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AQUARIST AND PONDKEEPER

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EDITORIAL

THANKS ALL-ROUND

I always knew that the 'Aquatic Grapevine' is a highly efficient way of spreading news. What I didn't know is just how efficient it actually is. Well, now I do.

On 8 July, I was rushed to hospital where I underwent emergency abdominal surgery.

The spread with which this bit of news travelled was quite staggering. By the next day, the 'phone calls had already started, closely followed by flowers, potted plants, faxes, letters and cards — all wishing me a speedy and complete recovery.

My heartfelt thanks go to all my friends in the trade and to all those AGP readers and contributors who have so kindly enquired after my health. Even now, quite a few weeks after the crisis, the enquiries and good wishes are still coming in daily.

Vivian (my wife) and I have been deeply touched by this overwhelming response (those who know me well say that I've been touched for years, in any case, so nothing's changed!) The support we've received has been tremendously encouraging and is very much appreciated.

I must also thank my colleagues at AGP for rallying round and pulling the August issue together at such a critical stage and with so little time at their disposal. They obviously did a magnificent

job judging by the many compliments we've received from our readers (who needs an editor, when you've got such a terrific team behind you?).

Finally, a most sincere vote of thanks to all those who rang or wrote in offering their assistance with the editing and proof-reading, and to my old friend, Dr David Ford, for standing in for me at the Hampton Show and the Sparsholt Conference at a moment's notice.

We often hear about the back-biting and 'politicising' that goes on, both within the aquatic trade and the hobby. We rarely, if ever, hear about the other facet — the generous, warm, unselfish side. Well, if ever I needed proof of its existence, I now have it in abundance.

My only frustration at the moment is that I'm currently 'firing on only two cylinders'... and can't wait to get the remaining ones going again... but that will come. In the meantime, it's great to be back!

Thank you all once again for your tremendous support.

John Dawes
Editor

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RETURN OF THE FISH PEOPLE

Following Channel 4's recently repeated aquatic programme, Jason Endfield puts forward his case for a better TV deal for aquarists.

It was good to see the re-screening of Channel Four's *Fish People* again a little while ago, wasn't it? Just a few months after it was first shown too. I suppose that it makes the point that there is, in fact, a demand for 'specialist' programmes on 'specialist' subjects once in a while.

And yet, does fishkeeping still fall into this category? With an incredible number of people in the U.K. now keeping fish as pets (about 2.8 million households), either in aquaria or ponds, the hobby has become virtually as popular as pastimes like DIY, gardening, and, dare I say it — fishing. And all of the above have one or two things in common. For a start, they've all been featured on television.

This isn't too remarkable — indeed fishkeeping too has been the subject of television coverage — after all there was *Fish People*, wasn't there? Yes, this is true, but DIY, gardening and fishing programmes on television, along with countless other 'specialist' pursuits on the 'box', have one common link. Any ideas? No, they're not all presented by Judith Chalmers (come to think of it, they might be, but that's not it!); and no, they don't have an accompanying fact sheet (yes, they do, don't they? But that's not it either...). The link I was thinking of is that they've all been the subject of regular

television series. And, what is more, they've attracted big viewing audiences. It's not really very surprising either when one considers that there are millions involved in each of these pastimes.

So, to the programme controllers, I say, "Thanks for *Fish People*, even though the picture painted by one or two of the 'expert hobbyists' presented a very misleading impression of the aquatic industry. Thanks for repeating it, too — but, tell me, when can we aquarists look forward to a series of our own?" *Fish People* has proved beyond doubt that there is more than a passing interest in the field and even those not involved directly in the hobby, can obviously derive much pleasure from watching fish on the small screen in the same way as they do at a public aquarium and even at the pet shop.

I'm well known for being a good grumbler, and I've even been called a cynic (yes, it's true), and I can, and do, go on a bit when something 'gets my goat', but this issue, I think, is valid. It began to niggle me, after watching something on the telly recently. (Stand by to be impressed!): I was watching the Open University programmes on BB2 (Impressed? Thought so) . . . alas, only because it was raining outside, and not through any educational or intellectual inclinations.

Anyway, in between 'Elementary Mathematics' (totalling baffling), and something about 'Social Structures in Society' (both top of the ratings charts, I'm sure), was a programme dealing with evolution, this particular episode being devoted to fishes. I sat glued to the box throughout the thoroughly interesting programme, which featured species as diverse as Hammerhead Sharks and Lungfish. It was narrated in easy-to-understand language (essential for boneheads like me), there was little technical jargon, and the only complaint I had was that it was on at a time when most interested parties would have more urgent matters to attend to than sitting in front of the television.

Although produced primarily with Open University students in mind, the programme was very general in its content, and would have fitted very comfortably into an evening slot when viewing figures would have been higher. "Well," I thought, "at least they are starting to take fish seriously as an entity all their own." A very temporary compliment this turned out to be, when, at the end of the show, I discovered that the programme was made in 1981 — very nearly ten years ago (I worked that out after seeing 'Elementary

Mathematics!').

I'm perhaps being a little too slamming here — there are other occasional programmes about underwater life, and they are usually of an excellent standard. Basically, I'm referring to our kind of fishy things though — not Whales, Sharks, Seals and Penguins (fascinating as they are), but more Guppies, Angels, Crabs and Corals; species that could be referred to as 'domestic aquatic life'.

Other pets have had their own series with unprecedented success — remember 'Training Dogs The Woodhouse Way'? It turned Ms Woodhouse into something of a national heroine, except among the dog themselves! So this feature is really an open appeal to any television producers reading *A&P*. How about a series on our fascinating hobby? We come cheap! We're not asking for fancy sets, nor for glamorous actors — we're not even demanding the expense of an accompanying fact sheet. And if the delightful Judith Chalmers has to present the shows, then so be it — statistically, she's probably a fishkeeper anyway!

But you know, it really is about time that one of the most popular pets in the country is given the attention it no doubt deserves. That means more than a one-off special and an occasional Open University slot. Lots of *Fish People* out here would be very grateful.

Tomorrow's Aquarist



By David Sands

Holiday thoughts

HOW did the holidays go? Did you do anything fishy? As soon as I hit a holiday town I used to head out for the first aquatic shop and then to the public aquarium (assuming they had one). Once, on Majorca, I collected octopus, anemones and small hermit crabs and kept them alive in a plastic bag held inside a waste paper bin in my hotel room. I had taken a battery air pump with me, so it was fairly easy to sustain everything. I brought the anemones and crabs home and didn't lose one!

I felt sorry for the octopus and returned it to the sea the next day. It was wonderful to see it skate its escape through the shallow water over the rock shelves to open sea. I always feel sorry for animals when they are trapped in specimen jars or whatever...

It is the one reason why I am not a fisherman, despite having a great number of friends who are devout anglers. I always feel sorry for the fish.

Peru expedition

I'm off to Peru. Well by the time you read this I will already be there, to catch some special *Corydonas*, my favourite catfishes. I never dreamed of travelling when I was a child. Going a few miles in a car was a long enough journey for me! The only part of travelling abroad that I don't really like is the long plane journey. I can never sleep and I get restless. Have you travelled to a far away place?

A special edition 'Pedigree Petfoods' Peru 1990 Tee-shirt is currently being made. I will be giving one away as a prize next month, so I suggest you read my column for clues...

Clown prize

While at the A of A Sandown aquatic show this year, Dr David Ford of the 'Aquarian' Advisory service snapped me with a clown. I will give another prize to the first **Tomorrow's Aquarist** who can name me the most 'clowns' in fishes (just the common names). Send your cards to T.A. (Clowns), Aquarist & Pondkeeper, 9 Tufton Street, Ashford, Kent TN23 1QN.

Fish food bills

I've received a letter from a **Tomorrow's Aquarist** who is already 'in today' and wants to keep a Red Tail Catfish alongside a Tiger Shovel Nose Catfish. He asked if his income budget of £15.00 per week (from a job) would be enough to feed a growing Red Tail.

I never really thought about whether young fishkeepers could afford to feed their fish or not. I always assumed that parents sorted out that sort of thing.

Do you struggle to make 'ends meet' when you have to pay for your own fish? Has pocket money gone up since I was a lad??

River watch

As conservation is my BIG thing at the moment, I'd like to know if you keep an eye on your local river. I recently saw a truck discharging concrete waste into the River Darwen and noticed huge sheets of polythene had spilled into the river from a storage warehouse. I also noticed the river had gone red-brown in colour one day and thought it might be harmful to wildlife.

I telephoned my local water authority and asked them for the telephone number of the National Rivers Authority. The NRA was very helpful about the colour change, telling me that a local paper mill had discharged dye through the sewage system

and it had gone right through... I am still not sure if it was harmful to the Canadian Geese on the river, but the NRA didn't seem over-worried about it. They are currently investigating the concrete and polythene pollution...

Perhaps you could be vigilant and report anything untoward that happens on your local river. I would be very interested to hear if you observe anything and call the water company. If you were to keep a watch on your local river or streams, not only would you have a nice walk observing the wildlife, but you could be doing something rewarding.

I had better mention that it is best not to fall in, otherwise your parents will be writing to the editor asking for my head on a plate! I would like to keep a list of our **Tomorrow's Aquarists** and the rivers they 'patrol'. I think that would make an interesting feature for our column. So let's see you on the river banks (carefully)!

More T.A. questions

I once asked if you borrow fish books from the library. While I did not receive a single letter on this subject I am still curious to know if any reader, unable to afford a new book, would go to the library to review them.

How do you manage when buying fishes? Do you have to save up, or do mum and dad help?

At the Birmingham and Sandown shows I met up with David James, from Hemel Hempstead, once a young fishkeeper, who attended a British Museum course on fishes with me. As a schoolboy, David travelled by train every week to Kensington to attend the 'Introduction to Ichthyology' series of lectures. His enthusiasm was boundless and, even though he has attended university and now has an accountancy job, that enthusiasm has not died.

David has always represented the spirit of enthusiasm 'a la tropical fish' for me. He had so many questions then and even has some answers now...

David photographed me and

David Ford on the 'Aquarian' stand at Sandown and admitted that photography was his new interest. I'm sure he will put his all into the subject and we will soon see articles by David in this magazine!

Do any other readers photograph fish? Let me know.



I took this photograph of an Emperor Angel in one of my tanks and was quite pleased with the end result. Do you take fish photographs?

T.A. artists?

Have you visited any fishkeeping shows this year?

I have noticed that many of the festivals have children's artwork in a special wall section. I would be interested to know if there are any **Tomorrow's Aquarist's** artists out there.

You may have noticed in my *Corydonas* article this month that Craig Greenwood produced some expert class drawing. Craig was a schoolboy, showing a real interest in drawing fishes, when I first began to encourage him to draw more. I gave him a set of ink pens that I hadn't used for some time in the hope that he would practise and become even more talented.

This year he gained a natural history artist's place at college against very stiff competition and his catfish artwork, produced to complement my work, went some way towards helping him pass the entrance requirements.

I am wondering if there are other 'Craig Greenwoods' about, so let me see your catfish drawings... or other fish if you prefer.

Happy fishkeeping.



Male fish displaying to female (seen peering out from behind a rock).

LINDY NICHOLS

PEACEFUL ROCK-DWELLER FROM MALAWI

There are numerous mbuna (rock-dwelling) cichlids in Lake Malawi. One of the best, according to **Stephen Dent**, is small, colourful, easy to breed, and comes from Likoma Island.

One of the most peaceful mbuna (rock-dwelling cichlids) that I have come across is *Pseudotropheus elongatus* 'ornatus'. This, together with the striking coloration of the male fish, and pleasing subtle tones of the female, should make it a popular aquarium species.

This fish, like all the mbuna, comes from Lake Malawi in East Africa. According to Tony Ribbink, it is found at Likoma Island, where it spends most of its time swimming and feeding over the upper surfaces of rocks. Here, it will mix with others of its own species in groups that can reach more than 100 (but usually consist of less than 30) individuals.

AQUARIUM REQUIREMENTS

As this cichlid is from Lake Malawi, it should be given water conditions with a high pH and some hardness. The tank can be furnished with plenty of rockwork providing numerous caves into which the fish will retreat if threatened by more aggressive tankmates. Because this fish is so peaceful, it is perhaps better kept with *Aulonocara* species or some of the more mild-mannered 'Haplochromis', than with the more robust mbuna species.



A pair of farm-bred *P. elongatus* 'ornatus'. These fish are currently being produced in Singapore.

LINDY NICHOLS

When I kept these fish they shared a 4ft x 18in x 2ft high (120 x 45 x 60cm) tank with *Haplochromis* 'ahli', *H. taeniolata*, *H. crysomatus*, *Cyrtocara moori*, *Aulonocara* sp. and the red form of *Pseudotropheus zebra*.

The readings in this tank averaged:
 Temperature 27°C
 pH 7.4
 KH 3°
 GH 8°

The fish were fed on good-quality flake and granular foods, with quite frequent feedings of live glassworms and whiteworm, and grated frozen beefheart. Other tidbits were given in the form of cooked chicken, shelled cooked frozen peas and sweetcorn kernels. On this type of diet, and with regular water changes, the fish grew quickly.

SEXUAL DIFFERENCES

I had bought four young immature fish and, fortunately, ended up with one male and three females, perhaps not just by luck because, even at a very small size, males have a darker coloration and frequently 'show off' to the other fish.

As these fish mature, the male develops a royal blue body with 6 to 9 black bars, the last few of which are incomplete and fade altogether when the fish is excited. The caudal (tail) and anal fin of the male has blue-black rays and royal blue membranes. The female, on the other hand, retains the juvenile coloration, which is a soft brown to salmon pink. She shows darker bars in certain

moods, but these remain brown and never change to the blue-black of the male. Both sexes show a broad black band which covers most of the dorsal fin. The edge of the fin above the black band is white.

BREEDING

As this fish doesn't grow much bigger than 3½ inches (9cm) I was not very surprised when, at about two inches (5cm) in length, the male fish started vigorously courting the three females.

After a few days of courting, where the male displayed to the females, all three were holding eggs in their mouths. Two days later, only one female was still holding eggs, the others (perhaps owing to the continual harassment of the male) had lost their eggs. Three weeks later, four young 'ornatus' were seen hiding in the large amounts of rock-work at one side of the aquarium.

After two or three months there were at least ten juvenile 'ornatus' all over the tank. Each fish had a little territory of its own and expelled intruders of their own size. This was just like the breeding displays of the adult fish, only in miniature. When larger fish came too close, the young fish quickly hid in cracks and crevices that were too small for their pursuers to enter. Even so, the number of fry in the tank did not seem to increase. I therefore decided to try and remove the females next time they had eggs.

After a weekend away from home, when the tank had been left unattended for two days, I noticed all three females with bulging

mouths. I vowed to raise all the young I could, so I attempted to catch the females and transfer them to another tank to brood in peace. I started with my attempts at seven o'clock on a Sunday evening, and finally succeeded in catching the last one after ten o'clock! Over three hours of patiently encouraging the brooding females into waiting nets is not really my idea of fun, but the hard job was over.

The females were then placed in a 3ft x 12in x 15in high (90 x 30 x 38cm) tank with a few rock piles, some Java Moss (*Vesicularia dubyana*) and a dense cover of Duckweed (*Lemna*). The females settled in quickly and seemed no worse for their adventure.

They were not fed for the next three weeks, but there were a few *Cyclops* and other small invertebrates in the tank. Three weeks later, perhaps 22 days after spawning, the first female released eight young fish. By the following evening, there were 24 young 'ornatus' in the tank, with the three females browsing on the algal growths and taking no further interest in the youngsters.

On a diet of Brine Shrimp nauplii, chopped whiteworm and staple flake, the fish grew well, but quite slowly, reaching 1in (2.5cm) in approximately twelve weeks.

Although the females were 2½in (6cm), or more, they only had small broods. As a result, it is unlikely that this attractive fish will become available in large numbers. So, if you do see them for sale, give them a try; they are well worth the effort in keeping them.

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SPAWNING THE BULLDOG CATFISH

Alan Milne reports on a rare event — the successful spawning of *Chaetostoma thomsoni*.
(Photographs by the author)

Being a keen aquarist of four years standing, and having developed an obsessive passion for the keeping and attempted breeding of catfish, I was browsing at Grosvenor Tropicals of Belfast when I saw a catfish of the family Loricariidae which I had never seen before. I was told by the ever-helpful staff that it was a Bulldog

Plec. I requested that three of the fish be held for me and rushed home to research the habitat and feeding requirements of this species and set up a tank accordingly.

At this point I must thank David Sands and his publication *Catfishes of the World Vol 4* and for his kind permission to reproduce the following shortened extract: "The genus *Chaetostoma* contains 40 species

of which two or three are regularly imported as aquarium fish. *Chaetostoma thomsoni* come from the fast flowing streams of the Andes through Colombia and Peru. They are characterised by eyes on the dorsal surface of the head, a wide mouth, naked belly, naked snout (at least $\frac{1}{2}$), without barbels. Males are more patterned than females".



One of my females.

Accommodation

I set up a 30 x 12 x 12in (45 x 30 x 30cm) tank with a gravel substrate on top of an under-gravel filter, powered by a powerhead and an internal filter to recreate a fast water flow, as it appears that the Bulldog Catfish will not survive in a still water aquarium. For hiding places, and for territorial disputes, the decor used was well-rounded rocks. Water chemistry was pH 7.2, DH 12 and temperature 78°F (26°C). Lighting was sub-

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duced and kept on for only eight hours each day.

I initially bought three fish, intending to buy three more at a later date. With six fish I would have increased the tank size to 4ft (120cm). This, I hoped, would give me the correct male to female ratio, but as things turned out, I didn't need the other three fish.

During the first week, the territorial disputes escalated as I thought they would, but I overcame this by feeding the fish in their respective territory and, by the second week, all disputes were over. I have found the Bulldog Catfish to be very shy, diving deep into the rocks if they spot any movement. They also take on a fright coloration if disturbed and take time to settle back into their environment. Because of their fast movement, they are difficult to catch and will use their mouths to adhere to the glass with such a force that they have to be dragged from the tank.

I fed the fish on a varied diet of lettuce leaves, vegetable tablets, flake food, live *Daphnia*, chopped prawn, peas and bloodworm. I did weekly water changes using 1½ gallons of matured water. I soon found that I had one male and two female fish. The male had minute opercular (gill cover) spines and showed a darker coloration when compared to the females.

Breeding

After having the catfish settled in the tank for eight weeks, I raised the water temperature to 84°F (c29°C) for two days then



Bulldog fry shortly after emerging for the first time

allowed the tank to revert to 78°F (26°C). I then carried out a 3-gallon water change using slightly cooler fresh water. I have used this method with other catfish and, as they have subsequently spawned, I hoped that the Bulldogs would do the same.

Unfortunately, I did not see the spawning when it took place, nor could I find any eggs. I know that the eggs must have been laid deep inside one of the caves as none were seen on the gravel or attached to the glass. I did not wish to disturb the fish, so I didn't dismantle any of the rock formations.

Some two weeks after increasing the water temperature, I saw a swift movement by one of the rocks and saw the first of the fry. In my excitement, I threw caution to the wind, and removed all the rocks. I found 18 fry of about

10mm (0.4in) in length; they were almost transparent. I fed the fry on fine powder feed, lettuce leaves and Brine Shrimp.

I kept a constant watch on the tank but saw no parental care. The adult fish ignored the fry, keeping to their own territories, while the fry huddled under, or at, the side of the internal filter. I found eight dead fry in the first week (one was inside the internal filter). The cause of the loss is not known, although I did carry out more frequent water changes on account of the extra food. I saw that the fry always chose a lettuce leaf which had been previously chewed by one of the adult fish and never saw one on a virgin leaf.

Notes:

1. At the age of six weeks, the fry measured 11-12mm (c0.4-0.5in) and had started assuming some of the coloration of the parents. Although this species is supposed to love algae, the fry did not appear to exhibit this trait. They did, however, love cucumber and mashed peas.
2. The fry probably did not feed on undamaged lettuce leaves because they were unable to break through the surface layers. The same problem was encountered with undamaged spinach leaves.
3. Fry started to die off after a period of about eight weeks. As yet, I have been unable to identify the cause. At the time of writing, I only have one survivor from the original batch and one from a subsequent spawning. Both are healthy and growing well.

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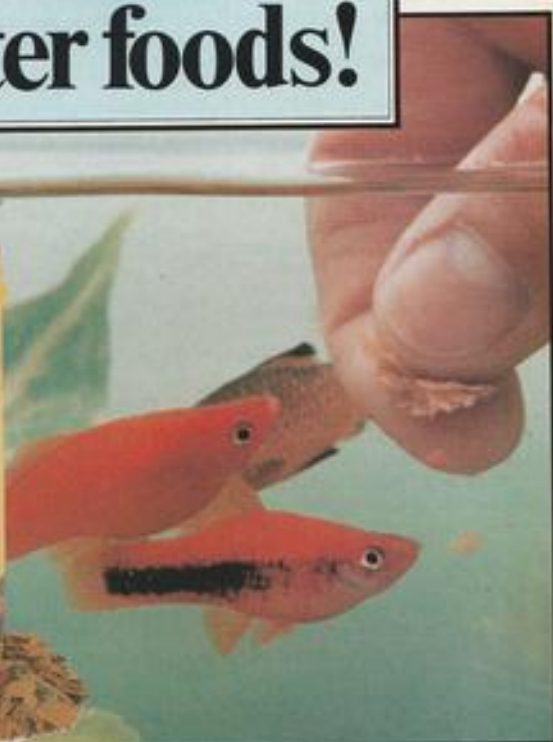
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Always ahead with the best ideas... naturally.



Naturalist's notebook By Eric Hardy

Transatlantic travellers

Young eels aren't the only transatlantic travellers to our estuaries. Plastic and polythene waste, increasingly littering our shores, has become a new, man-made modern environment, collecting colonies of marine life as it drifts along the seabed for years.

In the Dee estuary, a friend has collected not only Goose-barnacles and four Saddle Oysters from this synthetic material above all others, but also West Indian molluscs. Jewd Bay Clams (*Chama sarda* and *C. macrophylla*) and a Wing-shelled Oyster, *Isognomon*, from the West Indies, found on plastic waste on Hoylake-Hilbre shore, have been confirmed at Liverpool Museum. Two little *Chama* clams, still together in a piece of plastic tube, were considered evidence of the crossing. Also the tropical bean, *Entada gigas*, famous for being carried far on the sea, has been found there. Leathery turtles are probably the biggest Gulf Stream drift from the Caribbean Seas to Shetland. One was off Bardsey Island in April, while a Loggerhead from north Devon in February was returned to the Caribbean.

Discoveries

The rare Mexican lizard *Norops (Anolis) milleri* has been rediscovered by Texas university biologist, Jonathan Campbell. A University of Arkansas biologist has shown the adult Ringed Salamander, *Ambystoma annulatum*, can regenerate a limb, and a San Diego, University of California biologist, Allison Alberta, has worked out the evolution of chemical signalling in Desert Iguanas. Chemicals play a large part in reptile behaviour and Garter Snakes locate earthworms, fish, etc, by their chemicals, while rattlesnakes trail rodents by their chemical cues.

An interesting Red-sided Garter Snake from central Manitoba, Canada, a gyandromorph, sexually both male and female, recently had its reproductive behaviour studied at Boston University, while an attraction

at Sayaji Baug Zoo in India was a melanic (black) Royal Snake.

Angling Beetle

A reader, A.M. McShane, writes from Launton, near Bicester, asking if we can substantiate his idea that somewhere he read about a beetle capable of removing goldfish from a garden pond and flying off with them! This sounds more than a fishy tale. The biggest beetles, like the foreign Goliath, are vegetarians, but the story may have been exaggerated from the common yellow-bordered Giant or Great Diving Water Beetle, *Dytiscus marginalis*, very predatory on fish, especially in its aquatic larval stage. People have even had to give up fishkeeping from its predations. It attaches its sharp jaws to fish and sucks their juices.

The adult flies from pond to pond at night (some 40 years ago I wrote in *Aquarist & Pondkeeper* of one flying into a ballroom at the top of Blackpool tower and causing panic). Giant Beetles could carry fish fry, but they would be in the smallest, earliest stage; nothing like adult size.

Beware of anglers' tales. Honest anglers never exaggerate more than 25%! An angling club were telling tall tales in the local pub, after which they went out, tackled up, cast their lines over the bridge, and in five minutes the first train came under the bridge!

The ferocious larva of this water beetle lasts four or five weeks; the adult beetle several years.

In 1859, the London papers related stories of a "talking fish" which spoke "mamma" and "papa" when exhibited in the city. But the "fish" was a common porpoise.

There is, of course, the "talking catfish", *Acanthodoris spinosissimus*, but it only grunts like a Liverpool drunk when taken out of water!

Current research

Nowadays we take our natural history seriously as you will see from some recent research grants from the National

Environment Research Council: £59,000 for a Stirling University biologist's genetic studies of Arctic Charr, £67,000 for a Glasgow zoologist to find how juvenile salmon acquire territories and mates, and £70,000 for a Bangor University zoologist's study of micro-growth patterns in bivalve shells.

While the public gaze at the squid swimming around Plymouth Aquarium, biologists in the lab there use it in neurophysiology studies. Meanwhile, the great squid-fishing bonanza around the Falkland Islands has almost ended with new restrictions because the international fleets have almost fished them out. Squid are also fished off Rockall and Cornwall.

Scottish fish and herptiles

One of the most interesting fish left in our freshwaters by the retreating Ice Ages over 10,000 years ago are Arctic Charr, especially in Scotland. Even in the Hebrides, they still occupy waters on Islay, Skye, Rassay, Lewis, North Uist and (on Islay) big Brown Trout feed on them in some waters.

Only 11 freshwater fish are

found in Hebridean waters, and four of these, pike, perch and American Rainbow and Brook Trout are introductions to the Inner Hebs. Three- and Nine-spined Sticklebacks share other waters with Brook Lamprey, eels and the celebrated trout and salmon. The latter have Britain's biggest and earliest spring run in the short Grimersta River on Lewis, though this isn't mentioned in a fair summary of the fish in Collins' recent *New Naturalist* book on *The Hebrides* by J.M. and I.L. Boyd.

The limitations of local fishermen make the deeper waters of the Outer Hebs better known to Lancashire trawlers from Fleetwood, not all of whose rarer fish captures seem to be included, such as the Frill-gilled Shark in 1935 and May 1961. North Uist's Arctic Charr are in Lochs Fada, a' Bharpa and Skealtar; on Lewis in Lochs Langavat and Suainaval, in Rassay's an Uachdair, Skye's Mealt and Islay's Kennabus.

There are no Crested Newts, few Smooth Newts, but many haunts of Palmate Adders, but no Grass Snakes, occur, along with Common Lizards and Slowworms, Common Frogs and Toads.



Great Diving Beetles in mating clasp. Adults are good fliers but would only be able to carry fish fry at best. (See Angling Beetle).

Seaview

By Gordon Kay



Appeal

To start with, an appeal. There is a children's programme on BBC Television called *Expo*. This is a superb scientific programme (hosted by Johnny Ball) which is far too good for children (only joking!) On 5 June the programme was about the Tokai University Marine Science Museum in Japan.

I am inclined to be something of a twit and, although I knew the show was on, forgot to set the video recorder. I came home and switched on halfway through, to see a very strange-looking shark which evolution seemed to have forgotten. The remainder of the programme was brilliant and left me feeling very disappointed that I had missed it. My appeal is to anyone who may have recorded it. Would you consider lending it to me — PLEASE? I have loads of underwater films which I would be glad to lend in return (how's that for an offer?).

Faroe Slaughter

Earlier in the year, *Animals International* — the journal of the World Society for the Protection of Animals — ran an article on what it called "the barbaric and anachronistic" slaughter of Pilot Whales in the Faroe Islands.

The article told how, despite overwhelming international protest, the Faroese government continues to allow this horrific brutality which accounts for thousands of

whales (and other cetaceans) every year. They say that there is nothing wrong with a traditional "non-commercial catch of whales". They even claim it to be an "example of the valid utilisation of marine resources". Valid utilisation — that's not what I'd call it!

In 1988, 1690 Pilot Whales and, at least 630 other members of the family died, and over 1258 were killed in 1989. According to the article, this decrease was nothing to do with any conscience on the part of the islanders, but was down to the fact that fewer whales were seen around the Faroes. Surprise, surprise!

The way the Faroese kill the animals is abhorrent in the extreme. They are gaffed with a 5lb metal hook and then hacked through the spinal cord with a 6in whaling knife. And it's all so utterly, bloody futile!

The Environmental Investigation Agency has produced overwhelming evidence that the islanders don't need to do it. They have plenty of food to eat and, in fact, EIA researchers found "large amounts" of whale meat which had been thrown away to make room for a fresh catch. They also examined whale carcasses and found meat and blubber left on them after they had been butchered. Yet, still the slaughter goes on — several times a year!!

I've seen (on film, mercifully) all this happen and believe me, it is particularly sickening. The sea flows red with blood. It is absolutely horrific. You know enough about me now to be well aware of how I feel about such things, and I like to think that you are all of a similar mind.

Please write to Mr Jørgen Sundstein, Prime Minister, Foroya Landsstyri, FR-110 Torshavn, Faroe Islands. Tell him politely that you protest at the continuation of the slaughter of Pilot Whales. Tell him that you are sickened by the way in which they are killed — particularly considering how much meat is wasted. Do it for me — please.

On a much happier note, I notice that Sainsbury's now sells only tuna that has been caught by pole and line. You see, people power does work!

Net-training programme underway

Also on a much happier note, the American magazine *Pet Age*, ran a piece in April on the launch of the first phase of the Netsman Training Programme in the Philippines. The Haribon Foundation for the Conservation of Natural Resources (Manila) have introduced the programme in an attempt to educate divers who catch ornamental fishes to use nets instead of Sodium Cyanide.

They plan to teach the fishermen — in a series of two-week long sessions — using a 'hands-on' technique in the villages where they live, and hope to work their way through ten communities by the end of this year and a total of thirty seven by the end of 1991. The whole thing is being done in collaboration with the International Marinelife Alliance of Canada and is backed by the Philippine Tropical Fisheries Exporters Association, with the Philippine Department of Agriculture. We can support it by joining the I.M.A.

Write to International Marinelife Alliance — Canada, 2883 Otterson Drive, Ottawa, Ontario K1V 7B2. Do it now, please!

Hitchhiking plaice

The Ministry of Agriculture, Fisheries and Food have found how plaice and other flatfishes migrate from one area to another.

With the help of sonars, they have established that the fishes migrate by coming off the bot-

tom when the tide is flowing in one direction. They then get carried along with the tide and, when the tide turns — as it does around six hours later — they stop, return to the bottom and bury themselves so that the current will not carry them back again.

Experiments are carried out in massive aquaria with dimmed lights and currents to simulate tides. The fishes are then carefully monitored by a computer, with the results — over a two-week period — proving that flatfishes actually migrate by literally hitchhiking. All this goes to show that, at least, flatfishes know their plaice (!) And now, as they say, for something completely different.

Snippets

1 The estuaries of all rivers are full of sediment, loaded with minerals and decaying organic material. When these mingle with the dissolved salts in seawater, they clump together and drift to the bottom to form silt.

2 Twice a day, every day, the water in estuaries changes quite dramatically in character. When the tide goes out, and in particular when the river is swollen with rain, the water will be mainly freshwater. When the tide comes back in, then salt-water will predominate. Obviously, the animals living in this environment must be able to withstand vast changes in both physical and chemical conditions. However, those which do, tend to flourish because estuary waters are potentially more nutritious than any other — be they salt or fresh water.



Flatfish are now known to migrate from plaice to plaice(!) with the currents.

LAURENCE E. PERKINS



Spotlight on Killifish

NOTHOBRANCHIUS KORTHAUSAE

Ruda Zukal introduces an easy, colourful, and hardy killie from East Africa.
(Photographs by the author. Text translated by Mary Bailey)

Main photograph: During driving the male pushes the female to the bottom.

This fish was first caught on the Island of Mafia of the East African coast by Mrs Edith Korthaus in 1972, and later named in her honour. For the most part, *N. korthausae* lives in waters which are not seasonal, and which do not dry up during the course of the year. It attains a length of about 5 cm (2 in), and is distinguished from all other *Nothobranchius* species by its typical coloration, which resembles that of *Cynopocichus ladigeni*, which inhabits the same biotope. The colour of males is steel blue with red reticulation. The caudal peduncle and unpaired fins are striped with brown, while the dorsal and anal are bordered with white.

The water in the type locality was slightly acid with a pH of 5.8-6.4, with a temperature varying between 28 and 31°C (82-88°F); it was also totally soft. In the aquarium males grow to about 5cm., while females remain appreciably smaller. According to Mrs Korthaus, these fishes attain a smaller size in their natural habitat.

Aquarium maintenance

These fishes can be maintained in small to medium-sized tanks. They are generally undemanding, as long as the water is not hard, and thrive in a well-planted tank with a soft substrate.

They are peaceful, though males sometimes squabble with each other, and females are continually driven. Other small fishes kept with them are ignored.

Water temperature should not be raised unnecessarily, except at spawning time. Like other members of its genus, *N. korthausae* is not long-lived, and high temperatures will shorten its already brief lifespan even further.

Young grow rapidly and have a requirement for feeding in line with this growth. Adult fishes, like other members of the genus, often fall victim to fish tuberculosis and *Oodinium*.

Breeding

Breeding behaviour is almost identical to that of the Golden Pheasant Gularis (*Aphyosemion joesefi*). The female allows the male to lead her to the spawning site, or



Adult male.



As the fish press together, they point upwards.



In this shot, the dorsal of the male is clearly visible; his anal fin is also just about visible underneath the female.



During spawning, the female forms a funnel with her anal, and the egg slides through this.

(sometimes) she seeks out the chosen spot herself, closely followed by the male.

There is, however, a difference in the spawning act itself — when compared to the Gularis; the male not only lays his large dorsal fin across the back of the female, but also extends his anal, which is almost as large, round her belly. Their bodies curve in an S-shape; the female then folds her anal into a funnel and pushes this into the substrate. At this point, both fishes are pointing upwards and eject eggs and sperm simultaneously. The male then seeks to push

the egg into the substrate with a beat of his tail, and the pair fall apart.

The eggs are laid singly at each spawning movement. In most cases, the breeding fishes do not eat their eggs, and can be left in the spawning tank for a few days.

A small tank (10 litres — c2.2 gals) is adequate for spawning and a variety of spawning substrates may be used — peat, detritus, fine sand, small-leaved plants — even the bare tank bottom. The eggs may even be laid loose in the corners of the tank. The eggs have an average size of 1 mm, and

their development may be continuous or discontinuous. If kept in water, they will develop continuously for 18-25 days at a temperature of 25°C (77°F). If they are kept in damp peat, the development is not continuous and lasts 6-8 weeks. In the latter case, the fry are visibly stronger and livelier. Water hardness is apparently unimportant. It may vary between 1 and 15 degrees without noticeably affecting adults, eggs, or embryos.

Several pairs can be put down at the same time, but it is better to have a single male and 2-3 females. If the fishes lay their eggs in sand, on plants, or loose, they can be left where they are, or be sucked out via a glass tube and put in damp peat.

If they are laid in peat, and I wish development to be discontinuous, then I carefully siphon off the water from the spawning tank, put the peat into a linen cloth and carefully squeeze the water out, leaving the peat to dry out slightly, and then putting it in a plastic bag with a date label for 4-6 weeks' time.

After this, I empty the entire contents of the bag into an empty all-glass tank and wet the peat with soft water at a temperature of 25°C (77°F). After a few hours, the eggs hatch.

Rearing the fry is relatively easy; from the outset, they can take Brine Shrimp (*Artemia salina*), and as they are sexually mature after only three months, they must be fed generously.

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Second Aquatics Trade Conference at Sparsholt College

Held on 16 and 17 July 1990 at Sparsholt College near Winchester, this Trade Conference is now a regular feature in the aquatic trade's calendar. Over 60 delegates representing manufacturers, wholesale and retail outlets, researchers and, even, some hobbyists, attended the College. Some stayed overnight at the new (opened by the Princess Royal last October) student quarters.

Lectures were given on a range of subjects, but the main interest was the potential of North American fishes as cold-water ornamentals. The world authority on this subject is Dr Robert Goldstein, an environmental consultant (and author of many books and articles on fish) at Raleigh in North Caro-



Dr Robert Goldstein whose visit was sponsored by 'Aquarian', examining a ray at Portsmouth Sea Life Centre during one of the trips organised as part of the Sparsholt conference.

lina. 'Aquarian' sponsored the visit by Dr Goldstein and his wife and arranged for him to bring live examples of the fish from the USA.

Visits were also included in the programme to a selection of aquatic places such as the Sea Life Centre, Portsmouth. A champagne reception (courtesy of Tetra) was given in the even-

ing of the first day, followed by a five-course dinner and cabaret by the comedian Shep Wooley.

The meeting commenced on the 16th with a welcome address by Dr Len Norman, Principal of the College, who greeted everyone "from all walks of aquatic life". He also introduced the chairperson for the day, John Branford, Head of the Fish, Game and Wildlife Management Department of the College. The chair on the second day was taken by Aquarian's Dr David Ford, replacing *A & P* editor John Dawes who had been taken ill shortly before the Conference.

The packed programme of lectures, discussions and trips was well received by those who attended the conference. A copy of the proceedings may be obtained by contacting Jane Lloyd at Sparsholt College, Sparsholt, Hants, SO21 NF.

The dates for the 1991 conference are: 15-16 July 1991.

Cichlid Book Clarification

The June 1990 edition of *Aquarist & Pondkeeper* featured a review of a translation of Staack & Linke, *Amerikanische Cichliden I - Kleine Buntbarsche*, recently made available from the British Cichlid Association.

Unfortunately, the author of the review omitted to point out that, for copyright reasons, this translation is available only as a companion volume to the original book, published by Tetra. It can be supplied only to persons also ordering the original, or to those who can prove that they have already purchased the original.

The British Cichlid Association wish to extend their apologies to Tetra for this omission, and to thank them for drawing their attention to the error.

Aquaria and Watergardens '91 (Advance News)

Following the success of *Aquaria and Watergardens '90*, the organisers confirm that next year's show will be held in Hall

6 of the National Exhibition Centre, Birmingham, on Saturday 15 and Sunday 16 June 1991.

Despite the lack of fish on sale, which was due to circumstance, rather than by design, many of the over 12,000 visitors went away very satisfied. The trade stands all reported good business and some declared it their best-ever exhibition, while others were extremely satisfied by the trade contacts they made.

The organisers have several new ideas for developing the exhibition in 1991, although the much-used crèche and firm favourites, such as the lectures and aquarium demonstrations, will remain. The structure of the trade pavilion, which this year comprised double-fronted stands will not appear. However, all traders will have the option of having an office area created within their stand.

All stallholders have expressed great satisfaction with the exhibition and the venue and have indicated that they plan to return - and in force - for next year.

For a free copy of the 1990 showguide, rates, floorplan and stand sizes for 1991, contact the Organisers of *Aquaria and Watergardens* at:

Concept Conferences and Exhibitions Limited, 27 Brandreth Avenue, Dunstable, Bedfordshire, LU5 4JP. Tel: 0582 601456. Fax: 0582 609892.

Supreme Festival of Fishkeeping (10-11 November 1990)

The Festival, which is being jointly organised by *Interpet Ltd* and *The Federation of British Aquatic Societies*, is developing a truly international flavour. Keeping the theme of an educational and social event, the Festival aims to provide an enjoyable weekend, where it will be possible to learn about numerous facets of the fascinating hobby of fishkeeping, and enjoy the biggest social event ever organised for trade and hobby combined. *The Festival will not feature retail selling of*

fish or equipment, but books and magazines, along with specialist society publications, will be on sale.

Bookings for the weekend break, a fantastic bargain for only £45, are filling rapidly, and early booking is highly recommended. The weekend break price includes:

Accommodation and meals at Pontins Holiday Centre:

Friday night: Accommodation only, meal extra.

Saturday: Breakfast, dinner and cabaret, overnight accommodation.

Sunday: Breakfast.

Admission to show and lectures:

Admission to the show on both days is included. A full lecture programme has been arranged, with seating capacity of around 200. All lectures are included in the weekend price. We cannot, however, guarantee lecture places for everybody, so lectures will be on a 'first come' basis. A 'mini' lecture room will also be in operation, with seating for around 50.

Lecturers already booked:

Dr Joanne Norton (USA): Founder member of the American Livebearer Association. Expert on Angel Fish and one of the world's leading authorities on Mollies. Lectures planned on livebearers and Angel Fish.

Harro Hieronimus (Germany): President, International Rainbow Group. A leading light in the world of Rainbowfish. Lectures planned on Rainbowfish and Catfish.

John Dawes: Editor of *Aquarist & Pondkeeper*. Well-known for his excellent presentations on the Amazon and Livebearers.

Dr David Ford: Senior Consultant to 'Aquarian', regarded among the trade and hobby as a 'statesman' of the fishkeeping world.

Tony West: Chairman of the The British Koi Keepers' Society. One of the UK's foremost lecturers on Koi, presenting the fascinating world of these wonderful fish.

Adrian Exell: Head of Aquatic Product Development for *Interpet*. Specialist in fish nutrition and water chemistry.

Dick Mills: Author, Secretary of the Federation of British

Aquatic Societies and regular *A & P* contributor. Presents a very useful demonstration on setting up the aquarium.

For those people who may be classified in the 'Fish Widow' department, Dave Keeley of Underworld Products is sponsoring TWO coaches. One trip is planned each day to local scenic or historic places. These trips are also included in the cost of the weekend break and are not open to day visitors. However, on a 'first come, first served' basis, applications to go on the trips must be made only on Saturday 10 November from 9 am.

A disco is also planned for the

night of Friday 9 and after the dinner, cabaret on Saturday 10 November.

Many of the country's leading aquatic companies and fishkeeping organisations will be in attendance and an enjoyable weekend promises to be had by all.

Day visitors will be admitted on both days of the Festival at a cost of £1.50 per adult, 50p per child or senior citizen.

For further details contact:

Mike Clarke,
Interpet Ltd,
Vincent Lane,
Dorking,
Surrey, RH4 3YX.
Tel: 0306 881033.

Aquarium Evening at London Zoo

The staff of the Aquarium at London Zoo have organised another of their extremely popular 'Aquarium Evenings' for Thursday 20 September. The programme is as follows:

6.00 Arrive at the Meeting Rooms of the Zoological Society, Regent's Park.

6.15 Illustrated talk by Dr David Pool of the Tetra Information Centre, on 'Understanding Fish Behaviour'.

6.50 Illustrated talk by Dr Chris Andrews of London Zoo on 'Sharks, Piranhas and a turtle called "Raphael" '.

7.30 Aquarium tour, with wine, soft drinks and a supper buffet amid 3,000

fish, amphibians and aquatic invertebrates. A chance to have a look behind-the-scenes, and meet the keepers of the London Zoo Aquarium.

9.15 Free prize draw.

9.30 Close.

Tickets: £8.50 adults, £4 children (under 16), with a reduction for Lifewatch members (London Zoo membership scheme). Please make cheques payable to 'Zoo Operations Ltd', London Zoo is just ten minutes' walk from Camden Town tube station (Northern Line). There will be ample free parking after 6 pm. Guests arriving after 2 pm can gain entry to the Zoo at no extra charge. (Animal Houses close at 5.30 pm.)

Information & Bookings: Press Office, London Zoo, Regent's Park, London, NW1 4RY (Tel 071 722 3333, Fax 071 483 4436).



American Bullfrog — just one of numerous exhibits awaiting visitors to London Zoo Aquarium on 20 September.

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Fig. 1



Fig. 2



Fig. 3

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Spotlight on Killifish



A fully mature male resplendent in his barred blue spawning coloration. Females are relatively drab compared to males.

URUGUAYAN PEARL CHALLENGE

Jaroslav Kadler describes his experiences with a beautiful, but challenging, almost-temperate killifish
(Photographs by the author, text translated by Mary Bailey)

The South American country of Uruguay is the home of several species of killifish, which originate from two areas in particular. The first of these is on the Atlantic coast, eastwards from the border between the states of Roche and Velazquez; the second is the marshes of the River Uruguay, to the north of Rio de la Plata. Adloff's Killifish (*Cynolebias adloffi*) comes from the first of these, from the marshes between La Coronilla and Chuy, some 10-15 km from the border between Uruguay and Brazil. Specimens currently being bred in aquaria are derived from this population.

The description of this species by Ahl in 1922 was based on material from the region of Porto Alegre and from the Atlantic coast of the south-eastern tip of Brazil.

HABITAT

Coastal marshes in this part of South America are characterised by a reduction in water levels during the dry season, without totally drying up. For this reason, specimens from two generations can be caught there (ie) juveniles and adults from the previous rainy season. In the same marshes as *C. adloffi* are found the killies *Cynolebias lateolaminulatus* (Vaz-Ferreira, Sierra-de-Soriano & Scaglia-de-Paulete 1964) and *Cynolebias wolterstorffi*

(Ahl 1924) as well as the catfish *Callichthys callichthys*, and the livebearers *Gnasterodon decemmaculatus*, and *Jenynsia* species. The climatic conditions in this region are significantly affected by the proximity of the Atlantic Ocean.

The summer temperature fluctuates between 21-24° (70-75°F), and winter temperature between 10-16°C (50-61°F). Total rainfall is around 1100 mm (43in) per annum, which is similar to the level in central Europe, with the major part falling in April and May, then again in autumn and winter. The other months have appreciably less precipitation.

The majority of Uruguayan killies are hatched at the beginning of the autumn rainy season when the temperature is in the 10-16°C (50-61°F) range. In general, eggs hatched during the short spring rains do not develop. *C. adloffi* is one of those killifish species which have been known for a relatively long time — more than 50 years — but, in my opinion, it cannot be classed as a commonly bred species. I think that this has nothing to do with its form and colour, but rather because there are some problems associated with breeding it.

DESCRIPTION

Males as well as females have a carp-

shaped body, strongly compressed laterally. In nature males and females both attain a length of 5-5.5cm (2-2.2in) — 4-4.5cm (1.6-1.8in) in the aquarium. The fact that females attain the same length as males is not normal for the *Cynolebias* genus.

The base colour of males is blue-green, shading to brown on the back. All the unpaired fins, the pelvics (ventrals), and the gill-covers are the same colour as the flanks. The pectorals are transparent. In life, males have a few light spots on the dorsal and anal. Males also have a striking pattern of dark vertical stripes on the sides, the first of these passing through the eye. The number of stripes varies between 10 and 14; some are incomplete, and some broken.

The base colour of females is yellow-brown violet, with a faint blue-green iridescence visible only on the gill covers, dorsal, and anal. All fins are transparent. There are dark vertical stripes on the posterior body; the belly is a clear pale pink.

REQUIREMENTS FOR SUCCESSFUL BREEDING

This fish does not require much tank space. For a breeding trio of a male and two females an aquarium with a capacity of 20-50 litres (4.4-11gal) is adequate. Although they can be bred in a smaller container, even with

a good feeding regime, they will not attain the sizes mentioned above. Males will not tolerate each other, and so must be put down to breed separately.

For breeding and rearing, the water quality should ideally fall within the following parameters: 2-15 DH, pH 5.2-7.0. The wide range of hardness and pH which these fish will tolerate derives from the fact that, in their natural habitat, water quality changes dramatically with the drying up of the marshes, and the fishes become acclimatised to major changes of environment.

As with almost all its relatives, *C. adloffi* is tolerant of high levels of nitrate and nitrite, though in the interests of the health and also the vitality of the fishes, I feel that 50% of the tank water should be changed for fresh every 10-20 days.

The following two factors are particularly important for successful breeding:

1 Temperature

In general, this fish will tolerate temperatures in the range 10-30°C (50-86°F) but the average temperature for breeding and rearing should be about 20°C (68°F), though I do not recommend maintaining a constant temperature for a long time, eg by use of a thermostat. In the natural state, there are variations between day and night, and these variations may include long periods at 10°C (50°F). These variations are natural and easily achieved, and have a positive effect on the health and vitality of the fishes.

2 Food

C. adloffi requires a variety of livefoods, and its appetite, especially when coming into breeding condition, is rather large. It can be fed on *Tubifex*, small or chopped earthworms, any aquatic insect larvae, *Cyclops* and *Daphnia*. Egg production is markedly higher when *Tubifex* or earthworms predominate in the diet. In my experience, these fishes will not take dried or processed foods.

The breeding tank should have a dark — ideally peat — substrate, and the plants should not be rooted in this substrate. I have found *Microseris peropsis* the best for this purpose, as it does very well in the acid water produced by the presence of peat. An attractive background can be created using the dried stems of yellow reeds which contrast well with the colour of the fishes.

PERSONAL EXPERIENCES

I always use fibrous peat as a substrate. As *C. adloffi* spawns on the surface of the substrate, as well as 'burrowing' into it, the layer should not be too deep — 4-6cm (1.6-2.4in) is adequate. I put the peat in a glass dish with a diameter of 10-15cm (4-6in). Water quality and tank arrangement should be appropriate for breeding. If we wish the fishes to spawn intensively, then the temperature should be between 22 and 25°C (71.5-77°F); outside this range, according to my observations, spawning activity drops off rapidly. Naturally, the fishes must be well fed while breeding.

The spawning act consists of a brief — only a few seconds long — display by the male, with unpaired fins outspread; then the female swims parallel to the male, and both

disappear into the peat. As I have already stated, sometimes the spawning act takes place on the surface of the peat, so that the backs of the two fishes are quite visible. After spawning, the female emerges first followed, 5-30 seconds later, by the male. There is then a short pause before the spawning ritual starts again.

Adloff's Killifish belongs to the relatively productive members of the *Cynolebias* genus; a good-quality female is capable of producing 100 eggs in the course of a week, but a more average performance would be 40 eggs per week.

After the end of the spawning period — 10-30 days — I separate the sexes; the female, in particular, does not object. I partially dry the peat containing the eggs and put it in a polythene bag.

The author of publication 1 (see References) quotes three months as the development time of the eggs of this species. But he does not mention the relevant storage temperature. From my two years of experience with *C. adloffi*, I can state that the development time of embryos in 'dry' conditions is fundamentally affected by the average temperature. If we take the development period in days as 'D', and the average temperature during development as 'T', then, according to my researches, we get:

$$T \times D = 2,600$$

Thus, with an average storage temperature of 20°C (68°F), I moisten the peat after approximately 130 days; at an average temperature of 26°C (79°F) (eg during the summer months) the embryos are ready to hatch after 100 days. It does not matter if the development period is increased by 10-20%. For moistening, I use moderately hard water with a neutral pH, at a temperature of 15-16°C (59-61°F) I aerate the container so that eggs and peat are stirred up, and I add fine food, ideally *Cyclops* nauplii.

But my hatching of *C. adloffi* has never been particularly successful. If I managed to hatch 20% of the eggs then I considered myself successful. Why some killies, eg *C. trilineatus*, *C. constanciae*, are easy to breed, and others, unfortunately including *C. adloffi*, can be bred only with great difficulty, is



A pair spawning on the surface of the peat substratum.



The male surfacing after a 'sub-stratum' spawning sequence.

something I cannot explain.

The fry initially measure 5.5mm (0.2in) and are light brown. I would class their development, as *Cynolebias* go, as medium fast — at the end of the first week they measure 8mm (0.3in) and they attain a length of 10mm (0.4in) at 14 days old. For optimal growth, it is necessary to ensure food is almost continuously available; ie food should be added continuously, not just once or twice a day. Initially, the fry can be fed on *Cyclops* nauplii or *Artemia* nauplii, but after only a few days, they will be able to take small *Cyclops* and Grindal worms.

It is possible to sex the young fish by sexual dichromatism at about six weeks of age, and the earliest breeding attempt I have observed was at two months. I had no problems with skewed sex ratios among the fry I bred, males and females being produced in the ratio 1:1.

Adloff's Killie reaches maximum size after 15-18 weeks, and has a lifespan of about a year.

SUMMARY

C. adloffi is one of the least commonly bred South American killies. In my view, this is because of the difficulties in development and hatching. The care of the fry, and eventual spawning upon adulthood, however, present difficulties only for the absolute beginner.

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Herpetology matters



By Julian Sims

RATTLESNAKE BUTCHERY

North American rattlesnakes are seriously threatened throughout parts of the southern United States, particularly in Georgia, Oklahoma and Texas. The main cause of this decline are 'Rattlesnake Round-ups'.

These began some sixty years ago as an extermination exercise by cattle ranchers who regarded rattlesnakes as a threat to their livestock.

Nowadays, the 'annual spring round-up' is something of a misnomer because the collection of rattlesnakes might begin in the previous autumn. A variety of techniques are used to collect rattlesnakes, but one method which is particularly damaging to the environment is to pour petrol into the burrows where rattlesnakes have accumulated to hibernate through the winter. Toxic petrol fumes kill some snakes and drive others out of their refuge. This is a non-selective method of capture which also results in the deaths of many other species of wildlife — including other types of vertebrate and many invertebrates.

The rattlesnakes which are collected are deposited into sacks or jerry cans. The density of reptiles collected in this way might be so high that many die through suffocation or from injuries inflicted during their capture. The survivors are sel-

dom fed or watered, so others die through neglect between the time of capture and the time of the main round-up or hunt in the following spring.

March is the time when the organisers of 'round-ups' start to publicise their events in newspapers and on local radio. Round-ups are big business — several thousand dollars can be raised at these events which last over a weekend.

Entry fees are charged for spectators to watch snakes killed in a most cruel way. One method is to cut the reptile's head off. The live heads — fully conscious — are put into tanks of cold water which prolongs life in a most agonising way. The body of the snake is gutted and skinned, and the flesh is cooked, barbecue-style. The skins are used to make sheaths for Bowie-knives, belts and purses.

Public round-ups might also be organised. During these, 'off-road' vehicles are driven around causing more damage to the environment inhabited by rattlesnakes. Stones and rocks are lifted but seldom replaced. Again, invertebrates suffer — this time from the loss of their cover and the evaporation of moisture which had accumulated under the stones. Any snakes are collected — young and old rattlesnakes — together with non-venomous species. The damage to the reptile population is catastrophic. Indeed, it is now difficult to find large examples of adult rattlesnakes which were common only a few years ago. Ironically, without these predators, there is less control of the small rodent population. This has obvious disadvantages to the farmers and their crops: more rats and mice will eat more of their stored produce.

A strong international protest is being organised by the Trust for the Protection of Reptiles and the World Society for the Protection of Animals to highlight the senseless cruelty involved in 'rattlesnake round-ups'. If readers of *Aquarist & Pondkeeper* took part in this protest, another positive step would be achieved in outlawing these events. Please write a message on a postcard to the effect:

I/we wish to protest at the cruel and barbaric practice of RATTLESNAKE ROUND-UPS. These events can only tarnish the reputation of Texas. Please show respect for the natural environment and the animals and plants which live there and STOP THESE ROUND-UPS NOW.

Signed

Town with Country

As most of the 'round-ups' take place in the State of Texas, address your postcards to:

William P Clement, Jr,
Governor of Texas,
State Capitol,
Austin,
Texas 76711
U.S.A.

HUMIDITY AND HATCHLING SIZE

The eggs of Blanding's Terrapin (*Emydoidea blandingii*) from North America have been studied at Colorado State University. Water exchange between incubating eggs and the surrounding substrate has been investigated. The eggs of Blanding's Terrapin are mid-way in structure between the

flexible shelled eggs laid by female Painted Terrapins (*Chrysemys picta*) and the rigid eggs laid by female Softshell Terrapins (*Trionyx spiniferus*).

Reptilian eggs with flexible shells can absorb water during incubation, enabling the developing embryo to use all of the food reserves from the yolk and grow larger before hatching.

Water uptake by eggs with a rigid calcareous shell is generally much lower. However, water loss from these eggs is also comparatively low.

The research was conducted using freshly collected gravid female Blanding's Terrapins from the Valentine National Wildlife Refuge in Nebraska. The females were injected with synthetic oxytocin, a hormone



A hatchling Hermann's Tortoise (*Testudo hermanni*) emerging from an egg with a comparatively thick outermost calcareous layer.

which induces egg release.

The eggs were incubated at 29°C (84°F) in sealed boxes containing vermiculite moistened with different amounts of distilled water.

Blanding's Terrapin eggs incubated on wet or moist vermiculite increased in mass during the first half of the incubation period and decreased in mass during the second half. Their mass just before hatching was slightly lower than at the time they were laid. Eggs incubated on dry vermiculite, or on platforms above the vermiculite, decreased in mass throughout the incubation. The rate of loss speeded up during the second half of the incubation period.

The size of Blanding's hatchlings did not vary as much with water availability as do the hatchlings of species with flexible shells. It was therefore concluded that the embryos of species with rigid egg shells were relatively insensitive to the availability of water from the surroundings where they are incubated.

Conversely, the embryos developing inside eggs with flexible shells are highly sensi-

tive to water availability. This fact must be borne in mind when breeding chelonia in captivity. Eggs with flexible shells must be incubated in a medium which is frequently moistened with water. A good medium to use is vermiculite. Water enters the egg and allows the developing embryo to metabolise efficiently and grow. If flexible shelled eggs are incubated in a dry medium, then they will lose water and become 'dented'. In extreme cases of water loss, they crumple up and the shell splits where it folds over.

All adult terrapins and the hatchlings from this research project were released in the Valentine National Wildlife Refuge after the study had finished.

FURTHER FIELD GUIDES

Following on from last month, here is a further selection of field guides to take with you on your holidays to distant lands.

1] *Tortoises of Australia* by John Cann is published in a series of pocket books by Angus & Robertson. The tortoises (mostly

snake-necked terrapins) are easily identified with the help of the 92 colour photographs in the book. These photographs also illustrate natural habitats colonised by chelonia, their chief predators — crocodiles and humans, and comparative egg sizes. John Cann includes a chapter about keeping terrapins in captivity. There are three diagrams showing possible arrangements of aquaria — with ramps and basking platforms. Information is also given about preventing common ailments, such as respiratory infections, and 'soft shell' — a condition caused by mineral and vitamin deficiencies in the diet.

2] Undoubtedly, the most comprehensive single book describing the herpetofauna of Australia is *Reptiles and Amphibians of Australia* (the 1986 revised and expanded edition) by Harold G. Cogger, published by Reed. Although several other books describing Australian reptiles and frogs have recently been published, or are due to be published later in 1990, this book by Harold Cogger is 'the classic' against which all other publications

will be judged. This definitive work contains 230 colour photographs and more than 600 in black and white. Outline distribution maps are also included. There is, however, one disadvantage to the traveller — this book is large, containing 688 pages. It might, therefore, be rated as 'excess baggage' at the airport!

3] *New Zealand Amphibians and Reptiles* by Joan Robb, published by Collins. This informative book traces the origins of New Zealand's herpetofauna. Two chapters deal with introductions — including two species of tree frog from Australia and Red-eared Terrapins from the USA. Identification of the native amphibians and reptiles is helped by 142 colour photographs, together with maps of frog and reptile distribution.

4] A second book from the Auckland office of the same publisher — *Collins Handguide to the Frogs and Reptiles of New Zealand* by B. Gill — is also available. This handguide is considerably cheaper than the earlier (and larger) book about New Zealand's amphibians and reptiles.

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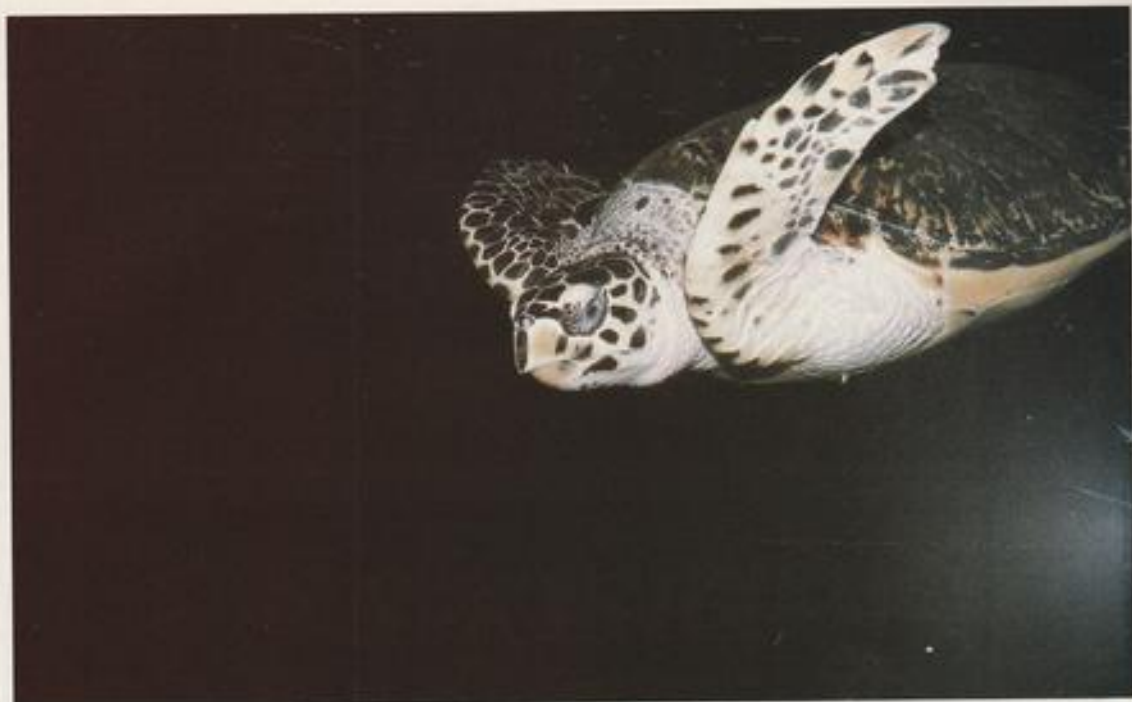
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One of London Zoo's Hawksbill Turtles — plans are underway to repatriate the Zoo's specimens.

STRANDLINE TURTLES

Dr Chris Andrews of London Zoo Aquarium reports on some of this year's strandings and on the Zoo's efforts to return them to the wild.

(Photographs by the author)

The first three months of 1990 saw an unusual number of live turtle strandings around the south and west shores of England and Ireland. About ten turtles, mostly young Loggerheads (*Caretta caretta*) were washed up, perhaps carried to these shores from the Caribbean or the Bay of Biscay by unusual prevailing winds or ocean currents (our chilly North Atlantic waters are a little too cold for their long-term survival and breeding).

Tortoise, terrapin, or turtle?

Turtles, tortoises and terrapins are all members of the Order Chelonia, with some 250 species inhabiting a wide range of tropical and temperate countries, both on land and water. Generally speaking, tortoises live on land, terrapins live in fresh water and turtles live in sea water — unless you come from North America, when you may call them all turtles! A further distinction here at London Zoo, is that, while tortoises and terrapins can be found in the Reptile House, our marine turtles are exhibited in the Aquarium.

Marine turtles are becoming increasingly rare in the wild as a result of hunting and disturbance and destruction of their nesting beaches. Marine pollution, in particular the disposal of plastics, is also causing serious problems. For example, marine turtles can mistake plastic bags for jellyfish (a common

prey item in some species) and, if eaten, these bags can block the intestines, eventually causing the turtle's death. Entanglement in other marine debris, especially discarded fishing nets, is an additional danger.



A debilitated Loggerhead Turtle on its arrival at London Zoo.

Repatriated turtles

Although they adapt well to life in an aquarium (thriving in warm, clean salt water, on a diet of chopped squid and chopped whole fish), turtles are rather difficult to breed. Therefore, it was decided to return the stranded Loggerhead Turtles mentioned above to their natural home before they became too accustomed to life in captivity. The latest batch of five young Loggerheads left London Zoo via Heathrow

Airport en route for Portugal and the Azores on 4 May. Four of these turtles had been cared for at various locations around the country, and then brought together at London Zoo immediately prior to their flight home. The fifth turtle had been at London Zoo since February, when it was brought to us by the RSPCA after being washed up exhausted on a beach near Worthing, in Sussex. Aquarium staff and the Veterinary Department carefully brought it back to health for its eventual release.

We are now investigating the feasibility of sending our three Hawksbill Turtles back to the wild as they have grown considerably since they were presented to the Zoo some years ago. One potential problem is that they may have grown a little too used to their care-free life in the Aquarium to adjust easily to life in the wild again. In the meantime, these turtles can usually be seen on display in the Seawater Hall.

First Aid

What about first aid for stranded turtles? Anyone finding a stranding should beware that even a small specimen can give a very nasty bite. The best thing to do is to leave a small turtle in a secure and, preferably sheltered, position, perhaps dampened with a little clean sea water, and then contact the RSPCA or London Zoo immediately. Large turtles are best left in the sea as they can suffer from respiratory distress and even heart failure if left on land for long periods.

At the Zoo, we are interested in sightings of live turtles around British Shores (five of the world's seven species of sea turtles occur here from time to time). Please send your information, including size of turtle, description, location and date of observation, to the Aquarium at London Zoo via the A&P office. We will ensure that this information is passed on to the Natural History Museum who keep records of all turtle sightings around the U.K.



Two of the Loggerhead 'strandings' just prior to packing for repatriation (the seaweed is used as packing material).

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Adult female Water Dragons exhibit smaller crest spines than males.

THE LADY AND THE DRAGONS

Faced with the challenge of keeping up with her husband's enthusiasm for reptiles, Valerie Davies decided to have a go at Chinese Water Dragons . . . and got hooked!

(Photographs by the author)

This will be a familiar story to many aquarists' wives: a husband with an all-consuming hobby which just seems to increase and increase. This was the position I was in, with a fanatical herpetologist, and for a long time, while finding the hobby interesting and assisting with preparation of food, etc, the creatures were always his.

Some time ago, however, we boarded various reptiles for a friend who would be out of the country for a while. One creature, in particular, caught my attention — a baby Chinese Water Dragon (*Physignathus cocincinus*). This specimen was weak and found eating difficult. Realising that it needed a great deal of time and attention, I was asked to make it my special concern.

The dragon was so weak it would not chase food items, but readily accepted waxworms, crickets, etc, from forceps or fingers. Several weeks later, and much to its owner's surprise, it was thriving and growing. This was the beginning. I was well and truly hooked, and I began to understand the fascination which had gripped my husband for so many years. Soon after, I acquired a pair of captive-bred baby Water Dragons for myself.

DESCRIPTION

The Chinese Water Dragon is a fairly large, semi-aquatic lizard native to Eastern Thailand and Indo-China. An adult specimen is about 75cm (30in) long, although approximately two-thirds of this is tail. These lizards are a bright green with darker rings on the tail.

The body scales are very fine and give the look and feel of smooth fabric. Larger scales around the bottom jaw extend down to the throat. These tend to be lighter, some having a pinkish coloration in mature specimens. The nape of the neck is arched and a crest of soft spines starts on this arch, extending down the back and along the tail. An adult male has a larger arch on the nape, larger spines and also heavy jowls.

Dragons' legs, especially the hind ones, are muscular, something which is necessary for their arboreal way of life. Young dragons are particularly attractive since they have, in addition, a bluish hue on the shoulders and light green diagonal body stripes, both of which disappear with age. The overall impression of a healthy, well-fed dragon is one of strength and agility.

HOUSING

Bearing in mind the future size my dragons would grow to, I realised a large vivarium was necessary. Initially, I decided to house them in a smaller unit so that they could be easily handled and fed, their feeding habits and growth monitored and recorded, and their behaviour observed.

When I acquired the dragons at the age of two and a half months, their snout to vent lengths (SVL) were 5.5 cm and 6cm (c

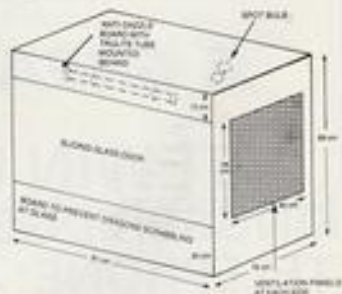


DIAGRAM OF VIVARIUM FOR WATER DRAGONS (see text for more details)

2.2-2.4in) respectively. They were housed in a 60cm (24in) x 38cm (15in) x 30cm (12in) vivarium. For ease of cleaning, newspaper was used as a substrate. Cork bark and several branches were placed to allow climbing and basking in the hot spot which was created by using a thermostatically controlled spot bulb at one end. A cooler area with damp Sphagnum Moss and cork bark was placed in the rest of the vivarium. Trailing plastic plants were included to provide some concealment. A small dish of water for bathing, a dish of drinking water and a third dish containing small pieces of cuttlebone completed the set-up. The vivarium was sprayed, a daily activity which the dragons still enjoy.

Meanwhile, preparations were in hand for the construction of their next unit. A wooden vivarium was built measuring 90cm (36in) x 75cm (30in) x 69cm (27in) high. I decided to use wood after observing many specimens in pet shops which seemed to spend all day trying to get through the glass, an activity which resulted in damaged snouts and mouths. These were probably wild-caught specimens which could not adapt to, or accept, the idea of a transparent barrier.

The front of my vivarium, therefore, was a sliding glass door which, in order to avoid the above problem, ensured a good depth of wood between the bottom of the vivarium and the glass front. The floor of the vivarium was constructed from plastic-faced chipboard and covered with a sheet of tough polythene which extended for several centimetres up the sides — thus giving a moisture-proof base.

A layer of moistened peat of about 5-6cm (2-2.4in) depth was placed on the polythene, followed by a layer of Sphagnum Moss. Space was made for a pool (cat litter tray) 45cm (18in) x 30cm (12in) x 10cm (4in). The dragons spend some time in this pool, especially when sloughing. I have noticed that both dragons have always defecated in the pool which, at least, keeps the moss clean! The pool is changed at least once a day. It can be exasperating when, having just changed the water, the dragons 'queue up', then jump in and defecate.

A number of sturdy branches were placed around the vivarium for basking and to maximise the space. Potted houseplants such as *Philodendron*, *Syngonium*, *Fatshedera*, etc. were buried in the substrate. Not only does this look more attractive, but it also provides the dragons with concealment. Some plants, however, cannot withstand the dragons' claws which punch tiny holes in thin leaves. Although the plants were initially placed in the vivarium in pots, they are now firmly rooted in the substrate which has not needed changing due to the 'convenient' habits of these lizards.

The temperature of the vivarium is maintained at 29°C (84°F) during the day, falling to 18°C (65°F) at night. Over one basking area, there is a thermostatically controlled spot bulb and over the other, is a Trulite fluorescent tube. The back of the cage is cooler and not so brightly lit.

Small pieces of cuttlebone are always

available in a dish and a separate bowl of drinking water provided, although the dragons tend to drink out of the pond.

Water Dragons need a humid atmosphere so the whole vivarium is sprayed daily. Despite their size and bulk, these creatures move nimbly around the vivarium without upsetting the decorations. Only some of the moss is disturbed and scratched up at night when they bury themselves in it, to rise the following morning like a pair of prehistoric monsters stirring from the depths.



An adult male Chinese Water Dragon. Note the large spines on the crest.

FEEDING

From the very beginning, my Water Dragons have been easy to feed, but, for me, it has meant that I had to overcome my original reticence at handling certain livefoods. As babies their diet consisted mainly of vitamin-dusted crickets, small locusts, waxworms and mealworms. In addition, they readily accepted common earthworm (*Laebricus*) and two types of small slug (one greyish-white, the other a light brown). Brandling worms and other species of slugs are not used.

As they have grown, their appetites have increased accordingly, and their original diet needs to be supplemented with larger food items — huge earthworms, 'giant' mealworms (*Morios*), pinkies and, occasionally, garden and edible snails if the shell is broken first.

Some books claim that dragons will accept tinned dog/cat food and fruit, but mine have never shown any interest in these foods.



This is a juvenile Chinese Water Dragon — aged 12 months.

Although using Trulite as a precaution against rickets, my specimens are dosed once a month with Vitamin D3. The dragons' appetites vary from day to day, with some days as many as five very large earthworms being taken by each specimen.

This menu seems to have agreed with them, since my records show that during their first 6 months with me, growth averaged 1.2cm (c 0.5in) per month (SVL). There has been a comparative slowing down (after a further 6 months growth averaged 1cm (0.4in) [SVL] per month) in increase in length since girth and general bulk also begin to increase.

At the moment, after 18 months, the dragons measure 19cm (7.5in) and 21cm (c 8.3in) (SVL), total lengths 53cm (c 20.1in) and 64cm (25.2in) respectively. They are fine specimens with good girth and powerful, well-muscled legs and tail. They have still some growing to do so the vivarium will be extended upwards with the provision of more branches and plants.

From the beginning the dragons have been hand-fed, first with forceps for tiny food items, and then from fingers. At feeding time, they jump down from the branches and run to the front of the vivarium eagerly awaiting the day's 'goodies'. For such large lizards, they are careful when taking food from fingers. Small food items such as crickets and waxworms are picked from the fingers by protruding the tongue, while larger items are seized in the jaws and shaken.

Because of the hand-feeding and daily handling, my dragons have become very tame. If, however, they feel a little insecure when being picked up, they tend to scrabble and their sharp claws can leave scratches similar to those of a cat. A wild-caught dragon could also inflict a painful bite since their jaws are very strong.

A pecking order seems to have been established between my two specimens. The slightly larger dragon often warns the other away with 'handwaving' — raising a forelimb and moving it in a circular motion — accompanied by head-bobbing.

CONCLUSION

Thanks to my dragons, I now have a greater involvement in herpetology with all its ramifications such as cage design and decoration, livefood cultures, etc.

To sum up, if one has sufficient space, Water Dragons make good subjects for captivity. Thankfully, more are now being bred in captivity, which takes the pressure off wild populations. In time I hope to be able to join the ranks of successful breeders of these superb lizards. Already I have increased my own reptile collection when I acquired a pair of Pink-tongued Skinks (*Tilapia gerrardi*) and a pair of Sinaloan Milk Snakes (*Lampropeltis triangulum sinaloae*).

My husband is now asking, "Where will it all end?" So, come on ladies — don't sit there bewailing the fact that your husband spends too much time on his hobby — if you can't beat 'em join 'em. You'll find a fascinating and rewarding time ahead.

Coldwater jottings

Stephen J. Smith

STANDARD A 'WAKIN'ING

I was delighted to hear from Bryan McHugh from Newport, Isle of Wight, in response to an item in *Jottings* about David Silk's appeal for a male Wakin to partner his prize-winning female Wakin, for a programme of selective breeding (see *Coldwater Jottings*: June 1990). Bryan makes a serious point which, hopefully, will prompt some response from Goldfish keepers throughout the fishkeeping world (yes - *AGP* is now read virtually worldwide!).

As a judge, fellow coldwater exhibitor, and breeder hobbyist, he finds it incredible that a non-standard Goldfish variety is being exhibited. Of even greater concern to him is that it is intended to perpetuate the strain. He is concerned that years of selective breeding may be thrown into disarray by the introduction of the Wakin strain.

Bryan continues with an appraisal of Wakin standards: "I have always understood that the Wakin is a result of an indiscriminate crossing of singletail and twintail Goldfish varieties, so what body shape or depth should one expect?"

He asks, "Would it have the body of the Common Goldfish/Bristol Shubunkin or that of a Comet; and what of the finnage - rounded or pointed, or

should the dorsal fin be likened to that of the Comet or the Common Goldfish?"

The caudal fin is also of concern to Bryan, who presents endless permutations and asks, "Which is the optimum to strive for?"

Bryan is also concerned that show standards in general could be eroded by the threat of the Nymph (twintail body/singletail finnage) on the show-bench, "along with every other oddball of uncontrolled breeding".

He concludes, "I firmly believe and recognise the varieties which we have in today's fishkeeping and feel that, as breeders, we should be striving to improve the strains as we know them now by producing a higher percentage of the desired features in each generation. If my remarks create an aWAKINing in the minds of others to rethink the ethics of breeding non-standard varieties then I hope I will have done some good."

I thoroughly appreciate that your heart is in the right place, Bryan, and share your concern about indiscriminate breeding, especially cross-breeding of recognised varieties to form 'new' varieties. However, even the Bristol Shubunkin was a 'new' variety once and is now considered the 'flagship' of British Goldfish breeding, so good luck to those who wish to set new standards by selective breeding of specialist strains.

Don't forget, too, that the vast majority of Goldfish keepers, and fishkeepers in general, are not enthusiasts, but simply require an attractive fish to display in their aquarium or pond. The Wakin is a popular variety partly because it fulfils just such a need, while at the same time presenting its own set of challenges to the serious breeder.

Returning to standards, I would be interested to hear the views of enthusiasts, as well as those with a less intense interest in fishkeeping, and trust that this item can stimulate further constructive debate.

SOCIETY PUBLICITY

Why is it that so many societies go backward in coming forward? Apart from some notable exceptions, coldwater societies seem content to hide their lights under several bushels (yet, are quick to complain when their event, or even their existence, has failed to be acknowledged).

I am continuously asked by hobbyists for information on where they can join a society. It is to the benefit of the hobby in general, and to your own society in particular, that such an interest is encouraged, and *Coldwater Jottings* provides the perfect forum for societies to present themselves and their views and opinions about the hobby.

Even some of the largest organisations appear to have very minimal press relations despite the fact that they are extremely active so, all you show secretaries, PRO's and members, write to *Coldwater Jottings* with information about your society.

SHOW DATE

Two of the notable exceptions referred to above are *GSGB (Goldfish Society of Great Britain)* and *Bristol Aquarists' Society*, who have kindly written to remind me of their respective annual open shows (keep it coming, chaps).

No less than 38 coldwater classes are expected to be on display at Bristol Aquarists' Society Open Show to be held at St Ambrose Church Hall, Whitehall, Bristol on **Saturday 8 September**. Previous years' events have been extremely exciting, and the Bristol society celebrated their Diamond Jubilee last year (see: *Putting on a show in Diamond Style, Aquarist & Pondkeeper*, December 1989), so this event should not be missed.

Equally unmissable is *GSGB's Open Show on Saturday 6 October*, at St Paul's Church Hall, Woodford Bridge, Essex.

Show secretary is Stuart Elton and it's not too late to enter, by applying for a show schedule from Stuart at 57 Drury Road, Colchester, Essex CO2 7UU (I'm sure he would appreciate a stamped self-addressed envelope, too).



The Wakin - a desirable... or an undesirable... variety? Opinions differ.

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LUCKY HORSESHOES

Living fossils, and primitive, they may well be, but, for many people — among them **Dr Gareth Evans** — Horseshoe Crabs hold a very special fascination.
(Photographs by the author)



The Horseshoe Crab, *Limulus polyphemus*, from Mexico — a genuine living fossil.

The idea of an animal which has somehow lived beyond its era is one which many find captivating. The very description 'living fossil' has a romance all of its own, instantly conjuring up images of strange beasts from the age of the dinosaurs and beyond. A number of animals exist which might be considered for such a title. Perhaps crocodiles and their relatives, or possibly turtles and their kin, spring most readily to

contemporaries. Clearly, to achieve this, the creature must be perfectly suited to its environment, but in addition, it needs an element of luck — hence the title of this article.

A number of marine animals are so superbly adapted to their various aquatic lifestyles that they exist today in a form virtually indistinguishable from their prehistoric forebears. The Coelacanth, *Lampris chalumnae*, is one, a living example of the



Underside of a Horseshoe — a complex array of appendages that have served these animals well for around 300 million years.

mind. Certainly they would seem to have the requisite antiquity, and can claim links with some of the most famous of all true fossils.

However, it is the evident 'successfulness' by which they have outlived *Tyrannosaurus* and its brethren that realistically exclude them from this distinction. Really to qualify, an organism should not only have ancient origins, but also have outlived its immediate

otherwise extinct Crossopterygian fishes, discovered as recently as 1938. The Horseshoe Crab is another.

Unchanged since Silurian times, around 300 million years ago, Horseshoe Crabs are the sole living representatives of the Merostomata. Once abundant in Palaeozoic oceans, these animals exist today as a mere four species, arranged in three genera, their

closest relatives being the extinct Eurypterid Sea Scorpions. Of these surviving species, three, *Tachypleus gigas*, *T. tridentatus*, and *Carcinoscorpius rotundicauda*, are found on Asian coasts, from Japan and Korea south through the East Indies and the Philippines. The fourth, *Limulus polyphemus*, is a creature of the eastern seaboard of the U.S. and Mexico.

Appearance

The bodies of these animals consist of a large domed carapace (the cephalothorax) a smaller abdomen and a long tail-spine, called the telson.

The carapace is a broadly horse-shoe-shaped affair (hence their common name), convex above, and concave below. The upper



Close-up of the compound eye which may detect movement but not necessarily be able to form detailed images.

surface is devoid of any visible segmentation, the main features breaking the otherwise smooth form being two dorso-lateral ridges, each bounded by a large compound eye. These show a number of unusual features, both structurally and functionally, compared with the eyes of other arthropods — highlighting the group's antiquity. It seems likely that these organs can detect movement, but lack the resolution to form a detailed image. The animal also possesses two other small pairs of eyes, one simple (i.e. not compound), and the other largely vestigial.

Underneath the cephalothorax are five pairs of walking legs, and one pair of specialised feeding pincers, the chelicera. So distinct a feature are these that animals possessing them, e.g. spiders, scorpions, sea spiders and horseshoe crabs, are sometimes classified in a separate subphylum, the Chelicerates. The legs are of much importance to these creatures, as although they can swim, flipping onto their backs to do so,



Detail of the feeding spikes which occur on the bases of the legs.

walking is the usual method of locomotion. Thus propelled, they trundle like animated plough-shares across the surface of the sand.

The hexagonal abdomen is bordered by six short, stout, mobile spines, and articulates with the front section, allowing the animal to jack-knife. Repeatedly flexing and straightening this joint, aided both by the rounded shape of the head and by the extra leverage afforded by the long tail spine, greatly facilitates burrowing, particularly in the soft sand found in the areas these creatures frequent.

On the underside of the abdomen there are six flap-like appendages, the first being the genital opening (the sexes are separate) and the remaining five serving as gills.

Feeding

Growing to around 60cm (2ft), Horseshoe Crabs live in shallow, soft-bottomed, coastal waters, ploughing through the upper surface of the sand in search of food. Scavengers, they eat a variety of marine molluscs, worms and the like, even consuming bottom-dwelling algae on occasions.

Their actual method of feeding, itself, is unlike that of other arthropods. The food material is grabbed by the chelicera pincers, and then transferred to the area immediately behind the mouth, where the legs join the body. At the base of each limb are a series of spines, and it is between this dense battery of spikes that the food is ground up, before

being passed forward to the mouth. (Compared to the elegant sophistication of insect mouthparts, this primitive, though functional, system clearly serves to highlight the horseshoes' more ancient origins).

Breeding

Large numbers of the animals congregate in the intertidal zone of bays and estuaries to mate and lay their eggs. The process begins when the smaller male climbs aboard the female, holding on to her using special hook-like adaptations on the first pair of walking legs. She then scoops out a series of depressions in the sand, into which she deposits 2-300 large eggs, which are fertilised as they are laid. The pair then separate, and the eggs are covered.

They hatch out into 1cm (0.4in) 'trilobite' larvae, so-named because of their similarity to these fossil arthropods, which can at once actively swim and burrow. Growth is slow, with the onset of sexual maturity only occurring after three years (and 12-14 moults).

Man and merostomata

Horseshoe Crabs have some little economic importance, the eggs being a caviar-like delicacy in some Far East countries, and an attempt has even been made to grind them up on a commercial scale for fertiliser. Hardly a fitting end for an animal of such antiquity and impeccable ancestry!



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Spotlight on Killifish



A. gardneri lacustre has an overall yellowish tinge, including a broad yellow band in the anal fin.



Numerous red dots on a mainly blue background identify this male as *A. gardneri gardneri*.

THE STEEL-BLUE REVIEW

British Killifish Association member Roger Gladwell takes a detailed look at one of the most popular of all Killies — the Steel-Blue Aphyosemion, *A. gardneri* (Boulenger, 1911)
(Photographs by M Nicholson)

It was just over 10 years ago when, after keeping various kinds of fish with a reasonable success at breeding, I turned my eyes towards Killies. I managed to obtain two or three species from a person whose name eludes me at this time, through an advertisement in one of the fish magazines. The fish, which I must add, I knew nothing about, turned out to be *Aphyosemion australe* and *A. gardneri*. The *A. australe* favoured the Molly tanks with the high temperature and lots of salt, the *A. gardneri* were more suited to the Kribensis tanks, as they tended to bully the livebearers. However, I needed more information, so I joined the BKA, and have been a member ever since.

On joining, I acquired very little information on *A. gardneri*; there did not seem to be a great deal to be had, even though I now had three populations and all looked different, so I proceeded to collect them from wherever I could, and, at one time, had 20 odd populations in my now ever-growing fish house. In the meantime, more information started to appear and, even more populations. Tim Addis photographed all the populations I had at the time as a record.

CLASSIFICATION

Aphyosemion gardneri is about the most successful Killie in Nigeria and north Cameroon, being found over large areas of both countries, with a wide range of colour divers-

ity and incubation tolerance times. In the list of species by Huber, Seegers and Wilderkamp, they are grouped into four sections: Gardneri, Lacustre, Mamfense and Nigerianum. However, the authors do not state how they arrived at this. By genetics? By colour? By countries? By bio-types? Each group has its contradictions, and the only one that seems plausible is the basic pattern of each group which is more or less constant.

Still on colour, things like dot size, trim width, shade and shape, bar width, shade and length and body colour must have changed in the wild to cause such diversity... and must still be changing. I have observed this in my tanks over some generations, with some fish being fast, some slower, in addition to the usual odd sports.

FLUCTUATING WATER CONDITIONS

The first thing any fishkeeper worth his/her salt must learn, is to maintain the water quality of the tanks whatever shape or size the fish come in, as this is essential to their wellbeing and health.

There may be a great deal of information on the fish's origin and bio-type conditions at the time it was collected. However, this does not mean that it always lives in those conditions all year round. There are monsoons which change water conditions, as well as temperature changes, while floods cause influxes of water which do not neces-

sarily run over the same minerals, etc, to the norm, especially the nearer the coast you get, i.e. even if the water area is not tidal, very high tides and storms may make it brackish for some or most of the year. So do not take for granted that the water conditions quoted are the best or the norm for your fish, i.e. the collector might have caught the fish in the middle or at the end of the dry season when the water tables were low. Dissolved components do not all evaporate like water; thus, an area of high rotting vegetation will make the water have a higher acidic content than during the rest of the year. There may also be a higher mineral content in soft-rock areas during dry periods, but once the monsoons come, there could be millions of gallons more water flowing over the same rocks.

I was fortunate to live in India for a few years and witnessed the monsoons and the River Ganges increase about twice its width in but a few days. The tropical rain was so heavy that you could only see clearly for a couple of feet on occasions. So, conditions clearly change. Of course, the fish take this as part of their lives. However, knowing this, the fishkeeper must observe very carefully which conditions the fish prefer and thrive in, then try to maintain these, even if those conditions do not match the prevailing ones when caught.

I have found that *A. gardneri* will live quite happily in water as hard as DH15 with some breeding success, but I have observed that it breeds best in near-neutral waters with a pH

of 4-6, with periodic influxes of peat acids in the odd water change. This species will also tolerate high acidic water, but the liveliness and breeding performance dies off, the degree depending on the population, i.e. Misaje and Udi fish tend not to tolerate as much acidity as, say, Akuire of Akampka ones. My assumption is that the former are hill fish whereas the latter are plains fish (water in hilly regions tends to run over more rock; while that in plains and forests tends to run more over silt and rotten vegetation).

Temperature also has a role to play too; Misaje and Akampka fish look similar and could easily be mistaken for one another at times, but the hill fish like a lower breeding temperature of about 68°F (20°C), while the plains fish prefer about 75°F (24°C). This occurs because, even if the air temperature were identical, the cold streams of the higher reaches would reach each bio-type stream at a different temperature, even more so in the rainy season. So, it is important for the keeper to study these possible weather and land conditions to enable experimentation in the search for, at least, reasonable conditions for his/her charges, for they are now totally dependent on their keeper.

VARIABLE SPAWNERS

Aphyosemion gardneri is classed as a switch spawner and commonly believed to be a 1-month or 6-week dry incubator. However, since I have had some populations on peat for as long as five months and still got a hatch, I must conclude that some populations have evolved longer tolerances of drought conditions than occur periodically in their chosen area. The fry of these fish also tend to grow faster, seeming to "know" that there is some possible reason to mature quicker.

I tend to put all my eggs on peat and find that I get fewer problems this way. This also causes the fry to hatch at around the same time, cutting down on inspections and evening out the variations in growth which would occur in water-incubated fry.

I over-breed in the main where possible, this allowing me more options when selecting the next breeders. If I have to cull, I then retain half of the larger fry with half of the smaller. The advantages are two-fold:

- 1) Sexes can grow at different rates, so by keeping only one batch, you may be causing an imbalance;
- 2) It may not be the largest fish which best resemble the population or your choice, so, having a back-up, always helps.

On hatching, the fry are quite robust and adaptable. I rear mine in quite hard water, but it's a matter of choice. I find that, with heavy feeding, alkaline water with a little peat seems to keep the incidence of Velvet Disease down to zero in between water changes which are frequent in my small initial hatch tanks. I feed my fry mainly on micro-worm and Brine Shrimp until they treble in size, then I start on an odd feed of ground flake (all my adult *A. gardneri* accept flake).

While in growth, the larger the water area

the better; if this is not possible, then double up on water changes. A warning to those who have not kept this fish before: if you keep more than one population, all females look similar, so don't mix them. Also, if you are in the habit of not sterilising your breeding tanks, assign a particular mop to each species and stick to it, or put them in boiling water in between spawnings. Discard any fry that appear in the tank and only take eggs from the mop; this will ensure the fry are those that you're breeding. Alternatively, assign one tank per species and stick to it.

BASIC GUIDELINES

Housing

Aphyosemion gardneri will be quite comfortable in a 12 x 8 x 8in (30 x 20 x 20cm) tank — a trio — as long as periodical partial water changes are carried out. I find, though, that

when breeding, a pair in a 12 x 6 x 6in (30 x 15 x 15cm) tank produces more eggs.

Water

In general, I have found that the populations have a wide spectrum of adjustment and will live and breed quite happily in water of a pH and DH which you choose to give them, so long as it is kept free from pollution and disease. In other words, most will adapt to the conditions which are supplied.

Food

They will accept nearly anything you wish to give them. I even give them 'Farlene' baby food, which they gulp down. Should you want to feed them with standard flake food, frozen or live foods, you will find no fussiness in these fish.



In *A. gardneri* Baissa, the red-dotted blue body is accompanied by intense golden edges to the caudal, anal and pelvic fins.



A. gardneri nigerianum Akampka has yellow edges to most of its fins and the body spots are larger — and more elongated — than in many other sub-species.



The Udi population of *A. gardneri nigerianum* is less spectacularly coloured than its counterpart from Akampka.

Breeding

All the subspecies of *Aphyoseion gardneri* that I keep are switch spawners, laying eggs in top and bottom mops and, even, on the bottom of the tank, in gravel or peat.

The behaviour, under normal tank conditions when the males are displaying prior to mating, tends to have two main patterns, depending on where the female is at the time. If the female is in the upper part of the water, say, from the middle to the surface, the male will do a combination of flaring all his fins and gill covers followed by shimmering, with all fins closed as if trying to intimidate the female and gain her attention. He will then try to persuade her gently, by going alongside her and pushing her to mate. If successful, she will either go right in with the male at her side, both fishes quivering and the male grasping the female with his dorsal fin and his caudal curved around hers as mating takes place.

Should the female be ready but playing hard to get, the male will do a bit of strong arm stuff to achieve his aim. Under normal circumstances this will do no harm, but should the fish be in a very small tank and the female not be ready, damage to her can occur, so keep a close watch.

Should the male catch the female near the bottom of the tank, he may display as above, or he may go straight in pushing the female down into the mop/substrate with the underside of his chin, until the female responds. Mating will then take place as before.

Should the male confront another male, he will flare and display all his fins and gill covers as for mating, but then he will do an odd thing: instead of confronting the oncoming male, he will shimmer and turn his tail to him as if to say "Follow at your own risk". Maybe this behaviour saves fighting most times, cutting the risk of injury or death.

The Lokoja population, for instance, have an extended lower lip/jaw and, when fighting does occur, the males lock jaws like cichlids and roll. Whether the extended lower jaw is primarily designed for this I can only guess, but it appears logical.

Eggs

The eggs of the various populations vary in size and colour, but that is really of no great importance in maintenance, as long as the small fry are catered for. They will all 'water-hatch' — varying from population to population — within a time scale of between about 20 to 90 days and sometimes longer. Some eggs from the same population will hatch in 16 days, while others will hatch in varying times up to, and beyond, 90 days.

I find that peat storage is more effective, giving more fry at one time, but this varies again from population to population. For example, I find four to six weeks ideal for the Akure strain, whereas 10 weeks is good for Lokoja specimens. I've even hatched Lokoja eggs after five months with reasonable success and they would probably have stood a longer drying time.

Fry

As indicated above, some populations of fry will be smaller than others; therefore, an infusoria culture is a good asset. I prefer what I call "a shotgun feeding". As I feed fry of all size in one go, I produce infusoria for all in the early stages, with daily feeds of Brine Shrimp and micro worms mixed with water, tipping a measure in each hatchery, thus giving the faster and slower growers in the same batch a chance of food best suited to the size of their mouth. A feeding of dry fry food is also beneficial once a week, if only for the change of menu. I also feed 'Farlene' baby food. I find that this is good for young fish.

A good hand magnifier is an asset at this stage, not only to see if the fry are taking food, but also to detect our old friend Velvet Disease. With this type of feeding in small quarters, small partial water changes are essential, but don't change too much, as some fry react quite badly to too big a change in water conditions. I have found *A. gardneri* fry, like the adults, very hardy, but just to be on the safe side, avoid excessive changes in water, i.e. pH-DH.

One observation made between 'water-hatched' fry and longish 'peat-stored-hatched' fry is that there is a difference in growth, the peat-stored offspring seeming to grow at a much faster rate. I can only assume that they have inbuilt genetic 'knowledge' of what they thought was a drought, this causing them to grow faster in order to be able to breed before the next drought comes.

Colour

The colour spectrum of the *A. gardneri* populations is so varied that at first you would dispute that different fish belonged to the same species. This is where I must extend my thanks to those who are of the technical frame of mind and whose scientific research has made it possible for the less technically minded, such as I, to know which fish (s)he has in his/her tank.

So, back to the colour, which, in *A. gardneri*, is hard to define as, in bright light, the fish look one colour and, in darker circumstances, another. This must be a photographer's nightmare, as you might have observed yourself when trying to compare a photograph in a book with the fish in your tank. I have also observed that, given a few generations, a fish's colour make-up can be changed simply by accident or by the breeder's choice of partner. For example, fewer red dots or a few more, a slightly thinner or thicker edging or bar, or even the removal of a colour spot, or selection through line breeding until a reasonable strain is obtained: blue from yellow, yellow from blue, or albino, etc. . . .

Young fish from the same population may also appear to have different colour forms until adulthood is achieved. For instance, a yellow type may show some blue, or a blue type may show yellow, or even purple or reddish in some populations. The above gives rise to the question "Are we, in some circumstances, doing in a few generations in tanks what was taken thousands of years to

do in the wild colour-wise?" A worrying thought!

Hybrids or Cross Mating

In most cases that I have had experience with, the fish produced through hybridisation were a poor mirror of one or other of the populations in the cross. Only twice have I gasped at a hybrid fish and said to myself, "What a lovely fish in contrast to the parent specimens".

The first instance was with an *A. mirabile* x *A. gardneri* Eymojoik (blue) cross. This crossing produced a dark blue male fish with lightning-shaped red stripes across the body. It was either sterile or semi-sterile, as no fry were produced.

The second was an *A. gardneri lacustris* x Eymojoik (blue) cross. This crossing produced two types of male offspring: those that looked like Lacustris with yellow-green anal fin, and a male identical in colour and pattern described by Radda in his 'Notes of distribution, Ecology and Variability of the *gardneri* Super-species in West Cameroon' page 4, fig 2, caught in the outlet of Lake Ejagham.

This led me to speculate that some of the colour variants were quite possibly much more recent than others, being natural crosses between two very old established variants. This is only speculation, but it is possible. It's just the proof you need to make it fact, something that is very hard to come by from just one experiment. No fry were produced from the fish and they were disposed of.

CONCLUSION

Because of its adaptability to water conditions, its ability to breed and survive in floods or long drought conditions, and its wide range of foods, *Aphyoseion gardneri* seems to have made the most of its natural habitat and thus spreading over wide areas.

It is a truly remarkable species. This has given rise to the saying among Killie-keepers that it is an 'easy' species. Yet, it took many years for the fish to become just that — a champion of its environment and a truly rewarding species to collect.

Anyone interested in joining the BKA and obtaining some of these, and many more, beautiful Killifish should write to:
Adrian Burge,
Publicity Officer, BKA,
14 Hubbard Close,
Wymondham,
Norfolk, NR18 6DU.
Yearly subscription: UK £11

PRODUCT ROUND-UP

BY DICK MILLS

ALGARID

No dull fish in Hull! After only 24 hours following the fitting of MMR's ALGARID Magnetic Water Stabiliser, Mr Hinch of Springfield Water Garden Centre & Fish Farm at Burstwick, near Hull, reported that recently lethargic fish became active and apparently full of the joys of life.

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ARMITAGE BROS

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Armitage's Nimrod plants form a natural-looking, permanent display.

time-consuming attention needed to cultivate them successfully), can be easily solved by relying on the NIMROD range of artificial plants from ARMITAGE BROS.

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NIKA

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may be successfully dealt with using GILLTECT and ANTI-FLUKES & LICE respectively. Fungus-like growths on the 'hoods' of Lionhead Goldfish and other similar varieties can be removed immediately with CLEAN-CROWN, using a cotton-bud; other fungus outbreaks, such as those that set in following skin/scale damage, may be controlled with FUNGUS-AWAY. Fishes showing signs of Swim Bladder Disease may be helped in the early stages with FLOAT-AID.



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Turning to remedies, ANTI-WHITESPOT eradicates this common ailment within 24-36 hours. Equally fast-acting, ANTI-ODINIUM will rid fish of 'Velvet' within 24 hours. PATCH-A-TAIL is effective against Tail and Fin-rot in tropical fishes.

Gill problems, whether bacterial or parasitical in origin,

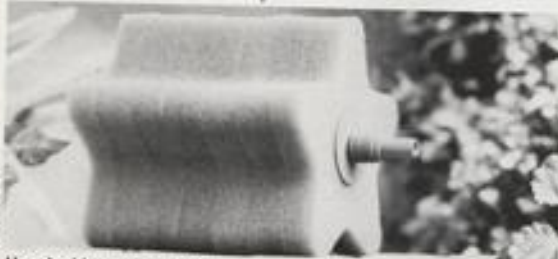
Finally, to keep your fishes in sparkling colour (especially Arowana and *Scleropages* species) there are two non-hormone colour enhancers — AROWANA COLOUR BRIGHTENER and DRAGONFISH COLOUR BRIGHTENER.

All treatments and remedies are in standard 28, 100 and 200ml sizes (except for the Colour Brighteners which are in capsule form), but strict attention must be paid to the manufacturer's usage instructions as, in some cases, the strength of the solutions vary from size to size. Full details of NIKA products from: EQUATOR AQUATICS, Chaucer Avenue, East Grinstead, West Sussex, RH19 1SF (Tel: 0342 326335).

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HOZELOCK have added the following to their range of CASCADE low voltage or mains fountain pumps. The new GEYSER and BELL replacement fountain-heads give, respectively, a foaming jet (ideal for oxygenating purposes) or a more genteel bell-shaped cascade. RRP prices are £13.99 for the Geyser and £4.99 for the Bell.

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Hozelock's new pond filter.

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GOOD NEWS FOR KOI IMPORTERS

News has just reached us from the Tariff and Statistical Office of HM Customs & Excise that

disassembled for cleaning and hobbyists will be quick to realise that *portional* cleaning helps to maintain biological filtration properties which would otherwise be lost with a total clean. RRP is £12.95.

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there has been a change (apparently for the better, in the order of from 8% down to 0% in the duty levied during the importation of Koi. From 18 June 1990, the changes are:

Koi imported solely for ornamental purposes are to be classified in Commodity Code 030110100.

Koi imported other than for solely ornamental purposes are to be classified in Commodity Code 030193000.

For more details, contact: THE TARIFF AND STATISTICAL OFFICE, HM Customs & Excise, Portcullis House, 27 Victoria Avenue, Southend-on-Sea, Essex SS2 6AL (Tel: 0702 367253 Fax: 0702 366093).

GREENAWAY POND FILTERS

Apology: In Product Round-up (A & P August 1990) an extra digit crept into GREENAWAY POND FILTERS' telephone number. It should have read 0787 71351. We apologise for any inconvenience caused.

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COVER STORY

BANDED FAIRY BASSLET

(Photograph: Max Gibbs, The Goldfish Bowl, Oxford)



The Banded Fairy Basslet — *Anthias fasciatus* — is a delightful fish that makes an appearance in the better aquatic shops in the UK from time to time.

Not a great deal is known about this attractive, peaceful species which only appears to attain a maximum length of some 9cm (c.3.5in). Its natural range is the Western Pacific, where it is found both in temperate and tropical regions, extending from Japan in the north to Australia in the south.

A. fasciatus appears to be a deep-water species — deduced from the head-down 'bobbing' behaviour displayed by newly-imported specimens. This is, however, an assumption which still awaits confirmation. New arrivals settle down quite quickly and, once they do, become quite easy to maintain.

NOTE: Our thanks go to Max Gibbs of The Goldfish Bowl, Oxford, and Richard Sankey of the Tropical Marine Centre, for supplying the above details.

John Dawes, Editor



An adult pair (male above). Note the characteristic caudal spot carried by the female.

THE CUBAN RIVULIN

Jiri Palicka re-introduces an attractive Killifish which once enjoyed great popularity among European aquarists
(Photographs by the author. Text translated by Mary Bailey)

In 1930, Fritz Mayer's company imported from Cuba a new species of American Toothcarp which had been described in 1861 by Poey as *Rivulus cylindraceus*. In Europe the species was offered for sale in the German trade under the names *Rivulus Cuba* or *Rivulus from Cuba*.

Soon after importation, this fish was bred by German breeders, and within two years, it was to be seen in aquaria all over Europe. There was great interest in this species, as is the case with any new introduction. But, as further new species were imported in great numbers, breeders soon abandoned the Cuban Rivulin. This situation continues to the present day, so that one now rarely comes across this fish being maintained and bred.

Characteristics

R. cylindraceus originates from Cuba but it is also found in Florida. In the main, it inhabits clear mountain streams, where it attains a length of 5-6 cm (2-2.4 in). It has an

elongate cylindrical body form, which when at rest, is moderately curved. The head and the anterior part of the back are slightly flattened. The dorsal fin is set well back. The rounded tail is a characteristic feature of this fish.

Males are strikingly coloured. The base colour is dark brown, toning to green posteriorly. On the underside, from the mouth towards the belly, the colour is yellowish, and this may change to orange according to mood. A dark longitudinal band runs from the mouth to the base of the tail, and the clarity of this band is likewise mood-dependent. The flanks are marked with red blotches and brown-red spots, which are arranged in several rows. The fins are brownish.

Females are coloured grey-brown on the back, with the lower part of the body more or less grey. There is a black spot with a light border on the caudal peduncle; this occurs only in females, a clear sexual dimorphism. In addition, ripe females are more rounded and, in the right lighting conditions, eggs can be seen in the belly.

Aquarium maintenance

The maintenance of the Cuban Rivulin is quite easy. In fact, it is a fish that is suitable for less experienced breeders. It makes no special demands as regards tank space, but, on the other hand, the water should be shallow. The aquarium should be well planted with several hiding places which the fish will eagerly seek out.

The fish often swim near the surface and jump out if disturbed; it is therefore desirable to have floating plants at the surface of the water or to cover the tank tightly with a sheet of glass.

The species is peaceful and quiet and can be housed with other fishes of similar size without need for concern.

For general maintenance, the temperature should be 20°C (68°F). Direct sunlight is an advantage. The fishes will, by preference, seek out areas thus lit. They bask in the sun and males use the light to show off their colourful dress to females.

R. cylindraceus makes minimal, or even

Continued on page 56



A male approaches a female during the early stages of courtship.

zero, demands as regards water quality and chemistry. I can testify to their hardiness from several occasions when, through lack of space, I have had to keep them in improvised containers. They have sometimes lived in conditions which no other fish would endure. I was surprised to find that they spawned in these decidedly adverse conditions, and that the eggs developed well.

Like all toothcarps, the Cuban Rivulin requires a varied diet. It prefers large mouthfuls; mosquito larvae are its favourite. Females fed on these become full of eggs very quickly. They also like caddis larvae, bloodworms, and shredded meat. They will not refuse plankton or dried food, but fine foodstuffs are of little food value to breeding stock.

Aquarium breeding

Breeding is easy, so even absolute beginners can try this species without fear. A small aquarium is quite suitable, or, in an emergency, any clean container. Only those females which are clearly full of eggs should be put down to breed.

It is preferable to put the female into the breeding tank a day before the male, so that she can become accustomed to her surroundings. The male can be added the next day. Spawning usually takes place after 5-10

minutes. The male presses his partner against the side of the aquarium, and, after a period during which the fish quiver, the pair give a distinct shudder. To start with, they go through this routine without any eggs being laid. Only after a few minutes do the first eggs appear. The parents do not eat them.

Spawning lasts, depending on the age and condition of the pair, no longer than four hours. Even when the female is spawned out, the male will continue to court her. The eggs measure about 2mm (0.08 in).

When spawning is over and the parents have been removed, it is necessary to treat the eggs with a fungus preventative. At a water temperature of 24°C (75°F) the fry hatch after 15 days. It is not advisable to accelerate the hatching by increasing water temperature, as this is likely to kill off the majority of the embryos.

The newly-hatched fry have a characteristic black longitudinal band. Initially they rest on the bottom, usually lying on their sides, and remain there two-three days while the yolk sac is absorbed. Then they become free-swimming and begin to take small live foods of the size of *Artemia salina* (Brine Shrimp) nauplii. They do not overeat, and take only as much food as they require. This results in a slow growth rate.

Sexual dimorphism becomes apparent during the fourth month of their lives. At this time they measure less than 2 cm (0.8 in). They become sexually mature at 5-6 months old and do not attain the normal adult size of 5-6 cm (2-2.4 in) until their second year.

R. cylindraceus makes no special demands as regards maintenance. It is well suited to display tanks and is ideal for novice breeders. Despite this, it is not widespread in the hobby. In my opinion, the reason for this is that these fish really do grow very slowly, and this probably causes difficulties to many aquarists.



Just before eggs are produced the pair lie side by side and quiver.



An excellent metallic Lionhead. Note that the tail (caudal) fin is held pretty upright.



This is a young adult Calico Lionhead which will probably not win too many prizes owing to its uneven back profile.

THE FASCINATION OF LIONHEADS

Pauline Hodgkinson is one of countless goldfish fanciers who have fallen under the Lionhead spell over the years. When you read what she has to say it's easy to see why this variety of Fancy Goldfish has such an enthusiastic following.

(Photographs and drawings by the author)

It appears to me that the interest in, and popularity of, the Goldfish and its varieties have never been so great as they have in the last few years. Certainly, the more exotic types are far more widely available than they were when I first took a more serious interest in Fancy Goldfish some twenty years ago.

In those days it was a surprise, and a delight, to come across the odd Fantail or Fantail Moor offered for sale in dealers' tanks. True, the real, keen hobbyists were keeping and breeding such varieties as the Veiltail, Veiltail Moor, Bristol Shubunkin and a few Lionheads, though, unless you belonged to one of the specialist goldfish societies, the chances of seeing, yet alone owning, such beauties were next to nil.

Nowadays, I frequently see in shops what we used to term 'rare' varieties in goldfish circles; in fact, some of these types are now positively common.

Over the years, I have been fortunate enough to have bred several different types of Fancy Goldfish, each one bringing a new challenge. Throughout, however, my real favourite has never changed: along with the nacreous Fantail, the Lionhead has always given me the most pleasure and sense of achievement.

'Fungus-ridden' Lionheads

I am frequently asked by people who have only just acquired their first Lionheads why they have been unable to clear up the apparent outbreaks of fungus which appear periodically on the fishes' head, even though they may have tried all the proprietary fungus cures. I well remember the time when I was persuaded by a fellow fishkeeper to part with a beautiful young female Lionhead that had all the potential of eventually becoming a magnificent individual but was suffering from this 'problem'. I know that we all are very reluctant to part with good stock, but unfortunately, lack of space does not permit us to keep all those fish we would like, so I let the 'affected' female Lionhead go.

A few weeks later I met the fish's new owner, but on enquiring on how she was getting along, I was informed that all was not well. The gentleman had been concerned that the fish had developed white pimple-like growths on its head, with tufts of fungus apparently oozing from them. He had proceeded to treat the condition with various chemicals without success.

Turning to a textbook, he had found a malady that he was convinced was the cause of the fish's problem: a type of parasitic

mollusc. The book's author advised that the pest should be cut out with a sharp knife. Thankfully, after removing the fish from the water he could not bring himself to subject her to this drastic treatment.

In my opinion, the authors of such advice who instruct unskilled laymen to perform operations on living creatures, in most instances without the aid of anaesthetics or proper diagnosis for that matter, should suffer the same treatment. Is it because we cannot hear a fish cry out in pain that so many are tempted into amateur surgery?

Fortunately on this occasion, the gentleman used his thumbnail to scratch out what he wrongly believed to be a parasite. How I wished that he had first asked for my advice before subjecting this fish to such severe treatment. Unfortunately, the outcome was inevitable; due to the pain, shock and stress, the fish died a couple of days later. I think this proves how important it is to acquire as much knowledge as possible before you are tempted to buy any pet.

Those fishkeepers who are familiar with the varieties of Fancy Goldfish that develop the raspberry-type hood growth will be quite aware that it is a natural process for the developing growth to secrete a white mucus that does certainly look very much like tufts

of fungus. Small white, pimple-like blobs which appear to burst and trail thread-like strands of mucus are more common with those individuals that develop the better hood growths. So, in fact, this phenomenon should be a welcome sight because it is actual evidence that the hood development is in progress.

Hood development

The hood, or cap, will continue to develop throughout a fish's life, though many Lionheads will never grow a proper hood and are therefore a great disappointment to their owners. It must be remembered that each fish is an individual and therefore, even brothers and sisters will vary in the extent of the hood development.

Some strains produce overall better heads, though — as is true of many other varieties — fish may excel in one characteristic but sadly lack good points in another. For instance, most of the Lionheads which I have seen with outstanding hoods, have what the most discerning fancier would term as a poor body shape.

Certainly, from my own experiences in breeding these fish, I have found firsthand that those fish from each spawning which developed the greatest hood characteristics were always those with inferior body shape. Therefore, if ever I am fortunate enough to see such a fish which excels on all accounts, then I am well aware of its rarity and can well understand the pride its breeder must be feeling, or have felt, in helping to create such a beautiful creature.

There are many claims for improving and increasing the hood, either by feeding specially prepared commercial food, or by feeding only livefoods, keeping the Lionheads in outside pools, or giving less frequent water changes if kept in aquaria. Personally, I believe that it is down to genetics. I believe that where I, for one, have gone wrong in the past when choosing breeding stock, is in my tendency to select overall good-quality parents, rather than paying more attention to the fish that excel in the chief characteristic and less to other points like body and finnage shape.

Slow-developing Kings

The Lionhead or Rancho is said to have originated in China but then developed by the Japanese in the nineteenth century. Several types were developed. The man credited with creating many of these, in particular, the Wakin Lionhead and the Long-finned Lionhead, was the Japanese breeder Kichigoro Akiyama, a master in the art of goldfish breeding.

Some of the varieties of Fancy Goldfish are less popular than others. The reason in some cases is because of their strange (to many people, grotesque) characteristics, such as telescopic eyes, or wobbly bubbles. Others take longer to develop their characteristics, such as the Lionhead, and therefore, when young, these fish have less appealing features than others, such as the Veiltail, Fantail or even the Oranda, for

although the latter must also wait for the splendid head adornment, it can still be appreciated because of its attractive body and finnage shape.

On the other hand, the Lionhead has no dorsal fin, and the other finnage is short and stubby, which therefore must make them appear highly priced for what many people must describe as unattractive, for they have yet to blossom into the fish known as King of the Goldfish in Japan. In fact, exhibitions are devoted entirely to this one type in Japan, where judging standards are very high and where fortunes can be exchanged for superior specimens.

In our times, just about anyone who wishes can keep these fish. In the past, things were very different because only the rich and noble were allowed to keep and enjoy their magnificence.

Vital statistics

The real beauties, besides possessing the well-developed hood growth, also have smooth, clean backs, free from any unevenness or blemishes. The back should rise gently from the head and fall gradually to the tail. In the Japanese Rancho Standards the back profile differs in that it falls further towards the caudal fin giving more of an arched appearance. Many of the Chinese Lionheads which I have seen, have had a much flatter back, though they certainly excelled, and even surpassed, most of the other types.



In the Rancho, the back curves markedly downwards as it approaches the tail. Consequently, the caudal fin is held at a very different angle to that found in Lionheads.

When viewed from above, the back should be broad. The width of the dorsal area and breadth of the caudal peduncle should be in proportion to each other. British enthusiasts attach as much importance to the back and its smooth, bump-free line, as they do to the development of the hood. Anyone who has had the experience of breeding one of the goldfish types lacking a dorsal fin, and in particular, the Lionhead, will be well aware of the difficulties involved in producing fish with blemish-free backs, and will thus



Young Lionheads. It will take these fish quite a long time before they will have developed to their full potential.

appreciate the time and effort expended by those breeders who are successful.

The body shape can roughly be described as egg-shaped, though, as with most other varieties, there will be variation within each spawning; some will have longer bodies, flatter backs, or deeper, rounded bodies, though in the better strains, the majority will be egg-shaped.

In the British Show Standards, the angle at which the caudal fins are carried is high, though not as high or as spread as in the Fantail. The caudal fin must be fully divided into two separate fins. It is here that many otherwise excellent Lionheads fail to attain Show Standard quality, as many fish have webbed tails. Even in the best strains, the majority of young fish will have webbed or partly webbed tails. However, in Japanese Standards, a tail which is undivided will not rule out the fish from competition. Other finnage is short, rounded and paddle-like; the anal fins are paired.

As with the other varieties, Lionheads may be found either with metallic or nacreous scaling. I, personally, prefer the deep orange metallic fish with, perhaps, a deeper, richer red in the hood. I also like to see the colour going through to the very tips of the finnage. However, that is not to say that I cannot appreciate red and white fish, some with very attractive colour patterns.

I have also seen some beautiful black fish and I must admit that I was tempted to buy one or two until I learned the asking price! Of course I accepted that, because of their rarity and quality, the price was fair. However, it was, unfortunately, out of my own price range. The nacreous Lionhead is yet another fine variation, though I have yet to see any which have developed hoods which can be compared to their metallic counterparts.

Breeding

For those hobbyists who would like to breed this fish, it will soon be apparent that it is one of the easiest to cull, for the faults are obvious from a very early age. This goldfish produces many individuals which are of poor quality in each spawning, so perhaps this is a good variety for the beginner to breed, since there is not the temptation to try to rear more fish than one has room for, thus avoiding the overcrowding which results in the stunted growth and outbreaks of infections and diseases that occur in crowded conditions.

Because many of the young Lionheads will have obvious faults, this helps rule out the dilemma of "Should I, or should I not, retain this or that fish in the hope that a mistake will be avoided?" By drastic culling, those fish which fall short of eventually becoming reasonable, if not good, specimens, will therefore make room for the better specimens to grow and develop at the correct rate.

It is important to select parent fish from a good strain — a strain which produces fish with the type of body and finnage shape you would like to see in your young fish. Knowing the pedigree of your chosen strain is an

advantage, but that does not mean that the unknown should not be tried. Occasionally, it is possible to take the advantage of breeding fish from good-class imported strains. Providing that a keen eye and careful judgement is employed when making a choice of possible breeding fish, there is no reason why you should not expect to produce excellent results.

As with any other variety, there is no point in choosing breeding stock from a poor or mediocre batch of fish, because it is unlikely that they, in their turn, are going to produce anything other than poor or mediocre offspring. It is pointless to sort through dozens of poor-quality fish to find one or two which are acceptable for breeding purposes; the end results are bound to be a waste of time and money.

Because this fish is held in such high esteem, the price of good-quality adults is usually quite high, so purchasing a few youngsters might be a better proposition. The experienced hobbyist can often sex young fish in their first year, but for the less skilled, I would suggest that at least six fish be initially purchased; in this number there is an excellent chance that both sexes will be present. Strong, sturdy youngsters can breed in their second year and it is not necessary to have large parent fish to obtain a reasonable number of eggs from the spawning.

One observation I have made over the years while looking at good-quality imported adult stock (and I am sure that I am not on my own in this observation), is that it appears that only one sex is sometimes

distributed to a particular outlet. I can only assume that the breeders are doing their best to make it difficult for their lines to be reproduced, but then — if this is so — who can blame them for safe-guarding their strains?

Whether you are considering to breed the Lionhead, or merely to give this delightful fish a home in your aquarium, you must be prepared to fall in love with its charm and beauty. It should, at all times, be given the best of conditions. Good water quality (which means regular partial water changes), a varied diet, uncrowded living conditions and a water temperature somewhere in the region of 65°F (c 18°C) will all help to contribute to a healthy, long, life for this excellent and charming variety of Fancy Goldfish.

RANCHU



To appreciate the beauty of the Ranchu perfectly would need a bird's eye view. When looking down on a fish from above, the form of the fish seems like an egg, or Koban, which was the gold coin used in the EDO period.

HEAD: The head should be wide between the eyes. The flesh that bulges should, in due course, become enlarged from beneath the head.

The variations of the head in the way the flesh bulges are known as:

TOKINKASHILA — the upper part of the head bulges as if it were a bunch of grapes.

BINBALI — the cheeks bulge on both sides.

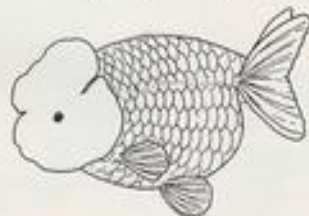
SHISHIGASHILA — this is a hood which covers the whole of the head.

BODY: The width of the back should be wide. The caudal peduncle is supremely important; fish with weak or poorly developed hindquarters will not be considered for awards, regardless of other attributes, such as good hood growth, rich colour etc.

TAIL: The perfect shape of the twin tail should be one in which the right and left halves are of the same size. There are three tail shapes: — divided, cherry blossom and joined. The tail should be small in size but look big. The divided tail is considered the ultimate; the split should be narrow, with both halves of the tail being held close together.

Twin anal fins are expected, although a single anal fin will not disqualify an exhibit. Such a fish could still be considered for an award if the rest of its attributes are superior to those of its twin-anal rivals.

LIONHEAD



BODY: This should be well-rounded, with smooth contours above and below. The head shall be short and deep and widely spaced between the eyes. Mouth small and iris type eyes. The whole of the head should carry a raspberry-like growth or hood protruding from the general line of the body.

COLOUR: Nacreous or metallic.

FINNAGE: The Lionhead does not have a dorsal fin. The dorsal contour must be smooth and rounded, showing no sign of undulations or spikes. Pectoral fins should be paired, short and rounded. Ventral (pelvic) fins should be paired, slightly longer and rounded. Anal fins should be paired, short and equal. The caudal fin should be a fully divided twin tail, with lobes short, rounded and moderately forked.

CHARACTERISTICS: The Lionhead is a twin-tailed, round-bodied fish with short, rounded finnage and excellence in the development of a wide head and hood growth.

Koi Talk

By John Cuvelier

Out of print Duijn

After my little blunder over the *Diseases of Fishes* book by C van Duijn, published by Butterworth (Koi Talk, May '90) our editor thought it might be a good idea to publish details of one or two companies specialising in obtaining out of print books, so here goes: **Martin Earl Bookfinder**, 'Netherwood', Thame Road, Great Milton, Oxford, OX9 7NU. Tel: 0831 124106; **J. B. Booksearch**, 203B Locking Road, Weston-super-Mare, Avon, BS23 3HG. Tel: 0934 633166; **Pamona Books**, 28 Canberra Road, Leyland, Preston, PR5 2JH.

I feel sure that there must be copies available somewhere, and one of these firms will no doubt be able to oblige.

Chameleon Koi

No matter how many years one has kept Koi, there is always something unexpected turning up to amaze one about these delightful creatures. Take the case of the 'chameleon' Koi! Early in the season I received a call from a lady Koi-keeper who I'd been able to assist with various problems in the past, to say that some of her Koi had outgrown their fairly small pool and would I be interested in taking some off her hands as she knew I had the pool capacity to cope.

There were five Koi involved, all of mixed pedigree(?) but very nice indeed and, as usual with this lady, in splendid condition. In due course, they were transferred to my pool and settled in nicely. One of them was very dark blue, almost black, all over and I was informed that this particular fish changed colour twice yearly!

Naturally enough, I took this with a pinch of salt and forgot all about it. Mistake! I should have known better about this lady and her knowledge of Koi. Came the middle of July, and my Koi spawned furiously.

Busily collecting eggs for hatching, I suddenly became aware of a stranger in the water, a beautiful ice-blue Koi with

Matsuba-type scaling and elegance personified! It really was quite unbelievable the transformation which had taken place overnight and, certainly, outside my experience. I'd be most interested to hear if anyone else has had a similar experience with Koi.

Budding Koi-keepers

During the run-up to 'breakup' day for school summer holidays in July, we were privileged to play host to the children from one of our local schools, Garway, who visited us on an educational outing concerned with a project on water gardens and the life therein. The 19 children and two staff had a whale of a time trotting around the pools, making innumerable sketches, examining the filter systems, and enjoying the refreshments we provided. Some of the expressions to be seen on their faces when first they caught sight of our Koi were a joy to behold. I can't help feeling that we planted a few seeds which will germinate into future Koi-keepers.

On a return visit we paid to the school a few days later, we were shown the work book which resulted from the children's outing, complete with plans of pools and filters, even to the stage of describing the 12,000 hair rollers contained in

the system, and a description of how these were colonised by bacteria. All this from seven year olds! Definitely a worthwhile exercise which other Koi-keepers might like to consider. All it takes is a call to your local school. It's never too early to generate an interest in the hobby. The picture says it all.

Snobbish approach

My comments in the July issue about the 'pond fish' title bestowed upon many Koi generated some comment, particularly from **Mr Gilliam**, manager of a Koi centre in the Isle of Wight. He related several stories about the 'snobbish' which exists within our hobby. Stories like the one about the gentleman who only purchased a 'Ghost' Koi after he had somehow managed to place it within a popular category. And the man who was most incensed that American and Israeli Koi were kept in the same display tank as Japanese fish.

What is it that makes people like this tick? I wish I knew!

The funniest tale concerned the chap who 'wound up' my correspondent by showing him how to differentiate between American and Israeli Koi but, as this is a family magazine, I'll leave you to work it out! All that aside, the literature and pictures of the Medina Centre indicate that this would be well worth a visit from anyone in the area of the I of W. The Japanese garden, the Italian garden and the Butterfly sanctuary, plus, of

course, the Koi make it a must. The centre is located at Wootton. My thanks to Mr Gilliam for the information and for his kind comments about our efforts.

Amazing Tetra food

I've been feeding my Koi for about a month now on Tetra's latest offering for gourmet Koi (all mine appear to be worthy of that title), and results have been, frankly, amazing.

Always a little cynical about advertisers' claims, I've been forced to admit that this time, at least, they're correct. The improvement shown in growth can almost be seen as it happens.

If you have not already tried Tetra's Growth Food for Koi, do get some. It's well worth the extra cost which is generated by the additional weight all that extra protein in the recipe adds. Needless to say, you can do as I do and mix all three varieties of 'stick' together and spread the load a little.

Hot weather effects

As this is being written, an unbroken run of 17 days blazing sunshine has finally ended, albeit for a short spell. The effects of this weather on pools everywhere has been very marked, with even the most sophisticated filtration schemes finding it hard to cope.

Certainly, the men have been sorted out from the boys, as regards filtration designs, and their ability to cater for extremes of weather and temperatures, etc. In my own case, clear water has only been maintained at the expense of more frequent vacuuming to remove the high speed algal growth which threatened to overwhelm everything. Even the two rivers which surround our village are sporting green overcoats, something which has never happened before in the seven years we have lived here.

One variety of algae which has appeared consists of long, chain-like filaments which lie for all the world like strings of spaghetti on the surface and grow with amazing speed. Strangely enough, the trout and minnow population has also exploded, which seems to prove that these conditions are very acceptable to fish, as there are literally thousands of fry cavorting around.



Enthralled 'Koi-keepers-in-the-making' around one of my pools.

Letters

CATFISH CAKE

As a regular reader of your magazine and a freshwater tropical fishkeeper for some thirty years, I thought you and my fellow readers might be interested to see the latest addition to my catfish collection!

This amazing sight made its timely appearance at my recent 40th birthday. I have specialised in catfish for over 15 years now but have a little difficulty in knowing this one's species. Is it *Pterygoplichthys gibbiceps* or an overgrown *Pacholius* sp? Perhaps David Sands might know!

It was bought to order, photo supplied to a local baker, by my

wife. As with many S. American catfishes, this one was promptly eaten, its 18-inch plus body feeding an equally surprised group of friends that evening. Only the dorsal fin was inedible; everything else was cake, jam-filled, and covered in coloured, shaped icing.

I am quite spoilt now. What will it be next: a Redtail, or a Tiger Shovel-nose? I'll have to wait and see.

Tony Scutt
Loughborough
Leicestershire

Editor's Note:
What a cake! What a superb idea! Many happy returns, Tony.
John Dawes



Tony Scutt's highly original... and tasty(!)... birthday cake.

DOCTOR FISH UPDATE

I was very interested to read your editorial *Doctor Fish of Kangal* in the June issue of *A&P*.

Shortly afterwards, I found myself in Turkey and took the opportunity to travel to Sivas, the main town which Kangal forms part of.

I can confirm that the fish are there in large numbers — in thermal pools whose temperature is 38°C (c 100°F)! I was able to obtain a great deal of information on the fish during my trip and would therefore be pleased to answer any questions which *A&P*'s readers may have.

I also discovered that no specimens can be taken from the pools without special permission. I would be grateful if you would pass on this letter to Roger Allen (the dermatologist you refer to in your editorial) along with my best wishes for his project.

Conrad Langley-Poole
Rodgau
West Germany

Editor's Note:
*Many thanks for your letter, Conrad. It's already been passed on as you request. When I was in Israel in June, I discovered that one of the species of 'Doctor Fish' — *Garra rufa* — exists in large numbers in certain parts of the country. A UK company, Tetra Mill Fish Farm, has now offered to import speci-*

mens for Roger Allen free of charge. So, perhaps, with a bit of luck, things will begin to look up before too long.

John Dawes

RIVETTED OSCAR

I hope I will be forgiven for being late with this letter; mail, particularly magazines, takes a long time to get here. I was very interested to read Jan Thompson's letter and Dr David Ford's reply (February 1990). My story is about two 'pairs' of Oscars, one of Tiger Reds and one of Reds, which I had sent out from home among a consignment of other fish selected for me by the late Rodney Jonklaas, probably the last thing he did before his death. He was trying to choose varieties which would survive the water and climatic conditions in the desert. I must say that his choice was excellent; none of that shipment were lost.

The Tigers were taken by a colleague who was new to fishkeeping and he has been completely dominated by his fish, who have, among other charming habits, learned to splash his carpet if their food is so much as a few minutes late! They are utterly spoilt, being fed on steak and chopped heart and whole prawns.

He was delighted to read in the Dec '89 issue of *A&P* that Oscars would tolerate the company of *Corydoras*. He bought a couple or pairs from a local pet shop and was dismayed when they took to hiding in the rockwork, only being glimpsed occasionally. The letter in the February issue had him dashing off to buy a pair of 3-inch (7.6cm) *Pangasius*, one of which, 30 seconds later, was buried up to the root of its tail in the maw of one of his Oscars, while the other was fleeing for its life.

The two Reds which I have kept have been difficult feeders and have grown much slower but are now 6in (15 cm) long. My wife joined me recently and, as she was mourning the death of her pet Bull Terrier, took to the Oscars as her own. The feeding with steak and prawns commenced until one day she complained that the bigger fish

(arbitrarily dubbed 'the male') hadn't eaten for three days. He was seen to be huffing and puffing like an old Colonel but otherwise looked quite well. Two days later a prolonged bout of huffing and puffing had resulted in the regurgitation of a green plastic rivet with a head diameter of 8mm and a shank length of 12mm. The next day appetite was back to normal. The rivet was from the base of a cheap plastic plant which the Oscars had amused themselves with by tearing to pieces some days previously.

I have been keeping fish for close on 50 years now, my father being one of the pioneers between the wars. I was a close friend of Rodney Jonklaas, having gone to the same school, as being one of the founder members of the Amateur Aquarium Society of Sri Lanka which he started. We miss him greatly.

The *Aquarist & Pondkeeper* is my favourite reading on the hobby. I wish the post worked a little faster, for this year I have only had up to the March issue.

Michael Abeyaratne
Al Gassim
Saudi Arabia

Editor's Note:

Thank you for your letter, Michael. Glad to hear that your 'riveted' Oscar is now well. I, too, miss Rodney greatly — a true gentleman in the purest sense of the word — and a major contributor to the world of aquatics during his varied and highly productive career.

John Dawes

**FOR THE BEST
ADVICE ON
ALL AQUATIC
PROBLEMS
WRITE TO
OUR PANEL
OF EXPERTS**

ENVIRONMENTAL HEALTH FOR NATIVE MARINES

(5: CORRECT MAINTENANCE)

Andy Horton examines some common environmental factors, including methods of speeding up the 'conditioning process' in new aquaria, that are crucial for the long-term well-being of native fish and invertebrates.

(Photographs by the author)

It has been reported in some of the earlier aquarium manuals that, once the biological filtration process is operating satisfactory (after the 'conditioning' period of 1 to 6 months) the marine aquarium will remain in satisfactory condition, providing that the routine maintenance and regular monthly water changes are carried out. This is not quite accurate, as in 'normal' home aquaria, using the undergravel or external filtration systems, a combination of biochemical events occur, which need to be dealt with in various ways.

The factors of most relevance to the aquarist are:

- 1 An increase in the numbers of 'nitrifying bacteria';
- 2 Gradual acidification (the pH tends to drop);
- 3 Gradual eutrophication, with an increase in the amount of nitrates and other salts;
- 4 A reduction in the amount of dissolved oxygen;
- 5 An accumulation of non-biodegradable substances;
- 6 Salinity increases;
- 7 Reduction in some of the major salts and important trace elements;
- 8 Alteration in the behaviour of the fish and invertebrates.

NITRIFYING BACTERIA

I have assumed that the aquarist has purchased a guide to keeping marine fish and invertebrates in captivity, as it is irresponsible to try to keep them on a wish and a prayer. All the books explain the procedure for establishing nitrifying bacteria, and include a graph which shows dramatically how the harmful ammonia reaches toxic levels within one week, and remains at high levels until *Nitrosomonas* bacteria convert the ammonia to nitrite, which peaks at a later date, before it, in turn, is converted to even less harmful nitrates by *Nitrobacter* bacteria. This process, of course, assumes that a filtration process is working continually.

It is usually reckoned that this 'conditioning' process takes at least a month before it is safe to introduce fish. The sequence of events can be monitored using test kits, and speeded up by using one of the following methods:



A Beadlet Anemone (*Actinia equina*) with two species of Blenny: below, the anemone, the Common Blenny (*Lipophrys pholis*) and right, the Tompot Blenny (*Parablennius gattorugine*). All three species can survive for a long time in fluctuating environmental conditions.

- 1 The use of a proportion of sand containing nitrifying bacteria from an existing, healthy operational aquarium. Best results are obtained if the temperatures of the two tanks are in equilibrium;
- 2 The use of natural seawater which will contain organic matter and small amounts of bacteria;
- 3 The use of a commercial brand of starting agent, containing bacteria or 'maturing' agents, e.g. Fritz-zyme, Seamatore, etc.

There is some evidence to indicate that the establishment of a 'conditioned' filter bed is inhibited at temperatures below 15°C (59°F).

Three Test Kits are available: nitrite, nitrate, and ammonia. If the ammonia test kit is used, the aquarist should, in normal circumstances, record a figure of nil total ammonia, as measured by the kit. A further test is made to calculate the non-ionized ammonia content which can prove fatal at



Every native marine aquarist should have a comprehensive range of test kits to help establish and maintain appropriate water conditions.

levels as low as 0.01 mg/litre for delicate species.

Kits vary in the way they indicate results: the liquid kits turn the water yellow when the chemicals are added, and the dry reagent kits turn the water to a darker, more noticeable, yellow at 0.1 mg/litre, and — at higher concentrations — to green (the latter only being likely to occur after a disaster in the aquarium). Any ammonia levels recorded indicate a major problem, equipment malfunction, or a dead animal, all of which will need to be remedied immediately.

HYDROGEN ION BALANCE (pH)

Natural sea water is alkaline, with a pH reading of 8.3, the vast amounts of the oceans acting as a chemical buffering mechanism, maintaining a constant ratio in normal circumstances. Pure water is neutral with a pH of 7.0, while some tropical freshwater habitats tend to be acidic, with levels lower than 7.0.

The chemical reactions of dissolved carbon dioxide, water and carbonate minerals constitute the carbon dioxide system in seawater (Spotte, 1979). The reactions are extremely complicated, and to avoid a verbatim transcript, interested aquarists are referred to the Bibliography¹.

Conditions in the aquarium can never hope to mimic exactly what happens under natural conditions. It is therefore suggested that the aquarist should attempt to provide a buffering system by the inclusion of substances to prevent the inevitable addition of acids from reducing the alkalinity. In British sea life aquaria, coral sand, and crushed shell substrates can dissolve and neutralise some of the acids, but this only has a small, possibly negligible, effect because:

- (a) the amount of carbonate dissolved is small;
- (b) organic wastes and bacterial slime form over the surface of the shells and coral sand and render them ineffective.

The most readily understandable processes resulting in a decrease in pH and alkalinity of importance in aquariums are:

- (1) Nitrification in normal operating biological systems, i.e. production of nitric acid;
- (2) Respiration of the animals and bacteria (carbon dioxide lowers pH, but the effect can be reduced by air exchange at the surface, expelling carbon dioxide);
- (3) Sulphide oxidation;
- (4) Production of methane from excreta.

We can conclude from the above factors that more acids are produced in a tank with a large biomass, i.e. one that is heavily stocked. In fact, a persistently low pH level can usually be attributed to an over-inhabited tank. This should be treated as a warning sign!

Different authorities report different tolerance levels for native organisms: Both Spotte and Lundgaard suggest pH values of 8.0 to 8.3. Exell² stresses the importance of keeping the levels stable, and avoiding rapid changes.

Despite this, in 'Native Marine' circles, small fluctuations or slight acidification are often regarded as an unnecessary consideration. This is because most of the common species often survive for long periods, i.e. over 2 years, or over 5 years with the common rock pool fish and 10 years in the case of sea anemones, in aquaria with infrequent water changes. The pH in these tanks often falls to 7.5. Because of good survival rates among certain organisms, the demise of such common species like the Hermit Crabs and Squat Lobsters is frequently overlooked.

Maintaining correct pH in the aquarium is, generally, not as important as temperature, salinity, dissolved oxygen content or ammonia levels. However, the best practical way to achieve a correct pH of above 8.0 is to make regular monthly water changes as part of a regular maintenance programme. This has other beneficial effects as well, such as reducing nitrate levels and assuring a correct proportion of other essential elements, like calcium, required in the formation of the

new exoskeleton after moulting in all species of crabs and other crustaceans.

Most pH test kits are quick and easy to use. Further, kits where a solution is added to the tank water in a phial, are accurate to within 0.1, which is satisfactory. Accurate electronic pH meters are also available.

Should the pH need adjusting, this can be done through the use of a commercial adjuster, but the effect is negated by the natural buffer effect of seawater, which, while preventing a rapid drop, also resists chemical treatment to increase the alkalinity.

NITRATES

Nitrates steadily rise as a result of bacterial activity. Native fish can tolerate high levels of nitrates, so these do not seem to be a major problem. Denitrification, as 'incorporated' into some of the advanced nitrate filter media has the effect of increasing the pH. This has the effect of improving the general health and long-term well-being of the fish and invertebrates. I monitor my water changes using a pH test kit, making a change when the level falls to 7.8 (water in phial turns green).

DISSOLVED OXYGEN

The reader is referred to my article in the April 1990 issue of *A & P* for fuller discussion of this topic.

An expensive Redox meter is available which measures the oxidising ability of the aquarium water, so this is a useful piece of equipment to have at hand.

Turbulence at the air/water interface reduces the laminar layer and effects a greater exchange, allowing carbon dioxide to be expelled and oxygen to be introduced from the atmosphere. turbulence with broken (white) water, and with air bubbled just under the surface is therefore the most effective method of increasing the dissolved oxygen levels.

NON-BIODEGRADABLES

Some compounds formed in an established aquarium are either non-biodegradable, or are not removed through conventional biological filtration. The most visible is a yellow colouring to old seawater which occurs as a result of the formation of dissolved organic carbon (DOC). This is best removed with water changes, although it can be adsorbed on to 'activated carbon' as the last in the line of filter media⁴. Protein skimmers will also remove DOC.

SALINITY

The salinity of the aquarium water should be regularly checked using a hydrometer⁵, and losses replaced by fresh tapwater. If the saltwater in the aquarium is too dilute, adjust with a water change, but do not add salts to an inhabited aquarium. In any case, small amounts of water, such as those involved in



Devonshire Cup Coral (*Cayophyllia smithii*) — a very localised species — requires extra special care in aquaria.

top-ups, are unlikely to contain the various compounds and elements in correct proportions.

TRACE ELEMENTS

Trace elements can be purchased and added to improve conditions where macroalgae (seaweeds) are growing in the aquarium.

Proportions of the major salt components can also fall and alter if adequate, monthly, water changes are not carried out, so these must also be checked on a regular basis.

BEHAVIOUR OF FISH AND INVERTS

This is of particular interest to the native British aquarists because some of the fish found in rock pools quite quickly grow too large for the smaller home aquaria. The Corkwing Wrasse, *Crenilabrus melops*, of the south and west is the best example of fish that, in two years, become extremely aggressive, attacking everything in the tank.

As the water heats up in spring, the chemical processes, the metabolism, nerve function and a doubling or more of the muscle power of the fishes, result in increased food consumption, and livelier behaviour. These factors should be considered when deciding the size and stocking levels of the aquarium.

Invertebrates like Hermit Crabs will need larger shells to move into as they grow.

Bibliography and Notes

¹ *Seawater Aquariums* by Stephen Spotte (1979) Chapter 5 *Buffering*. Also; *Encyclopedia Britannica (Oceanography)*; development of the oceans before life evolved on this planet.

² *Manual of Fish Health (Salamander Books)*, section on water chemistry by Adrian Exell.

³ *Oxygen in the Aquarium A & P* (April, 1990).

⁴ External filters use a variety of filter media for this job. Some aquarists, notably Les Melling of the British Marine Aquarist's Assoc, construct home-made filters that perform this function admirably.

I suggest the following books for readers starting their marine aquaria (the basic principles apply for both tropical and coldwater aquaria):

The Interpet Encyclopedia of Marine Aquaria by Dick Mills* (Salamander, 1988); and *Keeping Marine Fish* by Graham Lundegaard (Blandford, 1985).

Experienced aquarists recommend other authors not already mentioned including: Frank de Graaf, Martin Moe, Maurice Mielzak, Graham Cox, and others, which I have not had the opportunity to read.

* Encyclopedia includes clear instructions on the use of the Test Kits.

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A magnificent blue wild male *Betta splendens*.

WILD FIGHTERS

Every aquarist is familiar with the long-finned, colourful, man-made varieties of the Siamese Fighter. Not many have seen the 'real' wild Fighter, though — and even fewer have kept this fish in aquaria. Stephen Clark is one of this small, privileged group of specialist fishkeepers.

(Photographs: Kevin Webb)



This red-finned wild male has its fins extended in a characteristic display posture.

May the strongest survive' has long been part and parcel of the hierarchy of nature. The aura surrounding the lion as 'King of the Beasts', a symbol of mammalian strength, can also be associated with a five-centimetre (2in) long freshwater fish originating from South-East Asia.

This Fighting Fish, or to give it its Latin name, *Betta splendens*, can be found within the suborder of fishes known as Anabantoidae, part of the order Perciformes which can be further sub-divided into the family Belontiidae (sub-family Macropodinae) within which the genus *Betta* is classified.

Comparatively newly described to science by Charles Tate Regan in 1910, *B. splendens* has no precise origins, although Malaysia, Kampuchea, Sumatra and Vietnam are its fostered boundaries, but one can surmise that its natural home is Thailand.

The wild, stout-bodied fish rarely attains a size over 5cm (c 2in) and has a toughened 'bulldog' type head with strong muscular jaws and short, well-proportioned fins. The colours of wild fish can vary from red, through green to blue. Multi-coloured versions are only produced when cross-breeding these animals.

Air breathers

One remarkable quality of *Betta splendens* is its ability to 'breathe' atmospheric air. This is accomplished by using an auxiliary organ, commonly called the 'Labyrinth', termed thus to describe the 'maze' of muscular tissue (membranes) situated internally just behind the eyes on the head.

When the fish surfaces, it draws air into the air-breathing organ, where minute capillaries absorb oxygen into the bloodstream and through a reverse action, expel wasted gases. Nature's 'gift' of air-breathing is essential for survival as the sometimes cramped quarters of a water-filled ox's footprint can serve as home to a Fighting Fish. Normally, though, they can be found in overgrown ponds, marshes and rice fields where the water is still and sometimes stagnant. This 'anabantoid' (a general name for this type of fish) uses its gills in the same way as other fish by extracting oxygen from the water in the gill chamber but, if prevented from coming to the surface for air, it will eventually drown.

Fighting qualities

However, the curiosity that *Betta splendens* attracts, is related to its fighting abilities. For many years the people of Thailand have cultivated the short-finned fish for the 'sport' associated with male fighting fish. There have been many inaccuracies and fables recounted in literature relating to the Fighting Fish. One author described that when two male fish were engaged in combat, one of the fish was observed to 'literally burst' with rage.

The male 'domesticated' stock with their mutated long, flowing fins, achieve a greater

(Continued on page 72)



A wild-type female (full of roe) hovering below a male-built bubble nest.

length (6.5cm — c 2.6in) than their country, short-finned cousins, while the females are slightly smaller.

In Bangkok, Thailand, there are several hundred people who cultivate the natural strain of *Betta splendens* using selective pedigree stock to produce the best fighters for the 'sport'. Many years of selection to establish all the qualities of a fighting fish have resulted in cultivated stock being preferred to wild stock. There are even several licenced public combating places where the matching of fish and betting on the outcome is permitted. When they are not fighting, the fish are kept in rectangular jars about 9 cm (3.5in) square and 25cm (9.8in) high, with the neck of the jar slightly larger.

The contest begins with the two male combatants (whose previous achievements are already well known) being placed in a jar. Soon afterwards, their colour blooms and they start to expand their fins and gill covers, a trait of their threatening behaviour towards the same sex (this can also be seen when a fighter observes its own reflection). Stalking, followed by circling and close contact, with no visible aggression, precedes the contest.

Then, suddenly, faster than the eye can see, a series of attacks occur; the strong mouth tears and mutilates the tail fins of the opponent. Several times the fish can be seen locking jaws, while some action is directed

towards the 'branchial' (gill) region and, although it consists of a hard cover, blood is sometimes drawn. A fight between two fish of pedigree cultivated fighting stock can be expected to last as long as one to six hours. Fish that surrender before this time are said to be failures.

The fish judged to be the 'victor' is willing to continue the fight, while the loser, dependent on its injuries, will avoid coming into contact with its conqueror and may even 'drown' due to its inability to swim to the surface for air.

In aquaria, of course, these contests must be discouraged. We cannot support or encourage cruelty of any kind and, confining two fish, thus exciting their natural aggressive tendencies, cannot be condoned by responsible aquarists.

Betta accommodation

An all-glass fish tank, with dimensions of 24 x 15 x 12in (60 x 38 x 30cm) is sufficient to keep a pair of *Betta splendens*. The water temperature, normally at a minimum of 25°C (77°F) is increased to between 28 to 30°C (82-86°F) for breeding. Filtration of the water need only be slight, with a profusion of water plants to give the female security and plenty of hiding places from the dominant male.

The breeding of *Betta splendens* is fascinating. The stunning, wild-form males (dis-

tinguished by their outstanding colours and threatening behaviour) in most cases dominate the short-finned drab females, with their three horizontal stripes running along the body. The male begins the courtship by producing saliva in his mouth that, when mixed with atmospheric air, produces bubbles. Then, by blowing out one bubble at a time, he constructs a bubble nest at the surface of the water. The pair then 'dance' around each other, arousing the natural desires within them, this culminating in the male wrapping himself around the female and the eggs being released from her body through the small protruding white ovipositor located under the belly. The couple gently float downwards in their embrace and, with the male releasing his milt, he fertilises the ten to fifteen released eggs.

The pair part, with the masculine partner picking up the sinking, 1.2mm long eggs and placing them in the foamy cradle above. This process is repeated many times until between two to four hundred eggs (dependent on the female's prowess) are in the nest. At 29°C (83-84°F) the fertilised ova hatch between 32-35 hours. The fry hang, tail downwards, at the water surface absorbing the egg sac under the torso for a period of four days. However, only about fifty of the original fry are likely to survive after the male has picked out the weak and deformed fish.

When they become free-swimming, the fry will hunt for minute organisms consisting of single-celled algae and infusorians, followed by rotifers after several weeks. The young will soon become cannibalistic, so careful grading when the fry are older is essential.

The Siamese Fighter can be a good tropical freshwater fish to begin with, especially since it can be kept in small quarters. For example one 5-centimetre fish can even be kept in a large coffee jar, with regular changes of water, if the environment is kept clean and not polluted with excess food.

The average lifespan of Siamese Fighting Fish is between 24-36 months at a constant temperature of 27°C (81°F). Keeping them at a lower temperature — a minimum of 22°C (72°F) will prolong life for a further 6 months. (See my article *Back to Nature* in the June 1990 issue of *Aquarist & Pondkeeper* for further discussion of this subject).





Aerial shot at King Spring, Crystal River, Florida, showing boat, divers and — mainly around the 'hole' — a small herd of manatees.

MANATEES ON THE BRINK

Florida's magnificent, gentle, gigantic manatees are under serious threat. **Rick Gibson**, of *The Fish World* in Tampa, reports on their present precarious situation and on some measures that are being taken to protect them against their worst enemies — humans.

(Photographs by the author)



Snappers and other normally-marine fish accompany the manatee in its winter migration into freshwater.

It's early dawn in the middle of winter, and steam is rising from the warm waters surrounding Crystal River, Florida. A soft whooshing sound breaks the morning stillness. A large blubbery sea cow or manatee has just poked her nose out of the water to take a breath. She creates a small ripple in the water surface as she returns to the bottom. Again,

the water surface is broken. While diving down, the manatee's rounded tail gracefully flips into the air. Perhaps a parting gesture that could have enticed weary sailors to follow — seeking a possible mermaid. Such love-lorn encounters with the Florida or West Indian Manatee were first recorded in the explorations of Christopher Columbus. In 1493 he noted the 'mermaids' were not

nearly as lovely as some had painted them. From a distance, the thick-skinned manatee might appear to be a chunky person. But close-up it is often said, "They're so ugly, that they're cute". People who have had a close encounter with manatees develop a special fondness for them. The blimp-like creatures' sensitivity and gentleness are amazing.



Close-up of a manatee pup.



An adult manatee — "so ugly, they're cute!", it's often said.

AMAZING MANATEES

Many facts about the manatee are amazing. Fossil records trace this mammal back over 60 million years. Its closest living relative is the elephant. Like the elephant, the manatee's rough skin has single, short bristly hairs spaced about an inch apart.

Unlike the elephant, the manatee's front legs or flippers are paddle-shaped. Five finger-like bones can be seen on an X-ray of the flipper. Three small 'fingernails' on the tip of the flipper are left as remnants from long ago when its ancestors once roamed the land.

Today, the Florida Manatee (*Trichechus manatus*) belongs to the animal order Sirenia. Originally, there were at least a dozen species making up the order, but only four remain. Besides the Florida Manatee, there is a West African Manatee, an Amazonian Manatee, and a Dugong (an unusual manatee from the Indian Ocean). All are rare or endangered.

Every year, threats to the manatee increase

as its natural habitat is being destroyed by water pollution, dredging, and commercial development. The manatee's habitat needs to be clean. It also needs to be warm. The manatee, a warm-blooded mammal, is sensitive to the cold. The water has to be at least 65°F (c18°C). When temperatures drop along the south-east coast of the United States in winter, the manatees migrate into the warm springs of Florida. They will also congregate near electric power plants where hot water discharges heat the water. Like tourist flocking to Florida for the winter, the manatees will stay for the warm waters until late March. Then they will scatter and return to the coastal waters.

This migration is not unique to the manatee. Several saltwater fish also come up into the warm freshwater springs during the wintertime. Small flounders, mullet, jacks, sheepheads and large tarpon are commonly seen with manatees.

Travelling in either saltwater or freshwater is no problem for the manatee,

because, unlike fish, it doesn't need gills. While swimming, it simply takes air from the surface every few minutes. When resting or sleeping, it will breathe once every ten to fifteen minutes.

Travelling in murky water is no problem either. Though the manatee can't see well with its small, beady eyes, it can hear very well. It makes high pitched squeals to carry on conversations. The sounds also help in maintaining contact in the murky waters encountered on the way to the springs.

One of the most famous and accessible overwintering spots for the Florida Manatee is Crystal River. At the headwaters of the river is the warm King Spring. You can easily rent diving equipment and a boat from one of the many dive shops in the area.

Though the spring water is warm enough by manatee standards, 72°F (22°C), humans need extra protection of a 'wet suit' to stay in the water. The 'wet suit' is thick and rubbery, so after putting it on, you can almost imagine what it would be like to be a



Manatees suffer constant harassment from well-meaning divers.



Motor boats pose a major threat (unintentional or otherwise), often causing horrendous injuries like these on the mutilated tail of an adult manatee in Crystal River, Florida.

manatee. You feel fat and 'blubbery'. When you get into the water with a 'wet suit' on, you can't move very fast. Like a manatee (or elephant) the extra weight slows you down (a manatee can weigh more than 2,000lb).

Further, imagine yourself underwater with a 'wet suit' trying to be a manatee. Bring your arms close to your body. Leaving your elbows at your side, use only your forearms to move around (these are now your flippers). Next, imagine your legs and feet are tied together. You can move them only up and down, like one giant flipper (or tail). With the limbs shortened and constricted in this way, it is easy to understand why the manatee is so slow.

MAJOR THREATS

Quick movements are not needed in the manatee's lifestyle: it is a herbivore and spends seven to eight hours a day eating sea grasses and other aquatic plants (it takes a while for the manatee to consume and digest the 100lb of vegetation it requires daily). It is the only large underwater grazer in the American tropics, and it has no competition, which makes it completely harmless to other living creatures.

The manatee doesn't appear to be harmless, though. Its huge body, growing to 15ft, is intimidating by its size alone. There are no warning colorations or protective markings on a manatee's body — its colour is a dull grey. From a distance they all look alike. Upon closer examination, however, you can

identify individual specimens by their body scarring. Unfortunately, deep cuts can often be found on the manatee's backs or tails; these are caused by boat motor propellers hitting them underwater.

The manatee's gentle and passive nature may, in the end, become its downfall, since it is too slow to get away from its worst enemy — Man. Indians, and then, early settlers, hunted the manatee, mostly for its tasty meat. The thick hides were used for leather, the blubber oil for cooking, and the ivory-like bones for carving. The hunting has, fortunately, stopped, but now tourism, vandalism, and collisions with high-speed boats are new and powerful threats.

There are 80 to 120 deaths recorded each year. In fact, the estimated manatee population is being cut by more than 10% each year, and the once-large herds have dwindled until the manatee is now on the brink of extinction.

The main battle to save the manatee is taking place at Crystal River. On the one hand, the old fishing communities on Crystal River don't want any restrictions on the waterways. They want a free and clear passageway to their fertile fishing grounds in the Gulf of Mexico. On the other side are the conservationists who have, fortunately, had some influence, so that many of the underwater areas around King Spring and the river have now been declared a 'Manatee Sanctuary'. These areas are roped off with buoys and signs and here, boaters and divers are forbidden to bother the manatees in any

way.

Harassment still continues outside of the 'Sanctuary', though. On weekends, thousands of divers come to King Spring to see the manatees, some of which have adapted by accepting the intrusion of mankind into their watery world. Others are so fearful they will retreat into colder waters in order to escape humans who get too close and, in so doing, suffer cold shock and become sick.

The manatee has gradually adapted to its underwater environment over millions of years, and is continuing this process of adaptation in an attempt to save itself. For example, it now instinctively retreats from the noise and bubbles made from scuba divers and boat motors and, instead of being active during the day, some are moving about more during the night when the waterways are quiet. But, can the manatee adapt fast enough to save itself?

Time is running out, and each year the death rate is exceeding the birth rate. If this continues, of course, the gentle giant of the Florida waterways could be extinct in 30 years. It is only recently that the manatee's greatest enemy, Man, has come to its aid. We must be willing to adapt our behaviour (as the manatee has already been forced to do). We can, for instance, slow down our motor boats and give the manatees more space. The manatee may not be part of our home aquaria, but we should help it, in every way possible, to remain part of its aquatic world, a world which we should be trying to preserve and study.



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Reflections



by David Sands

Peruvian expedition

I am writing this column amid the final plans for the 'Aquarian' expedition to Peru. I want readers to know that if they do not receive a quick reply to letters this is the reason. So please forgive me in advance. With my recent house move and all my files still in boxes cluttering up the garage, goodness knows how I will ever catch up.

I am fascinated with the species *Corydoras weitzmani*, that lives almost 12,000 feet up in the Peruvian Andes. This fish was collected just after the last major war when the population of the place was a few thousand Indians. Only 41 years later that small population has grown to 260,000... I wonder what that people explosion has done to the local waters. *Corydoras weitzmani* has never been seen in aquarium circles; in fact, the half dozen specimens collected and taken to America in 1949 are the only known record of this 'coldwater' inhabiting catfish.

Maybe the habitat has been destroyed, maybe it's just the way that it was... I will only know when I get there! *Corydoras weitzmani* is a bit like *Corydoras panda*, but has an extra spot and, if the preserved specimens are anything to go by, it's a real beauty.

My long-time friend, Nigel Gerken, a cichlid enthusiast and salmon fisherman (and fellow Talk Talk fanatic — handy when playing music to fish by in South America) has excellent

Sony video equipment to film the expedition.

I could not attempt the trip without the help of my major sponsors, Pedigree Pet Foods/ 'Aquarian', The Met Office, The Association of Aquarists and others (a full list will appear in my articles on the expedition) so I don't want you to think that it's easy to get to South America.

All the injections (except rabies), all the equipment and all the film having been organised, all we need now is a firm to supply us with a good temperature and pH meter and a bit of Lady Luck to shine on us. Peru is a big place and the rivers plummeting from the Andes can't be the easiest of environments in which to locate a shoal of two-inch long catfish...

Catfish reprint

Talking about *Corydoras*, I have just received a proof copy of my first book, *Catfishes of The World*, Volume one (revised edition 1990) which has been out of print for the past few years.

Would all those people who have asked me for this book please contact me at AquAdventure (11 Hannel Lane, Walton Le Dale, Preston, Lancs, 0722 561767) because I will not have time to write to you all. (I am hoping the editor of this honourable magazine will review a copy soon). The first edition was written in 1979 and published in 1983 and was produced purely for pleasure. The profit motive did not exist then, I was just happy to see the work made into something tangible.

Dr Han Nijssen, the Dutch scientist famed for his work on *Corydoras*, introduced the original volume and even gave me permission to reproduce some of his Surinam field work. I have received so much help, advice and information relating to this volume from scientists and fishkeepers truly around the world, that I am extremely pleased to see the work back in print.

Red Tail report

Several Red Tail catfish keepers have spoken to me dur-

ing my show stints. One subject came up many times: what to do when the pH of the tapwater is so high. The ideal pH range for Red Tails is between 6.9-7.5 and it is imperative that new aquarium water is acidified. Some fishkeepers informed me that their tapwater was as high as 9.1. Of course, if you complain to the local water authority you will get the old 'stock in trade' response... "we supply water for drinking, not for fish to live in!"

Personally, I believe that if the water isn't fit for fish then it can't be doing us much good. Maybe extremely alkaline water has an affect on our blood, bones or brains. Who knows???

Red Tail catfishes produce bursts of ammonia (it's the nature of their digestive system) and, in high alkaline water, this is extremely poisonous, far more so than in an acidic system. If the aquarium filter is not mature then the results can be fatal for young *Phracocephalus*.

On rare occasions, owners explained they kept large Red Tail catfishes and that their main concern was aquarium "low pH problems". These can be solved easily with a handful of coral gravel in the filter.

PS. Anyone wishing to know about the Red Tail Catfish Club and Survey can write to Amanda Jane at the AquAdventure address.

I have received letters from Ron Atherton, who is an Englishman stuck out in Venezuela for a year or two (I can just bear all the fishkeepers saying "Ahhhh!"). He has seen massive Red Tail catfishes gaffed (hardly the ideal scene for fishkeepers) and he is about to send me a book (in Spanish) on the catfishes collected around the Orinoco river.

Ron is a former FBAS judge and must have something to tell when he returns...

Tableaux and losses

I've had a super letter from a fellow ACP contributor, John Cuvelier, who is in total empathy with my recent thoughts. He, too, hates the ridiculous tableaux that clutter up fish shows and he also feels that we should love the animals in our keep. I know that there are many other out there who share our views.

I am terribly concerned about the fish losses on and after import. This applies to wild-caught fishes and those farmed in the Far East. I would like to see a realistic quarantine system where retailers could buy fishes that are strong enough to survive the trauma of further sale and the wide ranging conditions likely to be encountered by fishes in home aquaria.

Anyway, good luck and happy fishkeeping.



I can already feel the pull of South American rivers beckoning. I'll be reporting my findings in A & P, of course.

Your questions answered

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

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

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

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

KOI

Advance Winter Advice

Although winter is still some months away, I am already becoming concerned about the welfare of my fish and would like to know in advance what steps I should take since my pool is only 3ft deep.

As your pool is only 3ft deep, I would be inclined to keep the filter running and cover part or the whole of the pool for the winter.

If you do run your filter, it is best that the water returns to the pond by means of pipework, rather than by any water feature, as the pipe can be lagged to prevent freezing.

Many methods are available to cover a pond in winter, from simple timber frame and polythene covers, to those which are kept and re-used each year. The main thing to remember is that, whatever you decide to cover the pool with, the framework to carry the cover must be strong enough to support both the cover and any snow or water that is likely to lay on top of the covers.

MARINE

Lights and Coral Sand

I have a 39 x 18 x 12in (c 100 x 45 x 30cm) aquarium which I intend to set up for marine fish and invertebrates.

1. Lighting will consist of one 20W Northlight and one 20W Trulite. Is this sufficient?

2. Do you consider a layer of crushed cockleshell covered by a 3in (c 7.5cm) depth of coral sand a suitable filter bed?

Lighting. While the two tubes which you suggest would be adequate for a fish-only display, if you are going to keep invertebrates I suggest that you double your proposed number of tubes and use two 36in (90cm) Northlights and two 36in (90cm) Trulites.

Filtration. A 4in (10cm) deep filter bed such as you describe would be perfectly adequate for your aquarium. Please remember to mature this filter bed (e.g. with Seamature) before adding any creatures to the system.

MARINE

Safe Maturation

*I have kept freshwater fish for three years but have always wanted to keep marines and now I think I'm ready to. I would like to have a small tank (only about 25 gallons - c 110 litres - of actual seawater - 30 x 18 x 15in - c 75 x 45 x 38cm) as nothing larger will fit the space I have. I would like to run it on the semi-natural system featured in your book **Tropical Marine Aquaria**.*

I would use an electric pump to work an undergravel filter and an air pump running a 'bubble-up filter'. I would also have an external power filter with charcoal as a medium in it, plus one 100W fluorescent tube lighting it.

To mature the tank, I would have one Pomacentrus Damsel fish and a small piece of Living Rock. After a few months I would introduce some more Living Rock, a clown fish anemone (Stoi-chactis) and a small Wimple Fish (Heniochus acuminatus). After about six months, I would put in one Common Clown Fish and some compatible invertebrates. The tank will also contain seaweeds.

Do you think that the above equipment is sufficient, and do you think the fish and stocking levels are all right, as I have heard that Damsel fish can be aggressive?

Filter Maturation Stocking. Using the excretion of a

Damsel fish in this way to mature your filtration system would take many weeks and may cost the life of the Damsel owing to the high level of nitrites which would exist throughout the maturation process. Additionally, after several weeks on its own in the tank, the Damsel would be very aggressive towards any newly-introduced fishes and may even kill them.

It would be far better to mature the filtration system with a maturing agent until the nitrite content of the seawater falls to zero and then, after doing a 50-70% seawater change (to lower the nitrate level), simply introduce the Living Rock, algae, a small anemone (no more than 4in - 10cm - across the oral disc) and the Clownfish. Better still, a male/female pair of young Clownfish of the same species! The young Wimple Fish could then be added some two to three months later, once the filtration system has fully accommodated the extra excretory output of the anemone and Clownfish.

Equipment. Your choice of equipment sounds fine. I recommend that you fill the external powerfilter three-fifths full of coral gravel, one-fifth full of charcoal, and one-fifth full of filterwool.



Using Pomacentrid Damsels for maturation purposes can lead to serious problems.

COLDWATER

Bristol Blues

I am keen to obtain some Bristol Blue Shubunkins for breeding but cannot find anyone in my area who can supply me with suitable specimens. Can you help?

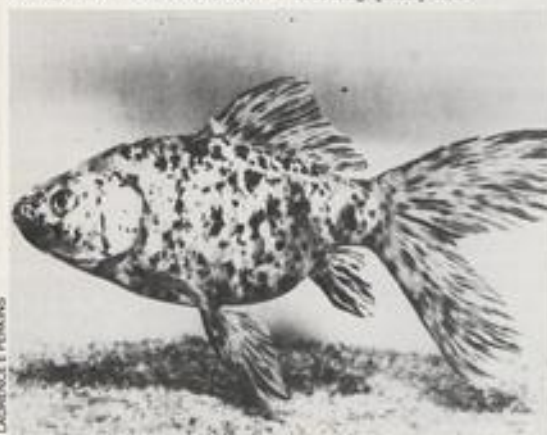
The Bristol Shubunkin is indeed a very fine fish either for the aquarium or pond. The quality of finnage development and beautiful vivid colours produced today by the amateur breeder are quite excellent and really a joy to see.

If you want to see the finest examples of this variety you

should visit the Bristol Aquarists' Society show which will be held on 8 September (see *Coldwater Jottings*). Top breeders will have their fish on display and you may be able to purchase some surplus stock.

For more information of this special event in the Goldfish enthusiast's calendar you can contact Mr S B Peacock, 13 Coffingham Avenue, Bristolington, Bristol, BS4 3QY.

Mr T J Sutton, 83 Coleshill Road, Water Orton, Birmingham. Tel: 021 749 3711 may also be able to supply you with breeding quality fish.



A top-quality Bristol Shubunkin.

Lonely Goldfish?

Is it true that a goldfish kept on its own becomes lonely?

I am sure that a single fish does need company and will be lonely for its own kind. It certainly has been my experience that fish are happier with others, though you must bear in mind the size of your tank before contemplating introducing more fish.

Unsafe Daphnia

Is it safe to feed Daphnia to my goldfish, or is there a risk of introducing disease organisms or pests? Of course, there is a slight risk when feeding live *Daphnia*. If you collect it yourself, do so only from waters you know do not contain wild fishes. If you buy it from your aquatic dealer, inspect the bag of *Daphnia* carefully for other creatures which might be likely pests.

You can familiarise yourself with just what is what by looking through the pages of nature

books which deal with water insects.

In actual fact, I do not think that live *Daphnia* purchased in this way will cause too many problems and, for a couple of small fish, a bag of this food could be regarded as their weekly treat.



Always inspect bags of *Daphnia* (either bought or collected) for the presence of pests such as Dragonfly nymphs.

TROPICAL

pH Accuracy

Are pH meters reliable and accurate? Some models claim to give readings down to one decimal point of accuracy. Is this really so?

Electronic testing equipment (including pH meters) use solid state circuitry and so are very reliable and absolutely accurate. They are also expensive and test paper (or liquids) give a sufficiently accurate result for far less cost.



Electronic pH meters are easy to use and offer a high degree of accuracy.

If you can afford a pH meter, however, it will give precise results, simply and as fre-

quently as required.

Yes, they do operate to one decimal place, which is ideal for the aquarist. Remember, though, that the 1 to 14 pH scale is logarithmic, i.e. each unit is ten times greater than the previous unit, so pH 8 is 10 times more alkaline than the neutral pH 7, and pH 6 is 20 times more acid than pH 8. This is why working to 0.1 of a pH unit is needed.

Keeping/Breeding Acaras

Would you please give me some advice on keeping and breeding Blue Acaras?

The Blue Acara (*Aequidens pulcher*) is a South American cichlid found in still waters, where it can grow to be a large fish; about 17cm (6.7in). It tolerates a range of temperatures (18-25°C — 64.5-77°F) but is prone to diseases if the water becomes very aged. Therefore, frequent partial changes are necessary. Water chemistry is not critical — and a filter is useful, but not a turbulent one.

Plants are not eaten, but get uprooted with the gravel digging, so use pre-potted plants.

Breeding is easy. The male has elongated rays on the anal and dorsal fins. A pair will spawn several times a year when 7-8cm (2.3-3in) in size, but the first few spawnings may get eaten. The fish lay their eggs on flat/rounded rocks or leaves and are attentive parents. The fry are large and accept freshly-hatched Brine Shrimps for the first week, then crumbled flake, etc. Remove the old family before the pair start a new one, or there will be territory squabbles.



A female Blue Acara laying her first eggs on an Amazon Swordplant leaf.

PLANTS

Aquatic Ferns

I am interested in ferns and would like to cultivate some in my aquarium. Which are the best species to choose and what conditions do they require?

There are several species of ferns available to the aquarist.

Sumatra Fern (*Ceratopteris thalictroides*) is a typical fern with fine pinnate fronds. It has several growing forms. Submerged, it can be used as a specimen plant, when it will reach a height of 18in (45cm). It is not fussy regarding substrate but needs good illumination and a temperature of around 78-80°F (25.5-26.5°C). Small plantlets are formed on the old dying 'leaves'. These will float to the surface and form a floating cover. The 'leaves' are then broader and not so finely dissected as in submerged plants.

Ceratopteris cornuta is a closely related species. It will grow as an emergent plant or will float. It does not succeed submerged. The fronds are tough, somewhat leathery, olive green in colour and show little indentation. It does not thrive in a pH above 6.5 and needs hot, humid conditions, so a cover glass over the tank is essential.

The Java Fern (*Microsorium pteropus*) and the African Water Fern (*Bolbitis heudelotii*) both

grow as underwater epiphytes, attaching themselves to bogwood or rocks by their wiry roots and stems.

To start with, attach them with elastic bands until they have taken hold on their perch. *Bolbitis* prefer to be placed near the power filter outlet, but Java Ferns do better out of the current. Both these species are 'tough customers' and will succeed under a variety of conditions. Java Ferns will even grow in brackish water.



The Sumatra or Indian Fern, *Ceratopteris thalictroides*. Submerged plants, such as this one, have more finely divided fronds than floating specimens.

HERPETOLOGY

Acquiring Tortoises

For some time now, I have been trying to obtain a tortoise but without success. I know that pet shops cannot sell them, and have been told that I need a licence to keep a tortoise. I would therefore be very grateful if you could point me in the right direction.

Importation of European Tortoises into Britain ceased after 1 January 1984, with the implementation of protective international legislation — the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

Additionally, the CITES legislation has also imposed restrictions on the selling or exchange of tortoises within the British Isles.

Under the CITES legislation, you do not need a licence to own or breed tortoises. However, if a tortoise owner, breeder or trader wishes to dispose of one or more tortoises, either by sale or by barter (exchange without the medium of money) a SALE EXEMPTION must be obtained from the Department of the Environment at the following address:

Room 1105,
Wildlife Conservation
Licensing Section,
Department of the Environment,
Tollgate House,
Houlton Street,
Bristol, BS2 9DJ.

The DoE does not issue application forms for sale exemptions. Therefore, as much information as possible should be sent in the style of a

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GRAHAM OLDROYD (0924) 277192 or FRED HARSTON (0226) 722578

letter. These details must include the species of tortoise, its sex and how it was acquired.

A sale exemption is only required by the person disposing of a tortoise, not by the person acquiring it. The exemption is in the form of a letter of authorisation from the DoE.

The best way of making contact with a tortoise breeder — the most likely source of a hardy reptile from adult stock acclimatised to life in the British garden — would be to place a request in the newsletter of a specialist society, for example:

- 1 The Association for the Study of Reptilia and Amphibia (ASRA), Newsletter Editor, 8 The Broadway, Lambourn, Berkshire, RG16 7SY.
- 2 The British Chelonia Group (BCG), Newsletter Editor, Newbarn Farmhouse, Toft Road, Kingston, Cambs, CB3 7NS.

Both societies encourage the captive breeding of reptiles. Therefore, it is also well worth writing to the relevant section of each society.

The address for the Captive Breeding Committee of ASRA is as follows:

The Chairman of the Captive Breeding Committee,
The Association for the Study of Reptilia and Amphibia,
The Cotswold Wildlife Park,

Burford,
Oxon, OX8 4JW.

The Stocklist Keeper of the BCG can be contacted at:
British Chelonia Group
Stocklist,
66 Green Street,
Chorleywood,
Herts, WD3 5QR.

Alternatively, tropical tortoises, for example Red Footed Tortoises (*Geochelone carbonaria*) from South America, are still being imported into Britain. Although these tortoises need specialist conditions, given the necessary care and varied diet, tropical chelonians do well in a heated vivarium illuminated with 'Trulite'.

Omnivorous North American Box Turtles, for example, the Three-toed Box Turtle (*Terrapene carolina triunguis*) and the Ornate Box Turtle (*T. ornata ornata*), are also still imported into Britain. Given the correct conditions in an escape-proof garden, Box Turtles thrive in captivity, although they are more secretive than 'free range' European Tortoises. An account about keeping North American Box Turtles, written by Jim Wright, was printed in the July 1989 edition of *Aquarist & Pondkeeper*, pages 45 and 46.

Suppliers of these reptiles now regularly advertise in *Aquarist & Pondkeeper*. Another source of potential suppliers of reptiles can be found in the Animals section of *Exchange and Mart* — published weekly.



European Tortoises cannot be sold or bartered without a special Sale Exemption from the Department of the Environment.

OUT AND ABOUT

From Loaves to Fishes

Billy Whiteside, BA, ACP

(Photographs by the author)

A good many years ago Desi Bryans began his working life as an apprentice baker and gradually worked his way up to being a fully-qualified baker. However, his heart really lay in a world inhabited by plants and fishes, and it was not long before Desi's interest in baking was taken over by his zoological and botanical interests. Eventually he packed in the baking and obtained a job in one of the leading aquarium shops in Belfast.

At this point, most people would have been happy to substitute their job for their hobby, but not Desi. His passion for plants and fishes was such that they occupied his working hours and his out-of-work hours, too.

Desi has been working at Grosvenor Tropicals, in Belfast, for many years now, and lives some miles away at Holywood, in County Down. He is an expert on almost everything aquatic, with a particular interest in cultivating all kinds of plants — especially pond and aquarium plants. He also acts as the shop's agony aunt when people with problems among their plants appear.

Desi is fortunate in that his wife, Anne, shares his interest in plants and fishes — which is a good thing because Desi's pond, garden and greenhouse, as well as his Discus tanks in the home, attract plenty of inquisitive visitors. It was a sunny Sunday afternoon when I finally reached his house, near the Hollywood Hills. I was not disappointed by what I saw; like Desi, I am also particularly fond of plants of all sorts and shapes.

Stepping into the back garden was like entering wonderland: the small garden was absolutely packed with a most beautiful garden pool, a cascading rockery, herbaceous border, bulging greenhouse, and Bonsai tree collection. Where to point the camera first was my problem!

The pool houses a thriving collection of Koi and a variety of flourishing pond plants. The beautiful flowers of Irises, in several colours, fluttered in the light breeze; and round the edge of the water, dwarf, low-growing evergreens blur the junction between water and stone. Equally fascinating are several large insectivorous Pitcher Plants, set out in their pots for the summer beside the



One of the Desi Bryans' adult Discus in a well-planted tank. The only other fish in the Discus tanks are Cardinals.

pool. The largest pitchers are big enough to trap bees — although Desi always releases any he sees captured.

On display quite close to the pool Desi has his collection of Bonsai trees, many of them grown from seedlings and cuttings. They include foreign and native species. A rockery, which was a mass of colour when I called, links together the aquatic and the greenhouse areas. Very sensibly, Desi has no fewer than two summer seats in his garden so that he and Anne, as well as visitors, can find time to sit down and just enjoy the amazing sights to be seen in the relatively small area.

The greenhouse is home to a very wide variety of plants — from cacti needing desert conditions in one area, to insectivorous plants such as Sundews and Venus Fly Traps requiring bog conditions in the other. The presence of the usual, small insects in the greenhouse means that the meat-eating plants are always supplied with nutrients.

On entering Desi's living room it is easy to see that his interest in both fishes and

plants is continued indoors. A massive tank stretches along one wall, housing a forest of tropical aquatics — mainly *Ceratopteris thalictroides* (Indian Fern), and *Hygrophila polysperma* — plus some beautiful Discus, in a variety of sizes. A shoal of Cardinal Tetras shares the Discus tank. Both species thrive in soft, acidic water, so both are happy in the giant display tank.

On the opposite side of the room are two Discus-breeding tanks, beneath which are two aerated Coke bottles producing continuous supplies of Brine Shrimps. The bottom tank contained an adult male Discus with a number of growing babies; while the top tank contained an adult male and female with eggs that were just hatching. Both parents were carefully attending their eggs and hatching babies. The eggs had been laid on a brown, clay, pottery pyramid — looking something like a large shell from the last war — made especially for Desi by a local potter. The spawning adults obviously appreciated the item designed for them.



Desi Bryans by his pool. Bonsai (top left), Pitcher Plants (among the plants on the left), cacti (in the greenhouse), rockery plants, and others are cultivated with equal enthusiasm.

Desi Bryan keeps his garden pool well filtered; but I was particularly interested in what appeared to me to be watercress plants growing in the filter box. "Right," said Desi. "The watercress removes dissolved nitrates and nitrites from the water better than many of the commercial products one can buy; and it's inexpensive too."

Look at the good root growth. It's called a vegetative filter." I left Desi Bryans' home thinking about his beautiful pond, complete with its Koi, and about his giant show tank of Discus and Cardinals; and then I thought of the breeding Discus, the Bonsai tree corner outside, and the greenhouse packed with fascinating plants.

It's no wonder that customers at Grosvenor Tropicals, and strangers — particularly young aquarists — turn to Desi when they need advice. He's really expert — and a very nice guy to know as well. He's one of those lucky people whose hobby is also his job.

NEXT MONTH
Report on the Aquarium Fishkeeping Exhibition Held at Sandown Park in June.

The Hampton Court International Flower Show

Dr David Ford — Senior Consultant to 'Aquarian'

Designed to rival the Chelsea Flower Show, the first Hampton Court International Flower Show was held between 11 and 15 July on 20 acres of the grounds of Cardinal Wolsey's Palace of Hampton Court by the Thames at East Molesey, Surrey.

Despite an entry fee of £12, about 50,000 people visited each day, making it certain that this will become an annual event. The show was sponsored by BR's Network SouthEast, so if visitors came by train, the entrance fee was reduced to £8, and the parking fee of £8 also avoided. Children and seniors paid reduced prices, too.

There were five sections in the show. Section A was for VIPs (the Princess Royal opened the show) and essentials such as St John's Ambulance, lost property, press and security. Section B included landscaped gardens with marquees for gardening tools and sundries. Section C was called the Village Area with a band stand, maypole and refreshments. Section D contained more landscaped gardens and food stalls. Section E was the largest, with six huge marquees filled with floral displays.

Car parking was over a river called The Long Water and two bridges specially built for the show brought visitors into Section E, the first area being the aquatic section and the first tent, the *Aquarist & Pondkeeper* stand.

The other aquatic traders included Anglo-Aquarium Plant Co, who did a brisk trade in marginal plants. In front of their tent they had a large display of ponds built from railway sleepers holding butyl liners.

Living Features had a large



Part of Kent Koi's prize-winning display.

tent filled with their aquariums. They install and maintain aquaria and ponds under contract. An unusual three-pointed aquarium filled with marine fish was central to their display.

Another specialist aquarium unit was Tranquility Aquatic Centre who had tanks of fish by geography: African Cichlids, South-east Asian fish, South American species and so on.

A firm selling herptiles called The Vivarium had a tent full of unusual pets and the special aquariums needed to house them.

The largest display, and winner of the SouthEast Network Best in Section Show Award, was Kent Koi. They built a huge pond especially for the show and filled it with large Koi, one of which was offered

for sale at £50,000. (It wasn't sold!)

The *Aquarist & Pondkeeper* tent housed a display of many aquarium and pond books, back numbers of the magazine and all the special Supplements (these were only 25p each). The bi-monthly posters were also offered for sale at £1 in a laminated form.

Each day, staff from the magazine and the parent Dog World firm were in attendance, plus specialists in the aquatic field. These included Dr David Pool of the Tetra Information Bureau, Dick Mills and Peter Cairn of Hounslow AS and Mike Clarke of Interpet, plus yours truly on behalf of the 'Aquarian' Advisory Service.

Over the five days we handled a continuous flow of queries, but most of them were the same one... how to clear a green pond. Hot, sunny weather occurred throughout the show and for many days before, which accounts for the green pond syndrome.

The *A & P* tent had a small pond in the centre with a fountain, four Ghost Koi and a selection of marginals, which was a good display to explain to visitors how to clear their own ponds.

Just outside the *A & P* stand was The Long Water river decorated with labelled marginals, too. It was designated a rest area with chairs facing the river and proved popular for visitors to cool off.

The show is not one to place in the aquarist's calendar, but if you are a garden lover, especially if you have a pond and water garden, it is a fascinating day out. It is worth the high cost of entry if you make it a full day... and arrive by train!



Dick Mills and I bracing ourselves for the 'onslaught'.

Diary dates

C.A.G.B. (Northern Area Group)

The Northern Area Group Catfish Open Show, to be held at The Mill, Pier Complex, Wigan, on **Sunday 2 September**, will feature two new classes:

1. LITTLE BIG ONES

This class will be dedicated to large species of catfish. However, owing to the difficulty involved in transporting and exhibiting fully grown specimens, Little Big Ones offers exhibitors the opportunity of showing young or partly grown specimens of these species.

2. CATFISH HABITAT COMPETITION

This class will feature aquaria decorated in the most suitable way for the species being exhibited.

For further details, contact S Anderson (Show Secretary), on 0257 481867 or Brian Walsh (Show Organiser) on 0254 776567.

UNION OF SCOTTISH AQUARISTS

The 1990 USA show will be held on **Sunday 2 September** at the Craigoyston Community Centre, Pennyswell Road, Edinburgh. Details from Daniel Stalker (Show Manager), 51 Nelson Avenue, Howden, Livingston, West Lothian, EH54 6BZ. Tel 0506 36915.

A.A.G.B. (Yorks Group)/RHEIN-MEIN-NEKAR; INTERNATIONALE GEMEINSCHAFT FÜR LABYRINTHFISCHE

This joint anabantoid show (including *Gambusia*, *Labeo*, *Phosphorus* and *Betta*) will be held on **Saturday 8 September** at the Hotel Peters Eck, Markplatz 1, D-6090 Ruesselsheim, West Germany. Opening time: 2 pm. Lecture: 4 pm — Arend van den Nieuwenhuizen on 'Aquaristic Impressions'. Everyone is

invited — membership of the association is not necessary. Judging to be conducted by an English jury, according to English standards, with prizes being presented by Arend van den Nieuwenhuizen.

For further details write to: Heinz Saddey, Duesseldorferstrasse 21, D-6090, Ruesselsheim, West Germany (enclosing an International Reply Coupon available from Post Offices).



INTERNATIONAL CHARACIN ASSOCIATION

The first ICA Open Show will be held on **Sunday 16 September**. Venue: Library Theatre, School Street, Dar-

wen. Benching: 11 am-1 pm. Open to the public: from 1 pm. Judging to start: 1.15 pm. Entries in competition: 20p each. Visitors: 30p (adults), 20p (children and OAPs).

There will be trophies for all 19 class winners, plus several major annual trophies. Place cards will be awarded for all 1st, 2nd and 3rd places. The *Aquarist & Pondkeeper* Gold Pin (qualifying the winner for the Champion of Champions event) to be held at BAF) will be awarded to the Best in Show.

A lecture, refreshments and sales stands are further features which should help make the day a memorable one. Ample free parking available. For further details contact Dave Sidebottom, 18 Harry Street, Werneth, Oldham, Lancs, OL9 7TA. Tel 061 626 9128.

THE SCOTTISH AQUARIUM SOCIETY

The 63rd S.A.S. Open Show will be held between **Thursday**

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Continued from page 87

27 and Saturday 29 September. Venue: Partick Borough Halls, Glasgow. Entries to the Show Manager by Monday 17 September. For further information contact W Hamilton (Show Manager), 9 Dunn Street, Paisley, PA1 1NU.

MILTON KEYNES AQUARIST SHOW GROUP

The Milton Keynes A.S.G. will be holding its first Open Show on **Sunday 14 October** at the Memorial Hall, Great Linford, Milton Keynes, Bucks. For further information, contact the Show Secretary, N Ridley, 2 Scardale Heelands, Milton Keynes, Bucks. Tel 0908 310847.

PORTSMOUTH REPTILE AND AMPHIBIAN SOCIETY

The 1990 Annual Show of the above society will be held on **15 and 16 September** at the Portsmouth Co-op Hall, Fratton Road, Portsmouth. Opening times: 10 am-6 pm. Full details from Jon Hollingsworth on 0329 833017.

MALTBY AND DISTRICT AQUARIST SOCIETY

The first Open Show of Maltby D.A.S. will take place at Bramley Parish Hall, Cross Street, Bramley, Rotherham, on **Sunday 30 September**. For full details, contact Mrs T Murrice (Secretary), 108 Bateman Road, Hellaby, Rotherham, S66 8HB. Tel 0709 701585.

BRITISH MARINE AQUARISTS' ASSOCIATION

The B.M.A.A.'s 1990 seminar will take place over the weekend of **8/9 September** at London Zoo. Marine 90, as the event is to be known, promises to be the most exciting seminar for marine aquarists ever held in the UK. Profiles of the guest speakers are shown below:

Albert Thiel: Currently considered as one of the experts in the world today on the subject of keeping Reef Tanks. Albert's expertise covers not only filtration systems etc, but also a detailed knowledge of invertebrates themselves and their requirements in a reef tank.

Martin Moe: Martin needs

little introduction to most marine hobbyists. Martin has published two books which have now become near bibles to those in the marine hobby. Martin's knowledge of breeding marines is excellent and, no doubt, he will be discussing this during his lecture.

Forrest Young: Forrest is proprietor of Dynasty Marines Inc, the leading commercial exporter of tank-bred fish and live rock. Many of the clownfish on sale in the UK have originated from Forrest's breeding hatchery in Florida.

Frank de Graaf: Frank is one of those experts who covers both tropicals and marines. Author of many books and articles, Frank is a respected authority within the hobby. Frank will be travelling from Holland for the seminar.

Dave Keeley: Proprietor of Underworld Products and previous columnist in a UK aquatic magazine, Dave is a well-known figure in the UK and has recently spent long periods of time on conservation projects. His lecture will reflect the conservation aspect of our hobby.

Peter Scott: Peter is a very respected vet who specialises in fish diseases. His lecture will look at how to diagnose and cure disease and the steps that can be taken to prevent the occurrence of disease.

The cost of the event is £15 per day for members of the B.M.A.A. (£17.50 non-members), or £25 for a weekend pass (£30 non-members). Refreshments will be available on both days, and the cost of the tickets includes entrance to the Zoo.

Tickets are strictly limited to 250 and approximately 30% of these are already sold. We therefore recommend early booking.

To buy your ticket (cheques/POs payable to B.M.A.A.) write to:

**Alan Hale,
B.M.A.A.,
PO Box 34,
Loughborough,
Leics, LE11 0WU.**

The same address applies for further information or details of accommodation available, etc.

DARWEN AQUARIST SOCIETY

The 13th Open Show of the D.A.S. will take place on **Sun-**

day 30 September at the Library Theatre, School Street, Darwen. For further information, contact D. Naylor, Show secretary, 8 South Street, Darwen, Lancs., BB3 3HZ. Tel. 0254 776295.

CRAMLINGTON AQUARIST SOCIETY

The 7th C.A.S. Open Show will take place on **Sunday 2 September**. Venue: Cramlington High School; Benching: 11 am-1 pm; Judging: 1.15 pm (F.B.A.S. rules apply). There will also be a photography competition, an auction of fish, plants and aquarium equipment, children's entertainment, and hot snacks and refreshments. Further details: Dave Murray (Show Secretary) — 0670 736603; or Colin Tweddle (P.R.O.) — 091 253 3452.

MID-SUSSEX AQUARISTS' SOCIETY

The Mid-Sussex A.S. Open Show takes place on **Sunday 23 September** at English Water Gardens (on the A24 Worthing-London road), Rock Lane, Washington, Sussex. The competition will include the F.B.A.S. Championship Class Ba (Barbs). Full details from John Smith (Chairman), 51 Eastbourne Road, Brighton, BN2 4DL.

PLYMOUTH & DISTRICT AQUARISTS' & PONDKEEPERS' SOCIETY

For schedules and full details of this year's Plymouth Open Show, scheduled for **22 September**, write to Mrs E M Taylor, 49 Radford Park Road, Plymstock, Plymouth, PL9 9DN.

BRITISH KILLIFISH ASSOCIATION

The B.K.A. 25th Anniversary Convention (partly sponsored by A & P) is being held at Hull University on the weekend of **21-23 September**. International speakers will be Rudd Wildekamp and Friedrich Bitter. All current and prospective members of the B.K.A. welcome. For further details, please contact: Hugh Cowen, 9 Quill Court, Orchard Park, Hull, HU6 9TJ. Tel 0482 851126.

BRISTOL AQUARISTS' SOCIETY

The 1990 B.A.S. Open Show takes place on **8 September** at St. Ambrose Church Hall, Stratford Road, Whitehall, Bristol. The show will consist of 38 classes of coldwater fish. Schedules and further information: Vic Capaldi, 2 Mackie Avenue, Filton, Bristol, BS12 7ND.

NORTHAMPTON AND DISTRICT AQUARIST SOCIETY

On **Sunday 23 September** the Northampton and District A.S. will be holding its annual Open Show and Auction at the Gladstone Centre, Gladstone Road, Northampton. Benching: 10 am-12 noon; Judging to F.B.A.S. rules. For further information ring 0604 233086.

NOTTINGHAM AQUARISTS

The Nottingham Aquarists are holding their Open Show on **Sunday 16 September** at the Highbank Community Centre, Clifton, Nottingham. Further details: Clive Hinton (Show Secretary), 45 Wollaton Avenue, Gedling, Nottingham, NG4 4HY. Tel 0602 876657.

BRISTOL TROPICAL FISH CLUB

The Bristol Tropical Fish Club will be holding its Open Show on **Saturday 29 September** at St. Mary's Church Hall, Grove Road, Fishponds, Bristol. For full details, contact the Secretary, T E Davis, 264 Badminton Road, Coalpit Heath, Nr Bristol. Tel 0454 775432.

EVESHAM & DISTRICT FISHKEEPING SOCIETY

The 7th Annual Open Fish Show of Evesham D.A.S. will be held on **16 September**. Venue: Evesham High School, Four Pools, Evesham. Benching: 9 am-12 noon. Judging: 12.30 pm prompt. For further details contact Jack Williams on 0527 26938.

**See Page 98
for what's in
store for October**