impossible to *completely* 'sterilise' a pond in this manner, anyway.

I have, however, the technical information sheet of a UVS manufacturer, and this states that their larger unit, at a flow of 2,000 gallons per hour, in a non-recirculative system, will achieve a "99.5% kill of most bacteria" in a single pass. I would consider this to be too great for a Koi pond application and to be at the 'drinking water' flow rate. Another unit is quoted at 'normal' flow rates, to have a 50% to 76% kill rate which will be achieved *each cycle* in a recirculative system.

③ It is a moot objection that is raised about my description of UV lamps. The term 'Medicinal' (which, I am sure, Andrew Curtis knows, has a very wide meaning,) is often used throughout the Koi world in connection with these lamps, although he is quite correct that the proper description is 'Germicidal'. It was never my intention to mislead.

INTRODUCING: THE GECKOS

Marc Staniszewski reveals some of the many attractions of these sometimes shy, sometimes aggressive, always fascinating lizards.

Photographs by the author

Representing one of the largest lizard families, the Gekkonidae is distributed throughout most of the warmer regions of the world where they are opportune masters of life in specialist, often curious, habitats. Due to the diversity of the family, it is divided into four distinct subfamilies, each containing species which display physical, behavioural and/or geographical similarities.

Geckos reach their greatest concentration in the tropics where, in some rain forests, as many as thirty species can be discovered in a single square mile. Notably, these differ in their behaviour and therefore habitat preferences. Of the 550 named species, only a small proportion are available for maintaining in captivity, yet these embody a variety of colourful, weird and highly interesting types from all four subfamilies and, together, form the most popular hobby lizards.

Oceanic Geckos

In recent years some of the largest, most spectacular and captivating of geckos from this subfamily (the Diplodactylinae) have been seen in captivity and this is due to a successful breeding campaign by specialist collections.

They are easily determined by lack of eyelids, large size, absence of large toe-pads and distribution confined to Oceania.

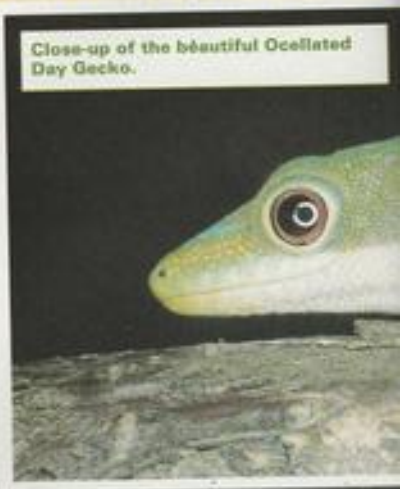
One of the world's largest — the Giant Gecko (*Rhacodactylus leachianus*) — comes from the moist, humid forests of eastern Australia and south Pacific Islands. Sometimes attaining 40cm (c16in) this reclusive, rather docile, creature stalks the forest floor for small mammals, fledgling birds and a variety of other smaller vertebrates and insects. It is equally at home in the trees, where specialised scales on the venter (belly) and underside of the tail provide additional support for this bulky creature.

As with many species, it is often frugivorous (fruit-eating), particularly enjoying sugary types such as banana.

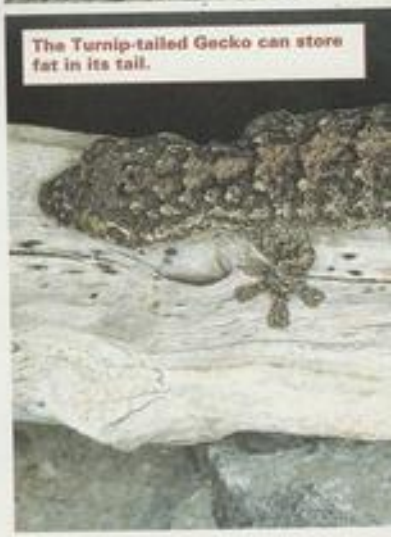
In captivity, it requires a fairly spacious vivarium complete with sturdy branches and a base of dry leaves, forest bark and plenty of hiding places. Warmth and humidity are vitally important in successful husbandry. These geckos also seem to enjoy a certain amount of attention from their owners and will not object to stroking or handling and will rarely bite, even when molested. However, because they are nocturnal (active by night) they should not be disturbed during the day and, to retain wild characteristics and more invigorated breeding response, such actions are best kept to a minimum.

Other species of large Rhacodactylids which are now occasionally seen include the 20-25cm (8-9in) New Caledonian Gecko (*R. chahoua*) and the similarly-sized Auricule Gecko (*R. auriculatus*), both requiring identical captive conditions as the Giant Gecko. All species produce one or two 'huge' eggs up to 3.5cm (1.4in) in length and the resultant offspring which hatch out are relatively large, such that they can be treated as the adults.

Perhaps the most familiar and widely



Close-up of the beautiful Ocellated Day Gecko.



The Turnip-tailed Gecko can store fat in its tail.

GECKO FACTFILE

1 The name 'gecko' is thought to have come from the sound made by the Tokay Gecko (*Gekko gecko*). In fact, geckos are the only truly vocal lizards and possess voices with varying frequencies of grunts, squeaks and yelps.

It is thought that vocalisation is an important aspect of territorial combat, mating behaviour and warning signal. A gecko may use its voice when excited, agitated, aggressive or distressed.

One of the reasons for geckos being vocal may be to do with the fact that the majority of species are nocturnal and also possess excellent hearing. Therefore, this is an ideal method of communicating in the dark.

2 Although the largest known living gecko is thought to be the Caledonian, in 1988, zoologist Aaron Bauer was studying various preserved specimens in the Musée d'Histoire Naturelle de Marseille when he came across a previously undescribed giant gecko that measured a startling 62cm (24.4in).

Closer examination indicated that this gecko was closely related to the New Zealand genus *Hoplodactylus* and it was subsequently named Delacourt's Gecko (*Hoplodactylus delacourti*) after the naturalist who discovered it earlier in the century. It is hoped that further specimens may be unearthed in the central forests of New Zealand's North Island.

3 Apart from one genus called *Agamura*, all geckos are able to shed their tails when the need arises, often at only the slightest touch. This voluntary amputation is an essential aspect of their defensive behaviour and, in time, they are able to regenerate a new (often misshaped and less colourful) tail in a process known as **autotomy**.

4 Geckos are experts at scaling vertical, sometimes inverted, positions due to a complex arrangement of minute terminal suckers on the toepads which adhere to smooth surfaces. In addition, thousands of tiny hooks and barbs give extra support. The reason for the peculiar waddling gait of a climbing gecko is so that it can unhook these barbs without ripping them off.

popular was the large, aggressive Tokay Gecko (*Gekko gecko*) from Japan, India and southeast Asia. Occasionally attaining 34cm (13.4in), this species is not for the faint-hearted, because although an easily-maintained and hardy captive, its irrascible disposition means it bites without warning — and a bite from a large specimen can be very painful.

The unusually bold coloration — turquoise with purple, brown or black speckles — coupled with its apparent fearless and showy nature when approached (it opens its jaws wide, waves its tail and hisses angrily) makes it a bright addition to any collection.

An equally large and aggressive species is the Green-eyed Gecko (*Gekko stentor*) from the Philippines which is considered even more 'dangerous' than its Japanese relative. The best method for persuading these lizards to let go of a finger, hand or whatever part of the anatomy they are gripping, is to submerge them in luke-warm water! Clearly, these geckos are excellent hunters of large prey, such as locusts, pink mice, snails (the shells of which they will crush with ease in their jaws), strips of raw meat and even day-old chicks.

Leopard Gecko male in aggressive stance.

A far less volatile genus that is restricted to the pan-Indian Oceanic islands of Malaysia, Mauritius, Seychelles and Round Island includes the most beautiful of all lizards — the humming birds of the reptile world. The iridescent coloration and active behaviour of the Day Geckos (*Phelsuma*) — so-called because they are completely diurnal — has made this the most popular gecko genus and, fortunately, they are successful in captivity when humidity and temperature requirements are met.

Of the thirty or so species that are regularly available in captivity, the most attractive include the Eyed Day Gecko (*P. quadriocellatus*), the Mauritius (*P. cepediana*), Gold-dust (*P. laticauda*) and — one of the largest at 24cm (9.5in) — the Madagascan (*P. madagascarensis grandis*). Even the largest species — the 26cm Round Island Day Gecko (*P. guentheri*), which had an estimated world population of just 300 in 1976, now numbers tens of thousands in zoological and private collections throughout the world.

Such is the pleasant disposition of these geckos that they will even accept food from their owners' hands and will even crawl onto and absorb the warmth from an outstretched palm. Of course, this behaviour in the wild means that they are easy targets for predators and collectors alike. Thank goodness they are so easy to breed in captivity!

Some of the most bizarre Gekkonines are of predominately south-east Asian origins; Kuhl's Gecko (*Ptychozoon kuhli*) is a marvellous example of adaptation. Its feet, limbs, tail and body laterals consist of thin flaps of skin which enable it to glide from branch to branch or tree to tree. In captivity, it not surprisingly, requires a large, tall vivarium, but is well worth keeping.

The 18cm (7.1in) Turnip-tailed Gecko (*Thecadactylus rapicaudis*) from Malaysia and Thailand is an agile arboreal species which, like some of the Eublepharines, stores fatty lipids in the tail to a degree where is becomes grotesquely shaped like a turnip. When fat storage is at its limit, such a gecko can survive without food or water for as long as four months.

Many other Gekkonines are frequently available, inlcuding the Turkish (*Hemidactylus turcicus*) — probably the reptile with the widest distribution in the world; the extremely common House Gecko (*Hemidactylus frenatus* complex), one specimen of which lived happily in my lounge for several years, showing a particular preference for hiding in the foliage of a goosefoot plant; the robust and very hardy Moorish Gecko (*Tarentola mauritanica*) and the awkward-looking Fanfooted Gecko (*Ptyodactylus hasselquistii*), whose digits end in triangular-shaped discs. All are relatively small species and do well in small vivaria.

Pan-American Geckos

The most advanced and specialised subfamily (the Sphaerodactylinae) is distributed in the pan-central American and Caribbean Sea, although several West African genera are also included. They represent the world's smallest and shortest-lived of all lizards, with some species attaining no more than 3.5cm (1.4in).

The Caribbean Gecko (*Sphaerodactylus elegans*) and the Banded Gonatode (*Gonatode vittatus*) are the most popular species and are, fortunately, easy to breed. Being largely diurnal, they make captivating subjects, but require vivaria with plenty of leafy plants. Finding a source of the necessarily tiny food types can be difficult, so it is wise to keep fruit fly cultures going constantly.

AEP

SHORE WATCH

BY ANDY HORTON

Crawling Dogwhelks

Eyes focused on the spartan pools of November, the practised observer will notice very small, almost imperceptible, differences and 'anomalies'. For example, a Dogwhelk on the bottom of a pool may seem to be moving faster (normally, they cannot be seen moving at all) and in uncharacteristic manner.

Dipping your hand into the bitterly cold water, the two tell-tale claws reveal the animal's true identity. It is, of course, a Hermit Crab, almost certainly the common species with a major right hand claw nearest the apex, or pointed, end of the shell when viewed from the front.

When attacked, or disturbed, the Hermit Crab will withdraw into its adopted home, with just the two claws filling the opening. Juvenile Hermits are present throughout the summer, but as they moult and grow, they will need to move into larger shells.

In late October and early November, they will decamp from the smaller periwinkle shells and look around for a more commodious home. Competition for the available shells is intense, and fights and squabbles take place, with a smaller crab often displaced by a larger rival.

Eventually, they will inhabit Whelk shells, the largest of the common gastropods found in British seas. Occasionally, live Whelks can be discovered between the tides, but they are only common in deeper water.

Eco-habitat on the move

Crawling across the pools, the Hermit Crab is able to clamber up almost vertical rock faces, if it can get a grip on the rough surfaces. It is both a scavenger and filter feeder, able to trap plankton and organic particles from the sea. Eyes, perched on stalks, and mandibles, are constantly in motion, sifting particles, with the claws shredding larger items of food. The claws will also scrape the rocks for anything edible.

The slow-moving Hermit Crab attracts a host of associated creatures, some deliberate, and others accidental. The adopted shell, like any undersea rock, becomes the home for settling spores of seaweeds, calcareous microalgae, anemones and plant-like animals. The limy tubes of the Keelworm and the spiral tubes of another miniature annelid worm, *Spirorbis borealis*, can also be discovered, as can Acorn Barnacles, which are commonly found on the adopted shells.

ANDY HORTON

In the seas of the south-west of Britain, the Common Hermit Crab may be accompanied by the sea anemone *Calliactis parasitica* living on the outside of its adopted shell.

ANDY HORTON

Limpet on sandstone rock near Cullercoats, in the north-east. The depressions worn in the rock by the limpets are known as 'limpet scars'.

Sea-firs

Hydroids, or sea-firs, look superficially like a plant, but are predatory animals in the same group as the sea anemones, corals and jellyfish. Usually, they appear as white feathery growths on rocks, mussels and empty shells and are particularly noticeable on the shore in winter. They also attach to the shells of Hermit Crabs.

There is one species of hydroid that is exclusively found on the shells of Hermit Crabs on certain shores. This is *Hydractinia echinata*, which can comprise a continuous white growth over the complete exterior of the occupied shell. The medusa larvae will not settle on stationary objects.

Empty pools

Pools in November are likely to be empty on the higher shore, with only a few stragglers in the deeper pools nearer the sea. Perhaps there will be an occasional small fish, one of the gobies, and there are always a few Shore Crabs left between the tides. Shore Crabs will eat Hermit Crabs, so their absence will allow a migration of the Hermit Crab onto the shore in about once every three years.

Throughout most of the east coast, life on the shore is restricted to the permanent residents. These are animals and plants that are unable to move into the deeper and warmer offshore sea. Instead, they have developed various strategies for enduring the harsh conditions on the shore during the cold winter months.

Periwinkles

Ubiquitous on all British rocky shores, the marine snail called the Periwinkle is found under rocks on the shore and exposed on boulders and man-made groynes. Although usually black, many shells are turned a dirty grey by exposure to the sun. A few striped ones (with brown and yellow) and all-red specimens can be discovered.

Winkles are able to protect themselves from loss of water at low tide by a thin silver called the operculum attached to the foot, which acts like a secure door. They can remain attached to a rock by a layer of mucus, although the winkle is easily removed by hand, or by waves and strong winds.

When the tide comes in, the foot comes out and the winkle crawls over the rocks rasping microalgae. This will also occur in captivity. However, if winkles are introduced into aquaria, there is also a serious risk of introducing a fish parasite called *Cryptocotyle*.

NOVEMBER CHECKLIST

The fauna on most shores, with the possible exception of the south-west, are so barren of the mobile animals during November that I will restrict the list to the most widespread of the permanent animal residents.

Molluscs	
Common Limpet	*Patella vulgata*
Mussel	*Mytilus edulis*
Cockle	*Cerastoderma edule*
Periwinkle	*Littorina littorea*
Flat Winkle	*Littorina obtusata*
Chiton	*Lepidochitona cinerea*
Grey Topshell	*Gibbula cineraria*
Dogwhelk	*Nucella lapillus*
Netted Dogwhelk	*Hinia reticulatus*
Sea Anemones	
Beadlet Anemone	*Actinia equina*
Daisy Anemone	*Cereus pedunculatus*
Sea Anemone	*Sagartia troglodytes*
Dahlia Anemone	*Urticina felina*
Snakelocks Anemone	*Anemonia viridis*
Crabs	
Shore Crab	*Carcinus maenas*
Hairy Porcelain Crab	*Porcellana platycheles*
Long-clawed Porcelain Crab	*Pisidia longicornis*
Pea Crab	*Pinnotheres pisum**

* Female lives inside the shells of mussels and other bivalves

Homing limpets

Limpets are conical in shape and are attached much more firmly to the rocks than winkles. This enables them, both to avoid dessication, and to be secure against the force of the waves. At low tide, most limpets will be exposed.

It has been proved by detailed study that each limpet, after its foraging expedition at high tide, returns to its original location. This is important for their survival.

The limpet grinds the rim of its shell down to fit the contours of the rock. If the rock is soft, the rock itself will be worn down, and this can be seen when the limpet is removed.

Staple mussels

Beds of mussels will occur where there are attachment points for the young larvae to settle and where the currents and tides bring sufficient nourishment from the sea.

When the tide is in, mussels filter diatoms, which are part of the microscopic phytoplankton (plant plankton) of the sea. In order to gain its food, the two halves of the shell open and the water is inhaled at a rate of up to 2 litres every hour, while the gills sieve and extract the edible plankton.

The flesh of the mussel is a rich orange colour and is often used as the staple diet for the inhabitants of native marine aquaria. The normal practice is to boil the mussels until they open up. The mussel flesh can then be easily pulled out of the shell. The brown foot is the organ that protrudes from the shell to lay the white byssus threads that moor the mussel to rocks and other mussels.

Want to know more?

The recommended identification guides for newcomers to the hobby of rockpooling are:

1. *The Handbook of the Marine Fauna of North-west Europe* edited by P J Hayward and J S Ryland (**Oxford University Press**, 1995)
2. *Collins Pocket Guide to the Seashore* by John Barrett and C M Yonge (**Collins**, 1958 — reprinted 1984)
3. *Hamlyn Guide to the Seashore and Shallow Seas of Britain and Europe* by A C Campbell (**Hamlyn** 1976 — several reprints).
4. *Reader's Digest Field Guide to the Water Life of Britain* by Dr F Dipper and Dr A Powell (**Reader's Digest**, 1989)

For fish-only guidance, the books are:

1. *Key to the Fishes of Northern Europe* by Alwyne Wheeler (**Warne**, 1978).
2. *Fishes of the Sea: North Atlantic and the Mediterranean* by John and Gillian Lythgoe (**Blandford** 1991).

There are other general guides and more specialist identification books. Some of the latest releases will be mentioned next month.

British Sea Temperatures

NOVEMBER	°C	°F
Thurso, North Scotland	8.9	48
Newcastle	8.9	48
Donegal	10.0	50
Brighton	11.1	52
Plymouth	12.2	54
Gibraltar	17.8	64

*For more information on British shore life, the **British Marine Life Study Society** publish the quarterly journal Glaucus. Please write to Andy Horton, c/o A&P for further information. Full book reviews are regularly included in Glaucus.*

COLDWATER JOTTINGS

BY STEPHEN J. SMITH

JOHN LEWIS

Southern Red-bellied Dace or Minnows — minus the characteristic red belly that develops as the fish come into breeding condition.

N. America update

In previous issues I have attempted to encourage coldwater fishkeepers to try some of the 'alternative' species of coldwater fish. Alternative, that is, to the ubiquitous Goldfish, Koi and Orfe.

This has met with some encouraging response, and even this 'jotter' has a fine collection of Golden Medaka (*Oryzias latipes*) flitting around a small ornamental pond, specimens which I have grown on from fry kindly given to me by a Corby and District AS member **David Page.**

I have also been pleased to reflect upon correspondence on the subject of North American species from reader **Eric Hollis** of Liverpool. In response to my own lack of success (that is, abject failure!) in keeping a small collection of Red Shiners (*Cyprinella lutrensis*), Eric maintains that this species can be kept outdoors even in the British climate, and he further supports his argument with a recent letter to these offices.

This relates to correspondence he has received from **Garold Sneegas** from Kansas, USA, who, Eric tell me, is an underwater photographer who specialises in photographing his native fish. "He wrote mainly to tell me about the adverse weather conditions in Kansas," said Eric. "He states that the climate is similar to the wheat-growing regions of the Ukraine: January and February temperatures usually average around 20 to 30°F (-6 to -1°C) and, often, the temperature drops to minus 10°F (-23°C) with ice up to two inches thick!"

According to Garold, Red Shiners, Fathead Minnow and Southern Red-bellied Dace thrive in these conditions, and he cannot see British winters having any adverse effect on these fish.

So, it seems that we should not be put off by the occasional non-success, and I shall be looking out in future months for some of these try for my own collection of 'alternative' species.

Just a note of caution, though: Garold implores people not to release any of these North American fish into our natural waters as they are prolific breeders and can upset the natural balance of our own fish populations.

Perch latest

Turning to UK indigenous species, you may recall that **Jeff Lumley** had achieved remarkable success in breeding Perch in the aquariums of his fish house in the Isle of Wight (see **Coldwater Jottings,** December 1994 and February 1995).

Jeff's Perch spawned again this year, but disaster fell when, upon returning from a day out, the water had turned, the eggs were spoiled and, to add to the misery, Jeff lost his female Perch. However, he tells me that he has had enormous success this year with his collection of Bristol Shubunkins, which have spawned again and again!

Thank you, Eric and Jeff, for keeping us 'posted'. I look forward to hearing other readers' comments on 'alternative' coldwater (or temperate) fish over coming months.

Meteoric response

How time flies! It was back in 1988 that I carried a 'jotting' about the existence, or otherwise, of the Meteor — a mysterious variety of Fancy Goldfish which, to my knowledge, no-one has ever seen.

That is, until now. I was delighted to receive a letter from **Gareth Davies** of Sketty, Swansea, who has actually purchased the nearest thing yet to a live in-the-flesh Meteor. In true orange Goldfish colour, the fish has no caudal fin and is perfectly fit and healthy, according to Gareth. "I'm not saying that the fish is a true-bred Meteor (the spine of the fish seems normal and there is a caudal peduncle) but the Meteor-type genes could be at work," he says.

Gareth very kindly sent me some Polaroid photos of his fish but, unfortunately, the quality is not too clear so we can't publish them. However, I will, hopefully, be off to Sketty with my trusty camera to capture this on film, so watch this space!

Net gains

Keeping you up to speed with coldwater trawlings on the Internet: the newsgroup *rec. ponds* provides a perfect complement to your enjoyment of *A&P*, since the subjects of discussion range from fish predators, to help with algae, to plant care... from all over the world.

Some of the topics for discussion (threads) relate specifically to Goldfish, and these are marked with a [G] symbol, but a topic which really caught my eye asked about the use of anti-freeze (!) to avoid a cascade freezing over during the winter!

Now, I have come across several measures to protect the pond from winter, many of which have been discussed within these columns over the years. But anti-freeze...?

Perhaps it was a wind-up (the newsgroups are, it seems, an ideal medium for leg-pulling, so some of what is said has to be taken with a pinch of salt and a smile), but the original thread has, this month, produced no fewer than 18 replies, or postings, on the subject and, I suspect, countless replies direct to the originator.

A word of warning folks. DON'T try this at home!. Anti-freeze will kill your pond off for years to come (I was tempted to say "till hell freezes over", but I'll resist...). Far better to switch cascades and fountains off during the winter; but do leave your filter running, albeit a little more slowly than usual. Having said this, you really cannot beat a cover over the pond and, perhaps, a small pond heater. Leave the anti-freeze for the car...!

Summer madness

While most of us in the UK were basking in a truly tropic summer, our fish were findin that the climate was having effect upon them too! In my own hobbyist establishment, there was hardly a day wher spawn wasn't flying around. was amazed at the ferocity with which my Koi went abo their spawning 'ritual'. How-ever, low oxygen levels and abundance of blanket weed caused their own set of prob lems, of course.

For many coldwater fish-keepers, the hot weather wa therefore a mixed blessing. how did you fare? Was your fishkeeping helped or hinde by the long hot spell? Do let me know what you did to ov come the problems and wha surprises the tropical climate brought to your enjoyment o the hobby.

COLDWATER JOTTINGS

BY STEPHEN J. SMITH

JOHN MAY

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Meteoric response

How time flies! It was back in 1988 that I carried a 'jotting' about the existence, or otherwise, of the Meteor — a mysterious variety of Fancy Goldfish which, to my knowledge, no-one has ever seen.

That is, until now. I was delighted to receive a letter from **Gareth Davies** of Sketty, Swansea, who has actually purchased the nearest thing yet to a live-in-the-flesh Meteor. In true orange Goldfish colour, the fish has no caudal fin and is perfectly fit and healthy, according to Gareth. "I'm not saying that the fish is a true-bred Meteor (the spine of the fish seems normal and there is a caudal peduncle) but the Meteor-type genes could be at work," he says.

Gareth very kindly sent me some Polaroid photos of his fish but, unfortunately, the quality is not too clear so we can't publish them. However, I will, hopefully, be off to Sketty with my trusty camera to capture this on film, so watch this space!

Net gains

Keeping you up to speed with coldwater trawlings on the Internet: the newsgroup *rec. ponds* provides a perfect complement to your enjoyment of *A&P*, since the subjects of discussion range from fish predators, to help with algae, to plant care... from all over the world.

Some of the topics for discussion (threads) relate specifically to Goldfish, and these are marked with a [G] symbol, but a topic which really caught my eye asked about the use of anti-*freeze* (!) to avoid a cascade freezing over during the winter!

Now, I have come across several measures to protect the pond from winter, many of which have been discussed within these columns over the years. But anti-freeze...?

Perhaps it was a wind-up (the newsgroups are, it seems, an ideal medium for leg-pulling, so some of what is said has to be taken with a pinch of salt and a smile), but the original thread has, this month, produced no fewer than 18 replies, or postings, on the subject and, I suspect, countless replies direct to the originator.

A word of warning folks. DON'T try this at home!. Anti-freeze will kill your pond off for years to come (I was tempted to say "till hell freezes over", but I'll resist...). Far better to switch cascades and fountains off during the winter; but do leave your filter running, albeit a little more slowly than usual. Having said this, you really cannot beat a cover over the pond and, perhaps, a small pond heater. Leave the anti-freeze for the car...!

Summer madness

While most of us in the UK were basking in a truly tropic summer, our fish were findin that the climate was having effect upon them too! In my own hobbyist establishment, there was hardly a day wher spawn wasn't flying around; was amazed at the ferocity with which my Koi went abo their spawning 'ritual'. However, low oxygen levels and abundance of blanket weed caused their own set of prob lems, of course.

For many coldwater fishkeepers, the hot weather wa therefore a mixed blessing. how did you fare? Was your fishkeeping helped or hinde by the long hot spell? Do let me know what you did to ov come the problems and wha surprises the tropical climate brought to your enjoyment o the hobby.

'CLEAN' Solution to fish lice problems

Professor Peter Wirtz of the University of Madeira reports on an environmentally friendly way of treating fish louse infections.

Text translated by Mary Bailey

Sea Lice (arrowed) on a grouper.

In order to remove Sea-lice (blood-sucking "paddle-footed crustaceans") from their fishes, Scottish and Norwegian salmon breeders use pesticides in their rearing cages. These cages float in seawater and are stocked with up to 37,000 young fishes, which, after only a year, weigh as much as 3-4 kilos (6.6-8.8lb), with this doubling in their second year.

The pesticides with which the fish farmers regularly treat their salmon naturally escape from the cages into the open sea. There, they also kill other crustaceans and many other invertebrates living in coastal waters.

Some salmon farmers have thereby acquired the reputation of significantly harming the environment.

MIKE BATES

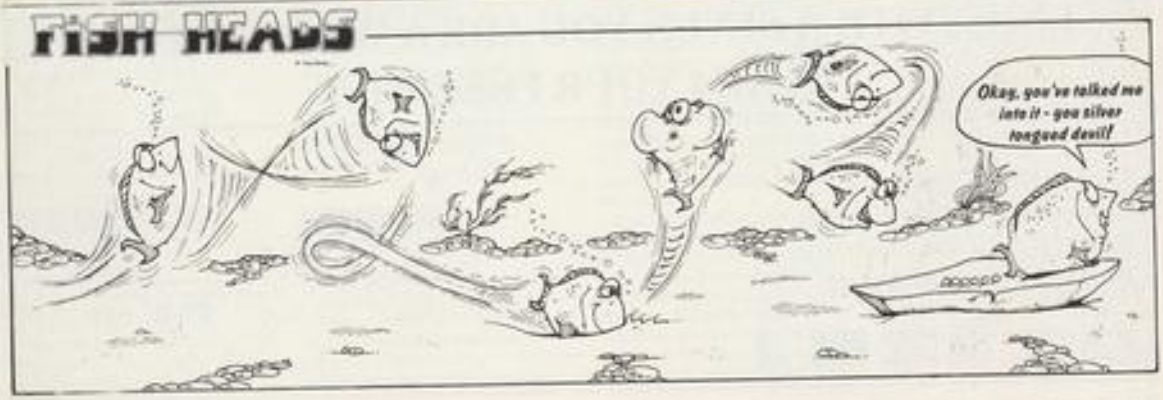
Goldsinny Wrasse feeding on a sea urchin.

Natural solution

It may, however, be possible to utilise cleaner fishes quite easily as a substitute for these chemicals. There exist several species which are specialised in removing and eating parasites from other fishes, not only in the tropics, but also in northern waters. In the North Sea and the north-eastern Atlantic, for example, the commonest cleaner fish is the Goldsinny Wrasse (*Ctenolabrus rupestris*). Preliminary experiments in Norway have had very promising results.

Although Goldsinny Wrasses are creatures of the coastal regions and do not encounter salmon in the normal course of things, in experimental cages, they dealt with the salmon parasites and treatment with chemicals was no longer necessary.

The use of cleaner fishes instead of chemicals is of not only environmental, but also economic, significance, since, after the salmon are ready for sale and have been harvested, the cleaner fishes can be left in the cages and used in the same way for the next generation. **AP**



Cichlid Secrets

MOBILE SNACK BARS - LAKE MALAWI STYLE

The Blue Dolphin Cichlid (*Cyrtocara moorii*) is one of the best known and most popular Lake Malawi cichlids, but few aquarists are aware of its strange feeding behaviour in the natural habitiat, where it is found over sandy substrates (not among rocks, as often mistakenly assumed).

It habitually follows feeding *Fossorochromis rostratus* and *Taeniolethrinops praeorbitalis* (no common names), both of them large (12in — 30cm) bottom-sifting cichlids which stir up huge amounts of detritus in the process. The Blue Dolphins pick edible morsels from the resulting 'clouds'.

As if that were not remarkable enough, each *C. moorii* regards its 'host' as a mobile feeding territory to be defended against potential interlopers, taking on dominant, territorial, coloration in the process. The bright blue is a surprising dash of colour in an environment where lack of cover favours sand-coloured camouflage.

Although the 'owner' may tolerate other 'followers', these are always smaller and do not show territorial coloration.

Mary Bailey.

MARY BAILEY

A pair of Blue Dolphin Cichlids (male above).

OLD HAT? BORING? FAR FROM IT!

So what could possibly be unusual about such a well-known cichlid as our old friend the Krib (*Pelvicachromis pulcher*)? Quite a lot, actually!

For starters, it and other members of its genus, have a unique finnage feature: the pelvic (ventral) fins of males are pointed, but those of females are club-shaped — hence the genus name. We don't know why.

Secondly, the coloration, particularly in males, is what is termed "labile" — it can change in just a few generations, depending on selection (or lack of it). Thus, it is possible rapidly to line-breed for large numbers of caudal spots — or to produce colourless unspotted males by failure to cull or choose good breeding stock.

The female is the dominant partner in a pair of Kribs, initiating courtship and sometimes guilty of 'husband beating' if he proves less than co-operative.

There is more — but no more space! At least, not this time.

Mary Bailey

MARY BAILEY

Well-spotted! But line-breeding can produce males even far more splendid than this.

KOI TALK

by Alan Rogers

I was in a general conversation with a successful Koi exhibitor the other day. He proudly mentioned that his fish were looking quite stunning during the latter part of the summer because of the strict feeding schedule he was adopting.

He regularly uses two grades of pellets, one containing a high grade of colour enhancer, along with various other favourite foods which his Koi enjoy, namely diced carrots, rice, bread, lettuce, boiled barley and potatoes. Carrots, surprisingly enough, contain valuable carotenoids, which are colour enhancers. Our jubilant exhibitor firmly focused great importance on his preferred choice of commercial pellets, which contains *Spirulina*, so naturally, his philosophy is based on satisfactory results gained from experience.

Remarkable alga

So, what exactly is this mysterious product called *Spirulina*? Well, it is a filamentous planktonic blue-green alga found only in hot tropical regions around the globe. Vast flocks of exotic birds, especially flamingoes in East Africa, seek and sift through ponds and lakes which contain this nutritional alga. African cichlids in the Great Rift Valley lakes enjoy *Spirulina* just as much as Koi.

For a number of years now, scientists have recognised the value and benefits of *Spirulina* alga in commercial fish feeds. The Japanese Institute of Fisheries and Scientists have, after exhaustive tests with *Spirulina*, made a number of valid discoveries. Their reports, reflecting work carried out over a two-year period, were based on fish fed with *Spirulina* ranging from 2% to 5% content as a supplement to their standard diet. By this strictly controlled method of feeding, a number of interesting results were observed and recorded.

① There was a noticeable improvement in reds, oranges and yellows.

② The texture and vitality of the skin was enhanced remarkably and displayed a shininess, even on non-metallic varieties.

③ Growth rates were greatly improved over a six-month period, and a greater reduction of mortality was found in younger fish.

④ These experiments also found that diseases, particularly related to skin disorders, were also greatly reduced.

⑤ In addition, less obesity was found in larger Koi.

From these encouraging test results, it was recognised that *Spirulina* supplied essential nutrients not found in other foods. Recognised as a natural colour food, it assures complete nutrition, stimulating both health and growth in ALL fish, not just Koi.

Natural forage

It has long been acknowledged that Koi kept in mud or natural ponds are generally healthier than those Koi kept in clear-water ponds. This is because of a number of factors, apart from the obvious water quality.

In a natural mud pond, Koi are able to forage for food, eating plants and invertebrates twenty four hours a day. Small crustaceans, insect larvae, snails, various worms and almost any 'bugs' which, themselves, have been feeding on algae, help to make up the vital ingredients of a natural diet. Just observe your Koi on a summer's evening 'sweeping' the surface of the pond in search of floating insects and larvae.

The algae which Koi consume contain fatty acids, amino acids, natural colour pigments and essential nutritive factors that are classified as being unique to *Spirulina* alga. These essential nutrients are vital for the proper development of healthy internal organs, the immune system, growth and development of strong colours.

In comparison to other green plants, *Spirulina* is much more easily digested, as its cell wall does not contain tough cellulose which needs a number of conditions to be broken down, but is, instead, replaced with a thin mucous protein. It is because of this unique membrane that fish and certain birds can easily assimilate *Spirulina*.

Clinical disadvantage

Koi kept anywhere in clinical conditions, that is to say, where any form of algae cannot be foraged, are at a considerable disadvantage. The gradual deterioration of colours in unsold Koi remaining in dealers' indoor tanks for excesive periods is a classic example of this.

The offering of a fresh lettuce or spinach rich in iron and vitamins does not have the same effect as naturally grown algae. Obviously, *any* green vegetation helps, but it can never be considered a perfect substitute.

Enhanced quality

Many of the natural nutrients in *Spirulina* cannot be found in commercially prepared fish meal or terrestrial plants like the aforementioned spinach or alfalfa (lucerne).

I mentioned earlier the value of colour enhancer qualities of carrots, which is derived from the presence of carotenoids; these are responsible for the intensities of red, orange and yellow pigments found in our Koi. By comparison, *Spirulina* is also much higher in these warm-colour pigments, containing more than 20% to 30% more carotenoids than found in carrots.

Koi keepers, along with research scientists, have also found that there is a definite improvement to lustre and skin quality when feeding a diet of *Spirulina*.

Lustre is composed of a natural mucus coating to the skin, which serves two main purposes: firstly, it protects the skin from bacterial infection, strains of aquatic fungi and accidental damage, and secondly, it gives the aesthetic appearance of vigour and vitality to the Koi. These protective coatings are made up of muco-proteins and abundant concentrations of these can be found in *Spirulina*.

Commercial operations

I used to believe that the only source of *Spirulina* was to be found in the warm waters of the Mexican Gulfstream where it was harvested in profusion and was principally shipped to Japan for the production of fish foods. Surprisingly, smaller quantities are also commercially prepared as health foods for humans.

How about this for stunning coloration attained with the help of a *Spirulina*-containing diet?

ALAN ROGERS

Later, I was to discover, unrestrained natural sites of *Spirulina*, often found in remote parts of the world, became an impractical and uneconomical proposition for commercialised farming.

Throughout the world, there are only a few isolated farms, namely in Colombia, California and Mexico which produce virtually all of the world's demand of pure *Spirulina*. These aqua-farms specialise in growth and cultivation in shallow concrete ponds, producing high-quality *Spirulina* in quantities of up to one ton per day. Extensive sunlight and warmth encourage growth of the alga, which is then filtered from the water and later dried to a dark green powder. In this dried form, it is easy to pack and ship to other locations where it can be blended with various other products, such as fish meal.

It has been said by some hobbyists that feeding excessive *Spirulina* creates a red or pink colour saturation to white skin.

Wishing to establish if there was any element of truth in such a statement, I raised this question with a famous Japanese fish food manufacturer and was informed that this is unlikely to happen unless "*Pure Spirulina*" is being solely administered in excessive amounts. Commercially prepared fish feeds, however, have precisely controlled quantities of *Spirulina*, together with levels of other products. There are clearly defined in the content analysis and printed on the package.

ALAN ROGERS

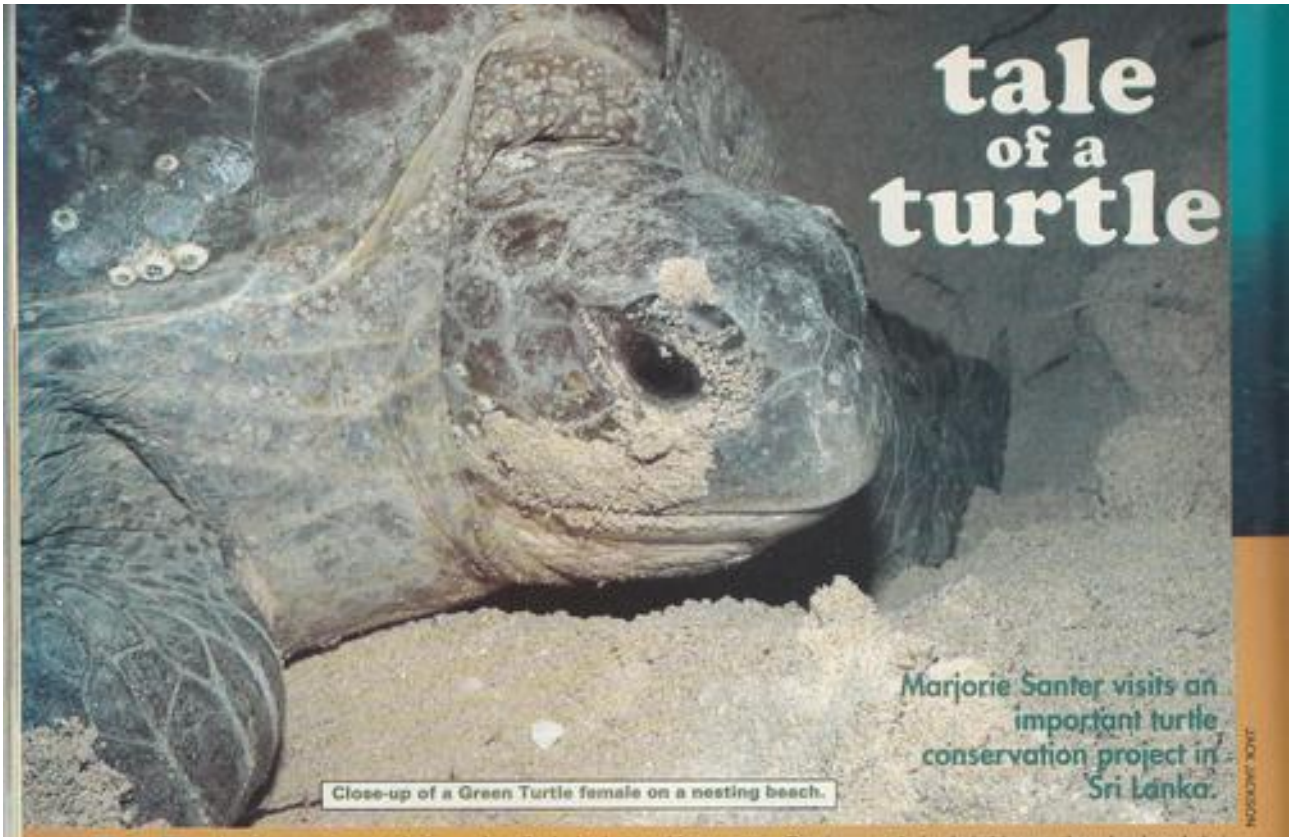
Good white skin enhances the depth of the other colours — all, in turn, affected by *Spirulina*.

Controlled farming of high-quality *Spirulina* and the export of such a product to countries, such as Japan, incurs high transportation costs, added to which the cost of blending the product with other fish meal food in the Japanese factories can see the cost escalate once again. Suitably packaged and exported to countries all around the world creates, yet again, further increases.

So, the next time you consider colour-enhancing food for your valuable Koi and feel hesitant about the price, just remember that this extraordinary blue-green alga has travelled probably more miles, and encountered more farming and factory processes, than you could possibly imagine.

Talk to you soon!

tale of a turtle



Close-up of a Green Turtle female on a nesting beach.

JACK JACKSON

Marjorie Santer visits an important turtle conservation project in Sri Lanka.

My hands cupped protectively around the tiny, beautifully patterned shell of the baby Leatherback Turtle. Its small but surprisingly strong flippers squirmed between my fingers in an effort to break free, but I wasn't about to let it go... yet.

I stood for a moment, gazing at the restless, turbulent Indian Ocean as its creamy waves rushed up the sand almost to my feet and wondered about the chances of survival that my small captive could hope for.

"There you go then, little fellow," I said. "Good luck!" and bent down to put him... or her?... gently on to the hot sand.

Tiny flippers paddling furiously, the little creature propelled itself down to the edge of the water. A wave rushed in and bowled it over so that it floundered helplessly on its back for a moment; then, a second wave righted it and, within seconds, it had submerged and gone. I imagined it swimming fearlessly out to sea, at last in its true environement... and wished it well.

Unique opportunity

Trudging back up the sloping beach, I felt so good. Thrilled that I had been just a very small part of this conservation project that I had discovered in Sri Lanka... in company with a party of others, I must admit, for I was on a holiday tour of this delightful island, the Jewel of the Indian Ocean, as it is sometimes described. And not without cause. But it made no difference that I had shared this experience with others. I still felt that I had been given a unique opportunity.

We were visiting the Victor Hasselblad turtle hatchery at Kosgoda, at the southern tip of the island, where a group of dedicated Sri Lankans were working to save several species of marine turtles — turtles that were being threatened with extinction.

Tortoises and turtles

The group of reptiles which we know as tortoises, turtles and terrapins are described as 'Cheloniants', this name being derived from the classification of 'Chelonia'. Tortoises are perhaps the most familiar, many of us having kept one as a pet at some time or another. They, of course, prefer to feel solid ground beneath their feet, while turtles are predominantly aquatic; certain members of this group are called terrapins.

Turtles have an ancient ancestry. Very early in their history, they developed their defences, their bodies becoming enclosed within a virtually impregnable case into which they could withdraw their head and limbs should danger threaten.

With such heavy and bulky armour that made movement on land slow and difficult, it was a 'logical' move for them to take to the water, but one thing prevented them from becoming completely at home there. Like their land relatives, the tortoises, they laid shelled eggs and as the embryos breathe through the shell pores with the help of a membrane beneath the shell, this system does not work under water. Indeed, the young would drown in their shells.

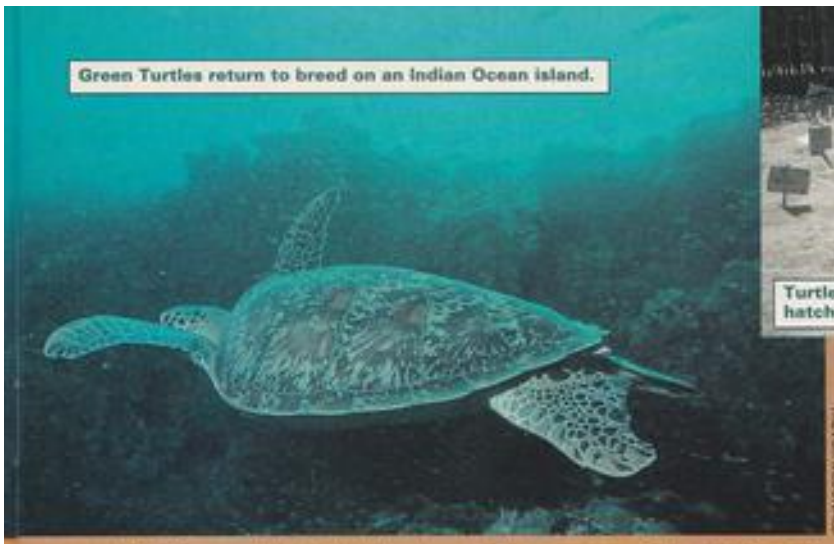
So, every breeding season, the female turtle has to leave the open ocean, swim to coastal waters and haul herself up the sandy beach to lay her eggs in a scooped-out hole, just as the tortoises do. Then, having carefully covered her eggs, she will return to her haven in the sea... probably with great relief(!)... leaving the hot sun to incubate them.

Hasselblad's prized albino Green Turtle.

MARJORIE SANTER

The Hasselblad project

The particular stretch of Sri Lankan beach we were on was one of those where the turtles came year in, year out, to lay their clutches of a hundred eggs or more in the hot white sand. Their habits had not gone unnoticed and the locals had, in the past, taken the eggs with equal



Green Turtles return to breed on an Indian Ocean island.

TREVOR McDONALD

Turtle eggs are collected and buried in the hatchery's compound.

MARJORIE SANTER

regularity. They could hardly be blamed for this; turtle eggs fetched a good price and a living had to be earned. However, times change and conservation belatedly stepped in to give these turtles some chance of survival.

The Hasselblad hatchery only covers a small area but has, to date, saved thousands of turtle eggs and must have substantially raised the number of surviving young hatchlings.

It lies at the end of a track winding its way through a jungle of coconut palms and exotic undergrowth and consists of a few buildings, some of them palm-thatched, several compounds and the open-sided wooden roofed shelters which house large seawater tanks. The compounds are deep beds of sand surrounded by wattle fencing and it is in these that the turtle eggs, which have been rescued from the open beach, are buried and duly labelled with the relevant date and name of the species.

The incubation period varies according to the species and the environmental temperature, marine turtles generally preferring a locality which is in direct sunlight. The beach at Kosgoda is ideal and in their monitored compounds, the eggs hatch out after about ten weeks.

It is now known that the incubation temperature of eggs is a vital factor in determining the sex of the hatchlings, a higher temperature resulting in the production of females. So, the wattle fencing is adjusted as the day goes on to allow the maximum amount of sunlight to heat the sand, in the hope that the production of more females can be achieved and so add to the reproductive potential.

Hatchling help

Just before hatching, a young turtle uses its 'egg tooth', which is a small projection on the top of its nose, to break the membranes of the inner shell. After the first tear, (for the shell is slightly soft) air enters the shell and the hatchling can eventually force its way out, taking about a day in the process. Then its own shell, or carapace, begins to take on its proper shape and the 'egg tooth' soon regresses.

As soon as the eggs have hatched out, the tiny chelonians, some no bigger than a fifty-pence piece, are transferred to the large tanks of seawater.

The yolk sac which nourished the embryo during incubation is usually still apparent, although depleted, and is attached to the young turtle at the middle of the under shell, or plastron, and this serves to nourish the hatchling over the next few days. As the two main parts of its shell become straightened, the yolk is drawn back into its body, finally disappearing altogether. Within these few days, the turtles have grown quite fast and can now be released into the turbulent Indian Ocean with some degree of safety.

Normally, if undisturbed and left to hatch in their sandy nest on the beach, they attempt to struggle down to the water's edge. As soon as they have pushed their way out into the world, the hatchlings head unerringly for the sea, the sound of the waves on the shore possibly giving them a strong navigational signal.

Many fall prey to voracious gulls before they even reach their haven. Other predators, even crabs, wait for such tender morsels. However, with being kept in captivity for a while and given the chance to become bigger and stronger, their chances of survival are, obviously, greatly increased.

MARJORIE SANTER

Long life prospects

The young man who showed us round held up a magnificent albino Green Turtle. "Very rare!" he told us proudly, "She is my pride and joy. She does not go back to the ocean."

It wasn't self-interest on his part. Most albino creatures, being so noticeable and therefore more conspicuous to potential predators, are under greater threat than their fellow creatures in the wild. He laid his cheek affectionately against her horny head before putting her gently back in her tank.

"She will live long," he added and told us that she was already nearly fifteen years old and could expect to reach sixty at least, with living in a safe environment. Aquatic turtles can live to well over thirty in the wild, perhaps even reaching fifty.

Land tortoises, on the other hand, are more long-lived and there is documented evidence of tortoises which had been taken to Mauritius in 1776 by the French explorer, Marion de Fresne, living to well over a hundred. The last surviving one finally died in 1918. If it was already an adult when it first arrived in Mauritius, it could well have been nearer 200 years old!

In the other tanks, turtles of varying sizes churned around in their hundreds. Most of them were Leatherbacks (*Dermochelys coriacea*) but there were also Green Turtles, (*Chelonia mydas*) Hawksbills (*Eretmochelys imbricata*) and Loggerheads (*Caretta caretta*). All of them had the most beautifully marked shells.

I spared a thought for my grandmother's dressing table set of years gone by, made of tortoise shell backed brushes, combs and hand mirror and shook my head. Tortoise shell is much more beautiful with the clear water glistening on its intricate patterns and a small lively body happily inside it.

I looked back through the coconut palms that fringed the beach before I left.

"Good luck, little thing," I said once more. "May you survive and live long!"

Useful Addresses

Hasselblad Hatchery,
c/o Dr. T.S.U. da Silva,
10 Dambulla Road,
Kurunegala,
Sri Lanka

Sea Turtles Research Centre,
K. Chandrasiri Abrew,
c/o B.H. Somasiri,
413A Main Street,
Ambalangoda,
Sri Lanka

A leatherback hatchling instinctively heads for the sea.

BOOKS

An Illustrated Encyclopedia of Aquarium Fish

By: Gina Sandford
Published by: **The Apple Press**
ISBN: 1-85076-597-9
Price: £17.99

I would dearly love to subtitle this *The Aquarist Strikes Back*, bearing in mind, not only that the author is none other than our own **Tomorrow's Aquarist** columnist, but also that she is indeed very much a practising hobbyist. The advantages of having such credentials (particularly the latter) is that the book is based on genuine hard-earned practical knowledge and likely to reflect current thinking, both in taxonomic terms (a very dangerous, but courageous stand to take at any time) and in aquarium technology.

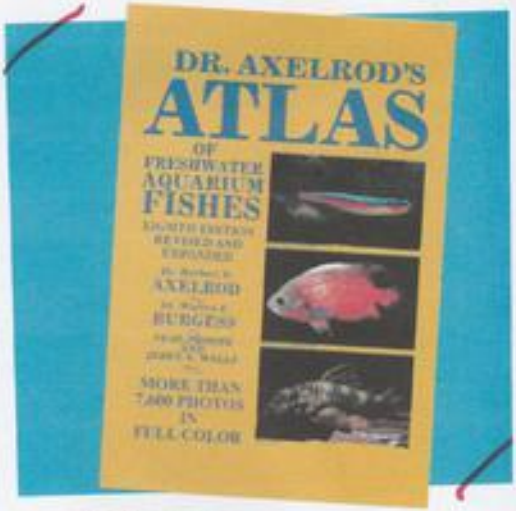
Basically, this is a fish book with only 20 or so pages devoted to setting up the aquarium; after that it's fish all the way. Page after page of well-illustrated species, accompanied by excellent text, which doesn't describe appearances, but gets right down to the nitty-gritty of the fish's character and life-style. Bullet-lines give essential information on things such as family and common names, distribution, size, food, temperature range and pH. (Size and temperature information is also repeated graphically beneath each illustration). Breeding information and a tank set-up description for each species entry is also given.

Fish species are grouped in the usual manner i.e. in the popular groups (note the unintentional bias (?) towards the catfish, hardly surprising considering Gina's own fish interests). These are followed by a miscellaneous collection which, in turn, leads to a generous marine section.

Very often, writing a book is likened to giving birth: the conception, gestation and labour of production often appear to have very similar stressful times. Well, in this instance, mother and 'child' have done very well even though, to coin another paediatric metaphor, lapses can be found — misplaced illustrations, non-uniformity of presentation in the artwork, etc, but on the whole, this is a very sturdy youngster on which readers' fishkeeping will thrive and prosper.

Dick Mills

Dr. Axelrod's Atlas of Freshwater Aquarium Fishes (8th Edition)



By: Dr. Herbert R. Axelrod, Dr. Warren E. Burgess, Neal Pronek and Jerry G. Walls.
Published by: **T.F.H. Publications, Inc.**
ISBN: 0-7938-0194-X
Price: £69.95

Nowadays, it's hard to remember what life was like 'before the Atlas'. At least, those of us who have found this immensely colourful and (literally) weighty tome helpful over the years have come to rely on it, often as our 'first stop' when trying to track down the identity of a particular fish. The latest (eighth) revised edition, being larger than its predecessors, will help us even further.

It is, as we've now come to expect, packed solid with full-colour photographs (over 7,600 of them) and essential information in easy-to-decipher coded form. I certainly wouldn't with to be without my copy, and know that numerous like-minded aquarists and pondkeepers will feel the same.

That is not to say that I think the *Atlas* is a flawless work of reference. There are, in fact, quite a few things that I find, either unnecessary, or difficult to fathom out, so I am unable to give it my unqualified praise.

Perhaps the most nigglingly unnecessary component is the 83-page Koi section. Now, I am a great Koi fan... but 83 pages packed with multiple shots of Koi? No, I don't think so. In any case, if we could justify such an over-abundance of Koi riches, why give Fancy Goldfish only four pages? Similar arguments could be brought to bear in connection with Fighters, Discus, Guppies and several other species.

A book of this size and breadth of coverage is bound to have 'holes' in it. In some cases, these might well be impossible to avoid because of the difficulty in tracking down an appropriate photograph of a particular species. Yet, I feel that where this is available for a species that is not particularly rare, as with *Alfaro huberi*, one of the Knife Livebearers, then such species should be included at the expense of some of the afore-mentioned 'surplus-to-requirements' examples.

There are, I feel, other shortcomings in the latest edition of the *Atlas*, but to cite any more of them would create an unjustifiably unbalanced review of what, I still feel, is a hugely valuable and informative boo that every serious aquarist, retailer, wholesaler, importer, exporter, breeder and collect should have... and it's still great value, even at £89.95.

John Daw

Cichlids — The Pictorial Guide (Volume 1)

By: Pablo Tepoot and Ian M. Tepoot.
Published by: **New Life Publications.**
ISBN: 0-9645058-0-0
Price: US$50.00
Available from: **Dutch Aquarium Supply, Dorpsweg 11, 3257 LB Ooltgensplas, The Netherlands, Tel: +31 187 63 2093; Fax: +31 187 63 26 62.**

This must be one of the most spectacular books published this year. Sometimes, books fail to live up to the image generated by their title, but certainly not this one. It is a true pictorial guide, largely concentrating on Lake Malawi species, but also including some Tanganyikan, Victorian and Madagascan ones for good measure.

Basically, the bulk of the contents consists of individual fish (both male and female for every species) presented on a jet-black background that produces a quite stunning effect. Information supplied for each fish is restricted, but includes common (trade) names, scientific names and an indication of size, along with details of date of first importation (where possible) and some of the more salient physical characteristics.

Purist cichlid fanciers may disagree with some of the nomenclature, but, as the authors point out in their Preface, the emphasis throughout is on simplicity and clarity. The overall aim is to produce a *book from the commercial* rather than the scientific, standpoint.

They also stress that they are not ichthyologists, and are not setting out to classify fish: "*Let the scientists and academics wrangle over the proper classifications. We only care about the names — common or scientific — that people currently use*".

The end result is a book that will act, like the authors intend, "*as an effective and powerfu reference tool for buyers, resellers and enthusiasts*".

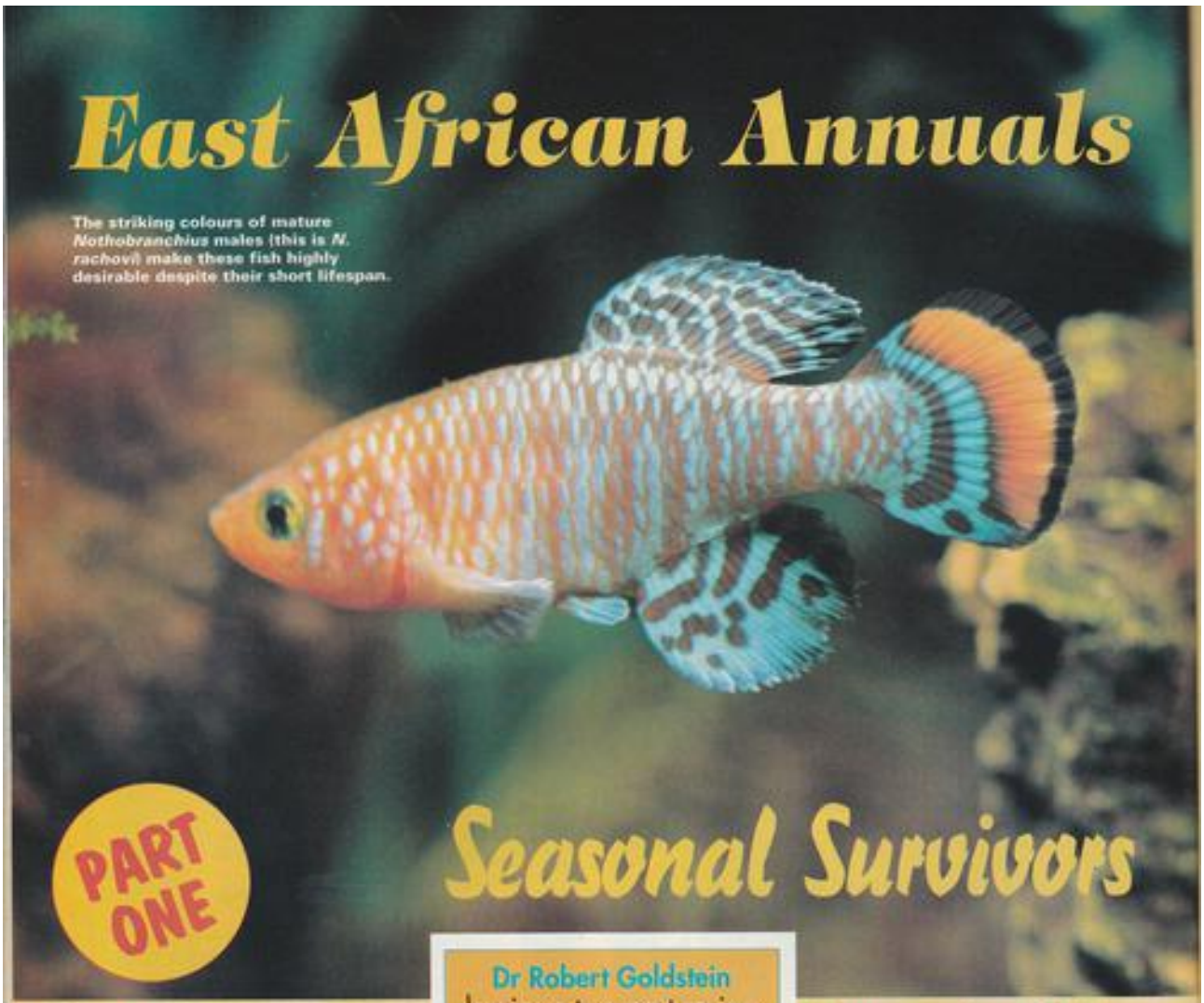
Recognising the 'loading' i favour of Malawi cichlid species, we are assured tha later volumes in the series w deal "*more heavily*" with *species from the other Africa* lakes, plus South America.

I wish Pablo and Ian Tepc great success in this bold ve ture. I hope that sales of thi first volume will be sufficient encouraging for them to be able to take on the consider able investment in time, energy and finances that fu similarly illustrated guides w demand.

John Da

East African Annuals

The striking colours of mature *Nothobranchius* males (this is *N. rachovii*) make these fish highly desirable despite their short lifespan.



Seasonal Survivors

PART ONE

Dr Robert Goldstein

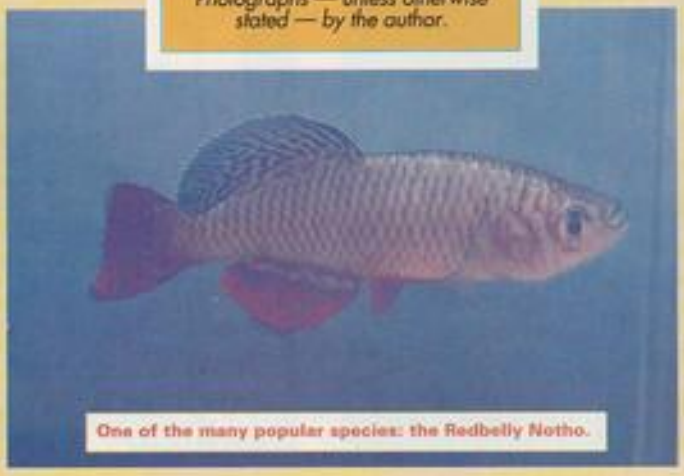
begins a two-part review of some beautiful but short-lived *Nothobranchius* killifish.

Photographs — unless otherwise stated — by the author.

BILL TOMEY

Killifishes occur through most of the world's tropical and temperate belts. In Europe they are limited to the Mediterranean region and Iberian Peninsular (*Aphanius*, *Valencia*, *Lebias* — see **Footnote** — etc.), while only a few genera and species occur in Asian waters (*Panchax*, *Pachypanchax*, etc.). Killies reach their greatest abundance and diversity in Africa and the New World.

Associated with diversity in genera, is diversity in where they live and how they manage to live there. Among the most fascinating and beautiful of all is the single line of evolution that has radiated out into species of the genus *Nothobranchius*, a group that has solved a difficult problem of seasonal drought with an unusual life history pattern.



One of the many popular species: the Redbelly Notho.

Unconventional Nothos

Nothos are small, somewhat stocky killifishes, usually one to two inches long, with short snouts, short peduncles and heavy chests. Some are more elongate than others, but their overall shape and constancy in other characters clearly places them in one single genus or line of evolution.

All the Notho species are sexually dichromic and dimorphic: in most, the males have blue flanks with or without red or gold hatching, red, orange, or yellow tail fins, sometimes with a black edge, and enlarged, flag-like dorsal fins. Females are typically tan-grey with clear fins and smaller bodies.

The taxonomy of Nothos is a difficult subject. Most fishes can be evaluated for relationships

by looking at their range within a river system or adjacent rivers, and these species don't vary much physically, i.e., we often have consistent differences between separated populations before we consider that they might be different species. In addition, species are usually reproductively isolated, so that even when hybrids occur, they are sterile. This is usually the bottom line when questioning whether two populations represent the same or different species.

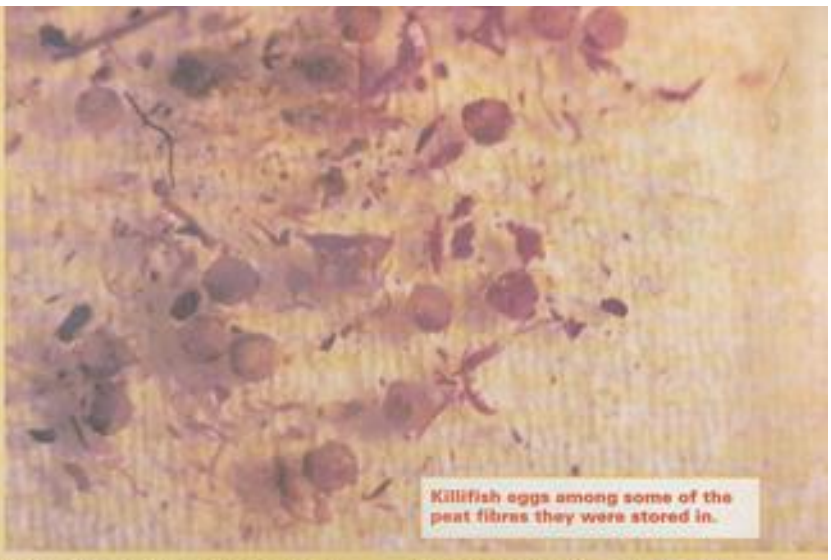
Nothos don't fit in this mould. Their ranges are erratic; they may have spread by historical rivers no longer recognisable, or by once-in-a-decade or once-in-a-hundred-year floods. Some vary physically from pond to pond, body shape and colour, apparently unrelated to food supply or water conditions. Worst of all, from a biologist's perspective, two populations of what are clearly the same species might be reproductively unable to produce fertile offspring, while two populations of clearly different species might indeed produce fertile hybrids (Dr Bruce Turner, personal communication).

Their range is still being discovered, but the bulk of known species occur around the Rift Lakes in East Africa and on Madagascar. Species have been discovered as far south as South Africa, but mostly occur throughout Tanzania, Malawi and surrounding lands. It is not known how far eastward and southward Nothos extend, and that is where current research efforts are concentrated.

Isolated sun lovers

Nothos are sun-loving killifishes, not found in shaded forests, but most often abundant in shallow (less than three feet deep) muddy ponds with emergent vegetation (grasses) in open grassy savannahs. There, temperatures can fluctuate from very cold at night, to terribly hot during the day.

They occur in vegetated roadside ditches, unshaded river floodplain pools, unshaded isolated river backwaters, natural vernal (seasonal, temporary or ephemeral) pools and isolated ponds in open fields with no clear connection to any river.



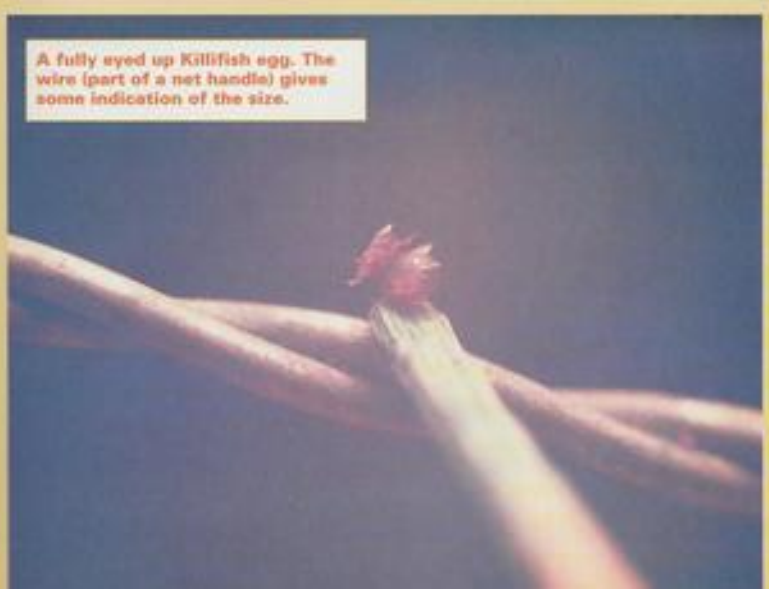
Killifish eggs among some of the peat fibres they were stored in.

Some isolated pools may contain one or two species of Nothos, and Nothos only. Overflow and backwater pools from rivers, on the other hand, frequently contain stranded river species, such as barbs or cichlids, in addition to the Nothos.

In photographs, the pond bottoms appear as deep silt mixed with sand, the sand providing anchorage for the grass-like non-wetland plants at the margins. But it is not known whether breeding occurs in the middle of the ponds where silt would be deep and anoxic, or at the pond edges where sand would dominate and the bottom sediments would be aerobic. Nobody has yet collected soil samples from a gridwork laid on the pond and counted the fish eggs at different locations.

Recent investigations presented at the annual meeting of the American Killifish Association by Dr. Brian Watters show that Notho habitats are associated with distinctive soils near the Rift Valley lakes. These soils resemble wetland soils in the United States, i.e., they are reduced, rather than oxidised, and somewhat anoxic (oxygen-deficient) during, at least, a couple of weeks of the growing season. This may play an important role in the unique reproductive strategy of Nothos.

Footnote: Lazara (Copeia, 1995, p. 501) has reported that *Aphanius* should be considered a junior synonym of *Lebias* under the rules of zoological nomenclature.



A fully eyed up Killifish egg. The wire (part of a net handle) gives some indication of the size.

Survival secret

In their native lands, Nothos are spoken of (in many languages) as "fish that fall from the sky." The local people don't realise that Nothos are not river fishes, but spend the hottest part of the summer dry season as live eggs buried in the bottom of the pond.

For a pond that lasts only a few weeks or months, life is very short and the Nothos must hatch, grow, mature, and mate before the pond dries up and the fish become victims of larger fish, fish-eating birds, or the hot African sun. In river floodplain pools that do not dry up, Nothos live longer, but lifespans have not been studied for fishes from such habitats. It may be that they are adapted to slower growing and longer lifespans.

Nothos eat benthic macro-invertebrates (i.e., non-microscopic) such as amphipods, *Daphnia*, ostracods, copepods, worms and aquatic insect larvae. Perhaps due to the lack of predators and the murky waters they inhabit, males have been able to develop spectacular poster coloration, a signal to the female that this particular male is king of this part of the pond and she should spawn with him, while also warning other males to stay away.

Poster coloration in many animals often indicates that the species is poisonous, but this doesn't apply to Nothos.

Immature, smaller, or just plain recessive (cowed) males will have reduced development of fins and coloration, but may resume development when the dominant male is removed.

(TO BE CONTINUED)

AAP

BY GORDON KAY

Now, it doesn't take Einstein to work out that shooting explosive charges into whales is going to hurt them. There is one report of a whale taking 55 minutes to die during the 1993 Norwegian hunt.

There was a lot of horrible stuff in the article and I won't bore you now, but the WDCS called upon the IWC — within the article — to do the following four things this year:

① Outlaw the use of the electric lance

② Investigate the inhumaness of the penthrite harpoon

③ Investigate the many secondary inhumane killing methods still being used, and

④ Investigate the inhumaness of killing methods used in hunting small cetaceans.

Amen to that!

Dolphinarium watch

You will recall that I discovered plans to open a dolphinarium on the island of Forteventura when I was there in February. Well, **International Dolphin Watch** have uncovered plans to build one on Cyprus. There very soon won't be anywhere left in the Med for me to go!

The plan is not without its critics, I'm glad to say, and the permit needed to build the thing had not been granted in June. Apparently, the authorities reckoned they were not aware of the exploitative nature of such establishments and that, if recognised bodies went to them advising them about this, then it just might affect their outlook.

IDW have approached several ministers with its views on the subject. Remember how people power can work. It could well be worth a few of us doing the same. The best person to write to is **Mrs. Michael, Director of the Cyprus Tourism Organisation, Nicosia, Cyprus.**

Oh, and I understand that there are also plans to build a dolphinarium in Norway. Watch this space!

UDAC on Internet

And now for something completely different. I assume that you all know what the Internet is. Well, there is now an electronic service on the internet — called **UDAC (Universal Dolphin Awareness Centre)** — for all those with an interest and concern in the environment and the future of dolphins and whales.

UDAC provides a site where anyone with access to the Internet can leave messages and announcements for free. This provides a wonderful opportunity to commuicate with anyone else with a concern for cetaceans, all around the world.

If, unlike me, you are a computer buff, why not give it a go? I would be very interested to know what it's like.

For more information contact **Sarah Broadhurst** on **delfinet@euronet.nl.**

I sincerely hope that makes sense to somebody! However, if it doesn't, then the postal address is **Engelandlaan 1190, 2034 GK Haarlem, The Netherlands.**

SNIPPETS

1 Blue-green algae are known scientifically as Cyanophytes.

2 The brownish colour of most corals comes from their symbiotic algae. Sometimes, superficial pigment conceals the brown colour, as a result of a combination of 'chartreuse' and red-orange pigments, which absorb the blue light penetrating the reef. The deeper the water and the more blue the light, the browner the corals.

3 The blue, green, purple and yellow colours of the Giant Clam, *Tridacna maxima*, are produced by light diffraction by submicroscopic layers of crystalline non-coloured pigments. These colours hide the animal's layer of symbiotic algae, which use the sun to produce food for the clam.

4 Apart from dugongs, turtles and sea urchins, very few reef animals actually feed on living sea grasses. Most of the energy produced by sea grasses is passed to other organisms through bacterial and fungal decomposition of dead plant material via the detrital food chain.

TREVOR McDONALD

Christmas-tree worms photographed in the Caribbean Sea.

5 The Christmas-tree Worm (*Spirobranchus giganteus*) feeds in a similar way to the sabellids, but differs in that one of the branchial filaments is modified to form a chalky plug which seals the tube when the worm retracts into it.

6 The Blue-ringed Octopus, (*Hapalochlaena maculosa*) possesses a deadly venom capable of killing humans.

A 'spiny skin'.

CORAL WORLD EILAT

7 Echinoids, or sea urchins, are the animals which originally gave the Echinoderm phylum its name, Echinodermata being derived from the Greek words for "spiny" and "skin".

TOP TEN TROPICALS:

Breeding Special

an Aquarist & Pondkeeper supplement by Derek Lambert

TOP TEN TROPICALS Breeding Special

Derek Lambert closes the series of Mini-Supplements for the year with expert advice on how to breed the Top Ten Tropicals featured in our first Mini-Supplement of 1995.

Back in January, Dr David Ford of the Aquarian Advisory Service, featured ten fish which sell in the largest numbers through the aquatic trade. In this article, I am going to take a closer look at how these same ten fish will reproduce in home aquaria. By breeding them yourself, you will have the enjoyment of watching the babies grow up, while also being able to cut down on the cost of your hobby. You may even be able to make a small profit on the deal by selling the surplus stock.

The Neon is a classic egg scatterer.

BILLY WHITESIDE

First of all, no matter which fish is being bred, some basic pieces of equipment are required, the most important being a separate breeding tank. It may be possible to save a few livebearer fry from a community aquarium, but without their own space to grow up in, they are never going to make the spectacular animals that their parents are.

To go along with this aquarium you will need all the usual equipment for keeping a tropical fish tank up and running. Filtration, though, has to be of the correct type and may not be advisable at all, in some cases, until the fry are larger. I will deal with this under the individual species headings.

1 Neon Tetras

Neons are classic egg scatterers which have the reputation of being just about impossible to breed. In fact, any egg scatterer should be easy to breed, providing the conditions are right.

The key to Neons seems to be water. They must have very soft acidic water which mimics their native habitat. Nowadays, there are chemicals on the market which will lower the pH and hardness with little difficulty but, personally, I prefer the old fashioned method of collecting rainwater and acidifying it with peat extract.

Since Neons need a pH of 6.0, at the very highest, to reproduce successfully, steeping peat in rainwater for a few weeks is probably not enough to lower the pH to the correct level. Instead, you need to boil peat in rainwater for about 10 minutes and add this extract to rainwater until the correct pH is reached.

The 24 x 12 x 12in (60x30x30cm) breeding aquarium must be scrupulously cleaned and filled with the rainwater/peat extract mix. Set the temperature at 75°F (24°C) and cover the bottom with nylon spawning mops. Add a bubble-up sponge filter, but do not turn it on yet. The breeding aquarium should now be left for a couple of weeks to settle down while you are conditioning the adults.

The way you condition your adult fish is of vital importance if you are to have any luck breeding them. They must be fed lots of live food for a couple of weeks before placing them in the breeding tank and the sexes should be kept separate during this conditioning period. At the end of this time, the females will have nice plump bodies and the males will be, literally, glowing with health.

From your shoal, select the plumpest female and brightest, liveliest male and place them in the breeding tank early one evening. Make sure you do not just dump them in, because the pH of the water they are in may be vastly different to that of the breeding tank. Slowly change the conditions over by mixing small amounts of breeding water with the old water over a period of several hours. Then release the pair.

If the pair are in breeding condition, they should spawn at first light the next morning. During spawning the male wraps his body around the female and turns her almost vertical, squeezing all the time. A batch of eggs is expelled and some milt. Over a couple of hours, up to 200 eggs will be produced.

As soon as the pair have finished spawning, they need to be removed or they will eat any eggs they can find. Eggs hatch in about 24 hours and the fry will be free-swimming on the fourth day. Since the fry are tiny, they must be fed *Infusoria* for the first week, followed by baby brine shrimp. Once the fry are eating brine shrimp, the filter can be turned on.

2 Cardinal Tetras

Cardinal Tetras are considered even more of a problem to breed in captivity and, today, most of those sold in aquarium shops are still caught in the wild.

Essentially, they can be bred in much the same way as Neons. However, they usually spawn in the evening and prefer subdued lighting.

Like their close relatives the Neons, Cardinals should be kept in shoals... but spawned in pairs.

BILLY WHITESIDE

Angels are regular spawners (at least, compatible pairs are).

HARRY GRIER/FLORIDA TROPICAL FISH FARMS ASSOCIATION

One essential difference between the two species is that Cardinals must be maintained in soft water conditions at all times if you plan to breed them. Since most aquarium shops keep them in hard alkaline water, try to buy newly imported fish and transfer them to soft water as soon as possible.

The other very important difference when breeding Cardinals is that the eggs are sensitive to light. Bright light will encourage fungus to grow and the whole batch of eggs may be lost this way. Keep them, therefore, in the dark during their development and always site the tank in a dimly lit part of the room.

3 Angel Fish

The breeding tank for a pair of Angels needs to be 36 x 12 x 15in (90x30x38cm) deep. This can be kept bare, except for a filter and pieces of slate stood almost vertically against the sides of the aquarium. The filter can be of just about any type. Set the temperature at 75°F (24°C) and feed the adults on lots of live foods, such as white worms and chopped earthworms.

Sexing Angels can be a little tricky, but if you look just behind and above the female's pelvic fins, she bulges out slightly; the male is indented or level here. It is a good idea to rear 6 or 8 young Angels in a breeding tank until a pair sex out and form a couple. The others can then be removed.

Birth of a Guppy.

HARRY GRIER/FLORIDA TROPICAL FISH FARMS ASS.

Numerous varieties of Guppy are available (this is a Half-black Yellow Delta Tail). All are easy to breed.

DEREK LAMBERT

Once sexually mature, Angels will spawn every few weeks on one of the pieces of slate. The eggs are usually laid in the afternoon and should be removed to a hatching container. This can be an aquarium or a tall 1-gallon jar in which the piece of slate is stood up and a stream of air bubbles directed near the eggs to enhance water circulation. Add 5% Methylene Blue solution until the water is a dark blue colour.

The eggs hatch after 3 days, but the fry do not start to feed until the seventh day. Once the eggs have hatched, change the water to remove the Methylene Blue. When free-swimming, the fry will take brine shrimp and *Infusoria* as first foods. The babies should later be moved to a rearing tank set up in a similar way to the breeding tank.

4 Guppies

Female Guppies produce a brood of young just about every month. Since most fry born in a community tank will be eaten, it is best to move a pregnant female into a 2ft (60cm) breeding tank to have her babies. The tank should contain plenty of plants or other cover for the fry to hide in and the female needs to be removed as soon as the babies are born.

Since the fry are large enough to eat ground-up flake food, you would think rearing good Guppies is easy. It is not, however, anywhere near that simple.

To start with, if baby Guppies are not fed correctly, they will be stunted and have poor fin development. To achieve good growth you need to feed them at least 4 times a day or, better still, 6 times.

Adult flake foods are not suitable at this stage. You need a fry food and, later, growth food with a higher protein content, for most of these feeds. Live foods, such as brine shrimp, must also be fed once a day.

HARRY GRIER/FLORIDA TROPICAL FISH FARMS ASSOCIATION

Despite all this pampering, if the genetic make-up of the babies is not correct, you will still end up with poor-quality fish. Since the mother was probably pregnant when you got her, you will have no control over the father of the first generation, but you can over the next.

As soon as males start to develop their gonopodium, remove them from the females. These young males are reared in another aquarium until the best one can be selected and allowed to mate with the best virgin female. In this way, the strain will improve over the generations.

5 Molly

Breeding Mollies is, likewise, easy. The fry are very large at birth and born on a monthly cycle. They often survive in a community aquarium of small fish where they will grow to about 2in (5cm) in body length and stop. At this size, even short-fin Black Mollies are stunted, but Sailfins can achieve much more.

To obtain the best from your baby Mollies, you need to rear them in at least a 3ft (90cm) aquarium with power filtration and large regular water changes. Aim for at least 50% weekly. As with Guppies, try to feed the babies as often as possible on a good-quality diet. Remember, a living Molly is a hungry Molly!

Mollies can adapt to slightly soft and marginally acidic water, but, generally, they do much better in hard alkaline water. They will take a wide temperature range and high temperatures are often recommended for them, but a temperature of about 74°F (23°C) suits them best. If the temperature is too cool, or the water quality is poor, they will start shimmying and clamp their fins.

Mollies can produce young about every four weeks.

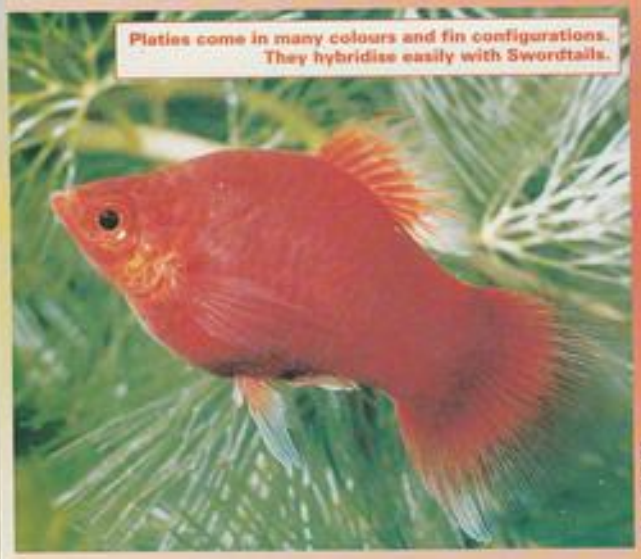
6 & 7 Platies & Swordtails

The cultivated Platies and Swordtails we see in the shops are hybrids between three different species of *Xiphophorus* which have been bred to look like one or other of the wild species.

They all produce broods on a monthly cycle and, as with Guppies and Mollies, they store sperm from previous matings. This means that if you have obtained your fish from a shop, the female will be carrying sperm from umpteen differenet males and all sorts of fry are likely to be produced.

This is no problem, though. All you do is keep your developing females virgin until a male with the desired characteristics has sexed out and then mate him to the best of the females. Careful selection through the generations will push the strain in the direction you want to go.

For rearing purposes, a 24 x 12 x 12in (60x30x30cm) aquarium will be adequate for the Platy types, but Swordtails like more room. A 3ft (90cm) aquarium, or even bigger, is best. It should include a sponge-type filter for Platies, but step up to a power filter for Swordtails when they are a month old.



Platies come in many colours and fin configurations. They hybridise easily with Swordtails.

DEREK LAMBERT

Few if any Swordtails found in the hobby are 'pure'.

DEREK LAMBERT

Zebras are (almost) as easy to breed as they are to feed!

LINDA LEWIS

8 Zebra Danio

Breeding Zebra Danios is simplicity itself. Keep your females away from the males for a couple of weeks, during which time they are fed with lots of live foods. Then set up a 24 x 12 x 12in (60x30x 30cm) breeding tank with tapwater and cover the bottom with spawning mops. Set the temperature at 78°F (c26°C) and leave the tank for a day.

Place a plump female and lively male in the tank in the evening and check it at first light the next day. Most pairs spawn within 2 hours of dawn and several hundred eggs will be produced.

As soon as spawning is complete, remove the parents, as they will devour all the eggs they can find. The eggs take a few days to hatch and the fry will hang on for another two days, so they are 7 days old by the time they start to feed.

At first, they need *Infusoria*, but by the end of the second week, they should be eating brine shrimp and a sponge-type filter can be added. Start water changes when the fry are a month old; later on, stronger filtration can be added. The youngsters love playing in the outflow of a power filter.

MAIN PIC — The beautiful and ever-popular Dwarf Gourami.
INSET — A three-day-old Dwarf Gourami fry.

JOHN DAWES

DEREK LAMBERT

MAIN PIC — Peppered Catfish pair in characteristic T-position during which the female sucks in spawn from the male's vent.

INSET — A clutch of Corydoras catfish eggs.

9 Dwarf Gourami

To breed Dwarf Gouramis, you will need a 2ft (60cm) long breeding tank with plenty of plants and some pots placed on their sides as caves for the female to hide in.

The male Dwarf Gourami then builds a bubble nest, in which he incorporates some vegetable matter into the bubbles to give it added stability. The female is enticed under this and the pair spawn. Afterwards, the female is driven off and should be removed.

The eggs take a couple of days to hatch and the fry become free-swimming on the fifth day. At this time, the male can be removed.

The fry are very tiny and feed on *Infusoria* for two weeks before taking brine shrimp. When the babies are eating brine shrimp, include a sponge filter in the set-up and start changing 10% of the water weekly.

Since the brood may be large, be prepared to split the growing fry into two or three other aquaria as they grow, or cull some of the slower-growing fry. If the tank is too overcrowded, large losses will occur when the babies are several months old.

10 Corydoras Catfish

Of all the catfish, the commonly kept species of *Corydoras* are the easiest to breed. Indeed, if you have a fully mature pair in your community aquarium, they are likely to spawn every so often with no further encouragement from you than a good diet.

To breed them properly though, you need a 2ft (60cm) aquarium with spawning mops hung from the sides of the tank and some broad-leaved plants in pots. A sponge filter should be added from the outset. In most areas, tapwater can be used to breed the common species, but if you are in a particularly hard water area, half fill the tank with rainwater.

Sexing Corydoras is not all that difficult when they are in good condition. Females are much plumper and males often have longer and more pointed pectoral fins. Place a single pair in the breeding set-up and feed them on lots of live foods such as *Daphnia* and whiteworms. A few weeks of this sort of food should be enough to raise them into spawning condition.

Spawning often takes place after a water change. The eggs will be laid into the mops, on the sides of the aquarium or the broad-leaved plants. They take about 6 days to hatch and the fry start to feed the day after hatching. All species are large enough to eat brine shrimp and microworms as first foods.

Some species are seasonal breeders and will not spawn until the right time of year, but tank-raised fish are generally much less fussy.

Water's Edge

By Dick Mills

The Garden Leisure & Entertainments Exhibition (GLEE) every September is the ideal launchpad for manufacturers' new products for the coming year. Here are some of the highlights I came across.

Interpet

ZOOPLANKTON, the new, vacuum-packed, glass-jarred food from **INTERPET** is a completely natural food. Held in a sterile culture, the 60% protein food is completely disease-free and, thanks to a pasteurisation process, retains all the original vitamins, minerals etc which would otherwise be lost during other forms of food processing such as freezing. It has a shelf-life (once opened) of 1 month at room temperature and 2 months refrigerated.

New MAGNETIC ALGAE SCRAPERS (in three sizes) and AQUA CARBON (made from several carbon sources, including coconut, to give wide-ranging adsorptive properties) were also making their debut.

The self-priming PRIME 20 is the second external filter to be launched following the PRIME 10 lift-off last December. For early release next year are several 'pet-care' books especially aimed at youngsters — a very welcome encouragement, bearing in mind that, no matter where their individual fishkeeping interests lie, they represent the continuing lifeblood of the hobby.

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

DICK MILLS

Hozelock

Safety, particularly where water and electricity are potentially-combined, must be uppermost in most people's minds. The LV (Low Voltage) range of SUPER CASCADE POND PUMPS from **HOZELOCK** are extremely good to look at and will not only perform just as well as their mains-voltage counterparts, but at reduced running costs, too. By the way, when comparing relative costs, do appreciate that a transformer is also included in the price.

A new 1250 model has also been introduced into the mains-voltage Super Cascade range. All pumps now conform to the CE requirements (mandatory after 1 January 1996).

Two compact external BIOLOGICAL POND FILTERS service ponds of up to 2,300 and 9,100 litres capacities respectively, while the POND FILTER PLUS (for ponds up to 6,800 litres) has three different filter media — brushes, sponges and biological plastic coils — for increased efficiency.

POND FISH FOOD, KOI FISH FOOD (both 'Stick formulation) and FISH FOOD FLAKES are a new but prominent feature of the company's range of products for the coming season.

Details from: **HOZELOCK Ltd., Haddenham, Aylesbury, Buckinghamshire HP17 8JD, Tel: 01844 291881; Fax: 01844 290344.**

Lotus

LOTUS have cleverly incorporated SIPORAX POND FILTER MEDIUM into the strainers of two of their pond pumps. Two clip-on strainer/adaptors are available, either as part of a complete fountain pump unit, or as an optional extra.

The new UV PURIFIER unit features a separate UV lamp (backed by a light-boosting reflector) which shines at water flowing through a separate quartz tube (again backed by a reflector); this allows easy replacement of the UV tube (no disconnecting or dismantling of any surrounding water-jacket) and easy cleaning of the water-carrying quartz tube.

DICK MILLS

Details from: **LOTUS WATER GARDEN PRODUCTS Ltd., Junction Street, Burley, Lancashire BB12 0NA. Tel: 01282 420771; Fax: 01282 412719**

Tetra

An example of a more comprehensive approach to fish care, following successful medication, was to be found on the **TETRA** display, where the product range was augmented by the new range of POND TREATMENTS and TONICS. 'After-care' is seen to be just as important as any medication and the tonics help to restore a fish to full health in a far shorter time than when left to its own devices.

Details from: **TETRA INFORMATION CENTRE, Chestnut Avenue, Eastleigh, Hampshire SO53 3ZQ. Tel: 01703 620600; Fax: 01703 629810.**

Sera and Eheim

Hi-Technology equipment offered by **SERA** includes the SERA PRECISION INSTRUMENT range, featuring the SERA pH METER and SERA CONDUCTIVITY METER. Each immersible probe gives instant (and economical) readings.

Also making its debut was the SERA SERAMIC pH CONTROLER which is designed to be used in conjunction with the SERA CO_2 INJECTION SYSTEM.

EHEIM have released extra models in the PICK-UP INTERNAL FILTER range. These filters have extra-easy cleaning facilities; all you do is 'pick up' the filter medium holder out of the tank (the motor remains in place). All have directional return outlets and adjustable flow rates; the two larger models also have integrated air diffusers. The range will suit aquariums from 30-160 litres.

Details from: **JOHN ALLAN AQUARIUMS Ltd., Eastern Way Industrial Estate, Bury St Edmunds, Suffolk IP32 7AB. Tel: 01284 755051; Fax: 01284 750960.**

DICK MILLS

Coral Reef & Underworld

Fluidised beds are the latest developments in aquarium biological filters (as reported in a recent **Water's Edge**) and are reported to be 25%-30% more effective than contemporary trickle filters. Two models were on display: the MERLIN distributed by **CORAL REEF TECHNOLOGY LTD, 62 High Road, Byfleet, Surrey KT14 7QL. Tel: 01932 355121; Fax: 01932 34918,** plus a range of SEASQUIRTS (internal) and SEASTORMS (external) by **UNDERWORLD PRODUCTS, Units 1 & 2, Belton Road West, Loughborough, Leicestershire LE11 0TR. Tel: 01509 610310; Fax: 01509 610304.**

DICK MILLS

Blagdon

Following company restructuring, and under new ownership by **Ubbink of Doesburg**, Holland, **BLAGDON GARDEN PRODUCTS** bounced back at GLEE with no fewer than 79 new products.

One feature well worth mentioning is the company's commitment to quality, which is reflected by a 3-year guarantee on the AMPHIBIOUS range of water pumps, which have been upgraded with new pre-strainers for lower maintenance, improved efficiency and improved flow rates.

The well-known *Blagdon Water Garden Book* gives details of all products and is available from: **BLAGDON GARDEN PRODUCTS, Bristol Road, Bridgwater, Somerset TA9 4AW. Tel: 01278 446464; Fax: 01278 446155.**

Cyprio

From small water features to large ponds, **CYPRIO** have new things for '96. Floating WATER SILKIES, imitation water lilies with 6in foam pads and silk blooms, can be left to float freely or be anchored in groups.

The FUTURA 680 FOUNTAIN PUMP is the 'Big Brother' to the smaller **Prima Pumps** introduced last year and gives 680 gallons per hour at 3-foot height. The BIO-COMPACT DE-LUXE FILTER cuts down dramatically the time and effort spent on cleaning your pump's pre-filter and provides mechanical and biological cleaning of ponds up to 500 gallons capacity.

Hessian-free CYPRIFINE PLANTING BASKETS come in eight sizes and keep both aquatic plants and aquatic compost in the right place — in the basket not in the pond! Similarly, CYPRIO FEEDING RINGS locate your fishes' foods precisely and any surplus leftovers are kept in one place too, so cleaning it up is no longer a wearisome chore.

The new PRO-POND FILTERS, using vortex/swirl sedimentation, mechanical and biological filtration principles, will deliver guaranteed performances in ponds of between 2,000 and 15,000 gallons.

Need help? Then **Jon Hart**, the HELPLINE Manager is there on **01778 344502** to help you. **CYPRIO LIMITED, Hards Road, Frognall, Peterborough PE6 8RR. Tel: 01778 344502; Fax: 01778 348093.**

Anglo

ANGLO AQUARIUM PLANT CO LTD have added a FISH FILTRATION EQUIPMENT planning and installation service to their more expected aquatic plant supply expertise.

Customised central filtration systems, based on minimum-maintenance mechanical, biological and ultra-violet light purifying processes, can be tailor-made to suit any commercial requirement and the end results look very spectacularly neat and tidy.

Details from: **ANGLO AQUARIUM PLANT COMPANY LTD., Strayfield Road, Enfield, Middlesex EN2 9JE. Tel: 0181 363 8548; Fax: 0181 363 8547.**

OTHER PRODUCT NEWS

Emplas

Tangled airlines could be a thing of the past for multi-tank owners. **EMPLAS** have produced a multi-tube version of PVC TUBING, which is a cluster of five parallel tubes tightly bonded together.

Running from the air supply, it is an easy matter to tear back each tube as required at its prescribed length, the rest keeping neatly together. Made from BS40 softness non-toxic PVC, the multi-tube can be supplied in 30, 50 or 100 metre coils (and in softer BS60) if needed.

Details from: **EMPLAS LTD., Saddington Road, Fleckney, Leicester LE8 8AU. Tel: 0116 2403407; Fax: 0116 2402805.**

Mecnov

Followers of a certain north-country based TV 'soap' will, no doubt, have a certain sympathy for a 'currently gnomeless' character.

Obviously hoping to pull on the nation's heartstrings, **MECNOV PRODUCTS** have released a set of five enchanting gentlefolk called GNODDING GNOMES. Constructed in tough, colourful vinyl, these wee folk have heads which nod to and fro as any breeze dictates: whether or not they also act as cat-deterrents too is not reported!

Details from: **MECNOV PRODUCTS LTD., Dept 12 Fiddlebridge Lane, Hatfield, Herts AL10 0SP. Tel: 01707 268426.**

JWG

The HYDRA system of MODULAR FILTERS, from **JAPANESE WATER GARDENS,** is designed to be expanded at will, without the crippling extra financial burden so often incurred. Two basic systems are offered: the HYDRA 2500 (up to 2,500 gallons) and HYDRA 4000 (up to 4,000 gallons).

Needing only a level concrete base and standard pipe fittings, the Hydra systems are easily installed (they are light in weight, yet very robust, making for a compact size: 107cm wide diameter, 100cm high). Water flow can be either upwards or downwards and extra units can be added as the pond grows to larger proportions. Vortex principle settling chambers are followed by brush and biological sections. (these biological filters have been regularly exported to Japan and the Far East).

Details from: **JAPANESE WATER GARDENS, 251 Toton Lane, Stapleford, Nottingham. Tel: 0115 939 7926; Fax: 0115 949 0451.**

Stuart Turner

Submersible pumps have their limitations, none more than where large volumes of dirty water are to be shifted to an external filter, such as in the majority of Koi systems. Recognising this fact, **STUART TURNER** have launched new SURFACE PUMPS capable of fulfilling this onerous task.

The new range consists of four models capable of moving 1,700, 2,100, 2,900 and 3,500 gallons per hour, respectively. Each pump comes with a footswitch and strainer (they are not therefore self-priming), 1.25in diameter bsp connections, two metres of cable and a two-year guarantee. Made from non-corroding plastic, the pumps are designed to pass dirty water and solids straight to the filter; nothing is left in the pond to continue any contamination of the water.

Because of their power, these pumps can also be used to advantage where large volumes of water are moved for decorative purposes, too, such as waterfalls and fountains.

Full details of all pond pumps, filters and accessories from: **STUART TURNER LTD., 47 Market Place, Henley-on-Thames Oxon. Tel: 01491 572655.**

Dupla

It's always best to start at the beginning (or, at least, with the things you can understand the easiest) and this is especially true for products which are getting more 'hi-tech' every day. The **DUPLA** name is associated with the creation and development of aquarium products right at the 'cutting edge', as they say and, by proceeding cautiously, all should become clear by the end.

Before things get too involved, your aquarium should be up and running and fully established. To achieve this in a relatively short time, DUPLA BACTER optimises the nitrification process in fresh and saltwater in new situations and also where extra stress (or load) is encountered — water changes, breeding or even overfeeding. No fewer than 100 million bacteria are in the 100ml bottle, all raring to go to work.

Caring for the aquarium can only be done if you know what the necessary (and apparently increasing in numbers) parameters are, or should be. The DUPLA ANALYSIS TEST CASE will keep all your test kits in a safe place (it's even lockable to prevent unauthorised use). The foam-lined aluminium case contains the basic equipment: flasks, brushes, spoon, pipette, thermometer, diagnosis sheet, analysis journal etc, plus room for no fewer than 21 liquid tests and 4 powder tests. The foam lining in the lid can be removed to form a working table, its white backing making for a clean working area and a perfect background against which to view colour comparisons.

The use of carbon dioxide injection is becoming more widespread and the two new sets, DUPLA CO_2: SET DELTA and SET DELTA S, will ensure that your aquarium plants get all of this necessary nutrient they require. The main difference between the two sets is that the Delta S comes with a larger gas bottle (750gm against 500gm) and the Reactor 400. Both sets contain visual indication of CO_2 content in the water.

If your calcium content is too low, then the new DUPLA Ca REACTOR will put things right. This specially-designed precipitator for foreign gases allows permanent operation of the Reactor, especially at high CO_2 concentrations, which usually means low pH readings. The Reactor is operated by a small 4-watt electrical pump and the body of the Ca Reactor holds up to 500gm of calcium granules. It is recommended that levels of calcium do not exceed 12° dH.

The Ca Reactor is used in conjunction with a CO_2 supply whose magnetic valve to the Reactor should be switched off at night (connecting the valve's controls to the tank lighting circuit is the way to do this, but the Ca Reactor pump should be left running to stop the calcium granules lumping together). It is usual to employ the Ca Reactor in reef aquariums whose pH levels lie between pH 8.15 and pH 8.20 after four hours of illumination.

Details of all Dupla products from: **DUPLA AQUARISTIK GMBH, Gildemeisterstrasse 90, W-4800 Bielefeld 11, Germany. Tel: 00 49 5205 9809 0; Fax: 00 49 5205 9809 10.**

Wattronics

Limewood has long been the traditional material for air diffusers (can hardly call them airstones!) for marine aquarium use either as direct aerators, or for use in protein skimmers. The one problem (also traditional) is that they have a relatively short life.

Now, with the AQUASYS EXTENDED LIFE AIR DIFFUSERS from **WATTRONICS** things are looking up. Made in STANDARD and SLIM versions (the Slim Aquasys is ideal for narrow protein skimmers), no assembly is necessary — just plug in to airline and blow — and the life expectancy is reported to be 4 to 6 times as long as other limewood diffusers. All materials used are ozone-safe too.

Details from: **WATTRONICS, 119 Meadowbrook Avenue, Beaconsfield, Quebec, Canada H9W 5B9. Tel: 001 514 695 1885; Fax: 001 514 695 7846.**

Aqua Co

It is likely that any company producing anti-algae/blanketweed remedies will have been bombarded with enquiries throughout the recently prolonged hot summer.

AQUA COMPANY had decided to offer even more help to pond owners in future by providing a detailed WATER and POND ANALYSIS on samples of pond water (not less than 300ml, 10 fluid oz) submitted to them.

On receiving the sample, together with a completed questionnaire (very comprehensive, yet easily answered) about the pond's conditions, the company will prepare a detailed analysis of the water within 14 days. Armed with this information, pondkeepers will be able to understand the key elements of pond maintenance and so avoid many of the green terrors of future summers and any other likely water quality based problem.

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

Hagen

Just as certain breakfast cereals come in variety packs, so do fish foods! NUTRAFIN, the popular food brand from **ROLF C. HAGEN**, can now be seen in a special display box of no fewer than 7 of the most sought after varieties. These are: GROWTH FOOD, STAPLE FOOD, STAPLE FOOD TABLETS, TUBIFEX WORMS, BRINE SHRIMP, GOLDFISH FOOD and RED GRUBS.

LIVING WORLD AQUASCAPES, the replica plastic plants, are now bigger than ever, a 20in length is now available in the following species — Anbulia, Anacharis, Cardamine, Foxtail, Hornwort, Hygrophila, Moneywort and Red Ludwiga.

The continuing supply of English versions of the renowned BAENSCH ATLASES is something all aquarists look forward to and now there's another one out. The *Baensch Fossil Atlas* will take you back down the time trail to where the beginning of our hobby's species occurred. Over 2,000 genera of fossil fishes have been described and the book contains around 900 colour photographs and over 200 recent descendants.

These, together with several hundred line drawings, make an invaluable reference work for anyone wanting to trace back any aquarium fish's family tree.

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

New filter aid

A new filter accessory, FILTAFLEECE, from **ELITE** will increase your filter's efficiency.

As the name suggests, the filter mat format looks just like a pure white fleecy rug; the very fine textured fleece is securely held in place by being bonded on to a firm green base. Tailored to fit 500/1,000-gallon, top-fed, single-chamber box filters (each mat measures 15.5 × 9 in (400 × 225 mm) this fine particle removing medium is durable and reusable after rinsing. It comes with a one year guarantee.

Another popular (and equally effective) aid is GREEN WATER BARLEY STRAW. This comes in two mini-bale packs, each mini-bale treating up to 1,000 gallons (4,500 litres) of water. Decomposition of the barley straw creates micro-organisms effective against algae bloom.

Hung at the surface of the water, preferably near to waterfall or filter outlet, each mini-bale lasts six months, but should be removed from the water momentarily, at least, twice per month; beneficial effects should be seen after one month. An overlapping time of one month between replacement mini-bales should be operated when used on a continuous basis.

Both these products can be seen at **AIRPORT AQUARIA, Heathrow Garden Centre, Sipson Road, West Drayton, Middlesex** (next to Forte Crest Hotel, M4 Junction 4) and full details obtained from: **ELITE SMP, P.O. Box 1229, Maidenhead, Berkshire SL6 3YB.**

DAVID TWIGG'S

KOI CALENDAR

Jobs for the month

Stability of water temperature, particularly in unheated ponds, is important during the winter months and especially during the spring when all the unwanted 'wildlife' in the pond is expanding rapidly.

A way of minimising this risk is by covering the pond in some way to reduce heat loss through, for instance, wind chill, while at the same time, providing a little 'greenhouse effect' to help counteract the losses. It's quite surprising just how much heat there is in the winter sun when in a protected spot, so making best use of this phenomenon can be quite rewarding.

Super Bubbler test

I have spent the last month, since attending the BKKS National show, observing the effects of the 1-metre long **Bioglass Super Bio-Bubbler** in my system.

But first, what is a Bio-Bubbler? Until recently, conventional air stones have been used to provide additional oxygenation for the Koi pond water by creating a stream of bubbles from, usually, a ball-shaped 'stone' fed from an air pump, such that, as the bubbles rise to to the surface of the water, they give up some oxygen into the water.

The Bio-Bubbler differs in two main areas. Firstly, it comes in a tubular form, so the area into which the bubbles are diffused is greater, and secondly, the bubble size has been reduced down to an extremely small diameter by comparison to the air stone. This means that, for the same amount of air pumped into the device, a larger amount of oxygen can be diffused into the water as the bubbles rise to the surface.

Because of surface agitation spoiling the viewing of my Koi and the continuous rubbing motion of airstones on my butyl liner, I have not, for many years, used air stones in my pond, but have done so in the header pond and water course. So, my first action was to replace one of my five air stones, driven by a HIBLO 40 air pump, with the Super Bio-Bubbler that I then placed in the main pond.

After a few moments, a 1-metre long chain of bubbles arose to the surface and the immediate area above the Super Bio-Bubbler was 'boiling'. The bubble size didn't seem to be a lot different from the airstones, but as I had been told that it actually needed less air supply to give the same effect, I turned down the air supply to a point where the bubbler was giving a dense stream of very fine bubbles indeed.

My Koi didn't immediately take to this device being placed in their environment and took station at the other side/end of the pond. I guessed that it would take them a few days to get used to this apparatus, as it must surely put 'noise' into the surrounding water. I therefore moved the bubbler to a position that I felt was less distracting to the Koi, namely 2 feet from the long side wall, halfway along its length and at a depth of approximately 4 feet, and observation began.

Twenty four hours later, the first effects were being seen: fish droppings were collecting on both sides of the bubbler that was obviously badly placed and interfering with the flow to the bottom drain. My Koi were happy now with the 'stranger' in their pond and would happily swim through the bubble stream

DAVID TWIGG

The Bio-Bubbler in action at Koi '95.

VIDEO REVIEW

Living Jewels, Part 4

Having seen and been highly impressed by Parts 1-3 of *Living Jewels*, I had high expectations of this next part in a continuing sequence of *Living Jewels* videos.

The tape, covering 7 ponds in all, opens with shots of a pond in Belgium. This pond is 16,500 gallons large, Japanese in design, has a magnificent waterfall and houses 40 Koi.

Viewing passes through a variety of well-designed ponds of varying size and the narrative describes each system in considerable detail. Apart from allowing us to see their fish, the owners of these ponds give their tips to viewers who are considering becoming pond builders or Koi keepers. One of these ponds is indoors! Oh I wish it were mine!

Living Jewels 4 finishes with a collection of fish that I would, as they say, give my eye teeth for and has left me waiting for *Living Jewels 5*. This is not only a highly informative video clearly describing the detail of seven lovely ponds, but it also gives the viewer an hour of relaxation with well over, I guess, 150 lovely Koi to admire, the last few of which are 'bowled' for even better viewing. Koi keepers, this is definitely one for your collection!

Living Jewels Part 4 can be obtained from **New Vision Video Productions, Heron House, Anglesea Road, Wivenhoe, Colchester, Essex CO7 9JR (Tel: 01206 827338)**. Price: £12.95 (add £1.50 for p&p if ordering by mail).

WHAT'S ON IN NOVEMBER

1 — Leicestershire Koi Section BKKS. *Meeting.* B.S.C. Social Club, Scudamor Road, Leicester. Speaking on *Koi Varieties* is **Peter Haywood.** Contact **Mick Reffin,** 0116 2712517.
2 — Suffolk & North Essex Section BKKS. *Monthly meeting.* Stanway Rovers Football Club. Contact **Alan Carter,** 01206 866011.
8 — Merseyside Section BKKS. *Bonsai!!* Contact **Phil Adamson,** 0151 2202970.
11 — Heart of England Koi Society. *Monthly meeting.* Contact **me,** 01926 495213.
12 — Mid-Somerset Section BKKS. Speaking on *Overwintering Koi* is **Nick** of **Watermarque**. Contact **Alan Purnell,** 01458 272132.
14 — Nottingham & District Section BKKS. *Monthly meeting.* The Western Club, Nottingham, 8pm. Contact **Shirley Hind,** 0115 981 0923.
18 — Northern Koi Club. *Annual Dinner Dance.* Everglades Park Hotel, Widnes. Contact **Tony McCann,** 0161 794 1958.
19 — Northern Koi Club. Colin Bragg of **Lakeland Landscapes** is the speaker. Contact **Tony McCann,** 0161 794 1958.
22 — London Section BKKS. *Christmas Fun Night.* Ruskin House, Croydon. Contact **Keith Nind,** 0181 673 3574.

SKS visit

On one of the **Heart of England Koi Society** day trips recently, we went across to the east coast and called in on **Kath Pye** and **Andrew Chatten** of **Selective Koi Sales** at Hainford, just north of Norwich.

SKS is in a lovely garden setting and has one large pond and a collection of smaller ponds holding a large quantity and wide variety of Koi from 3in upwards. Andrew told me that he is now the largest importer of Japanese Koi into the UK.

A large dry goods area houses almost everything Koi keepers could need to keep themselves and their Koi happy. If you haven't been to Selective Koi Sales, then it would be well worth calling in next time you're out and about in that area. They can be contacted on **01603 897453** or **01692 405347**.

***ABOVE* — High-grade specimen at Selective Koi Sales.**

***RIGHT* — SKS has a wide range of fish on offer in its outside ponds.**

WHAT'S ON (LATE OCTOBER)

19 — Peterborough & Cambridgeshire Section BKKS. Club night, Breaks Snooker Club, Peterborough. Contact **Gary Found**, 01733 573178 or **Alan Peppercorn**, 01733 349472.

25 — London Section BKKS. Speaker is **G. Saunders**, Ruskin House, Croydon. Contact **Keith Nind**, 0181 673 3574.

SHOW CALENDAR

OCTOBER

28/29 South of England Koi Club holds its first 'Japanese' 2-day *Open Show* at Barton Hall, Horndean Community Campus between Petersfield and Portsmouth and adjacent to J2 of the A3(M). Ample FREE parking, catering and licensed bar.

To show your Koi, or for further information, ring **Tony** on 01705 261065 or **Colin** on 01705 214761.

as if it didn't exist.

The other immediate observation was related to water clarity; I do not have a sand filter in my system and, consequently, suffer from very fine particles floating in the water. These particles were, without doubt, less in quantity and clarity was improved. Whether or not this fact was directly due to the bubbler or not I cannot say.

However, I then moved the bubbler out of the pond and into my header pond, where it is placed across the flow of the water moving to the waterfall. My clarity has continued to improve, but we have had a dramatic drop in sunlight since this year's super British summer went away, and this may well have contributed to this phenomenon.

Oxygen content of the water as measured with my test kit at the onset of use and taken again almost a month later (approximately 3°C cooler) fell between the 8 and 11 mg/l gradations on the colour chart, so I have seen no major change there.

The Super Bio-Bubbler floats above a stainless steel rod which holds it firmly on the bottom of the pond and water circulates around the air tube by virtue of a 'scalloped anchor skirt' so, unlike the conventional air stone, there is little restriction to airflow.

I am very happy with the way that the 'micro' bubbles are distributed with minimum water surface movement and at quite low pressure, so I could perhaps run from a smaller air pump if I were to replace each of my air stones with a bubbler. The Super Bio-Bubbler comes in a range of sizes, even circular!

For more information contact **Bioglass Ltd, Unit 2, Denton Works, Rothesay Road, Normacot, Stoke on Trent, Staffs. ST3 4QP. Tel: 01782 593263.**

Koi Water Barn anniversary

My thanks to **Andrew Wheeler** of **Koi Water Barn** who sent me details of the 'Barns' 10th anniversary celebrations on 6 August. On the day, a wide variety of dry goods, as well as high quality Koi specially imported from Japan for the occasion, were on offer at greatly knocked down prices. I understand that Koi in the 'bargain tank' were, in many cases, marked at less than cost price!

The highlight of the day, which had people queuing at the Koi Water Barn front door, was the competition for a GinRin Showa, valued at £2,500. Entry to this competition was by the purchase of a high-grade 6-7in Showa from the 50 on offer at £25 each, a fraction of their true worth.

First in the queue, having arrived at KWB at 5.15am (yes, 5.15 in the morning!) was **Andrew Geekie** and he got first choice of this wonderful selection of fish. This does not necessarily mean that he will have purchased the best fish in the vat, because the competition will not be judged until mid-November. The challenge of this competition is too select a Showa with potential and nurture it until the judging day. I wish Andrew and all the other entrants into this very challenging competition all the very best of luck.

The day was rounded off with a free Bar-B-Que and ox-roast around the Tateigoi growing-on lake in the meadow behind the 'Barn'. What better way to finish this item than with a quote from KWB: "A most enjoyable day for all and an event well worth repeating for our next major anniversary". I hope I will be able to attend that one!

My thanks to **Mark Duggan** of Walton on Thames for his call. Mark has a large trickle filter in his system that I am looking forward to seeing and reporting on soon.

KOI: guide to su

PART TWO

PRACTICAL ASPECTS

NISHIKIGOI INTERNATIONAL

There are many commercial designs for biological filters and if you intend taking this road, then you should seek the advice of the supplier or manufacturer of the unit you intend using. I will deal here only with the DIY aspect of filter design, as it is this path that most Koi keepers choose.

Many people try to copy the commercial designs of filter with differing degrees of success. In my opinion, the biggest flaw in this approach is that many Koi keepers try to pump water *into* such a filter and this has a number of disadvantages

Firstly, you cannot employ settlement by using pumped water, as the pump tends to 'liquify' the solids which then remain in suspension and necessitate a high filter maintenance workload.

Secondly, this means that your biological filter must necessarily work as a mechanical filter as well, which lowers its efficiency considerably. As such, designs of filters are perhaps marginal in size anyway, and this is a major reason why water quality is easily lost.

In-ground filters

While the filters mentioned above obviously have their place, most Koi keepers (in my experience) tend to favour the larger 'gravity fed' designs. These are built on the same level as the pond, have large input pipes from bottom drains in the pond with the pump at the end of the system, where it can directly drive many of the accessories used on the pond, such as venturis, heaters, and UVS.

Such a system can, of course, be made up from smaller containers and, peovided the diameter of the gravity feed pipes is great enough to cope with the flow, this should give good service. As a rough guide, I would say that you need one four-inch pipe for every 2,000 gallons (9,000 litres) per hour projected flow, but this will depend upon many factors, such as how many bottom drains you have. Once again, as a rough guide, I would say a minimum of two bottom drains and two four-inch pipes.

Be careful, however, when deciding upon the number of pipes, as four-inch piping will have a low flow rate and, being on the gravity side of the system, they will tend to act as a first stage of settlement (rather similar, in fact, to an inertia chamber). As a consequence, a flushing arrangement should be incoporated into the design.

I would also recommend that such a system has its containers connected 'in parallel' rather than 'in series' as this will make better use of the available medium or media. (see diagrams)

Top-quality fish like this impressive Sanke require top-quality filtration for long-term peak health.

ccessful filtration

Barry Goodwin follows last month's theory with a little practical advice on filter media.

Illustrations — unless otherwise indicated — by the author.

In-ground gravity filters can be of the **conventional flow** type, where the water flows in at the top and down through the media, or they can be of the **reverse flow** type, where the water flows in at the bottom and up through the media.

Efficiency can be improved by first building a suspended floor about 9in (23cm) off the bottom of the filter chamber. This can be made from an ash frame assembled with brass screws and covered with perforated plastic sheet and the media placed on top. The bottom void created by this method improves the flow through the media and prevents any tendency for tracking.

Whether or not you use conventional or reverse flow is academic, because any mulm that does enter the media, or windblown sand and dust, will eventually find its way through to the void underneath, where a suitable method of flushing it away will have been incorporated.

Design thoughts

There are some basic considerations listed below that will be useful when considering a filter design.

(i) The biological area of the filter should be, at least, one third of the pond area and, preferably, one half. It will utilise the media more efficiently if this part of the filter is designed as one large chamber, rather than being spilt up over several smaller ones.

Again, it is worth mentioning that some of the modern comnercial filters use a different design philosophy, incorporating high-tech media with vastly differing flow rates. If you are considering one of these, then you *must* adhere to the manufacturer's instructions.

(ii) It is better, and cheaper, to use 20mm to 30mm crushed gravel as a medium. This is because the rough broken surfaces have a much larger specific surface area than smooth water-worn stones and will therefore support more bacteria. The size of the stones will also discourage blocking.

(iii) To assist your calculations, 10mm gravel has a specific surface area of approximately 360 square metres for each cubic volume and 20mm gravel has a specific surface area of approximately 180 square metres for each cubic metre of volume.

(iv) Gravel has a voidage of about 50%, so therefore, this must be taken into account when calculating the volumes of gravel and water in your filter.

(v) A cubic foot of water contains approximately 6.25 gallons, which is a good yardstick to use when calculating pond capacity. It is subject to errors, however, as this figure of 6.25 depends upon temperature and, correspondingly, specific gravity. The most accurate means of calculating pond capacity is to use a water meter when filling it.

(vi) The hydraulic loading is the rate of flow in gallons related to time through the filter in relation to its specific surface area. The flow rate, and hence pumping capacity, should be chosen in order to turn over the pond volume, ideally, in two hours, and not more than three hours.

(vii) The retention time is the time that the quantity of water within the media takes to progress through. It follows that a bigger filter will have a higher retention time than a smaller one for a given flow rate.

This last item is probably controversial to say the least! Talk to a 'gravel filter' Koi keeper, and he or she will say that you need a high retention time therefore a bigger filter to maintain the flow rate. Talk to a champion of the smaller high-rate filter and he or she will say that it is not important.

It all depends which system you favour, really. You can't build your filter too big, but you can build it too small. Many Koi ponds in parks in Japan have filters as big as the pond.

Filter media choice

Once you have constructed your filter, you should then consider which medium or combination of media you are going to use.

This is not as straightforward as you might imagine, as not all media are suitable for all different chemistries of water. There is nothing specified about this and it is all down to the experience of

A filter system using brushes and matting to service a quarantine system.

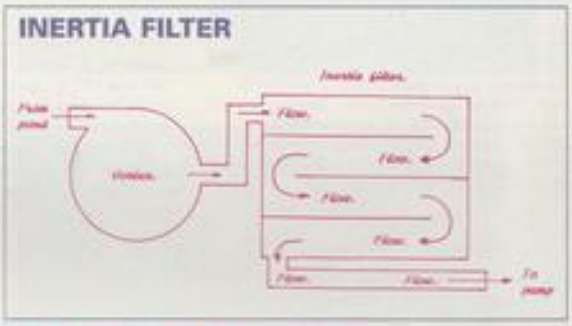


Fig 1. The principle of an intertia filter.

A tray of zeolite in a display vat filled with newly imported fish. The zeolite will help to keep the ammonia at bay until the existing filter system catches up.

the individual hobbyists themselves.

To find out what works well in your area, you should consult with other hobbyists and see what they employ. This problem does not appear to rear its head with gravel, which is why I recommended it earlier.

Now that the popularity of Koi keeping is growing rapidly, so are the numbers of firms offering 'wonder media'. You must beware of being sucked in here, as a few of these firms have little knowledge of Koi keeping and are jumping on the bandwagon, so to speak. There are, of course, many genuine people with a good product to offer, but be sure that what you buy does really live up to the claims of the manufacturer. You can only do this by seeing the medium in question in action on another system.

Sintered glass medium in a dealer's vat. This is used by many dealers as a means of effectively eliminating nitrite, which can be very persistent in environments where the stocking level is continually changing.

1 Foam

Foam is often used as a medium for a dual purpose, that of combining mechanical filtration with biological action. In my opinion, you should never do this. Although biological filtration will occur anywhere in the system, you should try to separate the processes, hence the advantage of using a vortex, as no form of medium at all is used. Mechanical and biological filtration are not compatible within the same area of medium.

Foam is also hard work to maintain on a big pond and therefore goes against one of my basic design criteria: ease of maintenance at all times. If you do use foam, then be sure to use pond water to clean it with; this will avoid destroying the biological culture.

2 Flocor

Another popular medium is known as "Flocor". This is comprised of corrugated plastic conduit chopped into short lengths and placed in the filter chamber. It provides a large surface area for bacteria to grow and a high voidage, which ensures a good water flow and less possibility of clogging.

A PARALLEL CONNECTED FILTER

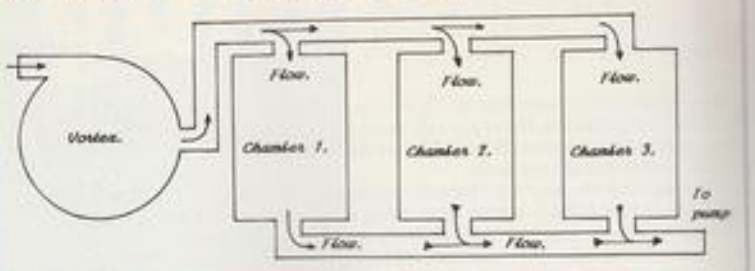


Fig 2. This is a 'parallel' filter system. Compare it with the accompanying one of an 'in-series' system.

3 Baked clay

Another suitable material takes the form of baked clay granules of the type used in garden centres to provide wet beds to stand potted plants on. This is not suitable where there are a lot of suspended solids. Because of its small size, it will block easily.

4 Zeolite

This is a fine-grained 'stone chip' type of material which removes ammonia from the water. It is placed in the final stage of the filter in some sort of removable container, as it may be recharged by soaking in a salt solution. Be careful that you do not use salt to treat your pond with when you are using zeolite, or you will discharge its ammonia into the water.

It is perhaps a good idea to keep your zeolite in two containers which can then be removed alternately for recharging without totally depleting the system at any one time.

5 Japanese matting

More modern methods utilise a form of coarse plastic matting built into a cartridge through which the water flows. This is quite commonly referred to as 'Japanese matting' and the cartridges are so designed that the water flows alongside the surfaces and not through them, which increases the biological efficiency. There are now alternatives to the 'genuine' Japanese matting which are readily obtainable at a more affordable price.

6 Sintered glass

Another type of medium takes the form of sintered glass rods or tubes. This has an incredibly high surface area and is claimed to have extremely high purification properties. It certainly is very efficient at controlling nitrite in heavily stocked set-ups and is used by many dealers as an addition to their existing media.

7 Brushes

The brushes mentioned in Part 1 in connection with settlement chambers are also used by some hobbyists in the biological stage as they present an ideal environment for the support of aerobic bacteria.

8 Hair rollers *et al*

Hair rollers can also be used, as can almost anything which is non-toxic and has a large surface area. I have even heard of worn out car wash brushes being used, but initial decontamination of these poses a problem.

Next time I will discuss the various items of filter equipment used by Koi keepers.

A SERIES CONNECTED FILTER

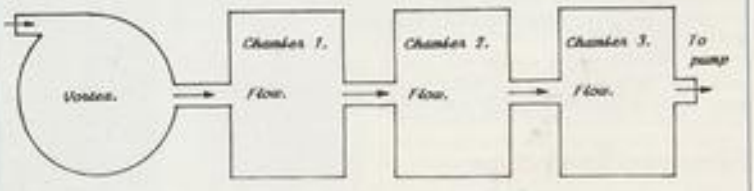


Fig 3. In an 'in-series' system, one chamber follows another one in sequence with a simple inflow and outflow in each.

John, my son, reading one of the excellent information boards (No.33!) at Underwater World.

Out & About

AUSTRALIAN DELIGHTS

Part 2: Underwater World

Ray Hocking follows up his visit to Sea World with an equally enjoyable one a mere two hours away

Photographs by the author

Some two hours drive from Surfer's Paradise, Mooloolaba (pronounced Moo-loo-la-ba) is the location of the southern hemisphere's largest tropical oceanarium, Underwater World. Here I hoped to see many fish that I might, or might not, see on my forthcoming brief visit to the Great Barrier Reef.

Eighty metres of acrylic tunnel, some 60mm thick, allow a remarkable view of the oceanarium inhabitants and the changing environments, from coral reefs, to rocky grottos and the open sea.

I made the mistake of agreeing to meet the family in the entrance foyer in four hours time ... I was two hours late and would have been later still, if my brother-in-law had not searched me out. Such a diversity of fish, including large sharks and rays, tempted me to ask of Underwater World's willing staff one big question: how did they maintain what is basically a 2½ million-litre marine tank?

Behind the scenes, the various systems that maintain, not only the oceanarium, but also numerous environmental display tanks was impressive indeed and answered my question to the full. A basic flow chart would look like this:

ocean→4 pumps→ozone generator→4 sand filters→4 pumps → ocean

10% of the oceanarium's total volume of water is changed DAILY, with seawater pumped in from an intake pipe located some 800 metres away. A second basic flow chart would look like this:

ocean intake pipe→pump→sand trap→into the system via the ozone generator. The overflow goes via a skimmer to the river.

To give you an idea the size of the systems, here are a few figures. The four large sand filters each contain three grades of river sand (130 tons of river sand per filter). The eight pumps move 200 litres of water a second! Three smaller sand filters are linked into the freshwater system which has a volume of some 200,000 litres and supports numerous tanks containing fishes from Africa, South America and S.E. Asia, as well as Australian natives, including Barramundi, Lungfish and even crocodiles. There's even a seal pool holding 600,000 litres of water, too. Water is returned to the oceanarium through a series of spray bars which, besides aiding good gas exchange, also camouflage everything above the surface.

Underwater World's three divers, Emily, Fleur and Ray spend time on underwater maintenance, as well as handfeeding the sharks.

Leaning over the parapet with my head in the water photographing the divers, I aroused the curiosity of a Reef Shark and had quite a shock to see it only a few feet away. That, quite frankly

Feeding the sharks.

A thriving mixed fish community.

is the nearest I want to get to a shark ... ever!

Other 'nasties' like the poisonous and venomous fishes, I was able to view in the display aquaria, all safely behind glass. Throughout the Underwater World complex, superb environmental displays, each with an illustrated and detailed noticeboard, were both educational and motivating.

For my own children, the 'Touch and Feel' coral lagoon, where a pretty girl encouraged them to hold starfish and crustaceans and to touch sea cucumbers and sea urchins, had a lasting effect. As a result, weather and tide permitting, I now have to take them to my local Cornish rockpools where, armed with net and a *Hamlyn Guide to the Seashore*, they explore the shoreline. This, in itself, is well worth the very reasonable entrance fee that we paid to visit Underwater World.

My only regret is that I never found the time to see the audio-visual presentations or meet Underwater World's curator. But Trevor, their Filtration Technician, their divers and all the others were excellent. I did, in fact, see more species there than I was to see later on during my two trips to 'The Reef', where, thankfully I met no more sharks!

With a busy schedule, I was never able to return but, at least, my forward planning and research had, through my visits to Seaworld and Underwater World, enabled me to see a large selection of Australia's aquatic wonders. Diving the Barrier Reef turned out to be the icing on the cake.

Which reminds me ... some six hours at Underwater World were spent without sampling the restaurants and watering holes of the nearby Wharf Complex, where my family and Australian relatives waited.

When I eventually emerged, I got strange looks and a roasting from my Australian sister-in-law who now considers me 'one can short of a six pack' ... but you understand ... don't you?

For further information on Underwater World, please contact:

Glenn Tonges (Assistant Manager), Underwater World, Parkyn Parade, PO Box 511, Mooloolaba, Queensland 4557, Australia.

Travelling down the impressive acrylic underwater tunnel.

SEAHORSE NATURE AQUARIUM

Out & About

By Linda Lewis *Photographs by the author*

Something fishy is going on in Exeter. It used to be just a shop, crammed full of things with a common theme: fish-shaped soaps, carvings of fish, seahorse-shaped earrings, and so on. In a quiet corner stood an aquarium in which lived a pair of seahorses — a sign of the passionate interest that was to grow into the **Seahorse Nature Aquarium.**

The aquarium is reached via the shop. Once inside, the sounds of the sea wash gently over you, as your eyes adjust to the lower light level. There are no vast tanks full of sharks — no quick thrills. The atmosphere is altogether more peaceful and so, so relaxing.

People have always found seahorses fascinating. It's something to do with the way they look (a cross between a chameleon, a monkey and a toy horse) and how they move. The dorsal fin that propels them is often totally transparent, so that the fish seems to glide, not swim. They don't behave very much like fish either.

Seahorses form long term bonds with their partners, which they reinforce by 'dancing' slowly together each morning. While dancing, they may change colour right in front of your eyes. A species of black seahorse can literally turn white.

A representative selection of the thirty or so seahorse species can be seen at the aquarium, ranging from tiny Sea Ponies, full grown at about 2in (5cm), to much larger fish such as *Hippocampus kuda*, which reaches 10in (25cm). Some kinds are relatively smooth in outline, while others are decidedly bumpy and covered with various outgrowths. These often have appropriate common names — Knobby (*H. breviceps*), and Prickly Seahorses (*H. histrix*) spring to mind.

As there are several kinds of seahorse to see, it's possible to glimpse many different behaviours in the course of one visit. You will almost certainly see seahorses feeding, as live food is available in the tanks for most of the time. You may even hear the 'snap' as a shrimp is sucked into the seahorse's trumpet-like mouth.

Pregnant male seahorse displays to his mate.

Sea Pony... under two inches long.

Perhaps you will see a male courting a female. He displays to her with colour changes and graceful movements. At times, his abdomen looks as swollen as it will be when he is carrying eggs. He may bend and contract his abdomen, imitating the movements he makes when giving birth. Watch carefully and you may see the entrance to his pouch open wide into a circle. It's as if he is showing the female that there are no eggs inside, and that he is ready to take some on board!

Actual mating is brief, lasting just a minute or so. The eggs then remain inside the father's pouch for at least two weeks, depending on species.

If you are very lucky, you may even witness a birth. If not, there are often new-born seahorses to see.

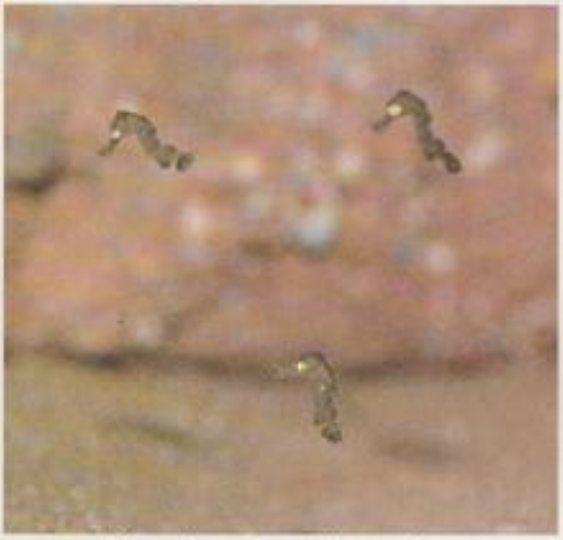
Many disappear behind the scenes for research, as this is what the aquarium is really all about. Getting seahorses to breed in captivity is not difficult, providing you have healthy adult fish to start with. What is causing problems is raising the resultant offspring to maturity. Most die when just a few days old. A major difficulty is their vast appetite. I read recently that after a few days, a batch of seahorse babies will need 1,200,000 newly hatched brine shrimp... EVERY DAY!

Work is being done here into the possibility of alternative foods and an international network has been set up so that seahorse keepers across the world can pool their information. The owner of the Seahorse Nature Aquarium, **Neil Garrick-Maidment**, is the UK's Seahorse Captive Breeding Co-ordinator.

Once it is possible to breed and raise seahorses in captivity, they will not need to be taken from the wild, at least not for the pet trade. In time, it may even be possible to begin to return fish to the seas to replenish dwindling wild populations. Seahorses have become so popular that demand for them is growing at an alarming rate. Unfortunately, they are not easy to keep by any means and most die within a couple of months of capture.

Fed up with seahorses? Well, there are other fish to see at the aquarium. Various pipefish that look like seahorses with the kinks straightened out, a shoal of piranha (have you ever been to an aquarium without them?), lionfish (both the commonly seen *Pterois volitans* and another beautifully marked red species called the Fu Manchu Lionfish), a group of captive-bred anemone fish, a tank of brackish fish, a whole host of colourful invertebrates and so on.

Work on graphics that will thoroughly inform all visitors is in progress, so if you have a question, just ask. An excellent video can be viewed at the aquarium, and you may find this has answers to many of your queries.



Baby seahorses born at the aquarium.

Neil Garrick-Maidment with school party. Such groups are welcome, but please book in advance.

Schools are very welcome and are invited to book so that they can be given an entertaining, very informative, guided tour.

If you are interested in carrying out research, or can offer sponsorship, please contact Neil at the aquarium.

The **Seahorse Nature Aquarium** can be found at **Unit 3, Kings Wharf, The Quay, Exeter, Devon, EX2 4AN** (near the Maritime Museum). **Tel: 01392 438538.** It is open every day except Christmas Day from 10.00am. Closing times vary according to season. Entrance costs £1.95 for adults and 95 pence for children; various concessionary rates and group discounts are available.

Growing Tips

BY BARRY R JAMES

THE GREEN INVADERS

Last month I wrote about allelopathy as one way in which plants control the growth of their competitors by emitting chemical growth inhibitors. However, this is just one factor influencing the way certain species dominate their environment.

Other factors which influence growth of all aquatic plants include light, temperature, depth of the water, water currents, pH and soil structure.

Introducing a new species into an alien environment can be a very dangerous practice.

1 Canadian weed

The most famous example of this occurred when, in 1847, Professor Babington imported some specimens of Canadian Pondweed (*Elodea canadensis*) from North America. Several pieces where introduced into the River Cam at Cambridge, where it spread like wildfire, infesting virtually every waterway in the country. It soon became known as "Babbington's Curse", Waterways became unnavigable, the government trying innumerable measures to control it.

Suddenly, the plant went into decline and became just a part of the ecosystem, instead of dominating it. Since then, we have learned that, on introduction to a new area, the plant swamps its competitors and grows alarmingly for between five and seven years before it seems to exhaust itself.

Strangely enough, two other species of *Elodea*, *Elodea nuttallii* and *Elodea callitrichoides* have also been introduced in recent years, but although both species have managed to establish themselves in selective areas, they are spreading fairly slowly.

2 Hydrilla

Hydrilla verticillata, a very similar-looking plant to *Elodea*, has also been introduced and has gained a foothold in some areas, but is struggling to maintain itself in the United Kingdom; it is, however, quite common on the continent. Beyond that it is a cosmopolitan plant found on all the warmer continents. I have grown it for the last 20 years in some small fibreglass pools, but attempts to grow it in a nearby natural pool, or in the river, have never been successful.

In many parts of the world, this plant has proved to be a most pernicious weed. Introduced as an aquarium plant, small slips have found their way into waterways and ponds and spread alarmingly, choking out all competition.

Much work has gone into studying this species and some interesting facts have emerged.

Firstly, Hydrilla is known to compete against itself. Plant 10 slips in close proximity and one will quickly swamp the others. It can also grow in deep water up to 10 feet (3 metres) in depth. At first, the single strands grow unbranched as they strive to reach the surface. Once there, however, these single strands branch profusely, forming a solid mat which blocks all light to the lower reaches. Plants under the mat are deprived of light and die.

The rate of growth is staggering. In one study, a few slips were planted and, after 16 weeks, it was found that the dry weight was an incredible 1,561 times that of the original material!

3 Other species

During the past 10 years, at least 70 species of aquatic plants have been let loose in areas far from their native environment. Some have gone berserk, such as the examples mentioned, while others have barely managed to survive.

BARRY JAMES

Pennywort gone wild in my pond and surrounding a lonely-looking lily.

ABC of Plants

Aponogeton is a well known genus of tuberous or rhizomatous plants used in both tropical freshwater aquaria and in garden pools. Last month I gave brief details of four species. Here are two others to add to the list.

While Aponogetons make spectacular specimen plants, the tropical species suffer from one major disadvantage in that they are difficult to propagate. This is because they rarely produce offsets from rootstock in cultivation, and although many species produce viable seed, the resultant seedlings take several years to reach maturity.

It is therefore necessary for stocks to be replenished from wild-collected plants. With the increasing cost of airfreight, however, there has, generally, been a steady increase in the retail price of these, and other, plants over the years.

The most attractive species of *Aponogeton* are confined to the island of Madagascar and collectors have to travel increasingly further afield to collect specimens, as the nearer sources become depleted. The other big collecting area is Sri Lanka and supplies from this country, too, have become steadily more difficult to obtain.

1 *Aponogeton stachyosporus*
Common Name: None
Distribution: Peninsular Malacca
Description: A splendid species with narrow light-green leaves with wavy edges. This species never seems to produce floating leaves. The leaves have characteristically translucent panels.
Cultivation: A temperature of 20-25°C (68-77°F) and bright lighting is needed, but the plant seems indifferent to the normal pH range in aquaria. Propagation is by viviparous plantlets which are produced in addition to flowers on the single-spiked inflorescence.

2 *Aponogeton elongatus*
Common Name: None
Distribution: Northern and Eastern Australia.
Description: An attractive plant with pale-green wavy-edged leaves some 30cm (c16in) in length and 5cm (2in) in width which are borne on shortish petioles. The single-spiked inflorescence is produced in late summer.
Cultivation: From two tubers sent to me by a reader in Sydney some years ago, I now have some 10 plants. I have grown these from seed which I sow in shallow trays of peat just covered with ½in (1.3cm) of water. I start the plants into growth in March by raising the temperature to 20°C (68°F). In the autumn, I allow the temperature to fall to around 15°C (59°F) and the plants hibernate until the following spring.

BARRY JAMES

The elegant and wavy *Aponogeton stachyosporus*.

I liberated Pennywort (*Hydrocotyle verticillata*) in one of my large natural pools. Within two years, it had completely swamped the surface. In spite of repeated 'dragging', it still survived, until I was invaded by water voles. Within three months, these little rodents had wiped it out, unfortunately, along with virtually every other aquatic plant in the pool.

Other well known 'escapees' include Water Hyacinth (*Eichhornia crassipes*), which is now found on every continent and is included in the world's Top 10 of the most troublesome weeds. *Ludwigia mullertii* and Water Cress — two other 'exotics' — grew furiously when first introduced into New Zealand.

It has taken thousands or even millions of years for each area of the world to develop its own distinct flora. In the British Isles alone there are approaching 300 species of endemic aquatic plants, with each species living in a complex association with other species in any given area. These associations come about as a result of many factors, some of which are, at present, still poorly understood. Introducing an alien into this settled ecological niche can therefore have unpredictable results.

IRRELEVANT EQUIPMENT?

The specialised equipment employed now for many years by aquarists concentrating on the growth of aquatic plants has always been looked upon by other aquarists, perhaps more interested in their fish, as having no relevance to their own particular interests within the hobby.

In time, however, I feel they will realise how beneficial these devices can be in maintaining and breeding their fish.

Carbon dioxide diffusion, for instance, is the most accurate way of maintaining pH levels, especially if combined with an electronic pH meter and magnetic valve.

Undergravel heating, too, maintains a comfortable level of warmth at the base of the tank during the night when the fish are at rest, ironing out cold spots.

I also happen to think that suspended Mercury Vapour or Quartz Halogen lighting show up fish colour to best effect.

FASCINATING FISH FACTS

A FANTASTIC TAIL

Have you always been told to look at a fish's fins before considering buying it? If they are folded flat, it would be best to buy your fish elsewhere. Well, there is at least one fish that this does not apply to.

The Fantail Filefish (*Pervagor spilosoma*) has a most magnificent tail: a rich, bright orange and bordered with black. However, this beautiful fish normally carries its tail folded up, and only spreads it if its territory is threatened. Then the tail opens to form a perfect half circle and looks just like an exotic fan, explaining the fish's common name.

If two males meet, each will spread his tail and circle the other, with fins spread and dorsal spines erect, until one gives up and backs away. The fan is then folded up for use another day. Rather a shame, don't you think?

Linda Lewis

LINDA LEWIS

Fantail Filefish — the occasional tail 'flasher'.

FROGS AND FRIENDS

By BOB and VAL DAVIES

Discarded turtles

Reports of discarded terrapins, usually Red-ears, (*Trachemys scripta elegans*) are quite common: a friend counted twenty four in a Merseyside park on a sunny day in early summer! A few days previously, there had been mention in the national press (*Daily Telegraph Supplement*, 3 June) of turtles being seen, apparently thriving, in the wildlife pond on Tooting Bec Common (South London).

It seems the turtles have few predators and are finding sufficient food and managing to hibernate successfully. Since they are few in number, they are not having any serious effect on the native wildlife of the pond and are not likely to breed successfully because our summers are not normally hot or long enough to incubate the eggs.

Various sightings of terrapins have been reported, especially in canals in the Midlands and south of England. The same article mentioned a Snapping Turtle (*Chelydra*) being caught by an angler in the Grand Union Canal. It was taken to the Herbert Art Gallery and Museum in Coventry, where it was tentatively identified as one which had been stolen from there some years previously.

It is a sad thought that unwanted animals are treated in this manner. They may thrive temporarily, but a hard winter could finish them off. It is also worth noting that releasing non-native animals into the wild is an offence under the Wildlife and Countryside Act 1981, with potentially large fines.

Furthermore, under the Abandonment of Animals Act 1960, it is an offence to release a creature into the wild without adequate effort to ensure its well-being.

The problem of discarded Red-ears is not confined to Britain, though. A report by the Humane Society of America claims that they are now to be seen in South East Asia, Malaysia, Sri Lanka, Holland, Germany and even Australia. They are reported to be especially common in southern France and "hundreds" were retrieved from the Seine and the Rhone in 1993.

A TV programme ('*Watch Out*', BBC 2, 26 August) highlighted the problem and gave details of a scheme to collect data on distribution, species and numbers in Britain, to assess their effect on wildlife and to find effective ways of capture. Sanctuaries are also needed to house them.

Children are warned not to try and catch them, since there are dangers associated with water, and terrapins can bite.

For report forms and further information send S.A.E. to:

Trevor Weeks,
National Turtle Project,
c/o 15 South Road,
Hailsham, East Sussex
BN27 3NT.

BOB & VAL DAVIES

Red-eared Terrapin. This specimen, measuring almost 25cm (10in) was found abandoned in a wood.

Old favourite rediscovered

Last year, we were lucky enough to obtain an old favourite — the Oak Toad (*Bufo quercicus*) which we had not seen for several years. This attractive little toad hails from the south eastern United States.

The colour is variable, but the light mid-dorsal stripe is usually present, some specimens being very attractive with small dots of red or orange on a pearl-grey to black background which has pairs of darker patches. This species may occasionally be almost complete black, with the light dorsal stripe.

This diminutive (up to 3cm/1-2 in) toad is probably the smallest Bufonid, requiring only a small vivarium, and is easy to keep.

During the breeding season, a shallow water area with easy access to land is needed. After breeding, a drier vivarium is suitable, but there must be a damp area or water dish so that the toads do not become dessicated.

They will thrive on the usual insect food of crickets, worms etc of an appropriate size.

A cool winter period of about two months is desirable, but in the wild, specimens from the south of Florida will not experience winters as cold as those from the northern part of the range. To be on the safe side, a minimum of 10°C (50°F) should be observed.

BOB & VAL DAVIES

Oak Toad: an attractive miniature species from the US.

Convenience herp foods

The supermarket shelves are packed with a vast array of convenience foods for humans, although health experts warn against over-reliance on these. Now, there is also an increasing number of 'complete' foods for reptiles appearing at retailers.

These are mainly from the USA and the most common is Iguana diet, but tortoise, Box Turtle and large lizard diets are also available. There are two types — granules in a jar and canned foods.

A recent development in the UK is 'sausage steaks' for snakes. These are made from natural sausage casing with a secret mix of minced mice, rats, insects and other ingredients.

We recently bought a tin of tortoise diet and one for Box Turtles; neither of these foods was eaten when offered. However, our Blue-tongued Skinks readily consumed them — but they hardly refuse anything!

Friends reported their tortoises ate the canned food if other foods were withheld for a while. The Box Turtle food contained mainly vegetable matter and our species (*Terrapene carolina triunguis*), Three-toed, is almost totally carnivorous. The snake 'sausage' was offered to a juvenile Cornsnake, but it refused it until the food was scented with a thawed-out mouse.

The above tests are hardly conclusive; some animals will have to be 'weaned' onto these foods gradually. Many keepers may find them time-saving and convenient to store. Those with qualms over feeding mice etc. may also find these foods a more satisfactory alternative, and since dietary deficiencies are common problems, they could be useful, especially for the inexperienced keeper, as they are claimed to be scientifically formulated to provide essential nutrients.

Finally, as most of them are

IN BRIEF

1 Smuggling

In June this year, the first custodial sentence for an offence involving reptiles was imposed on a pet dealer who had attempted to export CITES controlled reptiles from Pakistan illegally.

2 Imports

Imports of the Leopard Tortoise (*Geochelone pardalis*) and Bell's Eastern Hinged Tortoise (*Kinixys bellianus*) from Mozambique have been subjected to a special EC control — the importer must now provide evidence that the intended recipient can provide suitable facilities for these species and that they will be properly cared for. This, in effect, means that they will be available to order only and not for general sale in shops.

3 New species

A new species of frog from the Bolivian rain forest has been named *Ischnocnema santaecruzi* (no common name). This genus was not previously known to occur in Bolivia, although at least two species occur in Ecuador.

4 Another new species?

An advertisement in a magazine listed various reptiles for sale. The final item offered was "also Bavarians". One wonders if they were wild-caught/captive-bred, hand-tame and feeding well. As you have probably guessed, this should read: "also vivariums"!

imported, some people may feel they are expensive.

We may well comment again on these foods as more reports become available.

Happy ending

Over the past thirty years or so, large numbers of ponds have been lost, so it makes a pleasant change to hear of one, which although filled in, was replaced. This took place near Morecambe (Lancashire) some two years ago when "the last decent amphibian site in the Morecambe area" was about to be filled in to make way for housing. Although several smaller ponds exist in the area, this one was regarded as the best.

Steve Haley, area adviser to the **British Herpetological Society Conservation Committee** and self-confessed newt fanatic, who had known the pond since childhood, together with other volunteers, monitored events and trapped over 1,000 Smooth Newts in ten days to rescue them. They were removed to various garden ponds and other sites.

Steve then approached **Lancashire County Council Conservation Department**, who agreed to provide land which could be made into a habitat for native amphibians.

The Council sent an excavator to dig out four ponds, each approximately 30 feet by 15 feet and provided funds for aquatic and marginal plants, as well as access gates. The scheme is ongoing, the Conservation Department having also agreed to foot the cost of planting out the surrounding terrestrial habitat.

The ponds were constructed in 1994 and by mid-March 1995, all four ponds contained clumps of frogspawn. The field is bordered on three sides by shallow ditches, which are used for breeding by Smooth Newts. No frogs, newts or spawn have been deliberately introduced, so the hoped-for colonisation can be monitored.

This story could have had the usual sad ending — with the amphibians forced into an ever-shrinking habitat, as Steve's home video *'Death of a Pond'* shows, but thanks to the interest and cooperation from Lancashire County Council, individuals and conservation groups, a happier ending is anticipated.

We visited the site in early April when it still looked rather bare, but there were encouraging signs of growth and the establishment of various forms of waterlife. Steve has promised to keep us informed on any progress.

FACT FILE — HIBERNATION: do's and don'ts

At this time of year, keepers will have been preparing some animals for winter. Hibernation seems to be necessary for many species if they are to breed the following year.

It can be difficult to maintain the optimum temperature due to external influences. For example, a mild spell can cause the animals to become active, which wastes their reserves, while too low a temperature many prove fatal.

A series of experiments in the USA in the 1970's and early 1980's showed that female snakes (Kingsnakes, Milksnakes and Rat Snakes) kept active over winter possessed completely regressed ovaries the following spring and failed to breed. Only females which hibernated reproduced successfully. It has also been suggested that longevity in captivity is extended by regular hibernation.

Do:

1. Allow the animal to empty its gut. Retained faeces and food in the digestive tract will putrefy in the body, which can cause death. This should be done at normal temperature before cooling starts, as the metabolism then slows down preventing defaecation.
2. Allow three weeks for gradual cooling and reduction of the photoperiod (period when vivarium is illuminated).
3. Provide clean hibernation quarters with a suitable deep substrate into which the animal can burrow. Dust-free shavings have proved useful for snakes, large lizards and tortoises.
4. Place the hibernation container in a dry, frost-free situation and keep a constant check; a maximum/minimum thermometer is useful.
5. Ensure the hibernation box is rat-proof if an outhouse is to be used. A thermostatically controlled greenhouse heater will prevent temperatures from falling too low.
6. Consult a reputable book on suitable temperatures and conditions for your species, or seek advice from an experienced breeder. Optimum temperatures can vary from species to species. Many require only slight cooling. Even tropical species may undergo some fluctuation in temperature.

Don't:

1. Hibernate an animal which shows any signs of illness or has recently been ill.
2. Hibernate underweight animals or those which have not fed well.
3. Think that hibernation means the animal is 'out of sight, out of mind' for two or three months. Constant temperature checks must be made and brief, regular inspections, without too much disturbance, must be carried out twice a week.

CLUBS

LIVE IN ESSEX and interested in reptiles/amphibians? E.R.A.S. meet in Witham on the second Thursday of each month. Contact 01621 819675 for further information.

South African SMASHERS and Spearers

Photographs: Professor George Branch, Zoology Department, University of Cape Town.

Marine aquarist and scientific writer **Bevan Pank** introduces some 'hard-hitters' of the marine invertebrate world

Beware of the marine aquarium, because it could change your life as it has changed mine! It so hooked me, that I gave up a marketing career with a British company to learn more about my pets in their natural habitat. I chose to live in South Africa, where its two oceans of different temperature are home to spectacular invertebrates, including the amazing Mantis Shrimps, also known as "Smashing and Spearing" Stomatopods.

Stately warriors

Welcome to Danger Beach and smell the champagne-like air! It is the very heart of several marine reserves on the Cape Peninsula, about which, in 1580, Sir Francis Drake said, "This Cape is a most stately thing and the fairest Cape we saw in the whole circumference of the Earth."

One of its most stately inhabitants is a warrior of the super-order Hoplocarida, which means "Weapons Shrimp". South Africans are proud to show you three different species. Admire their beauty, but never handle them without protective gloves. Few other — if any — marine invertebrates can beat them in combat!

Resembling Praying Mantises, Stomatopods are aggressive nocturnal predators with a front pair of limbs modified into massive grasping appendages. "Smashers" have enlarged and extremely tough elbows, with which they smash crabs and other hard-shelled prey. After immobilising the victim, they often break it open on a favourite rock that serves as an anvil.

In intense combat, they unfold their appendages and deliver the *coup de grace* with a stiletto-like pointed finger.

Although "Spearers" lack tough elbows, they have equally formidable weapons in the form of barbed fingers. They even attack fish, by impaling them with an upward thrust and tearing them apart with specialised mouthparts.

The Sickle Mantis Shrimp (*Gonodactylus falcatus*) is a 60mm 'Smasher' from northern Kiva-Zulu Natal.

Top view of the 'Spearer' Cape Mantis Shrimp (*Pterygosquilla armata capensis*) from all regions in South African waters.

Smashing/spearing

Along our east coast, the shallows are patrolled by the Sickle Mantis Shrimp — a 60mm (2.4in) "Smasher" — and two related species with a sickle-like finger to their grasping claws. They strike with the force of a small-calibre bullet and can easily crack aquarium plate glass.

More common is the Cape Mantis Shrimp — a 200mm (8in) "Spearer" — also with two related species.

Their strike is invariably completed within four to eight milli-seconds, which is equivalent to an underwater velocity of well over 10 metres (33ft) per second!

Bristling with sensory antennae, Stomatopods are efficient hunters. They have five pairs of broad paddle-like limbs and a fan-tail to function as a rudder. They also have the most highly developed compound eyes among crustaceans and have

an acute awareness of spatial concepts which allows them to judge striking distances extremely accurately.

More surprising is their learning ability. When offered unfamiliar prey in a laboratory experiment, they soon learned to strike the most vulnerable point. Furthermore, when given the choice, they preferred a clam to a heavily armoured crab. They 'deduced' that it provided the most amount of edible tissue for least effort.

Close-up of a Spearer.

Family lovers

Like most humans with combat skills, Stomatopods never go out looking for a fight. In territorial disputes among their own kind, a "Smasher" allows the defender to lie in a coiled position on its back and absorb the shock of a tremendous pounding — aimed only at the heavily armoured fan-tail!

A "Spearer" is so lethal that it prefers to bluff itself out of trouble, rather than draw blood. It uses a ritual threat display of special coloured spots on its weapons to appear larger than normal.

All it really wants is a comfortable burrow in the sand and food to feed its family. In the final analysis, is this not what we also want, instead of chasing our tails?

Family is very important to Stomatopods and they are caring parents. Among some species, the brooding female stays at home to protect a bundle of up to 50,000 eggs. Others like to wander with the eggs carried between limbs, constantly turning and cleaning them.

They are kept too busy to feed, until hatchlings emerge and enter a larval stage lasting up to three months. During this period, the larvae begin to develop their armour and even a back-shielding carapace.

To witness the swift strike of a Stomatopod 'in the flesh' is an unforgettable experience. Although a "Smasher" is far too dangerous to keep in any home aquarium, I once had a pet "Spearer".

However, I could not bear to keep such a magnificent animal in captivity and eventually released it. I can imagine it returning to base with weapons still drawn after an intense fire-fight and living up to its proud reputation as a warrior of the super-order Hoplocarida. ARP

Further Reading

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Branch, G.M., Griffiths, C.L., Branch, M.L. and Beckley, L.E. (1994) *Stomatopoda, TWO OCEANS: A Guide to the Marine Life of Southern Africa*, **David Philip Publishers**, Cape Town.

Day, J.H. (1974) *Order Stomatopoda, A Guide to Marine Life on South African Shores*, **A.A. Balkema Publ.**, Cape Town.

***MAIN PIC* — Although refilling of the pond is seen under way, it's still easy to appreciate the extent of the disaster.**
***INSET* — Some of the casualties.**

Like any other artificial environment, a garden pond can be a disaster waiting to happen. The vigilant pondkeeper, aware of this, tries constantly to monitor everything, to spot trouble early and take action at the first sign. Occasionally, however, disaster strikes with such suddenness that the only options are to salvage what you can and do your best to ensure that the same thing never happens again.

Morning shock

Such an incident occurred last summer. Taking my morning stroll to feed the fish, I discovered, to my horror, that there was a scant three inches of water remaining at the bottom of the pond. Among the 'no-longer-floating-plants' lay dead and dying fish. It appeared a complete disaster area!

I've heard of the expression 'rooted to the spot', but never experienced it before. For a long moment, I simply couldn't believe what I was seeing. Some strange thoughts occur at such times. Possible causes flashed through my mind — as did impossible ones. I remember briefly considering both evaporation and leaks before commonsense regained control; fifteen hundred gallons of water simply do not disappear overnight that way.

> As Trevor Gray distressingly discovered, pond pipework is only as strong as its weakest joint.
> *Photographs by the author*

The causes had to wait. A quick spring for the garden hose added a few more inches of water; fresh tapwater it is true, but there was no choice. Next, I pulled out the plants and dredged out as many fish as I could find; those that I couldn't were, presumably, safe.

Depending upon size, the larger survivors went into the header pond, which was still full, and the smaller ones into glass tanks, of which I had two or three, also being a keep tropical keeper.

Sad sight

Sadly, it was generally the larger fish that had perished. The smaller ones were more easily able to find enough water to save them, and as I pulled out plant baskets, I found large numbers of fry surviving in the small amounts of water available to them there.

The final toll was six of my Koi and several Goldfish; a pathetic sight lying on the lawn. Of the surviving two Koi, one looked fine and the other as if it would not survive long (fortunately, they both did).

At that moment, I seriously considered filling in the pond and abandoning the whole thing. That none of them had been expensive fish was beside the point. Mongrels they may have been, but they were *my* mongrels; I had chosen them and watched them grow.

Leaky cause

The next problem was to find out where my water had disappeared to. The area surrounding the pond was totally dry. Following the hose from the pump soon provided the answer.

Adding the header pond the previous year had meant moving the filter, and instead of completely replacing the hose, I had added another section. This joint had separated and the pump had done the rest. The position of the joint, between the raised rockery holding the header pond

THREE-INCH POND DISASTER

A mere 24 hours later, there was no indication of the crisis that had occured.

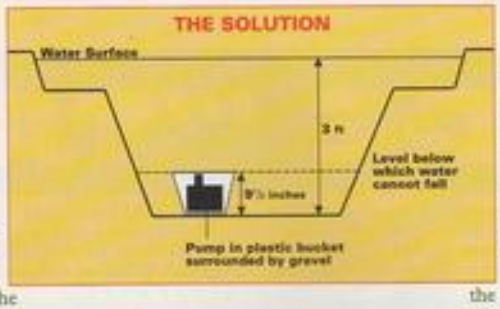
and the garden fence meant that my water had drained into my neighbour's garden.

Having established the problem, the solution was simply a matter of replacing the entire hose. When refilling, I added large quantities of tapwater conditioner. Luckily, when I reintroduced the surviving fish, they seemed unharmed by the experience.

Nevertheless, I was still very annoyed that I had been the cause of the problem. Further reflection, however, produced a different viewpoint. We are told that connectors are safe; furthermore, I had attempted to strengthen the joint with sealant.

Besides, this was not the only joint in the system. There must be at least one, where the hose is attached to the filter box. If you have a separate ultra-violet unit, this means another two joints and a magnet in the system adds two more (although I know of no reason why this last could not be put into the underwater section of the hose). Thus, there can easily be up to five joints, all potentially vulnerable.

Today, my system has a firmly tightened jubilee clip around each joint, even though we are constantly advised that such precautions should not be necessary. As an aside, it is worth considering similar precautions on an external filter for an indoor system. Many household insurance policies do not automatically cover water damage from a fish tank.



Life-saving inches

The fact that there were two or three inches of water left in the pond was due mainly to good luck. Inside the pond, I had created a home-made pre-filter. Attached to the pump inlet was a section of plastic piping with holes drilled in the underside, the whole apparatus sitting in the bottom of a cat litter tray and surrounded by gravel.

The original purpose of this was to slow down the rate at which the pump became clogged by the blanket weed that is the curse of my life. The accidental, though fortunate, benefit was that the water level was unable to fall below the level of the rim of the tray.

It should also be noted that even though it had been running dry for an unspecified time, the pump itself had come to no harm whatsoever.

As far as I can ascertain from my local retail outlets, there is no device commercially available that will cut off the pump if the water level falls below a certain level. As this is merely the reverse of the principle operating in every toilet cistern in the land, this would not seem too difficult a task (many pondkeepers, usually a versatile bunch of tinkerers, may have produced their own).

Alternatively, perhaps the power to the pump could be shut off. Is this a gap in the market for an enterprising manufacturer? With the amount that we spend on our ponds, surely such a device would sell like hot cakes.

My own solution was to replace my cat tray with a large plastic bucket. The pump sits in the bottom, complete with its original inlet basket containing two little plastic pan scourers; the bucket is almost filled with gravel.

In addition to fulfilling its original purpose, this now means that the water level cannot fall below the rim of the bucket; whatever happens, I should be left with at least nine and a half inches of water in my pond.

It could be argued that this restricts the circulation, preventing water at the bottom of the pond from being drawn into the pump. However, there will always be a degree of water circulation and I feel that I can live with this particular drawback. What is more important, so can my fish!

ADP

TRADE "TALK"

Hilton joins Cyprio

Pond management specialist **Cyprio** has appointed **Paul Hilton** as sales executive covering the northern area of the UK.

Paul's appointment completes the development of a nationwide sales force by Cyprio, whose products include the Prima and Futura range of pond pumps and Green Machine filters.

For further information ring **Cyprio on 01778 344502; Fax 01778 348093.**

Stuart Turner

The leisure products division of pumps manufacturer **Stuart Turner** has appointed a dedicated sales force to handle water garden and aquatics products sales through distributors and direct to garden centres in the UK.

Tony Robinson will cover the West Midlands, **Mike Horrocks** will cover the east of England, and the south and south-west will be covered by **Barry Read.**

Further sales agents are expected to be appointed in the near future, to cover the remaining areas of the country.

For further details contact **Stuart Turner Ltd, Tel: 01491 572655.**

Wood gets brush-off

Oak coral up to thousands of years old is being prepared for sale by **Cornish Wood Supplies** with the assistance of specialist brushes manufactured by **Bl Dendix.**

Oak coca is derived from part of oak trees which fell into peat bogs where they were preserved, and is now used extensively for decorating aquaria. However, part of the preparation process involves a high-pressure wash and a removal of the outer layer of wood using Dendix brushes. The wood is then dried and polished, using pencil brushes from the company's Dixo range.

Finished pieces of oak coca range from the size of a teacup to that of an armchair. The wood not only has a decorative quality but is also said to replace natural elements in the water, which otherwise would be found only in the fishes' original habitats.

For information contact: **Bl Dendix, Lower Church Street, Chepstow, Gwent NP6 5XT. Tel: 01291 625181; Fax: 01291 622354.**

Cornish bogwood being polished off for sale with a brush from Bl Dendix's Dixo range.

FASCINATING FISH FACTS

SIZE IS EVERYTHING

Off the shores of the British Isles can be found several species of pipefish — straightened-out relatives of the more familiar seahorses, with whom they share a well developed *MALE* pregnancy.

Studies by scientists at Sweden's Uppsala University show that one of these species, the Broad-nosed Pipefish (*Syngnathus typhle*) always mates with the biggest partner it can find.

Both sexes benefit from looking for a big partner a larger male can carry more eggs in his pouch, while a larger female can provide more eggs to fill it!

Which is the more choosy — male or female? Experiments show that a male will wait about 18 minutes before bothering to court a female smaller than himself, while a female will only wait five minutes before approaching a smaller male.

Females can't afford to take as long, simply because there are often more females carrying eggs than there are males to carry them.

Linda Lewis

LINDA LEWIS

Pipefish — females are more choosy than males.

Cichlid Secrets

NICAS: MOUTHBROODER IN THE MAKING?

The Nicas or *Copora nicaraguensis* (formerly *Cichlasoma nicaraguense*) is a deservedly popular Central American cichlid, attractive by virtue of its blue-green and gold adult coloration and its relatively well-mannered behaviour towards other fishes. Its slightly underslung mouth position is thought to facilitate sifting of the substrate for the small snails which form an important part of the species' diet.

"Nicas" are unique (among Central Americans) in their reproductive behaviour: although they are, nominally, substrate spawners, they lay non-adhesive eggs in a pit (in a cave) instead of attaching them to a solid surface.

Moreover, on a number of occasions, a parent has been seen to pick up the eggs in its mouth, 'churning' them around for a while before spitting them back into the nest. This behaviour is thought to be the equivalent of 'mouthing' adhesive eggs to clean them of debris.

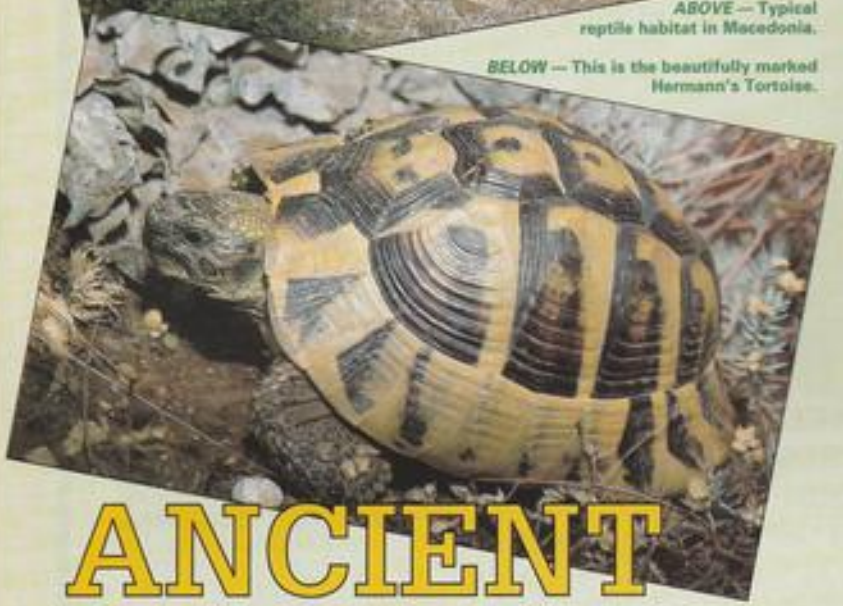
Could this be how mouthbrooding begins...?

Mary Bailey

MARY BAILEY

Young male Nicas.

ABOVE — Typical reptile habitat in Macedonia.



BELOW — This is the beautifully marked Hermann's Tortoise.

ANCIENT GREEKS

Dr Gareth Evans sorts out the similarities and differences between two much-loved tortoise species.

Photographs by the author

Probably the most widely known and readily accepted of all reptiles, 'Greek' tortoises were a once familiar sight in pet shops and on market stalls throughout Britain, retailing, in their pre-decimal heyday, at around the princely sum of half-a-crown (12½p).

Concern regarding the atrocious conditions surrounding their transportation, enormous fatalities in transit, and dwindling wild populations led to the EC banning the free commercial trade in these animals in 1983. The sale and movement of such beasts is subject to strict licencing, and adverts regularly place the current price of 'legal' tortoises at between £150-£200, making one legitimately acquired before 1983 a seemingly far better investment than gold!

Undoubtedly, this ban has done much for the animals. Hundreds have been spared a lingering death, stacked like so many tins of sardines atop each other, in overcrowded crates (although it must be said, that transportation today is much improved when compared to the early 1980s). Additionally, at the individual level, the existence of the ex-patriot tortoise, in general terms, is a far cry from its life in its own land. From the conservation point of view, also, things are encouraging — the natural populations do appear to be recovering — and there surely can be no better place to get a true picture of the tortoise's world than in the wild.

Confusion

At least in the sense of common usage, there is no true 'Greek' tortoise, this term being applied equally and indiscriminately to the two most widespread of the three European species, Hermann's (*Testudo hermanni*) and the Spur-thighed (*Testudo graeca*).

This confused state of affairs has arisen as a result of the former being the more common within Greece, and the obvious implication contained in the latter's scientific name, despite its fairly restricted distribution in that particular country.

The two species are fairly similar, both attaining a size of 20-25cm (8-10in) and inhabiting broadly similar habitats. In *T. hermanni*, the yellow carapace (upper shell) is noticeably more domed, and although the coloration and patterning of both species can be very variable, generally the black markings with which it is decorated are better defined and more extensive than in *graeca*. The plastron (breast plate or lower shell) of Hermann's tortoise lacks the black mid-line usually found in its fellow 'Greek', being marked with two longitudinal rows of dark spots.

Further differences are apparent on a rear examination of the animals; *T. graeca* possesses horny spurs on the back of its thighs which give it its alternative common name, the Spur-thighed Tortoise, though it lacks the bony tip to its tail found in the Hermann version. Additionally, immediately above the tail, there is, typically, a single supracaudal shell plate in *T. hermanni*, whereas the Spur-thigh's carapace ends in two.

In both species, the males are smaller than the females, with longer tails and more concave plastrons.

Distribution

These creatures are found only in areas with hot summers, being restricted within Europe, thus, to the more southerly regions.

Hermann's is found in south-eastern France, Italy (except the north east), throughout the Balkans, and on Sardinia, Sicily and the Balearics.

The Spur-thigh is found in two distinct areas, one being southern Spain, its second European domain ranging from the eastern Balkans, south of the Danube, into Macedonia, Turkey and the Greek islands. This animal also extends into North Africa, Asia Minor and the Middle East. Both species have, however, been introduced into several other regions.

Tortoises may typically be encountered in fairly open, undulating countryside, often with scrub or light woodland, though they are sometimes to be seen in gardens and cultivated land. Even apparently barren hillsides may provide them with a home, although Hermann's Tortoise seldom ventures much above 700m (2,300ft); the Spur-thigh may be found at altitudes of 1,000m or more (c3,300ft).

Despite their favouring of dry, warm habitats, both species drink a fair amount, and *hermanni*, in particular, has quite a liking for occasional bathing.

Diet & habits

Fruits, grasses and leaves make up the bulk of these armoured vegetarians' diet, though they supplement this with a certain amount of worms, insect larvae, snails, carrion and even faeces!

This rich variety contributes greatly to their health, and contrasts strongly with their traditional captive fair of lettuce, lettuce and more lettuce. This is not only boring and of little use nutritionally, but also seems to be addictive to the reptiles, causing, in extreme cases, effective malnutrition, even though they may appear to be feeding well.

In their habits, both animals are remarkably similar. They emerge from hibernation in February, March or April, the exact time depending on latitude and climate, and mating taking place in early spring. The male pursues the female, head-butting her shell and biting at her legs to make her receptive to his advances.

Mating itself is a fairly protracted and precarious procedure, for though the male has a more concave breast plate (the plastron) to help him, he often slips off the female's smooth, domed back. Copulating males are surprisingly vocal, accompanying their breeding efforts with regular high-pitched calls, which have been variously described as a cat's miaow, or a puppy's whine.

In May or early June, the female digs a pit with her hind legs, and deposits her oval, hazel-nut sized eggs. The clutch size depends largely on the female's age, older animals producing more, but generally, something in the region of 5-10 are laid, each within a hard, chalky shell. She may lay a second batch, about a week later.

The sun incubates the buried eggs, which usually hatch in September, into young which are near-perfect miniatures of the adults, except that they are slightly more rounded, and their shell patterns are more clear and distinct.

During the height of summer, tortoises tend to be active in the morning and evening, digging themselves into the ground, or seeking cover in suitable holes at night or in the heat of the day.

Like most of the world's herbivores, they consume huge amounts of vegetable matter, and foraging consequently occupies much of their time. They can often be detected as they go about this by the constant rustling they make as they plough through the undergrowth like diminutive reptilian tanks. Compared to the intermittent sounds made by the small lizards which often share their environment, tortoises are exceptionally noisy, and thus tracking them down is a relatively easy task.

Having fed well throughout the warmer months of the year, as cooler weather arrives in October and November, they seek out appropriate quarters and begin their short period of hibernation.

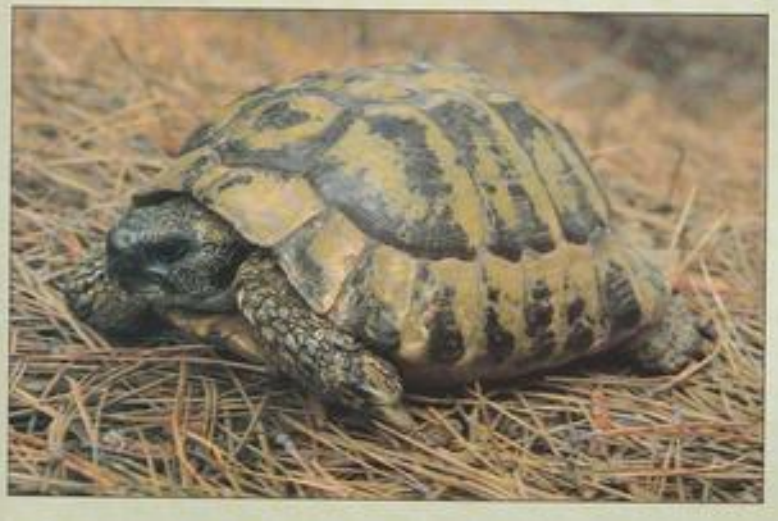
'GREEK' TORTOISE FACTFILE

Scientific names:
(1) *Testudo hermanni*
(2) *Testudo graeca*

Common names: (1) Hermann's Tortoise; (2) Spur-thighed Tortoise

Distinguishing characteristics:
(1) Domed, well-patterned carapace. (2) Less domed, less well-patterned carapace.

Distribution: (1) South-east France, Italy (except n.e.), Balkans, Sardinia, Sicily, Balearics.
(2) (a) Southern Spain; (b) Eastern Balkans, south of the Danube, Macedonia, Turkey, Greek Islands, North Africa, Asia Minor, Middle East.



BELOW **— The Spur-thigh is not as highly domed as Hermann's Tortoise and is less brightly marked.**

Man & tortoise

Throughout the ages, the tortoise has held a special relationship with our own species, though not always to their benefit. They were certainly kept by the ancient Greeks, who left various carvings and illustrations depicting tortoises in captivity. It seems that these 'domesticated' animals were kept, both as pets for young children, and additionally as a source of meat.

Today, a number of tortoises still die each year as a result of human activity. In some areas, habitat destruction and land development is to blame, while others perish in the accidental fires which frequently rage through their tinder-dry homes in late summer.

The roads claim their share also, the reptiles' natural defensive behaviour of hiding inside their shells and hissing indignantly being no deterrent to passing motor vehicles. Happily, though, these fatalities are far less damaging to the wild populations than was the case with their once wholesale and unscrupulous collection.

Great antiquity

Tortoises have two claims to fame, so far as antiquity is concerned. Firstly, as a group, the Chelonians (tortoises, turtles and terrapins) can trace their ancestry back to the days of the dinosaurs and beyond. Their kind first appeared somewhere in the region of 200 million years ago, over the last 150 million of which they have remained virtually unchanged — putting our own 4-million-year history firmly in its place!

Secondly, at an individual level, tortoises are very slow developing and long-lived animals, taking about seven years to mature, which is quite a time for a reptile. Their lifespan regularly exceeds 50 years and many claims have been made at different times for 100 year-old specimens.

Indeed, the famous naturalist and cleric, Gilbert White, commented on the "*instance of vast longevity*" of just such an alleged centenarian in 1770. He could never quite work out, however, why "*the Almighty*" should have chosen to "*bestow such a profusion of days ... on a reptile that ... appears to ... squander more than two thirds of its existence in ... stupor, and he lost ... for months together in the profoundest of slumbers*". But then, after all, as the kindly clergyman himself should have realised, it is often said that God moves in mysterious ways!

NATURALIST'S NOTEBOOK

By Eric Hardy

Dragonfly bonanza

1995 was the year of the dragonfly, despite drying rivers unable to urge many salmon up to the autumn spawnings, and ponds shrunken to puddles.

The influx of continental dragonflies and the continued northern colonisation by many rarities was the feature. Rarest of immigrants was the large, 66mm, Vagrant Emperor, *Hemianax ephippiger*, from southwest Asia which reached the Calf of Man in July and is now in Liverpool Museum. This sandy hawker, with a brilliant blue patch on the male's body (not so bright on the female) migrates normally through the Mediterranean to Africa, but it has reached northern England (Leeds) and Iceland.

Next was the Yellow-winged Darter, the male also with blue on the body, which normally migrates in small numbers from southeast Europe to southern England. This July is appeared all over the north after entering Norfolk and crossing the Midlands to Cumbria on the warm southeast winds. It appeared at Oswestry and Shropshire's Whixall Moss, Cheshire's Northwich, 14 at a slack on Birkdale dunes near Southport, Cheadle, etc.

The big blue Common Emperor which began colonising waters in Cheshire and Lancashire in recent years, appeared in greater numbers, even visiting a friend's garden in Wirral, while 11 were over a slack on Formby dunes. The Yellow-winged Darter doesn't stay long on the wing at barren open pools, but seeks reedy waters where it can settle half-way up the stem.

The Broad-bordered Chaser, a flat-bodied slate-blue species, continued its modern increase in Cheshire and Lancashire, and there were Four-spotted Chaser, Ruddy and even Black Darters and Green Hawkers all over the place.

They are not confined to Tennyson's babbling brook either! Providing there is water for egg-laying, they resort to the grimmest industrial sites. Big counts, for instance, of dragonflies and damsels are made very year by the huge lagoons at Fiddler's Ferry power station by the Mersey.

Reports v experience

Many newspaper articles are compiled more from reports than experience. A recent Sunday newspaper article on wildlife returning to our cleaned-up rivers quoted the Mersey having its first octopus and squid for decades.

As I've described in the Liverpool *Daily Post* before, both Common and Lesser Octopus and Common Squid have been washed by tides into docks or the beach of both Mersey and Dee estuaries in single specimens most years. Like salmon in the Mersey, they are the result of big, fast tides.

It's good river board publicity to list more and more newcomers to the estuary without checking how new they are to those of us keeping records before most of the new recorders were born! They should separate species into purely 'tide-drifted' and 'new river colonists'.

There is no chance of migratory salmon or Sea Trout stocking the Mersey with breeding fish in our time, as stated in the *Manchester Evening News*, although fish-passes are planned at Sale and Northenden weirs, where coarse fish have been introduced.

Plant boom

1995 has also been the year of water plants. With lakes and rivers shrunk low, Purple Loosestrife flourished in grand displays in their exposed muddy margins; also that prolific sign of pollution, the thickets of Himalayan Balsam which has conquered polluted streams since about 1930, like the Douglas below Wigan. It was in the countryside earlier, but about 1930, it took off as pollution increased. Its seeds drained down the sewers from town gardens into rural ditches.

Sometimes, when lakes expose great mud-beds, certain plants like Water Crowfoot, suddenly proliferate in sheets of flowers, like a fresh fall of snow. They are biologically no different from normal plants but, like Marsh Orchids in damp clay, they suddenly have a population explosion.

Otter spotted?

A news agency contacted me because someone told them they'd seen an otter on the Mersey. Otters became virtually extinct in Cheshire, though one was logged earlier in the year at Petty Pool, in Delamere Forest. There were odd reports in the upper Mersey tributaries after an otter haven was introduced in Derbyshire.

The trouble is to find if the reporter can distinguish an otter from the common mink, often confused by anglers in Cheshire, or a seal, like one a friend saw in the Mersey off Liverpool Pier Head, which probably started the story. Identification is commonly at fault in natural history journals, let alone, the press.

Imbalanced press

Great Crested Newts are much more widespread than repeated rarity scares imply. There's a big slack of them on Ainsdale reserve dunes. It's better fund-raising propaganda to claim something being rare than all over the place.

Press handouts are often imbalanced on this matter. For example, with waterbirds, while Snipe are down 95% through drainage in the last 25 years, Moorhens (37%) and Sedge Warblers (35%), Mallard or Wild Duck (36%) are all up. The Gilroy Nature Reserve ponds, in Wirral, swarm with them loafing on the fouled mud banks.

Threat to waterside butterfly

One of the waterside butterflies which lost most from modern drainage and the dry summer is the Marsh Fritillary. Flying low over the grass, a small, bright specky orange butterfly settled cheerfully in the sunshine and opened its wings wide before us when we visited its major haunt on Anglesey's Cors Erddreiniog reserve when the first were hatching at the beginning of June.

The row of black dots, restricted to its hind wings only, revealed its identity. Its caterpillar winters in colonies sheltered from birds, in silken tents spun on its food-plant, Devil's Bit, which is often submerged under floods.

In autumn, this peat bog revels in up to 13,000 Marsh Gentians where limestone springs enrich its flora. But in July, butterfly conservationists had to protest up trees when one of the few remaining haunts of the Marsh Fritillary was threatened with opencast mining at Sellars Farm SSSI, in the Neath Valley. It has disappeared from most of its Welsh haunts, like Royd y Clasty, near Pwllheli, while its Dyfed site is also threatened, at Parc Slip West. Only three sites remain in Cumbria.

The conservationists refused the offer of an alternative site to Sellars Farm, because a switch wouldn't work. Only two of over 50 attempts to transplant a colony of Marsh Fritillaries lasted over 10 years, and those have now died out.

M. WARREN

Marsh Fritillary: losing out to drainage systems.

Out & About

Special Viewing at Shirley's

By Nigel Caddock

Photographs: Nishikigoi International

As interest in Koi keeping continues to grow in the UK, many dealers have expanded the size of available viewing water to ensure that a wide choice and selection is available for the highly discerning UK Koi enthusiasts. Although bigger sales areas may offer bigger choices, there is another dimension to Koi selection that **Shirley Aquatics** of Solihull have also made a priority.

Shirley Aquatics MD **John Cook** recognises the importance of providing all Koi customers with what they want. He therefore identified that a growing number of serious Koi enthusiasts who visit Shirley, not just from the UK, but also from all over Europe, want — in addition to great Koi — somewhere appropriate to view their potential acquisitions. Recognising that this can be difficult in a major aquatic superstore where thousands of customers visit each week, a radical alternative was conceived, designed and built.

The special Koi facility, although being within the hustle and bustle of the Shirley superstore, is carefully situated away from the main sales areas. The facility was commissioned in 1994 and was further developed and extended earlier this year. It therefore now provides Koi keepers with perhaps the best specialist Koi viewing facility in the UK where customers can view fish at their leisure in an area specifically created to enable Koi to be enjoyed fully in a relaxed and totally unhurried environment.

In Japan, serious Koi enthusiasts demand quiet contemplative areas to view their fish, whereas the UK, major Koi vendors traditionally provide large sales areas which are not always the quietest of places, especially when major purchase decisions are being made.

John Cook's vision for the Shirley facility aims to offer Koi customers the best of both worlds. Within the main sales areas, thousands of great-value Koi in all sizes, varieties and all prices, are always available for viewing and sale. As well as this, through the special Koi area, Shirley also offer an additional 20,000 gallons of top-quality water with some of the best Koi outside Japan.

All the Koi in this facility have been carefully selected from some of the top breeders and dealers in the world. The result is four ponds with superb water quality and equally superb fish, all in a quiet, covered outdoor facility where the provision of 'zero-hassle' contemplative Koi viewing is the prime objective.

Koi always look best in daylight, which is why the ponds are outdoors, but with due deference to the British climate, a polycarbonate pergola roof and a new conservatory render the facility genuinely 'all weather'.

In addition to great Koi in a great environment, the highly skilled management eyes of Koi manager **Paul Stacey**, ensure that good information and advice are also always available.

As access to this facility is restricted and by appointment and invitation only, viewing numbers can be controlled to a level where the prime objective can be realistically achieved.

Shirley Aquatics is located just two minutes from M42 Junction 4 and lies in the centre of the country, so if you are seriously into Koi and want to see some of the best fish in Europe, a quick 'phone call will ensure you can access one of the best equipped, most impressive high-quality facilities outside the 'home' of Koi, Japan.

For more information contact: **Shirley Aquatics, Stratford Road, Shirley, Solihull, West Midlands. Tel: 0121 744 1300; Fax: 0121 744 0067.**

Main 15,000 gallon Koi pond designed for larger stocks.

Typical Shirley Koi: a 56cm Kujaku.

Three ponds designed for viewing smaller Koi.

FISH *by design*

Gills, scales & colour codes

PART FIVE

Roy Osmint concludes his series with an overview of the ways fish breathe, the uses they put their scales to and how colour can announce or conceal a fish's presence.

Virtually all known life forms require oxygen in order to survive, and fishes are certainly no exception. However, because they exist in water, an environment which contains only a minute quantity of oxygen by comparison to air, they need an extremely efficient system for extracting and absorbing it.

Efficient gas exchangers

Under normal circumstances, fish breathe as a consequence of water being passed over their gills, where oxygen is extracted, and from where it then enters the bloodstream. At the same time, unwanted gases are expelled from the body in a very effective form of gas transfer.

The gills, situated to the rear of the head, consist of a framework of arches upon which are located filaments that have lamellae on them; these are the actual respiratory 'organs'. Numerous blood vessels in the lamellae carry abundant quantities of blood, and it is this that gives the gills their bright red appearance. It is also where the life-giving respiratory transfer of dissolved gases takes place.

Water is drawn into the fish's mouth and passed over the gill lamellae. Here, oxygen is extracted by the blood and enters the body system, with carbon dioxide being expelled. The water then leaves the fish via the operculum (gill covers).

M P & C PIENAAR

Lungfish don't rely exclusively on their gills for their oxygen supply.

The size of the gill surface where gas exchange occurs is determined, not only by the size of the fish, but also by its activity level. Fast-moving species require more oxygen than their less active cousins and, consequently, possess a respiratory system capable of sustaining this greater exertion.

A little extra help

Certain species have, in addition to gill respiration, an accessory system which allows them to breathe atmospheric air. This has evolved where the natural habitats are deficient in oxygen and where the fish would not survive if they were dependent entirely upon the gills.

Members of the family Belontiidae, such as the various forms of Gourami, are well known among hobbyists for having this ability. These fish are equipped with an accessory breathing organ, known as a 'labyrinth', which allows them to take a gulp of fresh air from above the surface of the water and absorb oxygen directly into the bloodstream via a special chamber.

Even in favourable water conditions, these fish can be seen making frequent visits to the surface — taking a breath of air and then expelling a de-oxygenated bubble.

Some other species have evolved different methods of breathing atmospheric air to supplement normal gill respiration. The

M P & C PIENAAR

Scales guard fish like this Narrow Hatchetfish (*Triportheus angulatus*) both from injury and parasitic attack.

M P & C PIENAAR

Although the colours of many fish like this "*Haplochromis*" (*Nimbochromis*) *venustus* male make them attractive to us as hobbyists, this — of course — is not their 'purpose'.

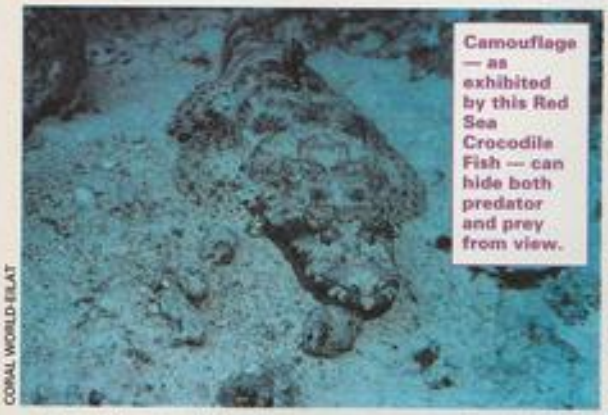
Lungfish of East Africa (*Protopterus annectens*), as the name suggests, has actual 'lungs' with which it takes air directly from the water's surface. These can also sustain it when lying buried in the mud of a dried up pool, while awaiting the arrival of the rains.

The Reedfish (*Calamoichthys calabaricus*) is able to take in air from the surface and channel it to the swim bladder. This then functions as a lung, supplying oxygen to the blood system.

Interesting examples of catfishes capable of using accessory breathing techniques can be found in the popular Peppered Corydoras (*Corydoras paleatus*) and the Armoured Catfish (*Callichthys callichthys*), which possess stomach and intestinal respiratory capability, respectively.

Versatile scales

Scales not only help to guard fish against injury from sharp objects and predators, but, in conjunction with a mucus covering, also add significantly to body streamlining and resistance to parasitic attack.



CORAL WORLD-ELAT

Camouflage — as exhibited by this Red Sea Crocodile Fish — can hide both predator and prey from view.

Most fishes are clothed in a protective coat of scales. These can vary greatly among species in terms of structure, size and quantity, while, in some types, they are absent completely.

The nature of scales present on the majority of modern bony fishes, differs considerably to those found on most of the ancient cartilaginous species of sharks and rays. The latter have tooth-like denticles or placoid scales embedded in the skin, often with an enamel covering, and possess a very rough sandpaper -like surface.

Non-placoid scales which appear on most other species, are, broadly speaking, thin overlapping discs which grow with the fish and are attached to the outer skin with varying degrees of permanence.

In the Eel (*Anguilla*) for instance, scales are very deeply embedded, do not overlap and are consequently difficult to distinguish, while in fish such as the Herring and its close relatives (family Clupeidae), scales are very insecurely anchored and easily become detached.

Armoured Catfishes (family Callichthyidae) are equipped with rows of overlapping bony plates called scutes which provide the fish with impressive body protection. In contrast, some catfish carry no scale or scute covering at all and have to rely on a tough resilient outer skin. Some members of Mochokidae (eg *Synodontis*) and Pimelodidae (Pims and their relations) display this characteristic.

Scales usually have a pattern of fine ridges upon them, sometimes referred to as growth rings. These develop with the fish and can, if correctly interpreted, give some indication of age.

Colour-coded messages

Fish can be found in almost every colour and shade imaginable, and its importance cannot be overstated.

From the aquarists' point of view, colour is not only likely to determine a fish's overall appeal, but also assists in identification, both in terms of species and, more particularly, sex. It also indicates the current condition and emotion of a fish in respect of health (or lack of it), fear, anger, agitation or excitement.

The majority of fishes have the ability to heighten or reduce the intensity of their colour to suit particular circumstances, while some are able to change it completely.

Pencilfishes (eg *Nannostomus*) are quite well known among fishkeepers for their habit of changing colour and markings during different periods of the day.

There are two principal methods by which coloration is produced: light reflection and pigmentation. Fishes that display a silvery blue iridescent appearance, do so due to minute crystals on the body being affected by varying wavelengths of light. The colour produced is dependent upon the angle of reflection and position of view.

Other colour is determined by the presence of chromatophores or pigment cells in the skin. These react by expansion and contraction to adjust the intensity of colour displayed.

Art of concealment

Although some species of fish have better developed colour vision than others, pigmentation often fulfils a vital role in terms of certain social functions and sexual behaviour. But some of the most remarkable aspects of colour and body patterning are associated with the business of escaping the unwelcome attention of predators via camouflage.

Concealment from predatory attack by camouflage is often a fish's most effective defence in the battle for survival. This, of course, is a double-edged sword, for some of the most voracious predators themselves use highly efficient camouflage techniques as they lie in wait for their unsuspecting victims.

Camouflage takes many ingenious forms to suit a multitude of different environments and circumstances. These range from actual concealment, as in the case of certain bottom-dwelling creatures that simply disappear by literally burying themselves in the mud or sand, to sophisticated body patterning enabling the fish to blend almost perfectly into its background.

Many of the well known marine flatfishes, for example, have a remarkable ability to modify both their colouring and markings in order to become inconspicuous with the sea bed.

The ever-popular Discus (*Symphysodon*), on the other hand, displays strategically placed dark vertical bars along both sides of its laterally compressed body. This helps it to merge with the reeds of its natural Amazonian habitat.

Some species not only assume the colouring and pattern of their surroundings, but also the texture. The highly venomous Scorpion and Stone Fish (family Scorpaenidae) closely resemble the rocks upon which they rest by displaying numerous body projections to match the encrusted surface.

In the kelp beds off the coast of Australia, lives a creature with camouflage so perfect, that even at close range, it is almost indistinguishable from the seaweed itself: The Leafy Sea Dragon. This remarkable fish has evolved, not only the colour and pattern of the kelp, but also its appearance and form. Extravagant outgrowths from the skin blend perfectly with the nature of the kelp to provide total concealment.

Fish are undoubtedly among the most remarkable of living creatures. They represent perfect examples of the extraordinary ways in which evolution has ensured, through selective development, adaptation and modification, the survival of such a multitude of different species in so diverse a range of habitats.

As aquarists, we should perhaps consider ourselves fortunate that two thirds of the surface of this planet is covered by the medium which supports the subject of our interest.

Gaining a better understanding of the overall design and behavioural characteristics of fish should inevitably mean that we can derive greater enjoyment from the hobby and, hopefully, become more successful fishkeepers. FTP

WANT TO KNOW MORE?

The other articles in this series were:

Part 1: Body of Information (Dec '94)

Part 2: Flexible Fins (Feb '95)

Part 3: Sensitive Adaptations (Aug '95)

Part 4: Remarkable Bladders (Sept '95)

SOCIETY WORLD

Scottish paradise

The **Federation of Scottish Aquarist Societies (FSAS)** promises to help you turn your aquarium into an "underwater paradise" at this year's **Scottish International Open Fish Show** (18-19 November, Glen Pavilion, Dunfermline).

Displays of furnished aquariums featuring tropical, marine and coldwater fish, as well as species and breeders' tanks and a reptile section, will be complemented by a workshop demonstration providing advice on how to set up an aquarium, from empty tank through to a fully furnished set-up.

Owners of the best of Scottish fish will be competing in the **Scottish Supreme Championship,** which will also take place throughout the show; while no fewer than 62 species of fish will be exhibited in an Open Show.

Completing the main attractions will be lectures on all aspects of fishkeeping, and the **Aquarian Advisory Service** will also be available with a display attended by **Dr David Ford.**

For information, contact: **James Montgomery, 6 Jamaica Street, Greenock.**

First for Glos

Gloucestershire AS celebrated its first birthday in the summer with a membership total of almost 50, most of whom turned up at the Bell and Gavel public house in Gloucester for party celebrations and the society's first Table Show, as well as the presentation of a cheque to the Pied Piper Appeal.

Meetings of the society are held on the first Tuesday of every month at the Bell and Gavel. Lectures from top aquarists, slide shows, quizzes and videos form the centrepiece of the evenings. Members receive a free magazine every month and a newsletter every two months, produced by **Andy Ramsbotham,** while a free gift is donated every month by **Reflections Aquatic Consultancy,** Stroud.

For further information, contact: **Andy Ramsbotham, 8 Canning Road, Longlevens, Gloucester GL2 0XX. Tel: 01452 521609.**

Strathclyde Festival date change

Owing to date clashes with other important aquatic events in the area, the **Strathclyde Fishkeepers Festival** will now be held next Easter at a venue to be announced.

For further details, contact **H. McGuinness,** Secretary, 10a Mill Road, Cambuslang, Glasgow G72 7QG.

'Oddballs' group launched

Just about every fishkeeping enthusiast has an 'oddball' somewhere in their collection. Whether it is a one-eyed Moor, a Butterfly skimming the surface, or Knives slicing through the depths of the aquarium, they may not be 'classic beauties' themselves, but they are nevertheless your 'pride and joy'.

Aquatic hobbyist **Ricci Rutter** has launched a society, called **The *Oddball* Club??,** to bring together stories, correspondence, photographs and information for everyone who keeps their own 'oddball'.

So, whether you have a tale of Wolves lurking in your aquaria, or Elephants charging through your plants, drop Ricci a line at: **'The *Oddball* Club??', c/o 11 Florence Street, Winlaton, Blaydon on Tyne. Tel: 0191 414 1448.**

Top marks to Lloyd

Thirteen year-old **Lloyd Rees** (pictured) was the winner of the Best in Show Award at this year's **Northern Goldfish and Pondkeepers Society** Open Show, sponsored by **Aquarian.**

Lloyd's Common Goldfish scored top marks above over 200 entries, some from as far afield as Scotland and the south of England, which included Shubunkins, Veiltails and Fantails, Moors, Orandas, Pompons, Pearlscales and Bubble-eyes.

DR DAVID FORD

ACN clarification

In the September edition of **Newsdesk** (page 86), we carried an item on Part II of the ACN's *International Directory of Aquarist Organisations.* In so doing, we may have created the impression that Part II was intended as a supplement of Part I.

We would like to stress that this is not the case. Part II is a second, complete annual edition which updates the first, and has grown from 960 entries to 1,214. We are grateful to Rob Huntley of ACN for bringing our possible ambiguity to our attention.

For further details contact: **Rob Huntley, Aquatic Conservation Network, 540 Roosevelt Avenue, Ottawa, Ontario, Canada K2A 1Z8. Tel: (613) 729 4670; Fax: (613) 729 5613.**

Wycombe goes monthly

As from last month (October) **Wycombe and District AS** will meet only once a month. New members are welcome to the meetings, which are held on the first Thursday of each month.

Information is available from **Andy Cluer on 01494 524549.**

DIARY DATES

NOVEMBER

Tuesday 7

Plymouth & District Aquarists' and Pondkeepers' Society — *AGM.* Plymouth Electricity Social Club, Armada Street, Plymouth. 7.45pm. Contact: **Ian Blackie**, 55 Carnock Road, Manadon, Plymouth PL2 3SH. Tel: 01752 709 599.

Sunday 12

Association of Midland Goldfish Keepers — *AGM (members only).* Foleshill Community Centre, Foleshill Road, Coventry (2pm). Details: **Mrs Anne Bloor**, 10 Barnett Crescent, Woodford Halse, Daventry, Northants NN11 3SP. Tel: 01327 61198.

Tuesday 14

Plymouth & District A and P Society — *Table Show.* ADV Cichlids A/B, Dwarf Cichlids Open and Angels Open. Venue and contact details as above (Tuesday 7 entry).

Sunday 19

OASIS — *Auction.* Thompson Park Community Centre, Monkwearmouth, Sunderland. Details: **Mrs A.M. Banks**, 122 Moor Crescent, Gilesgate Moor, Durham DH1 1DL. Tel: 0191 3841433.

Hemel District AS — *First Open Auction,* (at the new venue) Scout Hut, Durrants Hill Road, Apsley, Hemel Hempstead, Herts. Details: **Mrs Jackie Debonnaire,** Secretary, 95 Bayford Close, Woodhall Farm Estate, Hemel Hempstead, Herts HP2 7NA. Tel: 01442 233315.

Northern Area Catfish Group — *Auction.* Booking in: 1pm, Boys Brigade Hall, Bryn, Lancs. Details: **Mrs S. Pye.** Hon. Sec. Tel: 01942 707774.

Sunday 26

Association of Aquarists — *AGM.* Kempshott Village Hall, Station Park, Basingstoke. Ordinary quarterly meeting: 12 noon. Lunch: 1pm. AGM: 2pm. The afternoon will conclude with a presentation by the Judges and Standards Committee. Details: **Adrian** or **Judith Aylmer.** Tel: 01256 53793.

DECEMBER

Sunday 10

Northern Area Catfish Group — *Talk:* speaker to be announced, at Boys Brigade Hall, Bryn, Lancs. Details: **Mrs S. Pye.** Hon Secretary. Tel: 01942 707774.