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both of Ashford, Kent**COVER STORY***(Photograph: Jane Burton/
Bruce Coleman Ltd.)*

When a fish is as spectacular and hardy as the Firemouth Cichlid — *Cichlasoma (Thorichthys) meeki* — it's easy to see how it can hold its place among new and old aquarium favourites, come what may. The Firemouth is a Central American medium-sized (6in - 15cm) cichlid which likes neutral water at 24-26°C (75-79°F) and a varied diet. It is usually peaceful towards its tank-mates, as long as they are not too small, but, come spawning time, a pair will become very territorial and are quite capable of dominating a tank of even larger fish. Firemouths are substrate spawners and make superb parents, guarding their eggs and fry against all comers.

Pompons, Cardinals and the Future

Having spent some time chatting to Graham Jones, proprietor of Rayner's Tropicals (108 Alexandra Road, Hornsey, London, N8 — 01-888 7973) at *Aquarama '89* in June, I decided to pay him a visit, following my return to the UK. "We are in a difficult area and have limited space, but we try our best to bring 'new' fish in whenever we can", he had said.

He was right. The shop is quite small, yet it offers (almost unbelievably) a really wide range of dry goods for all manner of pets besides fish. But it was the fish that caught my eye.

In particular, I was amazed to see a tankful of robust, healthy Chocolate Pompon Orandas. Amazed because, not two weeks earlier, I had seen those same fish at Mainland Tropical Fish Farm in Singapore where we (Stephen Smith and I) had been introduced to these "new" fish from China by the amiable and dynamic owner of the farm, Desmond Yeoh. Graham had, obviously, seen them too!

On reflection, I shouldn't have felt that amazed because, wherever I go to see fish being developed and farmed for the hobby, there is always something new and exciting going on.

The great thing about it all is that, with communications as efficient as they are these days, keen, enterprising members of the aquatic trade, like Graham, can have these "discoveries" in their shop tanks within a few weeks of setting eyes on them for the first time.

With over 80% (some say 90%) of all aquarium fish being captive-bred exclusively for the ornamental trade, plus the inherent variability of the fish themselves, plus the creativity and ingenuity of the developers/breeders thrown in for good measure, I cannot help but feel that the industry is in quite a healthy state, despite what some prophets of doom might say.

Even hitherto wild-caught species like the Cardinal are now being commercially bred (reportedly) in South America and (definitely) in Florida. Add to this the influential, commonsense approach adopted by Ornamental Fish International (O.F.I.) and the future, in my opinion, looks quite optimistic overall.

If it weren't, why would so many people worldwide invest so much time, energy and money to satisfy the ever-increasing demand for ornamentals — a demand which is in danger (!) of shaking off the "minority interest" label that has been so often applied to our great hobby in the past?

Why, also, would companies like Mainland Tropicals bother bringing in "new" fish; why would Graham Jones and numerous like-minded people bother searching for these "new" fish, and why would they (the fish) sell like the proverbial hot cakes when they are put on display in the shops...?



John Dawes
Editor



COMPETITION WINNERS
For details of 'Aquarian' Orlando
holiday competition and English
Water Gardens Pond Competition
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The diminutive, but colourful, Three Spined Stickleback — the class "tiddler" loved by countless children, and adults the world over.

STICKLERS AND TIDDLERS

Jason Endfield is an enthusiastic Stickleback fan . . . but he's not too sure about his brother!

The few publications there have been on native fishkeeping invariably describe "the joy involved in catching one's own specimens". Hmm. Try telling that to my brother!

Some years ago, I was in one of my very stubborn stages (for a change) and I simply had to have a go at keeping some native fish. I had determination without ambition, however, and my sights were set on nothing more than the humble Three Spined Stickleback (*Gasterosteus aculeatus*).

I had already discovered a pond — it was of the ancient farmland type, probably originally intended for the watering of cattle. It was overgrown, but very natural, and obviously very well established, although it was difficult to determine whether there were any fish in its depths until the startling glimpse of a kingfisher with a catch in its beak confirmed that there were.

Makeshift beginning

Moorhens picked their way through the water lilies, and dragonflies buzzed over the surface of the water. Back at base, I hastily constructed a makeshift net from that handy nylon mesh that comes free with supermarket-bought vegetables — a piece of bamboo making a marvellous handle.

Then I dragged my brother to the tranquil pond. I shouted directions from the safety of the bank, while my brother swung precariously from the branch of an overhanging oak tree, net in one hand, dangling aimlessly in the water.

Well we (or actually *he*) scooped up lots of mud and dead leaves and generally did a splendid job in cleaning up the pond, but it wasn't until several scoops later that the "joy involved in catching one's own specimens" became apparent. There, in the net were about six tiny Sticklebacks.

Triumphant

We rejoiced — well I did — my brother couldn't rejoice very much, suspended as he was from the tree, and it was more relief that he showed on returning to terra firma.

I took the "tiddlers" (Sticklebacks are the original tiddlers) home in a bagful of pondwater and kept them in a tank for a short time before they joined a little pond in the garden.

I can't recall their eventual fate — the pond proved to be rather a temporary affair — and it was, even at my youthful age, quite irresponsible of me not to return them to the original pond. Having said that however, their fate there would have been possibly worse: that superb pond, haven for kingfishers, moorhens, flora and fauna, was filled with rubbish from a neighbouring caravan site — one less wildlife reserve in the area, but that's another story.

Sticklebacks are fascinating creatures, and attractive too — the male's breeding colours are more beautiful than many a tropical species (I've yet to see a Rainbowfish that really lives up to its name). Their breeding ritual is very interesting as well, the male building a tunnel-like nest from bits of debris, which he cements together with a

special mucus secreted from his kidneys (a disgusting practice, but highly effective!). He then entices the female (often more than one) into his nest, where she deposits her eggs. It is then the male who tends the eggs and, later, the fry until they can fend for themselves.

The "stickles" on their backs stop other fish from making a meal of these small fish. Our most common species has three of these spines, and can be found in fresh and brackish water (they have the ability to adapt to both). The freshwater form rarely exceeds two inches (5 cm). Other species occasionally encountered are the Nine Spined Stickleback (*Pungitius pungitius*) which is also found in either fresh or brackish water; and the Fifteen Spined Stickleback (*Spinachia spinachia*), which is marine and much larger.

Adaptable

The real advantage of keeping our Three Spined variety is that they require no special water conditions and not even artificial lighting if kept in a bright place (they're used to our dull English days). They will also eat any type of food and are generally very undemanding. Ideally, they should have a tank to themselves to avoid any accidents with those spines . . . or the transmission of the parasites they often carry.

They are, in many ways, the perfect fish, and all this talk has given me the urge to try them again. I've got a little tank going spare, and I expect I can find a net. Do you think that if I ask my brother nicely . . . ?

Herpetology matters



By Julian Sims

Tortoise discoveries

With the development of fast and varied methods of travel, together with navigation aided by "man made" satellites, current expeditions to isolated parts of the world are much more "immediate" but no less fascinating than the voyages of discovery made by sailing ships during the reign of the first Queen Elizabeth, or the exciting quests made by plant and animal collectors in Victorian times. Modern-day expeditions still capture the public's imagination.

One of the benefits of long-term international research projects such as Operation Drake, Operation Raleigh and Operation Tortoise has been to discover new plant and animal species, including new species of tortoise and terrapin. Also re-discovered, have been several long-lost species previously thought to have become extinct. Some examples are as follows:

The Cane Tortoise (*Hoemys nolinae*) has been re-discovered in the forests near Kavalai, south west India. This small tortoise was first discovered in 1911 by a collecting party from the Madras Museum. Subsequently, it had been thought to have been driven into extinction by the destruction of the upland rain forests in which it

lived. Cane Tortoises are extremely well camouflaged, having an upper shell (carapace) resembling the shape of a fallen leaf and a colour similar to leaf litter.

In southern Africa, Berger's Padloper (*Homopus bergeri*) has also recently been re-discovered and is now recognised as a species in its own right. This is a very small tortoise which inhabits rocky, semi-desert regions of southern Namibia.

In north Africa, morphological evidence, i.e. external features, suggests that tortoises of the genus *Testudo* which inhabit Algeria belong to two species — the well known *T. graeca* or Spur Thighed Tortoise (as described by Carl Linnaeus in 1758) and *T. whitei* described by Edward Bennett in 1836. The specific name *whitei* refers to Gilbert White's famous tortoise, Timothy which lived at Selborne (Hampshire — Sussex border) from 1780 to 1793. Timothy's carapace is preserved in the British Museum. It is quite probable that a few specimens of the rare *T. whitei* still live in the gardens of Britain — imported from north Africa before the international ban on the tortoise trade became effective in 1984. These "pet" tortoises could form the nucleus of a captive breeding programme.

In south America a new species of freshwater side-necked terrapin *Phrynops williamsi* has been discovered in Brazil. The species has been named in honour of the famous herpetologist E. E. Williams.

Unfortunately, all of these reptiles are comparatively rare and limited in their distribution. They are all threatened by the activities of humans —

mainly through the destruction of habitat.

Maggot diet

Maggots are the white, legless larvae of flies. They are sold in tackle shops as live bait (called gentles) for freshwater coarse fish. Some herpetologists also use them as live food for their reptiles and amphibians, but this can lead to problems.

Large lizards with powerful jaws and terrapins which have sharp and/or serrated edges to their mouths are able to bite into maggots, crushing them and eventually breaking through their flexible outer cuticle. However, frogs, toads and newts do not have such powerful "biting equipment" and swallow maggots intact.

The cuticle gives protection from attack by the amphibians' digestive enzymes and the maggot can pass out through the amphibians' anus undigested, sometimes embedded in a faecal pellet.

Once inside the gut of an amphibian, live maggots might even cause damage by burrowing through the thin gut wall and entering the body cavity. Such internal injury usually results in the death of the amphibian. It is, therefore, inadvisable to feed maggots to frogs, toads and newts.

As part of their life cycle, maggots pupate, forming a chrysalis. When first formed, these pupae are very dense and they sink in water. (Fishermen call such pupae casters). Older pupae are less dense and they float on the surface of the water. Terrapins push floating pupae around and "crunch" them up using their jaws. However, the soft tissue and fluid contents of pupae quickly cloud the water

resulting in the need for more frequent cleaning.

Left to complete their life cycle, adult winged flies eventually emerge from the pupae. These flies are an excellent food for tree frogs and geckos, providing amphibians and reptiles with hunting exercise.

When buying maggots which will be allowed to pupate and complete their development into flies, it is best to select "natural" white maggots and not those which have been artificially dyed pink or yellow. After all, public demand now favours human food which is "additive free".

It is also important not to keep maggots in high densities or in poorly ventilated conditions. The waste materials they excrete can inhibit pupation. These liquid wastes eventually cause the death of the maggots which produced them. Fine sawdust or bran are two good materials in which to keep maggots prior to their pupation. Sawdust, in particular, absorbs some of the liquid waste products.

Dappled basking

Unlike mammals, reptiles do not have sweat glands to help control their body temperature. Mammals release sweat onto the surface of their skin which evaporates to remove excess body warmth. The heat that is lost is that which is required to cause the liquid to vaporise.

Reptiles behave in a variety of ways to control their body temperature in hot conditions. One of these methods is "dappled basking". Having achieved an optimum temperature by sitting in the sun, the reptile moves off to find partial cover. Being only partly shaded, the sun still has a warming effect on the area of the body which is exposed, compensating for the heat lost from parts of the body which are in the shade. By this method, the reptile can regulate its temperature.

If reptiles are kept in an outdoor reptiliary or in an indoor vivarium it is most important to provide adequate areas of shade so that they can prevent overheating and regulate their body temperatures during daylight.

COMPETITION WINNERS

For details of 'Aquarian' Orlando holiday competition and English Water Gardens Pond Competition winners see page 10

Books

Piranhas in the Aquarium

By: Wolfgang Schulte
Published by: T.F.H. Publications, Inc.
ISBN: 0-86622-950-7
Price: £8.95

Remember The Piranha Book written by George Myers and published by T.F.H. in 1972? For years, it was the only aquarium book which concentrated exclusively on these fish.

That role has now been taken over by *Piranhas in the Aquarium*, translated from German, and illustrated largely from T.F.H.'s impressive picture library.

The text is packed with useful information on Piranha, from their classification to their carnivorous habits, from myths to maintenance, and from breeding to biology.

There are about 120 pages of colourful, easy-to-read, interesting text which will certainly go a long way towards filling the obvious gap that exists in Piranha literature.

Two reservations:

1. The section on maintenance, while offering very useful advice and guidelines, could have done with a more detailed breakdown of aspects of setting up, lighting, filtration, feeding, etc., specifically concerning Piranha.

2. The characin specialist will also find that the classification section, while being admirable in many ways, will not provide him/her with detailed diagnostic features that can be applied to distinguish between the four subgenera, *Pygopristis*, *Pristobrycon*, *Serranobrycon* and *Taddeella*.

These and a few other quibbles notwithstanding, I found *Piranhas* a very useful book, one which has long been overdue, and which should be bought by all who share a fascination for these "characters".

John Dawes

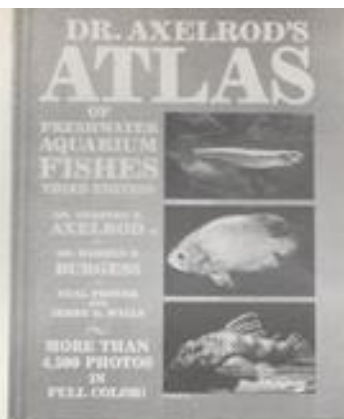
Dr Axelrod's Atlas of Freshwater Aquarium Fishes (Third Edition)

By: Dr Herbert R. Axelrod, Dr Warren E. Burgess, Neal Pronek and Jerry G. Walls

Published by: T.F.H. Publications, Inc.
ISBN: 0-86622-748-2
Price: £50.00

It's here, it's big and heavy, and it's good — very good.

The third edition of the *Atlas* contains even more illustrations than its predecessors — about 500 extra ones, in fact. It therefore comes a significant stage closer towards achieving the aim of its main author of producing an almost exclusively photographic identification guide.



Owners of the *Mini Atlas* will already be familiar with the series of symbols used in that book. These allow for a great deal of information to be presented in the minimum amount of space. This has now been adopted in the *Atlas*. As Herbert Axelrod states in his preface, this has allowed him "to enlarge the book substantially without increasing the number of pages (and thus holding down the price!) Eventually, the further editions will see the elimination of most species' write-ups, and more colour pictures can be placed in the space thus saved".

In addition to more photographs, the third edition also differs from the earlier ones in that its index is more comprehensive and includes a larger selection of common names, which will be welcomed by the majority of aquarists.

Personally, I applaud this approach, since anything that makes the difficult job of identifying a fish easier is to be welcomed. It is, in fact, for this same reason that I find the omission of the names of the different varieties of Koi, Goldfish, Angels, Guppies, Swordtails and other such fish somewhat irritating. It would be nice, if this apparent anomaly were rectified next time round.

I would also like to see all the photographs depicting a particular species (some of which are currently scattered within their geographical sections) being brought together on the same page in the fourth edition. For example, two different shots of *Haplochromis temminckii* appear seven pages apart. Having them side by side would seem to be a more logical approach.

So, on the one hand, a comprehensive index sorts out some problems of identification, while, on the other, the distribution of some of the pictures does little to help.

These are, however, minor dissatisfactions with an otherwise overwhelmingly satisfying book that informs, delights the eye, and is exceptionally good value.

John Dawes

Pond and River

By: Steve Parker

Published by: Dorling Kindersley in association with The Natural History Museum

ISBN: 0-86318-318-2
Price: £6.95

This expertly illustrated, colourful book is one of Dorling Kindersley's new *Eyewitness Guides*. The series, which will probably include as many as 20 titles by the end of

1989, has been conceived as "highly informative visual guides to the wonders and workings of the world about us".

With respect to the subject of this book, the pond and river, it must be said that the stated criteria have been well met.

Having said that, though, it must also be stated that this is no in-depth guide to pondlife. It is, rather, a colourful, easy-to-assimilate pictorial account of pond and river life. Each double page spread carries an introductory/explanatory bit of text, plus about a dozen or so illustrations, accompanied by extended captions.

The overall effect is easy on the eye and informative and, while I would have liked to have seen, at least, the odd scientific name here and there to complement the common names, I don't think that this detracts unduly from the overall value of the book.

A more significant criticism concerns the inclusion of non-British pondlife. There is so much life in our ponds and rivers (the unpolluted ones, of course), that I can't really see why exotics have to be included at all. Why feature such as Anacondas and Soft-shelled Turtles, and leave out the Crested and Smooth Newts?

I found such instances to constitute irritants in a book that achieves so much, so well, and is such excellent value.

John Dawes

Ponds and Streams (A Nature Guide)

By: John Clegg

Foreword by: David Bellamy
Published by: The Crowood Press
ISBN: 1-85223-223-1
Price: £3.95

I don't know how they've managed it, but they have. £3.95 for 128 pages, with more than 120 illustrations, over half in colour, is a magnificent feat.

Add to this an extremely readable and information-packed text from John Clegg, and you have a fantastic book on your hands. One of the "heavy guns" of the environment/ecological/conservation world, David Bellamy, has been brought in to add a few personal words of wisdom in the foreword, to lend weight to the book and help boost sales.

In the end, his contribution, interesting though it is, hardly adds anything worthy of note. The real value of this book — and it has a great deal of value — lies in John Clegg's expertise and enthusiasm.

I enjoyed *Ponds and Streams* from cover to cover, even if I was sometimes put off slightly by the inconsistency regarding the names of organisms, some of which appear both in their scientific and common form, while others appear in common form in the text and in both in the index.

That aside, this is a great book which no pond/stream enthusiast should be without.

John Dawes

COMPETITION WINNERS



English Water Gardens Competition

Congratulations to Mr F Voller of Wickam Bishops in Essex whose correct entry was the first out of the hat on 1 August.

Mr Voller's prize is a superb £425 pond from English Water Gardens' range of top selling ponds launched earlier this season. The correct answers to our questions were (i) Japan; (ii) 800 gallons; (iii) 5ft.

Thank you to the hundreds of entrants, most of whom got all three answers right, and thank you English Water Gardens for an excellent competition.



'Aquarian' winners on their way in style

First class all the way! Mr and Mrs Da-Costa setting out on their prize holiday to Orlando, Florida. They will be staying in the magnificent Orlando Hyatt Hotel, attending the International Cichlid Conference. Mr and Mrs Da-Costa won this aquarist's dream holiday to Orlando by coming first in the 'Aquarian' Holiday for two in Florida competition which was exclusive to Aquarist and Pondkeeper.

NEXT MONTH

October promises to be a very special month at *A & P*. In addition to our usual packed package of regulars and specially commissioned features on tropicals, coldwater and marines we have:

- A special **Supplement** which concentrates on all the common diseases that affect aquarium and pond fish, from "environmental" diseases, to viral, bacterial, protozoan, fungal, algal, crustacean and worm infections — they are all there in the capable hands of our team of experts:
Dr David Ford (Aquarian), **Dr David Pool** (Tetra), **Peter Scott** (Vetark Animal Health), **Jerzy Gawor** (J. G. Associates) and *A & P* Editor **John Dawes**.

- An **unrepeatable, unmissable and "Exclusive-to-A & P readers"** competition. We are giving away SIX autographed, numbered, leather-bound copies of the Limited Edition of the book everyone's talking about: **Bleher's Compendium**. Published simultaneously in 12 languages, featuring over 7,500 species of freshwater tropical fish, plus 8,800 full-colour photographs

... and selling at £170 each, these leather-bound volumes are going to be like gold dust — extremely valuable and hard-to-obtain.

So don't miss your opportunity to win a unique prize. Order your copy of the October edition of **Aquarist & Pondkeeper** now and make sure of earning yourself the chance to win one of these superb books **ABSOLUTELY FREE!**



ALLPETS OF STANMORE

Due to a typographical error the advertisement which appeared in our August issue on behalf of this excellent retail shop stated that they closed on Sundays. This is incorrect. Allpets are open every day except Monday plus all Bank Holidays. See page 63. We apologise for any inconvenience caused.

KENT
KOHAKU
COLLECTION

KOHAKU

It is often said that Koi-keeping begins and ends with Kohaku.

Certainly, top-quality Kohaku are among the most highly prized Koi, despite the fact that they only possess two colours red and white (the colours of the Japanese national flag). Whereas the more spectacularly coloured Sanke and Shows are tri-coloured.

Along with these two other categories (plus, perhaps, the "new pretender", the Shiro Utsuri). Kohaku form the large "group" of Koi collectively known as Go-Sanke.

Newcomers to Koi-keeping are usually attracted to the Kohaku by the contrasting colours of young fish, often irrespective of the actual quality of the fish themselves.

As experience is gained, however, the subtler differences between mediocre, good, and excellent fish begin to become appreciated, often leading to a life-long quest in search of the unattainable — the *perfect* Kohaku.

Kent Koi Ko
Part of the Koi (UK) Group
Polhill Garden Centre, London
Road, Badgers Mount,
Sevenoaks, Kent
Tel: (0959) 33567
Fax: (0959) 32715
OPENING HOURS: 9.30 a.m.
— 6.00 p.m. SEVEN DAYS A
WEEK



A magnificent *M. trifasciata* male.

THE BANDED RAINBOW

Rainbow Fish specialist, **Robert Kirkup**, describes his formula for success with this large and colourful *Melanotaenia* from Australia.

(Photographs by the author)

A Rainbow Fish is a very beautiful fish, as many people who have seen them will agree. But their true beauty can only be witnessed when you keep these fish yourself, possibly in a species tank with at least a half dozen of each species present, just as you would a shoal of tetras. Then you will find you have a constant blaze of colour with the males chasing the females morning and evening and sparring with rival males the rest of the day.

In my last article (*ACP*, June '89) I looked at a Rainbow fish suitable for keeping in small aquaria (*Popondichthys*). Now here's a Rainbow which is more at home in aquaria of over one metre (39 in) in length, the Banded Rainbow, *Melanotaenia trifasciata*.

One could say that this fish comes from "the opposite end of the Rainbow", differing vastly in size from the diminutive *Popondichthys* from New Guinea, and originating in Northern Australia.

The Banded Rainbow is more readily available in our shops, although, sometimes, its close cousin from New Guinea, *Melanotaenia affinis*, is sold in its place by mistake. As one of the photographs of two *M. affinis* shows, the obvious difference is the break in the longitudinal band. In addition, adult *M. affinis* are not as deep-bodied as *M. trifasciata*.

In *Melanotaenia trifasciata* there is a broad

dark band all the way from the upper edge of the gill cover down to the caudal peduncle, giving this fish its common name, Banded Rainbow.

Distribution

M. trifasciata has a wide distribution over the Northern Territories and the Cape York Peninsula in Australia. It occurs in water pools, small or large streams, and in clear or moderately turbid water.

These waters are partly shadowed and sometimes richly vegetated. Also living with *M. trifasciata* are *M. splendida mornata*, *M. maccullocki*, *Iriatherina werneri* and *Pseudomugil gettrador*.

Close relative

M. trifasciata, which was first discovered in 1922, has a close relation, *M. goldiei*. Many thousands of years ago they were both of the same species, but with the development of the Arafura Sea, making New Guinea separate from Australia, the "trifasciata" in New Guinea, being apart from their mainland ancestors and in a different environment, speciated into the form they are today (i.e.) *M. goldiei*.

Scientists believe that the Rainbows are able to speciate extremely quickly; where it would take a Rift Valley Cichlid, say 40,000

years to become a different species after isolation, it is estimated that it takes the Rainbows only 7,000 years.

Variable coloration

The Banded Rainbow is available in a riot of colours, every population having its own variation, just as in the *M. splendida* group. All have the dark band, but, above and below, this can be blue, green, red, yellow, olive or brown.

Hopefully, when you buy this fish, its population will be labelled as such and (hopefully) it will not have been cross-bred with a different race. Varieties I have seen are usually named after the river systems where they are found:— Giddy, Goyder, Coen, Mary, Archer, Pascoe and McIvor rivers, as well as the Gove Peninsula.

One of the photographs shows a male *trifasciata* from the Coen River, differing from the Goyder River Rainbow in not possessing red longitudinal stripes.

I have had no problems in growing my specimens to 150mm (6in) overall length, maybe because I have had my Banded Rainbows for many generations and they are used to my aquaria . . . I don't know. The female Banded Rainbows are some 30mm (c 1 in) smaller and slightly more drab in colour; except at breeding time. In most cases, the

first dorsal fin is not as pointed as in the males and does not overlap the second dorsal fin. Further, the female's head is not as "pinched in" as the male's.

I originally obtained these fish in 1983 from first-generation wild stock, and through selective breeding, as is done with livebearers, I have managed to develop females which are as colourful and as deep-bodied as the males.

The Banded Rainbow is suitable for "long" aquaria where a shoal can be quite breathtaking. They will mix well with other similar-sized fish (I have kept mine with barbs, characins and cichlids without problems. I particularly like to keep mine with Congo Tetras. In fact, when they begin breeding (either early morning or evening, with the help of the sun rays), they induce the barbs and characins to spawn as well! This usually results with the inhabitants of the aquarium having a good feed.

When you have kept a group of *trifasciata* in a tank for some time, a dominant male will emerge. He will nearly always be in spawning colours, exhibiting a blaze (a nuptial stripe which is present in nearly all *Melanotaenia*, running from the male's mouth to the first dorsal ray, and usually gold in colour). His finnage will also develop more than in other males, being noticeably longer, with the second dorsal overlapping the caudal fin.

If his colour were to fade, and he were to retire to the back of the aquarium, another male will stake his claim for dominance, not unlike the situation found in dwarf cichlids.

Spawning

When the fishes do spawn, they break from their shoaling routine. The fully-coloured male will select a territory next to the plant jungle, where he and the female he has enticed, will shimmy together as up to 40 eggs are expelled. They will then dart away from each other, wafting the eggs in all directions. The eggs hang from tiny threads and will stick to anything they touch.

There are many ways of spawning Rainbows.

There is the lazy way, where the eggs are laid in the community tank. Early each morning one checks the surface for the tiny black fry, removing these to a rearing tank. This way only a few fry will be saved, but they will be the strongest with a "will" to survive. Unfortunately there is no way of knowing the exact parentage of the fry, or indeed, if the fry saved belong to the type of Rainbow you wish to cultivate.

Another way is to place a spawning mop in a preferred site in the aquarium. A Killifish mop or Java Moss is adequate for the purpose. After the fish have spawned the mop is removed. A close inspection will reveal the tiny 1.2mm (0.05in) clear eggs. An adult pair of Rainbows will lay 150-200 eggs a day!

The eggs are resistant to pressure so one need not be afraid to touch them. Just like Killifish eggs, they can be picked off with the fingers, put into vials of water, and sent off by post to friends. Providing the weather is not too cold, or the post is quicker than seven days, they should be O.K.

An even better way of breeding Banded Rainbows is to set up a tank specifically for the purpose. A 40-litre (8.9 gallon) tank is a good size. If the eggs and fry are left in, it is a good idea to omit using gravel.

I sometimes use a power filter coupled with a spraybar. This, and the morning sunshine, usually ensures quick results.

I place the females in the aquarium first. They are always in good condition and have been fed with livefoods. I avoid using *Cyclops*, as the adults of this species will feed on the eggs and fry. I also try to use twice as many females as males, as courtship can be rough, sometimes fatal for the female.

I place the males in just at lights out. Hopefully, they will begin breeding at first light, among the Java Moss which I use as a spawning medium. I also keep a number of plant pots in my aquaria. These are filled with fine foliage plants and can be moved from tank to tank as needed.

I leave my fish in the spawning tank for five or six days, at the end of which I can usually see eggs hanging from just about everywhere.

Rearing the fry

The eggs will hatch out in about 5-7 days, the eyes and spine of the fry being visible before then. At this stage I switch off the power filtration as the tank must now be geared to produce infusoria.

There are as many ways to produce infusoria as there are aquarists. The problem is, that it is difficult to see if you have a good culture. I watch the stomachs of the fry for signs that I have a good stock of infusoria. If I have, then the fry's stomachs will be fat all the time. Because of the amounts of breeding of Rainbows that I do, I cannot wait for cultures to "make" themselves, so I collect my own from the wild. I feed the wild cultures a few drops of milk each and keep them brewing in an aquarium.

It is a good idea to place a strip of glass diagonally up the back of the breeding tank. An airstone placed at the bottom of this compartment will then circulate the water from the floor of the aquarium up to the surface. In a smaller aquarium a sponge filter without the sponge serves the same purpose. The reason for doing this is that fry will spend their first few weeks at the surface so the food (infusoria) must also be near the surface (the feeding of Brine Shrimps (*Artemia*) and micro eels is some weeks away).

No matter what you may have read elsewhere, the new born fry of any *Melanotaenia* are too small to eat Brine Shrimps. Therefore these early days are the most difficult. For the first few weeks the fry appear not to grow at all even when feeding on infusoria. It may not be until the fourth week that one will be able to feed larger foods and, because of this, the numbers of fry may dwindle from, say, 1,000 to 200 during this time.

I feed my fry on a very fine floating food, like *Paramacium* or make my own food, using vegetable flakes, trout pellets and freeze-dried bloodworm pulverised in a coffee blender.

When I begin feeding *Artemia*, I watch the fry carefully to see that they are capable of eating the newly-hatched larvae.

At this stage, I also begin to keep the aquarium floor clean. Using a fine siphon tube, I change only about 5% of the water each week.

By now the fry will be venturing to the bottom of the aquarium, so the sponge filters can now be put to work. The fry can also now be fed according to one's own personal style, e.g. sifted *Daphnia*, crushed flake food, etc.

The young fish should be around 10mm (0.4in) in length. I normally find half a dozen or so fry that are twice the size of the others; these will be my potential breeding stock for the future. I keep these, along with about 45 others, and cull the remainder.

After three months I increase the water changes. In the wild, *M. trifasciata* have a constant supply of fresh running water, and if the quality is allowed to deteriorate in an aquarium, the fish will be prone to a kind of ulcer along the lateral line region.

This problem does not occur with frequent water changes so I sometimes remove 75% of the water (until the fish are splashing and leaping around) replacing it with water which has stood for a few days. This will alter the pH from 6.7 to 7.2, but the filtration and bogwood will level the pH in a few days.

Young fish will begin to sex out at about five months, males being more obvious than females. Although this species will reproduce at around 10 months, it is best to wait until they are older. To get optimum results I breed them when they are between 18-30 months old.

I find that males which are older than 3 years tend to be excessively rough with the females and, since most of the eggs from such spawnings are infertile, I avoid using these old males altogether.

A young pair of *Melanotaenia affinis* — a species sometimes confused with *M. trifasciata*.





Bufo viridis, the Green toad. Females may reach 10cms (4in) in length. This species is reasonably common and, in Cyprus, can't be confused with any other amphibian.



Typhlops vermicularis. (Size to 35cms — 13.8ins) is a species of worm-like legless lizard which is well distributed around the Mediterranean countries, including Cyprus.

THE LAND OF APHRODITE

If you like reptiles and amphibians then, according to **John Skillcorn**, few places can be more rewarding than the beautiful island of Cyprus. (Photographs by the author)

When spring arrives in Cyprus, it is no half-hearted affair. Almost overnight, it seems, the whole island becomes covered by a blanket of flowers of all colours, shapes and sizes. The rain of winter (if there is such a thing in this idyllic land) slowly disappears, giving rise to luminous skies of a blue which can hardly be imagined, and which is only emulated by the brilliant turquoise of the crystal waters of the Mediterranean Sea.

The heat of the sun, although manifest even during winter days, begins to scorch the landscape, creating a heat-haze which shimmers in the distance, while the land slowly desiccates to a crisp golden brown. It is in this setting that we see the first awakening of the reptile life which is so abundant and varied on this now much-favoured holiday island.

I am one of those irksome Englishmen who delight in being able to say that I was there before it all became spoilt by the hordes of tourists which seem to cover every square foot of potential get-away-from-it-all places. So it was, then, that I landed on the island of Cyprus, serving Queen and country, while trying my best not to get sucked into the air-intakes of Lightning fighters and Vulcan bombers on R.A.F. Akrotiri. Seeing what happens to dicky-birds is enough to make you value your own life in a most appreciative way!

"UNINTENTIONAL" NATURE RESERVE

Akrotiri is situated on a peninsula to the extreme south of the island, and the air base occupies almost all of this area, being all but cut off completely by large salt lakes. Every winter, these are visited by huge flocks of the pinkest flamingoes. Furthermore, Akrotiri is an unintentional prime nature reserve. Because admittance is strictly controlled for obvious reasons, all sorts of animal and plant life flourish, protected completely from the interference of man.

However, many of the species of reptiles I saw on the peninsula could also be found in most of the areas of the port of Limassol, occurring in gardens, in the streets and even in the houses. What, then, may the tourist expect to see in the way of these animals during a flying visit to this lovely place?

CHIT-CHATS

I reckon that most people would remember the geckos more than any other, as they are abundant, obvious and amazingly vocal for such small animals. Geckos are lizards, often small, and many not only run up walls with alarming speed, but also have the bizarre ability to run across window panes and ceilings. Lamp-posts often have a group of these goggle-eyed acrobats sitting high up in the lamp-light during the warm summer evenings, waiting to pounce on the unsuspecting moths and other insects which blunder into the lights at night.

My mates used to call them Chit-chats, because of the noise they make when defending territories. By making tutting noises, I

was able to encourage them to descend, inch by inch, until they were only a foot or so away from me. This delighted me, kept the geckos out of mischief for a minute or two, and caused passers by to cross over the road, perhaps thinking that they would be next for my attentions.

These lizards also enter houses to prey on insects which are attracted to the lights at night, and provided me with much entertainment while having a shower after night shift. This species was *Hemidactylus noticus*, the Turkish Gecko, which possesses the typical adhesive pads on parts of the digits, enabling them to do the acrobatics which I have summarised above.

Some years ago I kept a small colony of these in vivarium in my school laboratory, until some helpful pupil removed the screws of the air-grill. Needless to say, the animals needed no further encouragement to make their getaway. The colony is still in existence, and my successor continues to report sightings occasionally. Escapees of fruit flies from genetics experiments, and other insects kept in continuous culture, keep them well fed, and they have access to the outside south wall through ventilators.

A second species, *Cyrtodactylus kotschy*, is common, but lacks adhesive pads, and is found at ground level, usually underneath rocks, although it may be seen out sunbathing early in the morning.

SPECTACULAR LIZARDS

The largest lizard I encountered was the Agama, *Agama stellio*. I have seen this spectacular lizard in two types of habitats — rocky coastlines with cliffs, and colonies living in old olive trees on the way up Troodos, the mountainous area of the island. There, they run across the road when you least expect it, leaving you speculating as to whether it was a rat or just the searing heat playing tricks with your eyes.

One I used to see regularly lived in an abandoned brick shelter, squeezing itself through holes in the bricks, just when I thought I had it cornered at last. Sneaky old devil — but it did come to accept my offerings of grasshoppers and locusts which I threw to it occasionally.

Next in size to the Agama was the Common Chameleon, *Chamaeleo chamaeleon*, a fairly frequently-encountered animal, although you could never find them when you were actually looking for them. They most often found you, when suddenly you would realise that you were being watched in a most curious fashion.

I usually discovered them in the yellow-flowered Mimosa bushes, but I do remember finding one crossing a road once, looking behind itself cautiously. Most people I knew had seen them from time to time, so I presume that they are common enough.

Snakes were there in abundance, but, unfortunately, I got good views of only a very few. One very special one was the species *Tropis vermicularis*. This one had been unearthed by a friend as he was digging his garden, luckily with a fork!

This strange reptile looks rather like a large earthworm, pink in colour with a



Agama stellio. Established in many parts of the Mediterranean, this lizard may be larger than 30 cms (12in) in length and cannot be mistaken for any other reptile in Cyprus.



Chamaeleo chamaeleon. Size to around 30cms (12in).

smooth, very shiny skin. This one was about a foot long and thin as a pencil. It had no easily definable head, but its little tongue kept popping out to show you which was the front. Various other snakes were brought to me now and again, but as I lacked good reference books on this subject, I tended to treat them all with great respect, and after a cursory examination released them promptly back to the wild. I saw snakes up to about four feet in length, but they remained shy and retiring creatures.

ELUSIVE AMPHIBIANS

The only species of amphibian I personally encountered was the Green Toad, *Bufo viridis*, which tended to materialise in the most unexpected places. Very attractive creatures, they afforded me endless hours of amusement as they sat waiting for the many insects which creep around after dark.

While walking through the orange groves at night, one can hear the deafening calls of tree frogs, although search as I might, I never actually found any, although friends assured me that they had seen them, and described them as typical Kermit in great detail. The calls were identical to those I have heard uttered from my own *Hyla arborea*, so perhaps, they are the same, or very closely related species.

Two species of skink were common. One was a diminutive individual *Ablepharus kizilbeli*, rather like a miniature British slow-worm with puny legs and fixed eyelids, often



Chalcides ocellatus, the Ocellated Skink, is well distributed around the Mediterranean regions, where it can sometimes grow up to 30cms (12in) in length, although in Cyprus it is usually somewhat smaller.

found underneath rocks in dry places. The other was much bigger, a species of *Chalcides*, probably *C. ocellata*, which could often be seen sunbathing in even the strongest sunshine. The smaller species, together with the multitudes of tiny baby lacertids (lizard-like animals) have been observed being preyed upon by the larger species of praying mantids which also abound on the island.

My time in Cyprus was richly rewarding and I would certainly recommend a visit to the island to anyone who would like to see a wide range of beautiful reptiles and amphibians at close hand... plus a great deal more, besides.

MONDAY
TUESDAY
WEDNESDAY
THURSDAY
FRIDAY
SATURDAY
SUNDAY

*A Week
in the
Life of...*

DAVID ALDERTON



After studying veterinary medicine at Cambridge University, David Alderton now works as an author, journalist and consultant, specialising in the fields of pet care and natural history.

MONDAY

The week starts with a bang at 7 o'clock as the postman knocks on the door. Among the items is a fat envelope from BEST magazine. I've been writing the "Animal World" page in this popular woman's weekly since it was launched in August 1987. It's now built up a circulation of around one million copies, and from the letters which I receive, it's clear that the magazine has many male readers as well!

Every Monday brings the letters addressed to me at the magazine. They cover a vast field, from the reader who was concerned about seeing camels mistreated in North Africa to an enquiry from a younger reader as to where cuckoos come from (I assumed this to be a geographical rather than biological question, and answered accordingly!). There may also be requests for further information about a subject which I have previously covered. This week, one reader wants to know where to obtain colour varieties of Discus, while another reader is seeking information on the Maine Coon Cat, having mislaid her magazine.

Since every week I always feature a selection of items which can be purchased for animals, ranging from cat litter to garden nestboxes, there are always mailings about new products from manufacturers and public relations agencies. Sometimes there are invitations to Press conferences. This week, these include details about Pet Chef's reptile supplement, and information about the launch of a book on British birds in London.

I start answering the letters, and dealing with other post before that unknown ingredient in my working schedule sounds: the telephone. I'm afraid that I'm fairly dyslexic when it comes to typing, even when using a word processor. But thankfully my long-suffering saviour, Rita, not only manages to read my scrawl, but transforms it into immaculate layout on the screen, often at very short notice. (Yes, she typed this as well, the night before going on holiday!) She calls to say that she's just finished a disc, which includes an article which is needed urgently by *Pet Business World* about a television programme on bird-keeping.

She lives nearby, and so I'm soon printing this out, before faxing it to the editorial offices in Kent. I suppose the fax is no more sensational than the telephone, but I still feel rather amazed as the sheets run through the machine, printing out at the other end almost simultaneously.

I spend the rest of the day writing a bird book. Having been immersed in animals since early childhood, I find the "exotics" area (for want of a better term) the most interesting. There's so many developments which have taken place in the care of birds, reptiles, amphibians and fish over the past decade. This also means there's no shortage of material to write about, either!

TUESDAY

Must go and check with the travel agents about the best routing to Uruguay for the CITES Animal Committee meeting. It doesn't seem the easiest place on the planet

to reach, and it's bound to be a long flight anyway. It turns out that I'll need to change planes in New York, before heading down to Montevideo with further stops in Brazil and Argentina. A fairly daunting 29 hours, but hopefully, I'll be able to sleep *en route*, and the time difference is just three hours here. A call to the doctor's surgery reveals that the vaccinations which I'll need aren't too bad — typhoid and a polio booster, and no worry about malaria.

CITES is the acronym for the Convention on International Trade in Endangered Species of Fauna and Flora, which regulates international trade in all forms of wildlife and wildlife products. Reptiles and birds feature more on the so-called "CITES appendices" than fish at present. An Appendix I listing effectively prohibits international trade, while Appendix II species are subjected to regulation, requiring CITES permits at the very least, if they are to be traded legally.

The Uruguayan meeting will consider a number of items likely to feature on the agenda later in the year, at the main meeting. About 100 countries are parties to CITES, and they meet at the so-called Conference of the Parties, held every two years. Here decisions are taken on the species' listings, and changes to the Appendices, among other mundane subjects such as CITES' budget! This year's conference will take place during October at Lausanne in Switzerland.

I've been asked to attend in Montevideo on behalf of PIJAC (the Pet Industry Joint Advisory Council, whose headquarters are in Washington, DC). There's a number of bird issues for discussion, and one concerning hard coral which is of significance to marine aquarists. Israel intend to propose that all such corals should be listed on Appendix II. But will their proposal meet the so-called Berne Criteria which need to be followed if a listing proposal is to have any credibility? There have been moves on this before.

It's interesting to see also that there will be a European proposal to list the Coelacanth (*Latimeria chalumnae*) on Appendix I. Apparently, this prehistoric survivor from the Devonian Period, thought until 1938 to have been extinct for probably 90 million years, is now being caught on a much wider scale than in the past. Part of the reason for this is a growing belief in the Orient that parts of this fish will help to prolong human life.

As preparation for the meeting, I spend the rest of the day going through minutes of past meetings, making notes and researching the agenda. It suddenly crossed my mind that I might need a visa — but it seems that with a British passport, this isn't necessary.

WEDNESDAY

After dropping elder daughter Isabel at school, it's down to the local station and off to London. Here I'm discussing the Fish World exhibition with Bob Paget, one of the organisers, and talking with Sam Hardy of TFH about other possible reader offers for the "Animal World" page of BEST. Every time I make this journey, it makes me realise just how lucky I am not to be a commuter!

Sam shows me the Nylabone range of

flying discs for dogs. These are great fun for the whole family, as well as the dog! We work out the details for the offer.

It's a slow journey back, and one of the chameleons is missing when I get home! We've a pair of Jackson's which live in the grape vine which occupies much of our conservatory area. Finally, I manage to find it. They're great characters, and although having a reputation for being difficult, they appear to thrive in these surroundings. Here there's plenty of space, and they can catch a wide variety of insects and spiders. Both factors appear to be important in maintaining them successfully. They'll drink from a pipette now, whereas previously, they would only take water droplets sprayed on to foliage. The Fire-bellied Toads (*Bombina bombina*) are also doing well. They're quite noisy during the breeding period, but unfortunately, their first spawning during the year has been unsuccessful.

THURSDAY

Proof-checking is top of the agenda today. Not my favourite occupation, because no matter how careful and diligent you are, there's always going to be something which you miss. This will then become immediately noticeable when you look at the finished book, and you wonder how on earth you could possibly have missed it previously! But since the advent of typesetting from computer discs, printers' errors are far fewer, so the task is easier.

Scientific names always need to be checked carefully. It usually takes at least nine months, and often a year or more, from delivering the text on disc or as a typescript, until the finished book is published — quite long enough for the taxonomy to be changed. But alterations at this stage are very costly, and can only be carried out if there is a really significant change required.

The afternoon takes me to Hastings, to visit Richard Newcombe of Beastly Things. One of the most innovative wholesalers in the pet trade, Richard tends to concentrate on practical and well-designed items, which, although not always cheap, are ideal for their purpose. We look at some of the fish which he has recently received in his adjoining pet shop. There's a nice range of coldwater fish, including a Mirror Carp with a somewhat unusual raised scale, which is projecting some distance away from the body, almost at right angles.

Richard's range of aquatic products is relatively small (he tends to specialise more in items for birds, dogs and cats at present), but there's useful brush sets for cleaning aquatic equipment, as well as breeding traps and hatching units. Plans are well-advanced for items which I'm certain will be of great interest to reptile enthusiasts, but I'm afraid that I can't reveal more as yet! You'll have to wait until later in the year.

FRIDAY

It's back to work early, preparing articles for BEST. I usually write a batch of two or three over several days. Many people think that because it's a weekly, writers submit their copy perhaps a fortnight in advance. In fact,



I am generally disappointed by the displays of lilies found in many shops. Few, for example, will stock the beautiful, small, yellow, *N. pygmaea* 'Helvola'.

I'm normally working between two or three months ahead.

My labours are interrupted by the arrival of a new book from TFH. It's John Dawes's *Book of Water Gardens*, which is certainly a lavish production, with a highly practical text. This is one of those subjects which is fairly topical however, and I need to schedule it as soon as possible. I don't think that it will have the same impact if I mention it in December, with snow on the ground! I break off to look at it. In fact, I always try to read books before including them on the page, so that I can describe them accurately and succinctly in the short space available. Environmental subjects seem to be increasingly popular among readers at present.

I usually spend Friday afternoon doing all those odd jobs which I've put off during the week, especially answering letters. It's nice to walk down to the Post Office at the end of the day, leaving an empty letters tray behind. This rather depends on what has happened during the week, however, as deadlines creep up on you. I find it impossible to plan the week's work strictly in advance, because I never know what's about to happen. It's so variable, which is part of the appeal for me. Although I do often work quite long hours, I don't get bored.

SATURDAY

I try to keep the weekends free to spend with the family, although I usually end up doing some work in a quiet moment. I'm lucky to have two daughters, Isabel who is now five, and Lucinda, who has just turned two. Both show enthusiasm for animals, although I'm careful not to force them in this direction. But Lucinda clearly enjoys feeding the fish, even if I have to restrain her enthusiasm, by measuring the food out separately first. She hasn't quite grasped as yet that they don't eat it by the containerful!

My main fishy passion is Black and Red Orandas. I think these are truly magnificent. Don't be put off by seeing those in aquatic centres which are a very insipid shade of yellowish-orange. Their colour will improve dramatically in pond surroundings. But do check carefully that they are not infected with fungus, especially around the head, with its embellishments. Unfortunately, it

seems impossible to purchase small fish of this variety and grow them on, while larger individuals are relatively expensive.

They'll certainly breed well in pond surroundings, however, although obviously, you'll not have such control as if they were spawned in tanks. My personal favourite is fish which have a black top half to their body, and fiery orange lower sides. Hikari are now marketing a special diet for Orandas, and I want to find time to see whether this produces a superior type of fish.

This afternoon, it's time to clear out the pond, and replant the lilies. It always disappoints me that many aquatic stores stock such a poor range of water lilies. But I managed to track down the double pink lily Mme Winifred Gonnerre, which I had only seen in photos before. It flowered last year, and it was a truly magnificent sight.

I've just received seed of the Blue Water Lily, *N. capensis* from a specialist supplier. I've long hankered after lilies of this colour, having seen them in the Botanical Gardens on the Seychelles. Isabel insists on planting the seeds, but promptly washes them out when she puts the pots in the tank. It's rather a disaster — she wouldn't soak the soil first! But ultimately everything works out. I wonder how long germination will take?

SUNDAY

Isabel's up early and helps me try out a new product which I've been sent for BEST. It's a very versatile and absorbent cloth. Aside from drying dogs and cats, it can also be used to remove water which a siphon has left behind at the bottom of an aquarium.

I'm surprised just how effective it really is! There's also the great advantage with a glass tank that you don't need to lift it up. Simply lay the cloth on the base, and it will soak up the water. You won't need to battle with paper towels, and it enables you to remove every drop.

Called *Moisture Absorb*, it should now be available from pet stores, but if in difficulty, contact Lorax Enterprises, Units 8c & 8d, Long Rock Industrial Estate, Long Rock, Penzance, Cornwall TR20 8HX. As a relatively new product, I haven't seen it in any aquatic stores, but it's well worth checking out. It must be the only towel backed by a year's guarantee, and a money back refund if you're not satisfied!

After lunch, we head out *en famille* to Washington in West Sussex, to see the aquatic centre here, as well as the garden centre and the newly-opened bird section, which together make up "Gardener's World". As you might have gathered by now, my wife Jacqueline, thankfully, shares my interests.

There's usually a good and varied selection of fish here, although I have to confess that on this occasion, we didn't buy any! Giraffe Cats and *Pseudotropheus* cichlids caught my eye. Then it's back home. On Sunday evening, we usually watch one of the nature programmes. After the rest of the family have gone to bed, I may then try to catch up on other programmes which I recorded during the week.

I wonder what next week will bring?

OUT AND ABOUT

Flying start at Aquarama '89

By John Dawes

I just couldn't believe it — neither could any of the other members of the British contingent attending Aquarama '89, Singapore's First International Fish and Aquarium Accessories Exhibition and Conference held at the World Trade Centre, Singapore, between 15 and 18 June.

Singapore has a small population as countries go — only some 2.6 million people all told. Yet, despite this, neither the oppressive tropical heat, nor the odd, violent thunderstorm, could do anything to dampen their incredible and insatiable enthusiasm for matters aquatic.

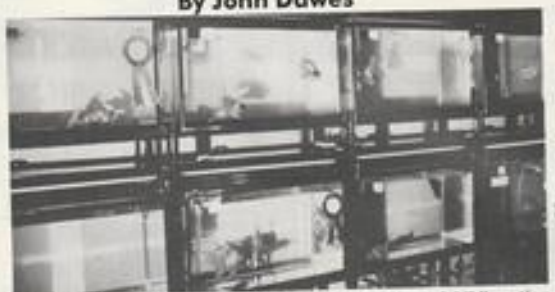
I have always been very aware the Singaporeans know and love their fish, but I wasn't really prepared for the overwhelming crowd of 50,000 or so people who thronged to the exhibition during its four-day stint. The queues waiting patiently to buy their tickets never seemed to diminish — they were just as long at noon as at 5.00 pm and when the doors closed at 9.30 each evening, the hall was still packed. A sight for sore eyes indeed!

The organisers, Academic Associates Pte Ltd., were delighted, of course. We would be ecstatic if even only a third of the Aquarama total graced one of our shows in this country.

Added to the 50,000 enthusiasts were hundreds of trade visitors from all over the world, gathered in Singapore for this first-ever totally aquatic trade/public exhibition.

I kept a tally of all the friends and contacts who I met during the four days and they really did confirm the truly cosmopolitan nature of the event. But the end, I had spoken to people from Britain, Ireland, Finland, Germany, Switzerland, Holland, Spain, Italy, Israel, South Africa, Colombia, US, Hong Kong, Japan, Australia and, of course, Singapore itself.

In total, there were some 66 trade booths which, at first sight, may not sound too impressive — at least, not until you take into account that they were all aquatic and that many potential future exhibi-



Part of the Pearlscale and Highhead Pearlscale (Hamanishiki) section in the fish competition. Note the large size of the display tanks.

tors were "just taking a look" this time. Talking to some of these over the four days, I was left with the distinct impression that most, if not all, will be back in two years' time, many of them progressing from "looker" to "exhibitor" status.

OFI was there in force, of course, adding yet another dimension to an already diverse scenario. Their meeting, as ever, included a great deal of discussion, in-depth debate and straight talking. As an outsider who is often lucky enough to be allowed the status of observer at such meetings, I have to state, yet again, how impressed I am at the way that the organisation faces up to the multitude of difficult problems that confront the industry. Where would we be without it?

With a new, energetic Secretariat, backed by a wealth of international talent, OFI once more seems set to make very significant strides in the near future.

However, back to the show itself.

Not only was there a wide array of hardware, books, foods, etc., on display, but also a good selection of fish and plants, both in the booths themselves and in competition.

Judging, as ever, was incredibly difficult, especially since we had to complete our job in a mere two hours of brain-draining hectic activity.

The Discus, in particular, were quite outstanding, in my opinion. So were the best of the Fancy Goldfish. To me, though, the most extraordinary fish of all was a pair of large *Leptobotia*

elongata — deserved winners of the Rare Species category. Not surprisingly, these great fish were quickly snapped up by an eagle-eyed and enterprising European importer.

The three-day trade conference that ran alongside the exhibition was generally well attended; the hobby lectures less so, probably as a result of their relatively high price tag.

Nevertheless, those members of the public who attended our sessions gave us very enthusiastic support. I know I speak for my co-lecturers (who included, among others, Hikari's Shigezo Kamihata, Sri Lanka's "unofficial" aquatic ambassador, the effervescent Rodney Jonklaas, and *Aquarist & Pondkeeper's* coldwater specialist Stephen Smith) when I say that the courtesy, interest, and encouragement shown to us by the Singaporeans are deeply appreciated... not to say anything about the uplifting effect they have on one's ego!

A "Technical Visit", incorporating a tour of some of Singapore's leading fish farms and exporters, proved very popular during the last day of the exhibition and provided overseas members of the aquatic trade with yet another set of opportunities to meet with both their established suppliers as well as with potential new ones.

A sumptuous evening pool-side buffet hosted by the exhibition's "official airline", Singapore Airlines, highlighted by short, but very apt and good speeches, rounded off a most enjoyable and fruitful Aquarama '89.

The first show of any kind is a particularly nerve-wracking experience for all concerned in its organisation. For Academic Associates Pet Ltd., there was an additional factor — this was their first-ever aquatic exhibition.

My discussions with them on the day after the event proved most encouraging indeed. Not only were they fully aware of the many good points of this year's show, but they were also equally conscious of the refinements and alterations that will need to be implemented before the 1991 exhibition.

This, in itself, is very good news indeed, since it shows that the organisers have not been carried away with their obvious success, but have their feet firmly planted in the real world, something that augurs well for the future of this fledgling event.

I think that Academic Associates, supported by SAFEA (the Singapore Aquarium Fish Exporters' Association), Singapore Airlines, OFI, the Singapore Tropical Fish Breeders' Association, the Singapore Aquarists' Society and the country's Primary Production Department, did exceptionally well in running this year's show as successfully as they did.

They can also take heart from the enthusiastic response of both the trade and general public, while those who missed the exhibition this time round should make a note in their 1991 diaries. The second exhibition promises to be an even better, bigger and more successful one, and shouldn't be missed by anyone connected with the aquatic industry.

Singapore's Parliamentary Secretary, Lee Yick Seng, welcoming delegates to Aquarama '89

JOHN DAWES



LONDON ZOO AQUARIUM DAY

On Saturday 15 July, an Aquarium Day was held in the Zoological Society Meeting Rooms.

The programme started at 2pm with a lecture by London Zoo's Dr Chris Andrews called 'Sharks, Shamu and Scabase Alpha.' Slides were shown of the Public Aquaria and Theme Parks in the USA that Chris had visited on a fact-finding tour earlier this year. He was very impressed with the professionalism and high technology used at each Centre and how education has become entertainment.

The latest seawater exhibits contain totally artificial reefs because coral and living rock is no longer used, to help preserve their natural habitat.

A dramatic 45 minute sound and colour *Survival* (Anglia TV film) showing deep sea research into shark behaviour followed.

After coffee, Dr. David Pool of Tetra lectured on water quality with a slide talk entitled 'There's more to water than H₂O'. Amusing caricature slides were used to illustrate the importance of parameters such as temperature, ammonia, nitrite, pH, hardness, and chlorine.

The marked effect on the colour of Neon Tetras was shown with the fish in neutral,

high hardness and in low pH, low hardness water. David also showed how water quality was related to diseases.

Dr. David Ford of the Aquarian Advisory Service then talked about 'Fish, Flakes and Feeding'. He showed slides of the new Thomas's factory at Birstall Yorkshire and the technology used to produce the 'Aquarian' flake food range.

The development of the flake food was then described with slides covering the period 1973 to 1989 showing the research undertaken in the Aquarian Laboratories.

The three experts then had a question and answer session, helping the audience with aquatic problems that ranged from how to cure Hole-in-the-Head disease to the merits of flake food over pellets.

The time was then 6pm and the Zoo was officially closed so visitors were able to have a private behind-the-scenes tour of the Aquarium. Zoo staff were on hand to answer questions.

The audience totalled 240 visitors from as far afield as Hull and the Isle of Wight and included several Aquarium Societies such as North Bucks and Swindon. All agreed it was very interesting and therefore successful day.

NEW WATER DECOR OUTLET OPENS

Water Decor is a new chain of aquatic retail centres.

There are five located in the southern region including Bristol, Plymouth, Langstone (S. Wales), West Hagety (W. Midlands) and Hampton-in-Arden (E. Midlands).

They all offer a complete service, including water gardening equipment, tropical, coldwater and marine fish, together with a full range of aquarium products, cabinets and accessories.

In addition each site hosts a spectacular display of 'Henri Studio' fountain ornaments in action.

Water Decor is building its reputation on customer service backed up by a team of knowledgeable and friendly staff.

The Bristol centre is Water

Decor's premier site and main base. Established five years ago, it offers a spectacular layout of displays and makes a great day out.

The official opening of the Hampton-in-Arden outlet (at the Jardiniere Garden Centre) takes place on 9 September when *AGP* editor John Dawes will be on hand to meet visitors and discuss their aquatic problems between 11.00 am and lunchtime (see advertisement in this issue). Official openings of the Plymouth and S. Wales centres will take place later in October.

The ultimate objective of Water Decor is to create a chain of retail centres where the customer can be guaranteed quality, reliability and sound professional customer service.

OUT AND



AIRPORT AQUARIA SHOWS THE WAY

by Dick Mills

The next time you're jetting off from, or arriving at, Heathrow Airport make a note of the easily-visible landmark of the Post House Hotel just north of the airport. Nestling right in its shadow is Airport Aquaria, a very worthwhile and easy diversion either for any fish-minded air-traveller or for the more permanently-grounded hobbyist — it's easy to reach from the M25 too.

There are three major display areas — the outside coldwater section featuring high-quality plants (pick your own) and fishes, backed up by excellent informative signs which guide purchasers into making the correct choices for their pond requirements.

Inside, there is a well laid out dry goods shop (again, with excellent information), and two main fish halls for tropical freshwater and marine species.

A simple idea of allowing the tank lights to shine through "price-windows" in the fascia panel means that there is no hard-to-see, felt-tip pen scribbles on the glass fronts to decipher. The ultra-quiet air supply to the tanks made a pleasant change to other more noisy venues!

"Well-organised" is probably the overall impression most visitors get, and this will be borne very much in mind with future developments. Tropical rooms are to be extended by some 600 sq ft to allow a triple expansion area for marines, and a central island Anglo-Aquarium plant display will

give a more open-plan effect, allow easier "customer viewing", and also cut out the current labour-intensive "plants-in-tanks" displays which now handle up to 3,000 plants each week!

Another sensible, already well-practised, feature is the indication, on fish tanks containing more "exotic" species, of the pH of the water; a recently-installed Interpet Professional Water Guardian system has allowed new species to be accommodated quickly (and without stress) in water closely approximating in quality that of their original conditions. Depending on species, eventual transition to local tapwater is made by the simple expedient of a bag of gravel being suspended in the tank to harden up the softened water over a lengthy period of time. Discus, for example, are kept in a "halfway-house" set of conditions for ease of further acclimatisation by purchasers.

Throughout the company, the accent is on responsible, constructive advice, so that the novice customer, in particular, can be sure of getting off to a safe start with few of the disappointments which normally result from haphazard and impulsive buying.

You can find Airport Aquaria at Heathrow Garden Centre, Sipson Road, West Drayton, Middlesex (Tel: 01 897 2563).

There's only one snag — dally too long and you might miss your flight!

ABOUT

NISHIKIGOI '89 — HERE'S TO '90, '91 ...

BY John Dawes

Bingley Hall, near Stafford, is a superb, spacious and accessible venue for a Koi show ... or any fish show for that matter.

Nishikigoi '89 was only the second dealer-organised show of its kind, yet there are signs that it is already becoming an established event in the minds of UK Koi-keepers. In fact, there was even a sprinkling of overseas visitors, including one from as far away as South Africa.

Koi-keeping — as we keep being told — is probably the fastest growing sector in aquatics, and the signs at Bingley Hall were that this claim is not far off the mark. It's difficult to imagine a show for, say, barbs, or loaches, or even some of the more popular types of fish like

livebearers or cichlids or even goldfish themselves — much as I love all of them — attracting several thousand visitors from all corners of the UK. Yet this is precisely what happened at Nishikigoi '89. The trade also responded magnificently with stands of all shapes and sizes taking up most of the available space.

As for the fish, well some just had to be seen to be believed ... and they were all gorgeous.

One thing that distinguishes this type of show from any other is that the competition is between dealers, rather than hobbyists, and that the competing fish are for sale! Mind you, not everyone I know would be itching to spend over £25,000 on the best of the fish on show! Still, there were plenty of other fish, bonsai, books, hardware,



Business was brisk — and the fish were good at Nishikigoi '89.

memorabilia, equipment, food, ornaments — and just about anything else you could think of that could be intimately or peripherally linked with Koi — on offer.

And (great to see), our own Nigel Caddock and colleague Greg Peck, were doing brisk business taking subscriptions for their brand-new Nishikigoi International magazine (re-

viewed in the June issue of *A & P*). Good luck, chaps!

I had a great time at Nishikigoi '89 and am really looking forward to next year's event. If you haven't been to this exciting show, make sure that you make a date to go next year. Chances are, you won't be able to resist getting hooked (sorry!) on Koi ... in the nicest possible way, of course.

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Seaview



by Gordon Kay

Letter from Italy

I received a very interesting letter in June from Italy. I was a little gobsmacked as I was beginning to think that *Seaview* wasn't even read in the UK, let alone in Naples!

The letter was from John Sprague, a name which struck a chord in my memory. On reading further, I realised why I knew the name — John was one of the early pioneers of the BMAA when it was formed back in the early 70's. (Get on with it Gordon!) Anyway, John's letter compared the state of the hobby as it is today with when he started, 16 years ago, and also compared marine aquatics in Italy with Britain (he left to settle in Italy some three years ago).

John said that, in the early days, most marine aquariums were run solely with "high turn-over" undergravel filters, powered by air pumps. Hobbyists were reasonably successful thanks, mainly, to Graham Cox.

Graham, as most of us are aware, was the first real force within the hobby in the UK. He was the first to recognise the possibilities of the undergravel filter systems being used by freshwater aquarists and he adopted the principle for use in seawater tanks. His company, Seaquariums, was also the first (I think) to market remedies and water treatments especially for the marine aquarist.

John said that, at the time, protein skimmers and ultra-violet sterilisers were so expensive that most just

couldn't afford them and powerheads weren't invented. He went on to say that aquarists in Britain are so lucky to have such a fine selection of equipment, books and food, etc, and that he thinks the Italians are now at the same stage Britain was 25 years ago.

I have to admit that I found that last point somewhat surprising. I have heard it said many times, that Britain is five years behind Germany and five years ahead of America (which I don't totally agree with) but 25 years ahead of Italy, well. This seems unbelievable when one considers that some of the finest equipment available in Britain comes from Italy.

Is not Italy in the EEC? I would have thought that ideas and products from Britain, Germany AND America would have found their way into the country by now.

Anyway, thanks for the letter John; I enjoyed it immensely.

Some whales facing extinction

Some species of whales are closer to extinction than was first thought, say the International Whaling Commission.

For the last 10 years, a team of counters has been cruising the Antarctic trying to spot whales. From the number of sightings in any one area, scientists can estimate how many whales there are in the Antarctic.

Their report says that Blue

Whale numbers are now down to less than 1,000, whereas it was thought that there were twelve times as many. Despite the fact that the hunting of rare species has been banned for some time, it would seem that their numbers are still not increasing.

Now, when reporting on such matters, I usually get onto my soap-box, but I only have one thing to say about this latest statement. Tragic.

Snippets

1

In estuaries, oxygen levels in both sediments and the overlying water are generally low. During the hours of daylight, however, local pockets of supersaturation may exist in *Zostera* beds as a result of the intense photosynthetic activity.

2

Cuttlefishes (*Sepia* spp) are Cephalopods, and are therefore related to the Octopus. They have superb vision, with eyes structured very much like human eyes. They also have a wonderful way of escaping predators. They turn very dark in colour and then emit a blob

Puffer Fishes can exude potent poisons — often when they are alarmed — and should therefore be handled with caution.

of ink which looks for all the world like the Cuttlefish, leaving the enemy lunging at the "blob" as it (the Cuttlefish) swims off (very quickly!).

3

Most Corals consist of a colony of polyps united by a skeletal framework, but Mushroom Coral is a single, very large polyp which, as an adult, lies loose on the surface.

4

The amazing Flashlight Fish (*Anomalops katopron*) has a light organ under its eye. This is a large "gland" made of parallel tubes which contain luminous bacteria. The bacteria get their food from the fish and provide light in return. Muscles can turn the light organ down into a black-lined pocket and the light is turned on and off every five or ten seconds.

5

We all know about the cleaning activities of the Cleaner Wrasse (*Labroides dimidiatus*) and Cleaner Shrimp (*Hyppolytina goshawii*), but Banded Coral Shrimps (*Stenopus hispidus*) are also cleaners. This Shrimp has developed a unique nocturnal cleaning role, often walking over sleeping fishes, picking off parasites.

6

The Valentine Pufferfish (*Cardigaster valentini*) is one of the most poisonous of all marine fishes. It possesses a powerful nerve poison called Tetraodotoxin (from which the whole family of Tetraodontidae gets its name) which causes death to predators, and possibly, even humans.

The Leatherjacket (*Parulatus prionurus*) is not in the least bit toxic and yet it looks so much like the Puffer that only the dorsal fin distinguishes the two species. By imitating the Puffer in this way, the Leatherjacket gains protection from predators who leave it alone for fear of being killed. Mimicry is common on the reef for reasons of obtaining food or protection.

Until the next time . . .



LYNET CHURCH PHOTO

News

Come and meet A & P at Zoologica

ZOOLOGICA is the only event of its kind in the world, as nowhere else does a comparable exhibition welcome the naturalist, the pet keeper, the serious animal breeder or — most important of all — the person who just likes animals. This "one day out" in rural Sussex offers those who are interested in animals a similar diversity of exhibit to what the great flower shows, such as Chelsea and Southport, put before the botanically-minded.

Most of the exhibits are in the Abergavenny Building — one of the largest "rooms" in the south of England — so bad weather presents no problems. The catering is good and the parking free.

There are living wild species and unusual domestic varieties in profusion, trade stands, displays, demonstrations and competitions of all kinds. Exhibits at the last ZOOLOGICA ranged from a Butterfly Farm to rare domestic cats, in addition to stands staged by societies whose interests range from aquaria to tropical birds.

At ZOOLOGICA one can handle a tame snake or ride a horse, listen to the commentary accompanying a parade of rare farm animals, ask any of scores of experienced stock-keepers for advice, or buy a pot of honey, a specialised nest-box or a book on natural history. It's a day for meeting old friends and making new ones among hundreds of fascinating and beautiful animal species, so it's small wonder that with each successive year the number of visitors attending ZOOLOGICA from all over the country increases. In fact at ZOOLOGICA '88, most of the commercial exhibitors said their takings were double those of the previous year.

Aquarist & Pondkeeper will be having a stand at this year's ZOOLOGICA. Pop in to see us on Saturday, 2 September 1989 at the South of England Showground, Ardingly, Sussex, just four miles north of Haywards Heath on the B2028.

Twickenham schoolboy reaches Toshiba finals

At a ceremony held at The Innovation Centre, Design Centre, Haymarket on 25 July, David Allsopp, 16, of Hounslow Road, Whitton, Twickenham was announced London & Home Counties regional finalist in the school category of the national Toshiba Year of Invention Competition, administered by the Design Council. His potentially winning invention is a device to help breeders and aquarium owners monitor water temperature and levels to safeguard tropical fish.

At the ceremony Ian McNaught-Davis, TV personality and chairman of the Toshiba Year of Invention judges, presented David with prizes of a Toshiba T1000 laptop computer, a Toshiba VHSC video camcorder and a financial award to help develop his invention for the national final judging in December.

David, a pupil at Whitton School, designed his "Aqualarm" device for his GCSE technology project. The idea came to him after seeing his father experience problems with wrongly heated water in his tanks. "Leaking aquaria, or wrongly adjusted tank thermostats, can kill valuable collec-



tions of tropical fish and ruin breeding programmes, which is distressing and costly," he says.

His invention consists of a control box with warning lights and a buzzer, and sensors which monitor water temperature, giving a warning if it gets higher or lower than the set limits, or if the level drops. The limits are adjustable, to suit a

range of owner/breeder requirements.

David has built a prototype "Aqualarm" as part of his exam work, under the guidance of craft, design and technology teacher, Ian McLintock, who suggested David's monitoring system to be entered for the Toshiba Year of Invention.

There are 21 regional finalists, chosen from nearly 3,000 entries, with the national winners being announced in February 1990.

The Toshiba Year of Invention, now in its second year, offers total prizes valued in excess of £100,000. National category winners will receive £5,000 plus a new Toshiba satellite receiver and dish; second in category receive £2,500 and third, £1,000. The overall winner also receives £10,000 and the choice of a twelve day trip for two to Japan and the Far East or a Toshiba T5100 desktop 386 computer.

For further information please contact: Rosemary Vaux, Ravenstone Public Relations, 14 Verwood Road, Harrow, Middx HA2 6LD. Tel: 01 428 8880 or Jeremy Watkins, Design Council, 28 Haymarket, London SW1Y 4SU. Tel: 01 839 8000.

Ponds need help urgently

On 22 July, Richard Branson launched The Wildfowl & Wetlands Trust's new nationwide investigation, 'Pondwatch', at the Trust's Centre at Slimbridge. The vital information collected by this scheme will be helping the Trust to protect wetlands by creating a register of the location and health of the country's ponds. 'Pondwatch', sponsored by Shell Better Britain Campaign and supported by WATCH (the junior wing of the Royal Society for Nature Conservation), gives the whole community the chance to improve its own environment, and to help reverse the loss of

ponds and canals by observing and saving their plant and animal life. More than half of the ponds in Britain have been destroyed in the past 100 years, and many that remain are neglected and polluted. In the Huntingdon area alone, 99% of the frog habitat has disappeared since 1930.

Everyone can play an important role in reversing this trend by taking part in 'Pondwatch' and adopting a pond or a stretch of canal. Groups taking part will receive a free 'Pondwatch' pack which gives instructions on how to survey a pond or canal to discover the plant and animal

life it supports. The pack also includes two full-colour wall-charts, a booklet about the natural history and ecology of ponds, and a 'bug dial' to help with identification.

All discoveries made by 'Pondwatchers' will be incorporated into the National Wildfowl and Wetlands Register that is going to be compiled by the Trust.

To join 'Pondwatch' and receive the free 'Pondwatch' pack write to: Doug Hulyer, Head of Education, The Wildfowl & Wetlands Trust, Slimbridge, Gloucestershire GL2 7BT.



PETER BERNAS

Bubble Coral (*Plerogyra simplex*) requires a certain degree of water turbulence for long-term survival.

THE LIVING ROOM REEF

Part 3

In the final instalment of their three-part series, Peter Bienias and Jane Tabern of Aquatic Design take a look at various aspects of stocking a "living reef"

First STEPS

Over the past few months the series has dealt with the basics and the behaviour of corals in a miniature reef, but maintaining this environment is probably the most difficult task for the hobbyist.

This is an uphill struggle from the word go, for it has been estimated that, even if one were physically to remove a section of a natural coral reef and place it in an aquarium, at least 1/3 of that section's contents would be left behind and therefore a total environment has not been created.

Further, the artificial salt water provided for the hobbyist is of a "sterile" nature, lacking the life-sustaining food chain. In fact, the only "natural" life source is played by the living rock.

With this data in mind we set about the task of maintaining the reef environment in a thoughtful and logical manner, with "special" consideration given to the correct selection of fish and invertebrates.

The replacement of the food source was achieved by the addition of commercial products, religiously sticking to the manufacturers' recommendations.

Observation of the coral's reaction to its "maturing" environment is probably the best way of checking if things are going in the right direction (this is where the progress chart discussed in Part 2 is useful).

The balancing of the environment, i.e. specific gravity, pH, nitrite, nitrate and ammonia content, needs to be monitored, as well as other general maintenance parameters, such as water changes and harvesting of the algal growth. All these should be continued on a timetable basis because this is where the long-term problems can originate from.

There is one other issue which, if not controlled, can lead to severe problems, and that is purchasing the right inhabitants. This is not just restricted to fish and invertebrates; buying the incorrect corals and sponges can be "unforgivable", mainly from the inhabitants' point of view.

FINDING COMPATIBLE SPECIES FISH

The listing of fish for compatibility in a coral community is not our idea of "assisting" the hobbyist in selecting inhabitants for their particular aquarium. We believe that, from the point of view of fish selection, every fish has its own characteristics. Obviously there are guidelines and laws of sensibility, but fish can act in a contradictory fashion to these guidelines.

The fish that we have in our experimental miniature coral reef referred to in this series are: 2 Mandarins (*Syngnatus splendens*), 2 Maldives Silver Bellied Wrasse (*Halichoeres* sp.), (both these species of fish readily spawn in the aquarium), 1 Clown Sweetlip (*Plectrohynchus chaetodonoides*) and 1 Royal Gramma (*Gramma lorea*).

All these fish, we have found, have an excellent temperament for a coral community.

That is as far as we want to take it regarding fish selection. There are many compatible species but we believe it depends upon the environment you "truly" want to create. Just bear in mind that your fish can quickly devour months of good "growth" on your living rock.

We feel a way of combating this is to be extra-careful when selecting, and by putting fewer fish in than normal.

A good book on the subject is: *Fishes for the Invertebrate Aquarium*, by Helmut Debelius — distributed by Tropical Marine Centre.

INVERTEBRATES

Invertebrates are sometimes automatically considered as a compatible choice for the miniature reef system.

However, quite a few species do have an incompatible side to them.

Crabs

Unless they are to be used in a symbiotic union, then the majority of crab species can turn out to be more of a handful than the hobbyist may realise.

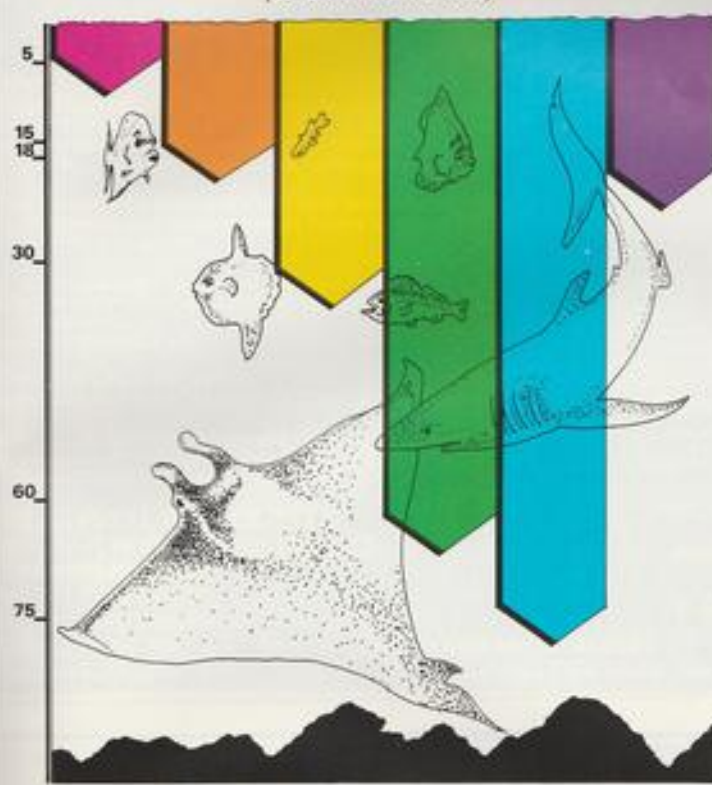
During the day-time hours, the crab will retire to its hide-away, or secretly scuttle about the aquascape. It is during the night-time period when the crab then becomes a problem.

These midnight raids can leave the poor hobbyist heartbroken when (s)he awakes to find the tubeworms disappearing one by one, or that the starfish has only four legs! Spielberg said, "Gremlins shouldn't be fed after midnight!"

Shrimps

Not as treacherous as crabs, they can sometimes be more of a playful pest. Many a time we have seen shrimps trampling across the coral heads to collect as much food as possible before the fish eat their fill; at other times a shrimp may take a liking to the byssus section of a clam (the "threads" located at the base part of the clam).

LIGHT PENETRATION IN SEA WATER (SHOWN IN METRES)



This totally annoys the clam which decides to remain half closed, and the hobbyist hairless because (s)he can't catch the shrimp.

A suitable book on shrimps and some species of crab is *Armoured Knights of the Sea* by Helmut Debelius — distributed by Tropical Marine Centre.

Starfish

This invertebrate is virtually trouble-free except for the possibility of losing one or more of its legs. It does have the ability to re-grow the lost leg, but it can take some time.

Select one of a reasonable size, 2-3 inches (5-7 cm) across the legspan, and not something that looks as though it has just crawled in way out of a Jules Verne novel. Also, anything smaller, more than likely, will become easy prey. The varieties we favour are the *Fromia* species.

Clams

The subject of keeping clams in captivity, as with every species that man holds in captivity, either for scientific or pleasure purposes, is under review again. Without going into a lengthy discussion concerning the rights and wrongs of clam importation, we shall stick to the job of trying to cater for the mollusc's upkeep... if you are lucky enough to purchase one, that is.

The environment we created for the clam in our reef system was to situate the clam near some gentle water movement, with a good light source and space for it to move about.

At times the clam altered its position slightly so that the "stream" of water hit it side-on. It is also free from torment, which we feel is important.

Sea Urchins

Aquarists sometimes feel the answer to algal problems is the purchase of a sea urchin. This is not necessarily the case because they very rarely eat the problem algae, i.e. "hair grass" or algal mats (red and brown types).

We found it is the encrusting algae that are the main attraction for the sea urchin. If an algal problem has already arisen, then it is more of an environmental problem and a look at the whole system, i.e. lighting type and duration, filtration, water quality and movement, etc. might prove more beneficial.

CORAL COMPATIBILITY

In Part 2 of this mini series, we dealt exclusively with corals. Now we would like to complete this section with a few brief comments on coral compatibility.

When selecting corals and sponges finding out about their light requirements and water movement requirements is impor-

tant. By doing this you will be able to imagine the surroundings you need to create for the species. For example, some corals and sponges require considerably less light than others. Therefore, in the average home aquarium, problems can occur in having corals that need plenty of light with corals that don't need as much light, because the penetration of light won't vary as much in an aquarium as it would on the reefs.

The accompanying figure gives some idea of light spectrum penetration in "clear" sea water (clear meaning no suspended matter, i.e. sand disturbance or dense planktonic growth, etc.).

At 0-5 metres (0-16 ft) the visibility is like viewing from the surface. At 20 m (66 ft), a red or orange colour looks black and the only visible colours are yellow and violet/blue. Below 30 m (99 ft) everything appears shades of blue; this is what gives the sea its colour characteristic.

Taking this into consideration, and the fact the corals live at a variety of depths and places, i.e. on slopes, under overhangs, in caves, etc., it is easy to see why all corals don't appreciate high-intensity lighting.

An example of this in our system, was when some corals were placed in our "normal" aquarium conditions. They appeared to do well for the first few weeks, as all healthy corals do. Then, they began to show signs of disapproval, so they were transferred to one of the nursery aquaria, where the light intensity was altered.

The situation was monitored and the corals appeared to respond more favourably to this. The interesting point to this is that all the species had one thing in common, i.e. they were the "red"-coloured coral and sponge varieties. (Sponge are also growing under these same conditions in our aquarium.)

Light intensity can also bleach corals. Journal reports describing light effects on corals have shown that corals taken from deeper waters and placed in shallow waters suffered from reduced growth, algal bleaching and high mortality.

With these few thoughts in mind the selection of inhabitants for the miniature reef is not as straightforward as it seems. Again, it revolves around the issue, "what aquatic scene do you REALLY want to create?"

Unfortunately, the ideal artificial environment, as far as the hobbyist is concerned, is still somewhere in the future, but it will arrive.

We still believe that looking at your aquarium and comparing it to the natural reef as a whole, and not in individual categories, and by providing as natural an environment for the inhabitants as possible, is the way forward when building a "living room" reef.

Further Reading

Marine Invertebrates and Plants of the Living Reef, by Dr Patrick L. Colin, published by T F H Publications, Inc.
The Interpet Encyclopaedia of the Marine Aquarium by Dick Mills, published by Salamander Books Ltd.

Spotlight on *Catfish*

CORYDORAS LATUS

Pearson 1924

Dutch aquarist Peer Koppelaar introduces a brand new and extremely attractive *Corydoras* catfish

(Photograph: Arend van den Nieuwenhuizen) (Translated by Mary Bailey)

It appears that a few rare *Corydoras* species have recently been imported into Europe. I, myself, have seen these, among other species, in shops in Germany and Belgium. They derive from importers in Holland, including the world-famous Ruinmans, and from Heiko Bleher of Aquarium Rio in Germany (best known for his expeditions).

These armoured catfishes include such species as *C. caudimaculatus*, *C. sterbai*, but, above all, a species with bright green and brown coloration, which I had never seen before in my life. The dealer called it *C. latus*, but this name was quite unknown to me. I bought six and took them home.

By chance I had the book *A Complete Guide to Corydoras* by Dr W E Burgess. After I had checked through the other literature in my bookcase without success, I finally looked in this book and, on page 80, found a photo by Dr Herbert R Axelrod with the caption "*Corydoras latus*".

Fish of a different colour

But the picture was of a quite different fish. This had a beautiful bright plain green coloration on the upper half, while the belly was clear red-brown. This therefore did not resemble the fish I had purchased at great expense as *C. latus*, and which I had placed in an aquarium whose substrate consisted of a layer of black-brown sand, with a few pieces of bogwood, covered in Java Moss (*Vesicularia dubyana*). The water surface was covered with floating Hornwort (*Ceratophyllum demersum*) which created partially diffuse lighting in the tank. The tank size was 150 x 50 cm (c 60in x 20 in) so that the catfish, a group of six specimens, had sufficient room to spread out round the tank.

Their tankmates were a group of eight *C. robiniae* and eight *C. reticulatus* (both members of the *poncatus*-group), so that these three species, with regard to colour, made a fine combination. The middle region of the tank was the domain of a group of 10 *Coelacanthus tenuis*.

When I purchased my unknown catfish I noticed that there were differences between individual fish which might perhaps be

sexual dimorphism. The colour photo by van den Nieuwenhuizen clearly shows these differences.

In specimens of some 7 cm - 2.75 in (full-grown?) - the supposed females are somewhat more compressed and deeper-bodied. The green spots on the body are clearly somewhat smaller, more numerous, and generally have a rounder shape. The lower half of the body is clear red-brown and on the belly are long vertical spots with a darker surround. The dorsal and anal fins both have a spotted, partly dark, striped marking on the posterior part. The fin rays are dark brown. The anal and ventrals (pelvics) also have dark markings. The ventral profile is straight as far as the anal fin but then makes a sharp upward angle towards the caudal.

The supposed males have much larger green markings. The spots are larger, variable in shape, and extend to the underside of the belly. But although they are larger and more irregular, they are the same colour as those of the "females". The dorsal and caudal fins, as well as the pelvics, have only faint markings at their bases, but are more clearly marked further out. The supposed males are also more slender in form and the angle at the anal fin is less pronounced than in the supposed females.

As I skimmed through Burgess's book looking for a picture resembling my new purchases, I found two photos of *C. undulatus* on page 100. The upper, by Dr Burgess, showed a dark-spotted animal, which, in general, did not resemble mine.

The lower, by H J Richter, showed a very dark catfish with, here and there, green spots like those of my fish, but much smaller. The caption read "*C. undulatus* showing two variations in colour pattern. The above individual has less solid body colour and more pattern on the caudal base".

This discovery proved interesting when, not long after, I spoke to van den Nieuwenhuizen and asked him if he knew anything about the matter. It transpired that he had photos and several were clearer.

The *C. latus* pictured on page 80 of Burgess's book were sent from South America

with the green-spotted catfish, purporting to be the females of the latter species. This would have been the first known case of such marked sexual dichromatism in an armoured catfish species.

In an aquarium shop in Germany these fish were being kept in a tank with *Brochis brinzi* and were being sold as *Brochis brinzi*. They do, indeed, resemble that species in colour and body form. But, on closer inspection, one observes immediately that there are two species involved, as *Brochis* has a long dorsal fin, while this is short in *Corydoras*. The question was therefore, "What is what?"

True identity

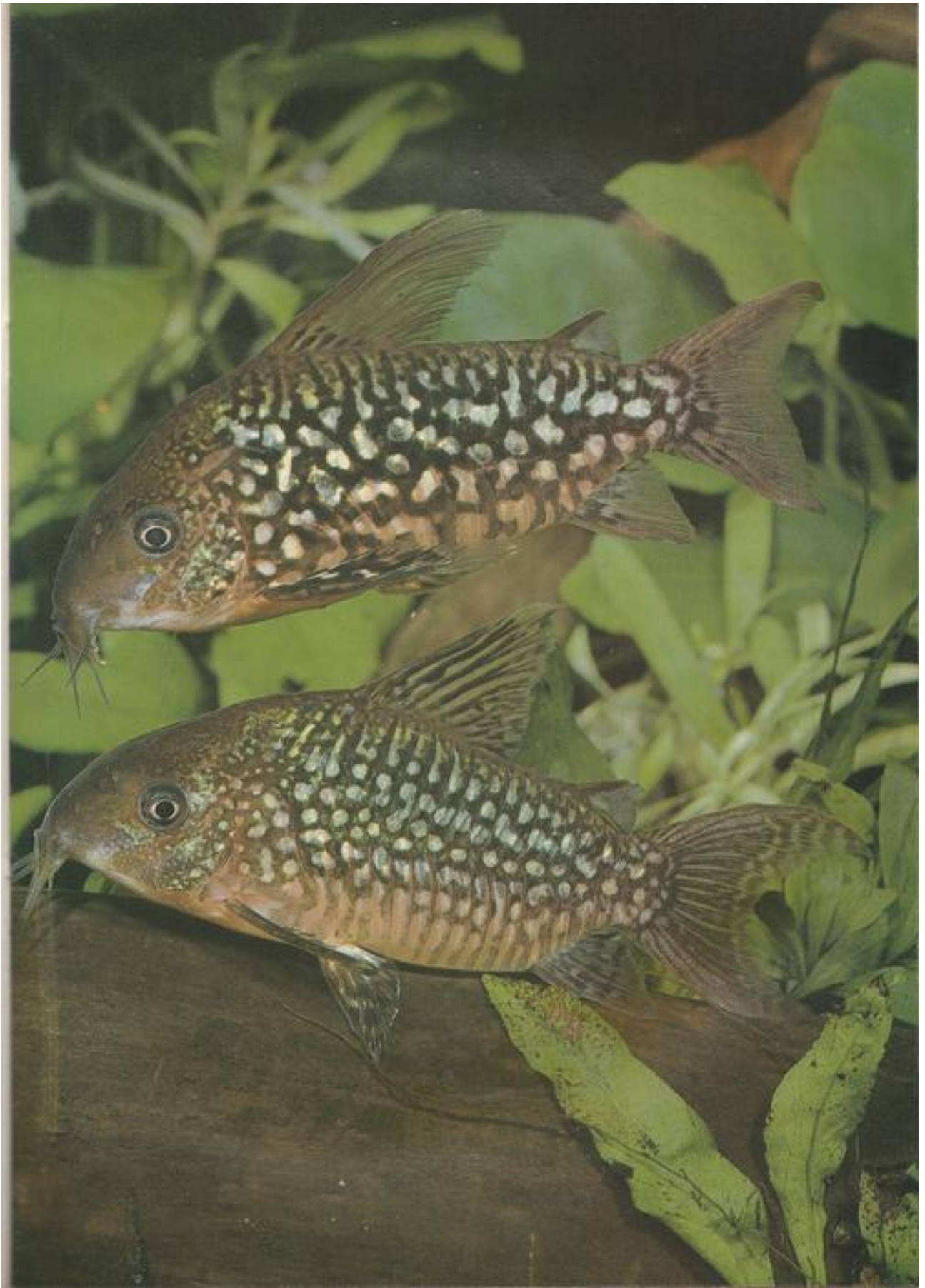
The only place where such questions could be answered was in the Zoological Museum in Amsterdam by the catfish specialists Dr Nijssen and Dr Isbrucker. Van den Nieuwenhuizen had done so, and now explained the situation as follows: The beautifully green spotted *Corydoras* are, indeed, *C. latus* and the description of sexual dimorphism given above is almost certainly correct. *C. latus* belongs to the so-called *elegans*-group, as does *C. undulatus*.

Dr Isbrucker was of the opinion that *C. latus* has sometimes been pictured under the names *C. undulatus* and *C. reticulatus*. The first of these is understandable, but not the latter, as *C. reticulatus* is quite different in appearance. Moreover the fish labelled *C. undulatus* in Burgess is certainly not *C. latus*, although one can see that superficial observation of the dark animals with the green spots could lead to this error.

There remained the question of what species is coloured plain green. Again, not *C. latus*. Dr Isbrucker revealed that it is a new species, already described, but which is still being studied because the coloration is variable. Unfortunately, he was not free to reveal the name.

As these fish are imported with *C. latus* and offered for sale under that name, then they probably derive, at least in part, from the same area and are probably found in the same biotope. This is, however, open to question.

Van den Nieuwenhuizen had learned



from the importer that the fish came from Rio de Janeiro and derived from the highlands to the northwest of this town and/or from Matto Grosso province. The original description of *C. latu* was based on fish from Bolivia (Benin). Van den Nieuwenhuizen kept his fish in rather soft water (5 DH) and a neutral pH, with a temperature of 26°C (79°F).

The water hardness in my aquarium is 13 DH, pH on average 6.9-7.2, with a temperature of about 24°C (75°F). During the recent heatwave this rose to 29°C (84°F), with no effect at all on the fish. The tank is, however, fitted with a well-maintained power filter which produces a turnover rate of 1400 litres (c.130 gals) per hour. This creates a gentle current which the fish clearly value. They are much livelier than in an aquarium with no current such as in dealers' tanks where they are often kept with only aeration.

Unfussy diet

They are not choosy regarding their food. Mine are fed on *Tubifex*, red mosquito larvae, deep-frozen krill, water fleas and finely crumbled cichlid food, for which I append the recipe as follows:

500 gm (c17.5 oz) fatless beef heart, rendered very small in a liquidiser/food processor. To this is added 1 egg yolk, 30 grams (c.1 oz) green paprika, 80 grams (2.8 oz) spinach, 1 dessert spoon carrot juice, ½ teaspoon milk and ½ teaspoon cod liver oil.

This is well mixed and frozen in the

freezer in portions of about 100 gm (3.5 oz) and used as required. My *Corydoras* relish this. But it should be given by itself, and, ideally, as the first meal of the day, ie not together with live food, and only as much as is eaten quickly and none left over. As this food contains hardly any roughage, it is best

used as part of a varied diet.

I purchased my *C. latu* in April. It appeared that the females were not carrying eggs and I am not aware of any breeding success by other fishkeepers. It is to be hoped, however, that breeding is not difficult and will soon be achieved.

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Spotlight on *Catfish*

THE CAT'S WHISKERS

Have you ever wondered why catfishes have barbels, why they are light-shy and why they are so sensitive to noise?

David Sands has some answers.

(Photographs by the author)

Why are catfish 'catfish', asked the little girl, as she looked curiously at the information sign on the display aquarium which housed my giant Red-tail Cat. I had to pause to think for a moment and then, when I thought I had an answer that might do, I leaned back onto the shop counter.

"Catfish have whiskers... that's why they are called catfish..."

I remember that I sighed with relief when the youngster grinned, with the "question mark" still glowing in her face, before she toddled off to rejoin her mum and dad who had been browsing in my aquarium shop.

What is a Catfish?

Catfish do have barbels, "feline" hair-like extensions that seem to spring from their heads and mouths. They are the key by which most aquarists would identify a catfish to be a catfish. Strange as it may seem, although whiskers are a quick catfish identification character, they are not the reason why catfish are catfish!

Catfishes belong to a classification order called Siluriformes, which includes electric eels and knifefishes and a super order that brings in all the barbs and tetras. (Many barbs have barbels too!)

It is actually the Weberian Apparatus and a couple of general anatomy characters that

link the thirty two families and almost 2600 species of catfishes into one group. The Weberian Apparatus (named after its discoverer) is a series of connecting bones that link the inner ear to the swim bladder via nerve lines. This special sound receiver, also found in carp, tetras, barbs and loaches, helps a catfish pick up sounds and react to its environment.

Sensitive

The possession of a Weberian Apparatus means catfish are highly sensitive to noise and vibrations and will respond to sounds such as people walking past the aquarium, etc. The swim bladder enhances sounds received via the tiny bones of the Weberian Apparatus, providing an "early warning" device which is handy for protection against predators. This is the very thing that can send a catfish hiding behind the nearest rock or piece of bogwood, to the frustration of the inquisitive aquarist.

It is therefore advisable to situate an aquarium primarily stocked with catfishes well away from main walk-ways, such as door entrances. It is equally important that the aquarium be placed onto a solid floor. This should reduce the extent of vibrations that reach the aquarium and help put catfishes at ease. Viewing light-shy catfishes should be a little easier with the aquarium lights out and just the room lights to illuminate the tank.

Despite the fact that catfishes are not

classified together because of their "whiskers" or barbels, these "wires" are undoubtedly of primary importance as they can succeed over catfishes' eyes as primary sensory organs.

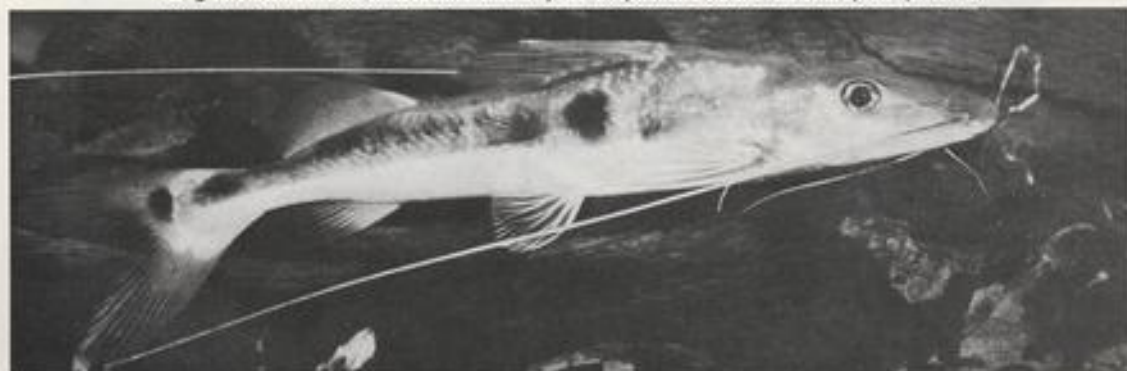
Catfishes are mostly nocturnal and search and scavenge for food in night waters that can be muddy, like a murky river-bottom or deep, dark lake. In this murky world eyes can be totally useless but barbels, like the blind person's stick, can let the catfish know "what is where".

In captivity, when the aquarium lights are switched off, even the most docile-looking catfish can be observed swimming over the aquarium gravel searching for food. The barbels locate food quickly and efficiently... so that all that remains is for the catfish to put its mouth where its barbels are!

Spawning catfishes seem to use their barbels in some form of mutual caress. Some male Driftwood Catfishes, the Auchenipterids, have thickened, almost bony, maxillary barbels and use these to take hold of a female in the spawning clinch. Some male Loricariids have tentacles to show off against other males in stag fashion and, perhaps, the amazing whip-like fin extensions of some of the larger *Loricaria* species may also play a part in "whipping up" a frenzy when the ripe female is in town. Maybe barbels have more to say than we will ever know.

Some barbels are merely sunken sensory organs, buried in the skin, unseen on the

Long barbels and an end-of-head mouth identify this *Duoplatinus* as a fast "burst-of-speed" predator.



outside, but still playing a vital part in locating food and even a spawning companion when breeding time is nigh.

Some catfish groups can be distinguished from each other by the number of barbels they possess. The South American Pimelodids, best-known through the Polka Dot Cat, *Pimelodus pictus*, have three pairs of barbels. Asian *Mystus* may look very much like their South American cousins but they possess four pairs of barbels, including a distinctive nasal pair, on top of the nose.

There are catfishes that have barbels longer than the full length of their body, such as *Leiocassis* the Sailfin Catfish from Brazil and, to a lesser extent, *Clarias* and *Heteropneustes* from Africa and Asia.

The Loricariids, or Suckermouth 'Plec' Catfishes, do not have large distinctive barbels but have broad lip-like mouths that are sometimes fringed with miniature barbels.

Corydoras have small barbels, but they can dig into the substrate "nose-down" and the barbels locate the food.

African Electric Catfishes, *Malapterurus*, spread their short barbels out and pin their prey down after they've zapped them with an electrical voltage charge.

Some catfishes, like the African Giraffe Nose, *Auchenoglanis*, seem to start with a long nose and end in a bunch of barbels... ideal for "hogging", pig-like, in the muddy river bottom for any juicy morsel!

In Lake Tanganyika there is an extraordinary Bagrid (Scale-less Catfish) called *Phyllonemus typus* which has long barbels that are membraned at the extremities. Another African catfish, the 'Giant Upside Down', *Hemismodotis membranaceus*, has long scoop barbels to enable it to sieve plankton into its mouth. Many *Synodontis* have extremely branched barbels, none more so than *Synodontis alberti* which has long maxillary (outer) barbels and multi-branched mandibular (inner) barbels. The little *Mochokiella* catfish from Sierra Leone has more branches to its barbels than most trees!

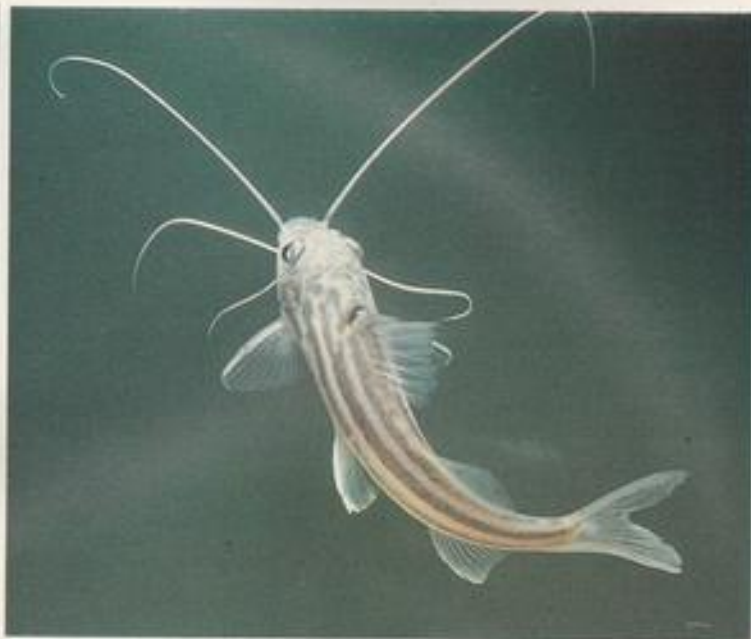
Barbels and Catfish health

In poor water quality conditions, catfish barbels are prone to infection and damage and, if the signs are not treated, the death of an otherwise healthy fish could occur.

Barbel infection is often the end result of several stress factors: poor diet, underfeeding, overcrowding, or acute stress during capture and import. It is not the result of sharp gravel or rocks coming into contact and wearing the barbels down (as first thought by many catfish enthusiasts). It is the result of the combination of parasitic and bacterial infections, one stemming from the other, or the stress factors mentioned.

Treatment should be through antibiotic or sulphur-based drugs which cannot be used in the normal community aquarium because they damage the filtration system by killing the bacteria that break down the poisonous wastes of fishes.

Antibiotic treatment must take place in a separate, fully operational quarantine hospital aquarium, and the fish should not be fed during the treatment period.



Some Pimelodids have extremely long, attractive barbels — ideal for finding food under difficult environmental conditions.



In *Hemismodotis* the barbels are membranous or scoop-like. These allow the fish to "sift" plankton into its mouth.

Left, *Chaca chaca* has indistinct barbels... but what a mouth!

Thankfully, catfishes are extremely hardy and can survive the worst of diseases and adapt to most conditions.

Although hard, rounded gravel is the most commonly used substrate in aquaria, river sand is a natural alternative for catfishes. The drawback is that sand easily packs and can stagnate on normal undergravel filtration. In this situation external filtration is certainly necessary. Large areas of sand in aquaria require plenty of stirring/raking during partial water changes.

It is possible to deduce the type of diet that a catfish might need from its barbels and

mouth position. Catfish with forward, long-reaching barbels and a forward mouth to match, like the South American *Leiocassis pictus*, or the African *Bagrus bajad* and Asian *Mystus nychia*, are fast, "burst-of-speed" predators and use the long maxillary barbels, firstly to detect, and then to herd, or even corner, prey. Once cornered their wide "end-of-the-head" mouth ensures a fast grab of prey.

These catfishes need something they can grab onto, preferably if they and "it" are moving. Live earthworms are ideal, but it is also possible to plunge defrosted prawns and

Spotlight on *Catfish*

AFRICAN SHOCKER

A nocturnal, cylinder-shaped predator which packs a punch — that's the African Electric Catfish — a fascinating fish for aquarists, such as Jørgen Wimo, who like something a little different.

During a visit to the Danish Aquarium I obtained five Electric Catfish (*Malapterurus electricus*) each measuring 30cm (12in). I thought that they might be a pair as they had been in the same tank for some time and one of them was considerably thicker than the other.

When I (in triumph) showed my two new "pets" to my family, the first comment from my wife was: "Ugh, how ugly they are".

My daughter (aged 14) had another variation: "They are disgusting. You can't want to keep them."

My other daughter (aged two) said: "Daddy, they are nice."

So, of course, I kept them, as I also thought they were nice!

The two Electric Catfish were put into a tank (200 litres — 44 gallons) which already had seven adult *Stenocranus casuaris* cichlids in it. This aquarium was decorated with stones and tree roots, creating a lot of different hiding places; it was planted with Giant Vallisneria (*Vallisneria spiralis*). It did not take many minutes before the catfish had decided where they would like to hide and before some of the cichlids had to find another hiding place.

I had been told at the Danish Aquarium that the food the catfish liked best was mussels. That was correct because the fish were reluctant to come out of hiding when I fed them other things.

Disappearing Cichlids

For five months the two catfish and the cichlids lived together without problems, but then one day, I decided to breed the cichlids. I therefore caught two pairs of cichlids and left the other two males and one female in the aquarium and the two Electric Catfish.

The pair of cichlids left in the tank together with the catfish spawned first. The

next morning I was curious to see how the cichlid pair had managed to look after their eggs, but they were nowhere to be seen. The only fish left in the tank were the two Electric Catfish and the left-over cichlid male.

I could not find any trace of the cichlid pair or their eggs. It was not possible for them to jump out of the tank so I still think that the cichlid pair had tried to defend their eggs against the Electric Catfish, which shocked them into unconsciousness and then ate them.

After this cichlid dinner the two Electric Catfish were moved to a 200-litre aquarium of their own. They spent three months there till one morning, the thin one had a 10cm (4in) long bloody wound along the body. The wounded catfish was immediately moved to another tank of its own, where I added some Common Salt (NaCl) to control an attack of fungus (*Saprolegnia* or *Achlya*). Within a week the wound was healed and the only thing I could see was a scratch. A month later I was supposed to take the catfish to an aquarium exhibition so I kept them apart until the day and then put them together in a 250-litre (55 gallon) show tank.

Everything went fine for a week at the aquarium exhibition. Whenever I fed the fish somebody would announce this, and visitors would rush to the tank in such numbers that nobody could see anything!

One morning, an old age pensioners' organisation was visiting the exhibition at the same time as I was inspecting my fish. The "thin" catfish had received another large bloody wound during the night. I immediately decided to take it home with me to look after it. I had hardly taken the cover glass of the tank before somebody shouted: "He is catching the electric catfish." Everybody eagerly rushed to the tank to see the owner being "punished" with a shock of 100 volts!

But my youngest daughter was right; the catfish were nice and didn't give off an electric discharge that was any stronger than I could feel. The spectators were impressed at the owner's courage, but I also sensed a certain disappointment!

The wounded catfish soon recovered from the serious bite but, six months later, I still haven't put the fish together in the same tank. This will not happen before I have time to observe them all the time.

It would be fun if they were to spawn. Propagation in the Electric Catfish is, at the moment of writing, unknown, but "loose" rumours indicate that they are mouth-brooders.

Basic statistics

The Electric Catfish from Africa, *Malapterurus electricus*, (Gmelin 1789) belongs to the family Malapteruridae and is placed in the monotypic genus *Malapterurus*. (A monotypic genus is one with only a single species).

The name of the genus can be divided into three words, *malakos* (Greek) which means "soft", *pteron* (Greek) which means "fin" and *oura* (Greek) which means "tail" — all together "with soft fin near caudal fin". This refers to the adipose fin, which is placed on the back just in front of the caudal fin.

The body of the Electric Catfish is big, round and long. There is no dorsal fin but there is an anal fin and caudal fin, as well as paired pelvic (ventral) and pectoral fins. Young fish have a whitish band near the base of the tail and the basic colouring of the body is brownish with black areas.

The eyes are very small compared to the size of the fish, and there is no doubt that the three pairs of barbels which are placed around the large mouth are important in searching for food.

The lateral line system is replaced by small electric organs which are placed on both sides of the body in the blackish skin and the shock that can be given is arbitrary.

Electrifying facts

Only fish can be electric and of these, there are only three which can generate so high a current that people and animals can feel an electric shock when touching them: the Electric Eel, *Gymnotus electricus*, the Electric Ray, *Torpedo marmorata* and the Electric Catfish.

While in the two other electric fishes it is the muscles that have been changed into electric organs, it is the skin tissue which has been modified in the Electric Catfish. "The batteries" surround the whole body like a case between the muscles and the skin. It is a "strong-current" fish, and specimens measuring about one metre (39in) in length can give a shock with a potential of 110 volts and a current intensity on $\frac{1}{2}$ ampere. Fish measuring 30cm (12in) can still give a shock which will make one remove one's hand very fast from the tank. It is necessary for the fish



DAVID SANCOS



SANDY WARD

Above, *Malapterurus electricus* looking out from its shelter in typical fashion.

Top, the smooth, cylindrical body of the Electric Catfish can be clearly appreciated in this photograph.

Right, the Electric Eel (this is a dead specimen collected for food by Rio Negro fishermen), is one of only three "strong-current" fish species.

to have eaten well for it to give a strong electric shock. If a fish does not get a meal, this will make the electric current weaker... and the need for food greater, but because the possibility of catching some food is smaller owing to the even weaker current, the need for food becomes even greater, and so on.



DAVID SANCOS

Background notes

The African Electric Catfish lives in Lake Victoria, rivers in East Africa, Lake Tanganyika and the former River Congo (now the River Zaire) at a temperature between 23° - 30°C (73.4-86°F). Young catfish measuring 3½ cm (1.4in) in length have been found but spawning behaviour is still a secret.

In nature the Electric Catfish is a solitary fish which lives in caves and crevices, where it spends the time with its head sticking out during the day, leaving the shelter to seek food at night.

Electric Catfish caught in Lake Tanganyika do not have as large a potential electric current as those from the River Zaire, where conductivity is not nearly as good as in Lake Tanganyika, with its more alkaline water.

The Electric Catfish has been known for many thousands of years, as 6000-year-old paintings from Egypt show.

It is possible to eat the Electric Catfish flesh, but I am not writing from personal experience! Even so, I have given our two catfish the names "Hotdog" and "Sausage"!

The electric organ of this fish is used as a health remedy by natives in Africa. They cut out the electric organs and throw them on glowing coals. They then let the sick person breathe in the gas produced or else, let the gas flow over the affected house in which the sick person lives. The Electric Catfish is, without doubt, an exceptional fish.

Bibliography:

- Pierre Beichard: *Fishes of Lake Tanganyika*. TFH 1978. Günther Sterba: *Süßwasserfische aus aller Welt*, 1977. Britt-Marie Sunderström: *Värför heter akvariefisken så?* Akvariet 1980. Elise Wessenberg-Lund: *Levende el-kraft*. Vor Viden, bind 10, February 1950.



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Spotlight on *Catfish*

THE INDIAN DWARF

Bill Tomey's occasional introductions continue with a very special Dwarf Mountain Catfish

Family: Sisoridae (Mountain Catfishes)

The family Sisoridae comprises 23 genera of catfishes which are little known as aquarium fishes. Small wonder: *Bagarius buchunasi* Bleeker 1853 is a giant, reaching 200 cm (6 ft 6 in) while the main genera are small or even dwarfs. In fact, *Hara jerdoni* (Day 1879) only grows up to 4 cm (1.6 in). Some small fishes of this family prove to be extremely hardy aquarium fishes, as long as the conditions under which they are kept are more or less in accordance with their biological demands. Typical for this family is a naked body with a flattened lower surface and a more or less flattened head provided with four pairs of barbels.

Origin: Almost 120 years ago Sir Francis Day described this dwarf under the catfishes from India. It lives in the northern Sylhet District, in the fast flowing waters of the Brahmaputra system in Arunachal Pradesh (Nagaland) and in the State of Bihar.

Hara jerdoni may be considered one of the tiniest catfishes on earth and is therefore perfectly suitable for small aquaria.

Year of import into Europe: It seems that the first of these dwarfs were imported alive into Europe around 1930, but they disappeared from the aquarium hobby and did not return until 1985, when they were rediscovered in Bihar and Assam and exported via a development project.

Sex differences: From the few things that are known, it seems that the males are smaller than the females and that they show slightly bigger fins and barbels around the mouth region.

Natural conditions: These dwarfs cling to stones, rocks and tree roots, preferably overgrown by a green layer of soft algae. They will also sometimes be found in cavities under stones, using these as a shelter against the currents and feeding usually on the lee-side of the stones.

One should expect these fishes to be food specialists, feeding, as they do, on algae. However, there is probably no abundance of food in their natural environment — or only periods of abundance — so "daintiness" is out of the question. They feed on everything edible, so much so that the specially-constructed traps which are used to catch them are baited with fish, slaughter house refuse, or anything else. As usual for most catfishes, *Hara jerdoni* start their activities at dusk, continuing all



through the night until pre-dawn.

Biological aquarium arrangements: A bottom layer of coarse river sand — grain size around 2-3 mm (0.07-0.12 in), alternated with big pebbles and rocks or driftwood roots, preferably with a green layer of algae, is best for keeping these dwarfs in a healthy condition.

They also like clear water with a swift current, as can easily be achieved with modern filter systems.

Temperature and water conditions: The temperature may vary from 18°C (c 64.5°F) in the winter to 24°C (c 75°F) as the optimum temperature. In their natural environment, they are hardy fishes with preferences for clear water, but in aquaria, the chemical composition of the water does not seem to be important, as long as extremes are avoided; medium hard water

Hara jerdoni with maximum length of 4 cm (1.6 in) is one of the smallest catfishes in the world. It is very active at dusk, night and pre-dawn, searching for food along the bottom or climbing submerged branches and leaves. The specimen shown here is resting on the leaves of *Trichomanes javanicus*, the Malaysian Glass Fern.

(dH 8-12°) and pH 6.9 to 7.4 is fine.

Food: As already described, daintiness is unknown to *Hara jerdoni*. According to my own experience, they willingly eat soft algae, small pieces of blanched lettuce, grindal worms, insect larvae, *Daphnia*, *Cyclops* and, even, minced beef heart with different additions such as oats and the top leaves of stinging nettle. They also take dry food in flake and tablet form.

Breeding: So far, there seems to be no

RF MOUNTAIN CAT

(*Hara jerdoni*, Day 1879) from India. (Photographs by the author).



In clear daylight *Hara jerdoni* prefers to rest on the surface of stones, roots or leaves, resembling a "jet-fighter" with delta wings!

known report regarding their breeding behaviour.

From their natural environment and aquarium observations, however, I would surmise that *Hara jerdoni* will seek a protected dark place to mate and guard the eggs until they hatch. Therefore, some PVC tubes placed between some aquatic plants or covered with some stones, should provide the protection they need.

Shoaling behaviour: *Hara jerdoni* is extremely sensitive to weather changes, as nearly all catfishes are, and will therefore swarm together throughout the aquarium. However, during low pressure or lightning spells, they will merely swim up and down in a corner, apparently ill at ease.

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Our native crayfish, *Austropotamobius pallipes*, has no resistance to Crayfish Plague.

SIGNAL CRAYFISH: FOOD FOR THOUGHT

The keeping of Signal Crayfish in aquaria and ponds is on the increase. However, as crayfish specialist, **Anthony Thompson** explains, these beautiful creatures can present a serious threat to the survival of our own native species.

An interesting solution to the build-up of unwanted aquatic plants during the summer months may be to stock your pond with freshwater crayfish.

The increase in demand which this biological approach to plant control is causing, plus the recent growth in the demand for crayfish by the hotel and restaurant trade,

has meant that more and more fish farmers have started to produce crayfish either for stocking purposes or for consumption.

The species most commonly available is the imported North American crayfish, *Pacifanicus lenisocalis*, which is commonly known as the Signal Crayfish — a title apparently derived from white markings on the last pair of chelipeds (claws) which can be seen "flashing" in the water when the

creature swims away.

Signal Crayfish — or "Signals" — are very adaptable creatures and will thrive in virtually any pond so long as the water is reasonably alkaline (ideally, pH7/8) and well-oxygenated (above 5 ppm), and so long as the temperature exceeds 15°C (59°F) for at least three months of the year, these last conditions being required for the animals to moult and reproduce successfully.

Because they are nocturnal, they will also require somewhere to hide during daylight hours. In the wild, Signals usually accomplish this by burrowing into banks or by hiding among tree roots and under rocks. In artificial holding facilities, such as an ornamental pond, provision of short lengths of piping on the bottom will suffice.

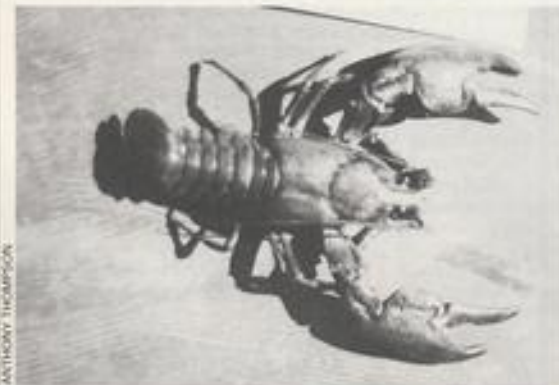
"Health Inspectors"

By night the Signals will leave the safety of their "hides" to go in search of food. Being omnivorous, they will feed on a whole variety of animal and vegetable matter, either alive or dead — Huxley (1875) called them the "freshwater health inspectors". This has the effect of reducing nutrient exchange and effectively slowing down eutrophication (the "over-enriching" of an aquatic environment with nutrients — this resulting in excessive plant growth) which is especially important in summer when high water temperatures combine with excessive plant growth to "choke" the pond and deprive the fish of much-needed oxygen. Thus, by preventing the build-up of plant materials, Signals can act as useful aids in restricting fish losses to a minimum.

In winter, when all the plant growth is required by the fish for cover, the Signals will pose no problem because their metabolic rate will have lowered to such a point that they will require very little food to sustain their activities. Only when the water temperature rises again in the spring season will the Signals begin to feed in any great quantity.

It is very important to obtain the correct size of crayfish for stocking. For example, if the tiny juvenile Signals, the newly-hatched young, are introduced, there is the very real danger that they will be eaten by the fish in

Below left, adult male Signal, about four years old and measuring around 20cm (8in). Below right, symptoms of Crayfish Plague, *Aphanomyces astaci* on Signal Crayfish. Here a crushed pincer (left) has become infected with the fungus, where site of infection is distinguished by dark melanised patch.



ANTHONY THOMPSON



DR MAGNUS FURST

SWEDEN: INSTITUTE OF FISH DISEASES, UPLANDS LÄN

Crayfish as Biological Controls

1 During the 1970s Idi Amin introduced crayfish into Uganda in an attempt to combat river blindness or onchocerciasis. This affliction is caused by the larvae of the nematode, *Onchocerca volvulus*, migrating to the eye and eliciting host responses which manifest as fibrous tumours formed around the invading larvae, and thus resulting in blindness. By cropping the large extant populations of river snails, which were acting as host for the parasite, the crayfish are reported to have successfully reduced the incidence of river blindness.

2 By introducing crayfish into natural waters that have become or are in the process of becoming excessively fertile and then harvesting the surplus a few years later, they have been used to de-eutrophy waters. They achieve this by removing significant amounts of nitrogen and phosphorous contained in plant and animal matter. Some of the benefits of this process include clearing the water of excessive weed growth for navigational purposes and

improving the "aesthetics" of recreational waterways.

3 Experiments are currently being undertaken to determine how effective crayfish might be in purifying effluent from trout farms. The effluent from trout farms is nutrient-rich and provides a good medium for the growth of macroscopic hydrophytes (large aquatic plants). Positioned at a suitable point in the culture system, crayfish could feed on these macrophytes as well as on the excess food passing from the main culture units. In return, the crayfish could purify the water and render it suitable for recycling.

4 When *Aphanomyces* struck Swedish lakes and decimated the native crayfish populations contained therein, there resulted an alarming increase in the biomass of aquatic plants. This inevitably resulted in some waters being choked of oxygen and the subsequent loss of finfish. To restore the ecological balance, "new" species of crayfish had to be introduced.

the pond. Even carp and ornamental fish will do this.

To overcome this problem, older crayfish, namely, summerlings (over 4 cm — 1.6 in), that is, one summer-old crayfish, should be stocked. These are capable of defending themselves against fish of their own size or even a little larger. At the other end of the scale there is the possibility that a large adult crayfish (over 10 cm — 4 in) will damage small fish should they stray too close to its hide.

Stocking levels

With regard to the number of crayfish to stock, this poses an equally important problem. Too many crayfish and the plant cover may be totally destroyed, too few and there may be no appreciable benefits. It may take a little experimentation to achieve the "right balance" — and it is advisable to use only males if a fixed population is desired!

Fortunately, there is a growing band of crayfish suppliers who can provide information on such matters. Provide him/her with accurate information on the dimensions of your pond, the water quality and the extant (existing) fish populations, and in return (s)he will be able to recommend a suitable stocking strategy.

Most suppliers belong to a recently-formed marketing co-operative, known as the **British Crayfish Marketing Association (BCMA)**, which is run from **Cricklade Nurseries, Andover, Hampshire**. The co-operative, which produced 3.5 tons of adult Signal Crayfish last season (July-October), has around 25 producing members, situated mainly in the South of England.

Transporting the animals up-country presents little difficulty, however, since they can survive out of water for around 3-5 days, providing they are correctly packaged. Typically, the price being charged, up to quite recently, for juveniles and for adult males and females, around 95p and £1.10 apiece, respectively. Females bearing a clutch of eggs cost considerably more.

Signals could also serve as an unusual and interesting addition to indoor freshwater



Underside of an adult female Signal

aquaria. With their distinctive red, white and blue colouring and lobster-like appearance, they are sure to enhance the visual appeal of any display.

In addition, they will improve the aesthetics of an aquarium by controlling snail populations and by "grooming" the growth of algae on the sides of the tank. Indeed, their ability to purify the water may even obviate the need of a filter.

Plague warning

Ending on a more cautionary note, it is possible that Signals one buys may be carrying a parasitic fungus, *Aphanomyces astaci*, colloquially known as "Crayfish Plague" or just "Plague". Signals are not immune to the plague but they are usually very resistant to it, unless unduly stressed, for example through bad handling of because of poor water quality. This resistance is due in part to their relatively thick carapace, and in part to their ability — at least in some cases — to stop the growth of the fungus by encapsulating and killing the invading hyphae (fungal threads).

More frequently, Signals remain chronically infected with plague, thereby acting as very effective vectors of it. That is, they are continually releasing plague spores into the aquatic environment. Unfortunately, our only native British crayfish, *Austropotamobius pallipes* (formerly *Anacrus fuscianalis*) known as the Atlantic, Stream or White-Clawed Crayfish, or more simply as the Crayfish, has no resistance at all, and will succumb if infected. When a water becomes infected with plague, mortality of existing native crayfish populations is usually 100%!

The Law

In an attempt to prevent the import of foreign organisms and, in so doing, help control the dissemination of *Aphanomyces*, the Government has made it illegal, under **Section 14 of the Wildlife and Countryside Act, 1981 (enforced 1983)**, "to release or to allow to escape into the wild any animal which is of a kind not ordinarily a resident in and which is not a regular visitor to Great Britain".

The Act allows for the licensed release of non-native animals (licensed under **Schedule 16 of the Act** by the Agriculture Minister, after consultation with the **Nature Conservancy Council**) and provides a defence in the case of accidental introductions.

Regrettably, these laws are generally recognised as being, almost certainly, a case of too little, too late. Plague is spreading at an alarming rate and is proving to be virtually impossible to control.

The situation is compounded by uncertainty over the term "wild" as used under **Section 14 of the Act**. If it is applied to farm ponds, virtually every producer of Signal Crayfish in the country will be breaking the law! This is probably the reason why the **Ministry of Agriculture and Fisheries (MAFF)**, which helped to set up the BCMA and which has provided funds ever since, has been reluctant to enforce any of its powers.

Releases into totally enclosed ornamental ponds or fish farms will be exempt from the licensing provisions under **Schedule 16 of the Act**, though in the case of accidental

The Law Relating to Crayfish — a Summary

1 It is illegal under Section 14 of the Wildlife & Countryside Act, 1981 to introduce Signal Crayfish into the wild, except under licence.

2 It is illegal under Schedule 5 of the Wildlife & Countryside Act, 1981 to take native crayfish from any water.

3 If your pond is in the immediate vicinity of a natural "wild" watercourse, take all reasonable steps to prevent escape. If your pond drains into such a watercourse, check with the MAFF or NCC to discover if the rivers in your area contain any endangered

populations of native crayfish. If they do not, go ahead and stock, but if they do, it would be advisable not to stock from a conservation point of view. However, it is not illegal to do so under the existing legislation. The choice is entirely yours.

4 If you intend to use an ornamental pond which is completely isolated from any natural watercourse, you can do so.

5 If you intend to hold your Signals in indoor aquaria, don't be tempted to dispose of them at some point by dumping them in the local stream. This is illegal.

escapes, it will be necessary to prove that "all reasonable steps were undertaken, and due diligence exercised, to prevent such escapes". In practice, there are very few commercial crayfish farmers that take out effective measures to prevent escape, but most will satisfy the legal requirements by fitting mesh screens to the inlet and outlet of their ponds.

Preventive measures

Preventing the animals escaping is, in fact, very difficult, simply because, having legs, they are able to leave the pond at any point. And there are a variety of reasons for them to do so, not least to feed on bankside vegetation or to go in search of more favourable waters.

To be truly effective, what is needed is the construction of steep banks with incorpo-

rated overhang. Better still, specially-configured perimeter walls should be erected along the banks. Walls such as these are used on French crayfish farms and, typically, are made of wooden boards that stand about 25cm (c 10in) high. They are arranged so as to "herd" the crayfish away from land and back into the water. This is analogous to the way in which the wings on a deep sea trawl net or the leaders on a fyke net herd the fish into the net.

Even the most stringent measures to prevent animals escaping will be useless if the pond drains into a natural watercourse; plague spores are water-borne. They can also be transmitted by birds, such as herons, or by human agency, for example, infected mud on anglers' boots. So, even if only isolated ponds are utilised, there is still no guarantee that plague will be contained.

In a last ditch attempt to save remaining populations of native crayfish, the Nature Conservancy Council may propose "no-go" areas for Signals. There are several such areas and each is characterised by extant populations of disease-free natives. By banning Signals from these areas it is hoped that they will remain so — though by the time the MAFF finally gets around to embodying the proposals in law, it will probably be too late.

NOTE: The two following reports, both by Anthony Thompson, are available at £5 each from 15 Meadoway, Church, Accrington, Lancashire.

1. The British Crayfish Industry — 12 Years On
2. Plague Threatens Survival of Native Crayfish

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KOI POOL FILTRATION

— PART 3 —

THE SYSTEMS APPROACH

Pond shape, test kits, skimmers, construction materials and purification units are Nigel Caddock's ingredients in the latest instalment of his comprehensive series.

Shape of the pond

It is clear that the options relating to the shape of your pond are totally infinite. However, there are some important factors which one needs to bear in mind.

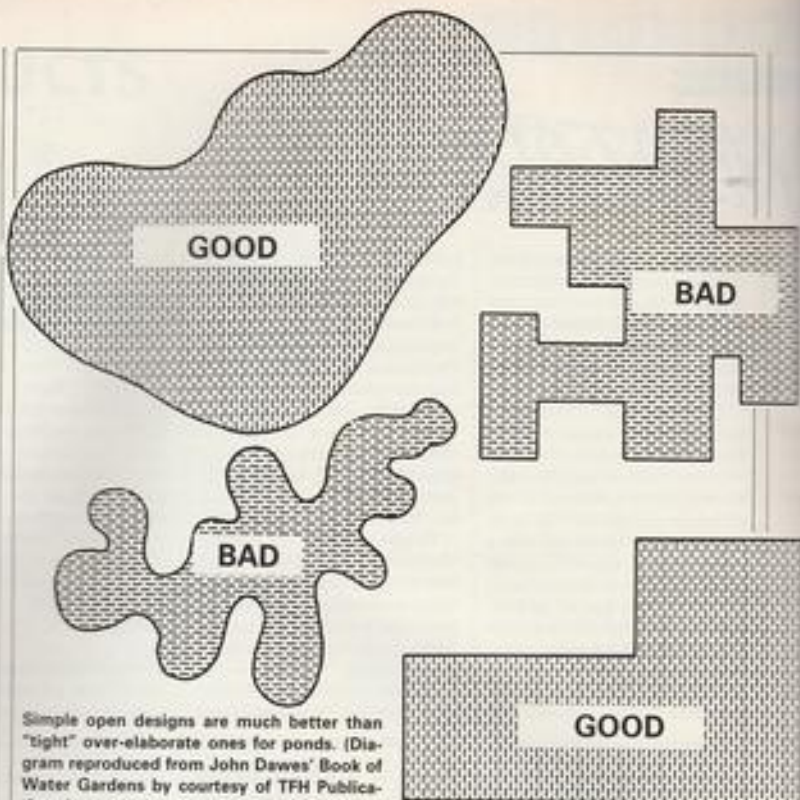
The ideal shape would be one that induces a current with no dead water areas and a good depth; the definitive shape is, therefore, an elliptical one with a cone-shaped bottom. We do, however (well most of us, anyway), live in the real world and, although this may be the best shape, it is not necessarily the most acceptable, for a variety of reasons.

It is important, nonetheless, to keep the advantages offered by the elliptical-shaped pond in mind and seek to incorporate them into the chosen shape.

Whatever shape you select — square, rectangle, kidney or figure-8-shaped — DO bench the bottom of your pond steeply towards the bottom drains, and DO place the pond returns in such a place that all the pond area is kept moving with none of the "dead" areas which are havens for the anaerobic "baddies" or can be "hotspots" of contaminated water with locally high levels of nitrite and ammonia. These may not show up on your tests, but they are there nevertheless.

Water test kits

There is a wide range of test kits, some inexpensive, some expensive, the most important ones being Nitrite, pH, Ammonia, Oxygen and Chlorine.



Simple open designs are much better than "tight" over-elaborate ones for ponds. (Diagram reproduced from John Dawes' Book of Water Gardens by courtesy of TFH Publications.)



Power skimmers represent a very worthwhile investment in the battle against deterioration of water quality.

Nitrite and pH tests are readily available in cheap, reliable and excellent small kits, the best of which, in my experience, are the Tetra range. Like most things, the choice is wide and the price range is even wider.

These kits are especially useful when a new system is set up to monitor the progress of the nitrification process, but when a system is established and mature, monthly tests are fine. It is also useful to record your readings.

Oxygen monitoring is a more complex process; the testers are relatively expensive and there are still only a few chlorine test kits available. They are, however, useful stand-bys and make ideal Christmas and birthday presents.

Important message

The most important message I want to convey is that the best water indicators we have are our Koi; their behaviour will tell us if the water is OK or not. Get to know their ways and quirks and, soon, you will be able to tell at a glance how good or otherwise, the water is. It is my sincere belief that only when we have developed this relationship can we begin to understand the hobby of Koi-keeping.

It is very important to keep the information obtained from test kits in perspective; despite what a kit indicates there will be local "hot spots". A good system will minimise these, but they are almost unavoidable. With this in mind test kits are super supplementary water-monitoring devices, but the most important indicators are, as I've said, the Koi, and the most sensitive detection units should be our eyes.

Power skimmers

Several swimming pool items have been successfully introduced to Koi ponds. These include the Sand Pressure Filter and the Pond Boiler, but perhaps the best, and certainly the cheapest, is the Power Skimmer.

A power skimmer fits into the side wall of a pond with two-thirds of the inlet below water level. The pond water then flows through the skimmer which, with the aid of a simple floating basket arrangement, skims the very top water. The water is then pumped either directly to the pond, or into the filter, through a venturi, waterfall, etc.

These devices are remarkably efficient and the advantage over conventional skimmers is that the skimmed water is not discarded while the surface scum of floating debris is efficiently separated and the good water returned to the pond.

Additional pump

You do, of course, require an additional pump although, if plumbed into a gravity-fed filter, one can also avoid this, but this is a very useful investment and the difference it makes to the pond's surface is staggering.

An additional advantage of an independently pumped skimmer is that you do not need it running all the time so you can have control over it when you skim the surface; but the most important extra advantage is that, if the skimmer is independent of your filter system, you can use this device as a way of increasing the flow in your pond without increasing or "meddling" with the flow rate through your filters. This can be especially beneficial in the summer when you may require a way of introducing additional aeration/turbulence.

It is an old but true cliché that "you get what you pay for". Nowhere else is this truer than in construction materials. I include in

this, pipework and pond linings.

Try to economise in other areas if you must, but do not skimp on concrete collars, reinforcement for bases, choice of pond lining and, most importantly, pipework.

DO NOT USE cheap pipework below the water line — DO USE PRESSURE PIPE WORK, CONNECTIONS AND BENDS.

It is absolutely true that pressure fittings are twice the price of normal ones, but what critics fail to say, and extensive experience proves beyond any doubt, is that they are 100 times better(!) and will, if fitted correctly, give you peace of mind, and total system integrity.

Water purification units

There is ongoing and raging controversy surrounding the addition of all manner of chemicals to our tapwater. The real problem to Koi-keepers is that, although many of the additions are harmless to humans, they are, potentially, killers to our Koi.

I have personal knowledge of total wipe-outs due to chlorine and the practice of a growing number of water authorities of introducing monochloramine which is very strong and stable in water. This means that the old trick of spraying tap water to disperse chlorine just does not work anymore.

Monochloramine is not being added everywhere, but in these times of increased pressure to eradicate serious problems such as Legionaire's Disease, it may be only a matter of time before we all have chloramine in our water.

The results of such additions to Koi ponds

are potentially disastrous and even more worrying because they can build up gradually with water changes until enough is present to begin to affect Koi detrimentally. By then, the damage is done and the usual remedial measure of increased water changes serves only to compound the problem even further.

The answer may be to opt for a proprietary purification unit such as the "Aqua-pure". This unit is, basically, a chlorine removal unit and contains 11 different active filtration media which are capable of removing monochloramine. Where this problem has manifested itself these units have provided a solution.

I would, however, postulate that it is always better to avoid a problem in a position of strength, than try to solve it from a position of panic when your Koi are in trouble.

In summary these units may prove to be invaluable to all Koi-keepers as the "problems" of water treatment increase. With the onset of privatisation of the Water Authorities this problem is likely to get worse for Koi-keepers before it gets better. These units are comparable in price with UV's and, in my mind, are an excellent investment.

Note: Part 4 of The Systems Approach will wrap up matters by dealing with aeration, heating, UV, ozone and allied topics.

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News from the societies

Association of Aquarists Midland Aquatic Show '89

"Just a few lines to let you know that the A of A will soon be holding the second of its regional shows.

The show is being hosted this time by Milton Keynes Aquarist Society and will take place on 1 October 1989. The venue is the Memorial Hall, Great Linford, Milton Keynes.

The show will follow the same successful lines as the previous one in that not only will we be accepting entries in 36 classes covering tropicals, freshwater, plants and furnished aquaria, but we will also be holding a fish bring-and-buy.

In order to attract greater interest from members of the general public the fish will be on display throughout judging — a



Tony Hurt receiving the award for Juvenile Champion Fish at the Spring Show from Lady Harewood.

departure from the usual format in many parts of the country. Of course, the show is open to any fishkeeper, whether A of A affiliated or not; all are welcome.

Copies of the show schedule can be obtained from N Ridley,

2 Scardale, Heelands, Milton Keynes, Bucks. Tel: 0908 310847.

I trust that we can once again count on your valued support through editorial coverage of the event." Mike Shepherd
A of A Programmes Officer

Yorkshire Koi Society 11th Open Spring Show — 28 May 1989

"YKS's two annual shows (spring and summer) are held at Harewood House, near Leeds. This year *Aquarist & Pondkeeper* kindly agreed to sponsor the prize for the Juvenile Champion by offering a year's free subscription to the winner, Tony Hurt won the prize with a superb Showa Sanke.

The prize for Young Champion also went to a Showa Sanke owned by P Henson. The show was very successful, was held under clear blue skies and glorious sunshine. Entries totalled 59 fish. Interest from the huge crowds was phenomenal.

Thank you *A & P*, once again for your support of the event.

Cath Lett, Editor
YKS Journal

Diary dates

Union of Scottish Aquarists

The annual Open Show of the USA will take place on **Sunday 3 September** at Craigryston Community Centre, Pennywell Road, Edinburgh. For further details contact Alex Pickup, 3 West Pilton Terrace, Edinburgh. Tel. 031 552 0970, or Danny Stalker (Show Manager), 51 Nelson Avenue, Howden, Livingston, EH54 6BZ. Tel. 0506 36915.

Darlington & District Aquarists Society

The DDAS 1989 Open Show will be held on **4 September**. For details contact K G Rodway, 33 Geneva Road, Darlington, Co Durham.

Corby and District Aquarist Society

The above society will be staging a Guppy Show "open to all individuals and clubs for the evening of **Wednesday 6 September**." There will be tro-

phies for first, second and third placed fish in both male and female classes, plus an additional trophy for Best in show. During judging, there will be a lecture by Chris Cheswright on livebearers, with a free buffet during the interval. Competition entries: free. Benching: up to 8.00 pm. Lecture: 8.15 pm. Venue: Corby Conservative Club, Cottingham Road, Corby. Further details from Stephen Elliott, 23 Shrubfield Grove, Corby, Northants, NN17 1HD. Tel. 0536 65817.

Plymouth & District Aquarists' & Pondkeepers' Society

The PDAPS 1989 Open Show will be staged on **16 September**. Details available from Mrs E M Taylor, 49 Radford Park Road, Plymstock, Plymouth, PL9 9DN.

Wyke Show Society

WSS are holding their Open Show on **Sunday 17 September**

at Endike Junior High School, Endike Lane, Beverley High Road, Hull. Benching: 12 noon - 2.00 pm, judging: 2.15 pm. Further information available from N Woodward. Tel. 0482 797384.

Northampton and District Aquarist Society

The annual Open Show of the NDAS will be held at the Gladstone Centre, Gladstone Road, Northampton, on **Sunday 17 September**. Benching: 10.00 am - 12.15 pm. Details from E Sanders (Open Show Secretary). Tel. 0604 233086.

Mid-Sussex Aquarists Society

The 1989 Open Show of the Mid-Sussex AS will be held at English Water Gardens, Rock Lane (Off the A24), Nr Washington, West Sussex, on **Sunday 24 September**. For further information contact John Smith. Tel 0273 602407.

The Scottish Aquarium Society

The 62nd Open Show of the

Scottish Aquarium Society will be held at City Halls, Candleriggs, Glasgow, on **Friday 22, Saturday 23 and Sunday 24 September**. Entries close on Monday 11 September. Full details available from W Hamilton, 9 Dunn Street, Paisley, PA1 1NU. Tel 041 889 9400.

Goldfish Society of Great Britain

The GSGB Open Show will be held on **Saturday 7 October**. Venue: St. Paul's Church Hall, Chigwell Road, Woodford Bridge, Essex. Further information from Stuart Elton (Show Secretary). Tel. 0206 563844.

Halifax Aquarist Society

The Halifax Aquarist Society would like to inform *A & P* readers that their Open Show scheduled for **8 October** has been cancelled. Further details from Stuart Hardie. Tel. 0422 45978.

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.



TROPICAL
Dr David Ford



COLDWATER
Pauline Hodgkinson



PLANTS
Barry James



KOI
Roger Cleaver



DISCUS
Eberhard Schulze



MARINE
Graham Cox



HERPETOLGY
Julian Sims

Tropical Chipboard seal

I am thinking of building an aquarium from chipboard with a glass front as described by Jørgen Hansen in Making Your Own Aquarium.

The tank will measure 96x24x24in (240x60x60cm). The book says that the inside must be lined with a plastic solution and a covering paint. It goes on to say that the plastic solution must be mixed with a hardener before application, allowed to dry for six hours, and then covered with the paint. Do you know of any manufacturer that produces these products? Details of glass thickness and lighting (tubes) would also be appreciated.

The paint Jørgen Hansen is referring to is the two-part resin paints that were popular when the book was written (1979). They were available at all the DIY stores. However, they are only seen in specialised outlets now, being superseded by the simpler one-part polyurethane paints. These are sold at all the

DIY shops under names like "Yacht Varnish" — just note that it is a clear varnish made from polyurethane.

Give three coats allowing each to harden thoroughly.

The plastic paint Hansen mentions is the type sold at Water Garden Centres for sealing ponds. It is water-based, like an emulsion, but dries to a rubbery texture and is ideal for covering new concrete. However, it can be used in the aquarium, especially where a coloured background is wanted.

There is no need to use both the above paints.

You need 12mm glass with a good overlap to support it all round the edge.

Such a large tank is best fitted

with a top glass cover and external lights because a traditional box lid would be difficult to lift with internal lights. Use sections of glass inside plastic runners (DIY cupboard door runners) on glass or wooden ledges inside the top of the "box."

Lights can be the decorative spot bulbs sold in all the lighting shops these days; 60 watt every 2ft (60cm) hung 6in (15cm) above the glass cover.

Arowana feeding problems

I've bought a small Arowana and am at my wits' end regarding its feeding. It will take bloodworm as it sinks but will ignore it if it drops to the bottom (I keep two Corys to clear up the left-overs). Anything you can tell me about this fish will be appreciated.

The Arowana, *Osteoglossum bicirrhosum*, is an Amazonian

The large upturned mouth and sleek, straight-backed body identifies the Arowana as a surface predator.



J. PERKINS

predator that can only be kept in the community aquarium when very young and small. When adult it can reach some 18in (45cm) (2ft — 60cm in the wild) and can only be kept alone in a home aquarium. That is why it is not usually listed in fishkeeping books and any adult specimens are usually only seen in public aquaria.

The preferred temperature is 25°C (77°F) and it can be nervous, so moving the fish (eg table shows) is not recommended. Water chemistry is not important but it does need chunky food. It can be trained to take shellfish, fish and meat chunks. Since your fish is taking bloodworms, continue, but add small shreds of flesh, increasing the amount daily, until the fish is weaned onto this more convenient food.

Then cut a slit in the chunks and push in a flake of fish food so that the fish receives the essential vitamins and minerals they cannot get from scraps.

One day it may eat the *Corydoras* too...!

Koi Breeding size ... or age?

At what size will Koi be able to breed?

Size alone is not really the question as far as breeding Koi is concerned. The age of the fish is the main factor which must be considered.

To breed successfully, Koi must be sexually mature. As far as males are concerned, they generally become sexually mature at two years of age. Usually, this means they are at least 10-12in (c 25-30cm) in size. Females, on the other hand, should be three years old for a successful spawning and, at that age, they are normally at least 12-14in (30-35cm) long.

Size alone is no indication of age with Koi as many fac-

toes can prevent a fish from reaching its full potential growth in a given period. Lack of food, poor food, inadequate space and poor water conditions are just some of the factors which can prevent a Koi from achieving normal growth.

Plants Arrow Arums

I have come across a plant called the Green Arrow Arum. It is a pond plant, but my dealer couldn't give me any further information on it. Can you help?

The Arrow Arums belong to the genus *Peltandra*. There are only two species, *P. alba*, the White Arrow Arum, and *P. virginica*, the Green Arrow Arum. Both are native to the USA.

Handsome marginal plants, they have glossy, arrow-headed leaves. *P. virginica* grows up to 30in (74cm) high with leaves some 8in (20cm) in width and strongly veined. The rootstock is vigorous, with thick fleshy, fibrous roots. The flower is a spathe, green in colour and producing green berries.

Quite hardy, I think this species is about to enjoy great popularity now that supplies are plentiful again.

Best aquarium floaters

Which are the best floating plants for tropical and coldwater freshwater aquaria?

For tropical aquaria one cannot do better than go for the various *Sagittaria* species. *S. auriculata* and the smaller *S. brasilensis* are both available in the UK and, although both adopt a diminutive form under artificial light, they increase rapidly, the long trailing roots being excellent as fry cover as well as for filtering the light for algae control.

Remember, however, that condensation trays are essential in order to maintain a humid atmosphere and prevent the lights scorching the leaves.

For coldwater aquaria the only plant likely to succeed is *Riccia fluitans* (Crystalwort). A delightful plant, it belongs to the Liverwort family which are closely related to mosses.

However, members of the carp family (which includes Goldfish) are liable to devour this plant with relish. The only



Riccia — scarce, but available, is an excellent floater for coldwater aquaria, which can also do well under tropical conditions.

drawback to this plant is its scarcity, but persistent enquiries will, sooner or later, lead to success in tracking down a source of supply.

Discus New(?) Marbled Discus

I have heard that a new variety of Discus, known as the Marbled Discus, is being produced in Thailand. Is this so, and if it is, what are its characteristics?

Yes, there is, at present, a Marbled Discus being offered here in England; I think its name also originated in England, but whether I could call this fish a "new" variety or not, I am not so sure.

For many years the top breeders in the world, and especially Dr Eduard Schmidt-Focke of West Germany, tried to produce a Red Turquoise Discus with perfect horizontal lines, the lines covering the whole of the body. As one can imagine, it has taken many generations to produce such an animal. During the stage of selective breeding, there were

always a small number of youngsters where the lines were broken and formed a "marbled" effect. Dr Schmidt-Focke rejected these offspring for breeding purposes.

These seem to be the fish now available from Thailand. I am not sure whether these fish are, basically, badly striated Red Turquoise Discus, or whether they were specially selected for creating a "new" variety. Only the breeder will know the answer to this.

In fact, I visited a Discus farm in Bangkok earlier this year where such fish were among many hundreds of perfectly lined offspring. Because of their incomplete striation, they were offered rather cheaply.

As we know, beauty lies in the eyes of the beholder, and if a hobbyist feels that these "marbled" Discus fish are what (s)he wants, by all means let them buy them, but not because they are a so-called NEW variety.

Quality control

I have kept Discus for about two years, in a 2ft cube, bare tank with external power filter, plus two internal power filters, plus an oxydator. The temperature is kept at a constant 30°C (86°F) and a pH of 6 to 6.5. For breeding purposes the temperature was lowered to 28°C (82°F) and the pH adjusted to 6 by

means of phosphoric acid. One bucket of tank water is changed every other day. The new water is prepared using a domestic water softener. The hardness of the tank water measures 385 ppm. The total hardness is 11 dGH.

I have two pairs of Discus and they spawn every week, but the eggs fungus within half an hour. According to Bernd Degen's book it is the quality of the water. When does one term water being of good quality?

I am thinking of installing a UV steriliser in my breeding tank. Will this help?

As you rightly say, the problem is with the water quality. As you do not use deionised water, but water "softened" with a domestic unit, you are only changing calcium for sodium. Although this water may be termed "soft," it is still unsuitable for breeding Discus. This "soft" water is only really useful where large amounts of detergents are being used (washing machines or dishwashers).

For you to be able to breed Discus, you will have to add demineralised water, where the hardness has been removed and not exchanged for another kind of hardness which cannot be measured using a drop-test. The conductivity of the softened water will be the same as the raw water.

For Discus eggs to hatch out the water should have a conductivity of about 150 µS/cm (about 3 dGH) and a pH of around 6 to 6.5.

If you were to use a good biological filtering material as well, the bacteria should be able to keep this water in good condition, especially since you also make use of an oxydator. Therefore, there is really no need to use a UV steriliser as well.

Find yourself a suitable water supply. Then, by using the right biological filtering material, I am sure that you will succeed in fulfilling your dream.

FRED THE PIRANHA.



Marines

Marines — easy or difficult?

For some time, I have been very interested in keeping marine sea water fish.

However, from what people tell me, there are two views: some say they wouldn't advise it, some say it's easy.

As I don't know what to buy, where to start, what levels and quantity to use, and what materials, I am prepared to go to great lengths to find the correct way to start.

I would therefore be very grateful if you could help me and forward me the necessary information.

Marine aquaria are indeed easy to keep provided that you adhere strictly to six basic rules as follows:—

- 1) Use an external power filter to operate an underground filter in reverse-flow mode.
- 2) Choose the largest tank you can afford — and certainly not one smaller than 30 gallons (135 l) capacity.



A pair of albino Paradise Fish about to embrace under the bubble stream. Males of the species are quite aggressive towards each other and, to a lesser extent, towards females.

- 3) Always feed the fishes extremely meagrely, and only once a day.
- 4) Never allow even one uneaten morsel of food to reach the bottom of the tank — and if it does, siphon it off immediately.
- 5) Don't introduce any fishes to the tank until the seawater's nitrite content rises to 15 ppm (= 15 mg/litre) and then collapses to zero ppm — thus showing that the coral sand filter bed is matured and ready to receive the first hardy fish — a Damselfish.
- 6) Do NOT overstock.

Floraset quota

My tank measures 60x24x24in (150x60x60cm). It is illuminated by two Floraset spotlights. Is it sufficient?

For such a large, deep aquarium you do not have nearly enough light successfully to grow light-loving species of invertebrates, unless you are prepared to limit these species to the small areas immediately beneath the spot-lamps.

To achieve success with marine invertebrates which are evenly distributed over the floor plan area of the aquarium, you would need a total of four

Floraset evenly spaced at 12in (30cm) centres over the centre line of the tank. These lights should be no more than 9in (c 23cm) vertically above the water's surface.

Coldwater Coldwater paradise

I have heard and read that Paradise Fish can be kept in coldwater aquariums. Can you supply me with a few details of this fish?

Paradise Fish *Macropodus opercularis*, are Anabantoids (related to the Gouramis) which grow to about 75mm (3in) long. They are quite pretty fish with flowing fins.

They are bubble nest builders and so are interesting fish to breed. Not too fussy about their food, they can tolerate all types of water in a temperature range of 16-24°C (c 61-75°F) and can even be kept out of doors in a pond in the summer months.

However, they can be aggressive towards each other.

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SOME AREA DISTRIBUTORS STILL REQUIRED

Naturalist's notebook

By Eric Hardy

IPN

After last year's Spring Viraemia epidemic of carp died down, an outbreak of Infectious Pancreatic Necrosis occurred on a Braunston, Oakham (Rutland) fish farm at the end of September. An earlier outbreak had also occurred at Washburn Valley trout farm at Farnley Hall, Otley, Yorkshire in May.

IPN is a notifiable disease but doesn't harm people eating the fish. This is another virus, usually affecting fry that have just started feeding, particularly Brown and Rainbow Trout. As it may be carried on the surface of eggs, these are usually disinfected, but infected adult fish may act as carriers. One remedy is to reduce stocking density, removing all sick and dead fish, of course. There is no curative therapy.

Pancreatic Necrosis seems to be confined to trout and, occasionally Atlantic Salmon. Symptoms are increased activity, abdominal and skin extension, swellings of the eye, darkening of the skin and the trailing of faeces.

Least Yellow Water Lilies

Around the north Shropshire meres recently I visited Colmere, the only British haunt of the Least Yellow Waterlily, *Nymphaea pumila*, south of Scotland, which grows in the middle of the mere. Beyond the pike-fishers' Crosemere, the fen-carr of Sweetmere seemed almost buttered with early Marsh Marigolds among its marsh-ferns and downy birch trees.

The best way to identify the Least Yellow Water Lily from its hybrids is the end of the brandy-bottle seed-pod, which has eight to 10 radiating spoke-like stigmatic rays. It is no longer in Merioneth's Tal-y-lyn.

New Lacewing

A new British brown lacewing-fly, *Hemerobius fenestratus* was identified from brambles and oak in Etchden Wood, East Kent. Though not an aquatic insect this is one we often see

when visiting waters. Well known in central and eastern Europe and the Baltic countries south to Greece, it was identified at the British Museum. Not being a migrant, it is presumed to have been overlooked and probably occurs elsewhere like so many other rather specialised groups of insects.

Far-travelling exotics

One realises the potential distribution of water plants by far-travelling water-birds in the bird-ringing results of one's friends.

The large feet of Common Mute Swans easily entangle in weed, and a Mute Swan ringed on a pool near Southport flew 82 Km North to Bowness on Windermere in six months. A mallard went from an Essex reservoir to Lancashire and a Dutch Wigeon duck to Southport. No wonder the duck-pools on Mere Sands nature reserve in mid-Lancashire are almost choking with alien Swamp Stonecrop (*Crassula helmsii*).

Cleaners . . . and glass diet!

Many fish are known for their cleaning activities, removing parasites, particularly the Cleaner Wrasse (*Labroides dimidiatus*). This is mostly to the benefit of other fish in their company, especially in coral

reefs.

Observations at the Grand Cayman Island research laboratory, West Indies, recently discovered that the French Angel Fish, *Pomacanthus paru*, performs this cleaning activity on the Hawksbill Turtle. "Spongivory" has also been discovered in hawksbills — a diet of glass!

Unhealthy seals

Dr J R Baker found Britain's Grey Seals are not particularly healthy animals at any time. Pup mortality is commonplace. They are prone to infection because they fail to get protective antibodies which they can't absorb from their mother's placenta like other mammals.

Disease-causing bacteria infect their breeding isles off Scotland where mud and excreta accumulate and 50% of their deaths occur in the first 10-12 days, after which they usually survive.

Peritonitis is the chief fatality because, unlike other mammals, the seal pups can't lift their umbilical or navel cord off the ground, and it becomes infected. It is less on well-drained, unstable sands, cleansed by the tide or rocks, but, with no blubber in their early stages, pups washed off are drowned from exposure.

Juvenile French Angel (*Pomacanthus paru*), clean Hawksbill Turtles and eat "glass" in the process.



Miscellanea

Until recently, five species of Asiatic Box-turtles were known from swamps in Malaysia and China, and kept in heated terrariums. A sixth, named *Casoumaccardi*, has been described recently from the Guangxi province of China by Carl Ernst of George Mason University, Fairfax, USA.

Krintler of the University of Florida, has described a new species of frog, *Atelopus pictiventris*, from the western cordillera of Colombia, South America. Sometimes called toads, 43 species of *Atelopus* contain poisons and, living in isolation, are usually voiceless. Females have small, pointed flank warts where males are rounded.

They live in Central America, varying in size and pattern from lowland to mountain species at 4,000 metres in the Andes of Colombia as temperatures become colder. They also have a very long period in amplexus (mating clasp), several months before laying.

Other interesting observations include predatory ground-beetles preying upon young salamanders.

A new phenomenon in amphibians has been the discovery of the independent expansion of the front toe-tips in the frog, *Lanzarana largeni* (both sexes at all ages). It was the discovery of Benedetto Lanza of La Specola university museum, Italy. Also interesting is the discovery in Italy for the first time of the Mediterranean Ladder Snake previously ranging from the French coast to Minorca, a large snake with an overhanging snout.

Although the food-hunting of the peculiar tentacled Fishing Snake of south-east Asian rivers (which may need them for scenting prey) has been recorded, little seems to be known about the use of its short tentacles. Chris Mattison's *Snakes of the World* (Blandford, £14.95) even discounts the idea that they lure fish prey within range.

Sea Snakes were not thought to have natural predators until wounds were recently found in a Yellow-bellied Sea Snake off Panama.

Koi Talk



by John Cuvelier

Uncertain future

Once upon a time, there was a little country surrounded by salty water but with a fairly consistent supply of fresh water falling from the sky.

For more than a hundred years this fresh water was gathered, treated and dispensed to all and sundry, including the many thousands of fishkeepers throughout the land, usually without any problems, apart from isolated incidents involving pipe flushing or increases in chemical dose rates at treatment plants. When such incidents happened, one could usually rely upon a sympathetic hearing from the Authority responsible, together with an explanation as to what was happening, and why.

Judging from the number of calls I've been getting of late from worried Koi-keepers losing fish from what strongly appears to be due to peculiar things happening to the water supply, and meeting what appears to be a wall of silence from the water undertakings when enquiries are made regarding just what IS going into the water supplies, it would appear that those carefree days are coming to an end.

Just a couple of months after you read this, the all-new, all-singing, all-dancing private water industry will be with us, the prospects for our fish (and us) being, at best, questionable. Leaving aside (with difficulty) the morality of the whole exercise in the face of opposition from at least 80% of the population, one can only pre-

pare for the worst and hope things will not be as bad as many fear!

As an ex-"waterman" myself, I know only too well just how many ways there are to cut costs in treating drinking water (principally labour costs), maintaining supplies fit for human consumption (just), but liable to give our fish something to think about! Should this be the attitude of the new industry, hobbyists everywhere could be in for a rough time.

The best advice one can give is to be on your guard and, should you suspect something nasty is coming out of your taps, contact your local water emergency number explaining what you suspect and requesting a visit from the duty chemist to test your supply.

Should there be any reluctance to oblige, then contact the P.R.O. of the undertaking and point out that your valuable fish are at risk and you feel sure that the media would be interested to hear of the lack of interest being shown by the undertaking. If that does not move them, you're in bother!

Cascading Water Cress

Moving on to happier topics, those of you who like to keep a healthy crop of Water Cress going through the season might be interested in the J.C. method of getting a crop going.

My last attempt at growing it from seed was a disaster so this

year I tried a new tack. Buying a bag of salad cress from our local supermarket, I merely poked individual stalks through some plastic mesh and suspended the whole thing in the top of my cascade header pool.

The result bordered on the miraculous, as, within only two days, the stuff was throwing out a lush growth of roots (the bits that do the nitrate stripping)!

Using this method there is no fear of the stuff taking over the whole system as it is easily culled when required. The beauty of cultivating in this manner is that small areas of water can be served as easily as large; all that's required is some mesh and a pair of scissors.

If you want to see some fun, try placing a piece of planted mesh in your main pool. I'd be surprised if the cress lasted an hour! Incidentally, if your Water Cress does not flourish, aren't you the lucky one not having any nitrate in the pool water?

Good year for lilies

What a fantastic year for water lilies this seems to have been, or have I just been fortunate? On one day I counted no fewer than 29 blooms, with as many buds still to come and this from a total of only nine plants. These

Lilies appear to have done extremely well this year. This is one of the most popular varieties — "Attraction".

are just run of the mill varieties such as "Attraction" purchased at our local centre two years ago and planted in large nurseryman's baskets as described in an earlier article. My Koi also found them attractive as they ignored my carefully positioned spawning media and chose to spawn in the lily bed!

Egg failure

Which brings me nicely on to another "funny". Having happily retrieved several hundred eggs from this spawning, and set them up in my aquarium as usual, I waited for the expected hatch to take place.

Fat chance! Not one solitary egg hatched for some reason. The only thing different this year was the temperature which was a fairly constant 30°C (86°F), all this taking place during the very hot spell. Perhaps someone more knowledgeable can tell me if this had any bearing on this disappointing episode.

A second spawning has occurred within the last few days but the parents beat me to it and I only managed to rescue perhaps a couple of dozen eggs which I am now watching closely. More anon.

Catch 22

I presume that many hundreds of Koi-keepers have been gnashing their teeth in fury at the imposition of a hosepipe ban in their area? It's a bit of a Catch 22 situation, isn't it? Either break the law or watch your fish suffocate.

Overstocking a pool is a mistake which only really comes home to roost during extremes of weather such as we've recently experienced. It's a bit much when we need to keep our eyes and ears peeled for the sound of that "bear in the sky"!

There is a lot to be said for a permanent buried water supply to one's pool which can be used covertly. Failing that, you can always run a submersible pump in the pool with its outlet directed vertically so the output drops back into the pool providing a modicum of aeration, but beware of the noise disturbing your neighbours during the night which is when the requirement is greatest.



JOHN DAVIES



These Longfin Ray Barbs from Moonlight Fishery were show stoppers at the 1988 Florida Tropical Fish Farms Association Show . . . but what actually makes a winner? Opinions differ.

"THERE'S NO BUSINESS LIKE SHOW BUSINESS"

FBAS "C" class judge **Jo Field** proves that, despite obvious superficial differences, Crufts and fish shows have a lot in common.

I went to Crufts this year. What has that got to do with fish? You might well ask. To be honest, not a lot. I felt like a fish out of water, as they say.

Interestingly enough though, once I had squashed my feelings of superiority about the complexity of our game as compared to their's (well — let's face it, one dog is much like another to a fishkeeper . . .) it seemed to me that a dog show is not altogether unlike a fish show.

All the usual signs of nervous anxiety and utter disbelief in the judge's verdict were displayed by owners and dogs alike. Brushes, combs and fur were flying from pampered pets before and during their big moment; not so different to the frantic polishing of tanks that goes on when fish are "benched" (for the uninitiated, that's when the tanks are placed on tables ready for judging — we have our jargon too!).

The cameras clicked and videos whirred, and the buzz in the air was just the same. So too were the tired sandwiches and queues for

cups of tea, and the post mortems that continued long after it was all over. Would you believe — there was even water on the floor!

Thinking about it, I suppose the objectives of showing dogs and fish are similar too. The major associations, federations and societies all lay down strict rules to govern the way in which fish are shown and judged. Their purpose is to protect the live exhibits from abuse, encourage fishkeepers to look for excellence in both choosing and breeding fish (and thus prevent degeneration of the species) and, generally, to promote interest in the hobby. I can't speak for the Kennel Club, but I daresay their reasons are not much different.

But rules, regulations and objectives aside, there's a lot of fun and excitement to be had in showing. Even if you're not a competitor, going round the shows is a good way to see and appreciate the best of the numerous species that are around, whether it be dogs or fish. It's also a good place to pick up tips and

advice — even the old hands reckon to learn something new each time. But beware — it's frustrating to see a winner when you've "got a better one than that at home!"

A question of standards

I was asked by a doggy person (obviously experiencing similar delusions of superiority to mine) how you judge fish; "Do they get points for swimming, ha ha?" Well yes, in fact, they do. It comes under the category of condition and deportment.

Fish are judged on a pointing system and are usually awarded up to 20 points for each of five categories — thus the highest standard achievable is 100 points (needless to say, no fish has ever scored as much as that and probably never will, but to ask why is to enter the realms of philosophy rather than science). Just to complicate matters, the categories differ depending on the type of class being judged.

So, for example, in addition to condition and deportment, tropical freshwater fish are

judged on their size, body, colour and finnage, whereas goldfish have no size category but are judged on their characteristics instead. These must comply with the standards laid down by the various Judges and Standards Committees. There are separate classes for coldwater fish and Koi, for breeders and pairs, and for plants, aquascapes and furnished aquaria too.

Each of the basic classes is subdivided to separate the different species within each family of fish. Egg-laying Toothcarps (Killies) for example, have several named subdivisions as well as a catch-all class for those that don't fit into any of them.

At the end of the day, all the winners are entered for "Best in Show" — that coveted title which, in the case of Crufts, is watched by thousands on TV. The winner, in both dogs and fish, should be the one that comes nearest to perfection based on the standards for its species or breed. Most judges find it difficult, when faced with all that excellence, to be totally objective about this. One has one's favourite after all . . .

Usually though, all the judges involved in a fish show put it to the vote. The fish world has its "Crufts" too, the championship shows that are held at the major festivals and exhibitions. Here the supreme champion of them all becomes Fish of the Year, or Champion of Champions, or Supreme Champion, or . . .

Fish are not so easy

One big difference, as far as I could see, between judging dogs and fish is that dog judges know what they are judging — with fish it's not always so easy!

Most fish judges resemble mobile libraries when they go to shows, and even with all those reference books to help, it is still sometimes impossible to identify the creature that looks out at you through the glass.

On those occasions, the only course available to the judge is to assess the exhibit as "a fish." If you don't know what it is, how can you tell what size and colour it should be, etc? All you can really say is that it looks good, appears to be appropriate to type, is well balanced and healthy. Sadly that is not enough, and unidentified fish are hardly ever awarded a place card, much to the annoyance of their owners.

Another obvious difference is in size. Dogs should achieve specified proportions and weights (though I never saw a dog weighed), but fish have to be finely measured against the standard that exists at that particular time. Sizes go up and down (usually up!), and new size sheets are issued by the organising bodies to their judges each year.

Next time you've got a few minutes to spare, you try measuring a busy *Rasbora maculata* — and remember that the size that counts is measured from the end of the caudal peduncle (that's the beginning of the tail fin) to the tip of the nose — and see if you can get it the same each time.

You can bet your life that any fish about to be measured will suddenly develop an urgent need to exercise. No small wonder that a fish scoring 19 for size at one show will only score 15 at another!



Trophies, like this Best in Show being proudly displayed by Sherry Hennessy of Ekkwill Tropical Fish Farm, are always keenly contested.



Judging is a difficult, stimulating job that can be richly rewarding . . . and totally thankless at one and the same time. Going through this range of emotions are Steve Somermeyer (with the moustache), Jerry Sellers (with glasses) and ABP editor John Dawes.

Correct identification by the judges is vital to a fair result. It is not too easy, say, to pass off a Scottish Terrier as a West Highland, but take two fish like *Esomus danricus* or *Esomus metallicus*: two types of Flying Barb that, to the inexperienced eye, are almost identical, barring the fact that one should grow larger than the other. The problem then facing the judge is whether it's an undersized *danricus* or a full sized *metallicus*. If you don't know you're very likely to award the wrong points.

Indeed, it is not unknown for eager competitors to misname their fish and then argue the toss on what it actually is, in order to gain a few extra points for size. Fortunately, as always, "the judge's decision is final."

Road to the top . . . for fish and judges

But experience counts for a lot. It takes several years for an enthusiast to become a top judge allowed to officiate at open and other major shows. This experience is gained at the coal-face of local society Table Shows, so, if you're keen to have a go, that's where you should begin.

There you will learn to look out for many things — the tricks of the trade. The old hands tell horrendous tales about the days when Moors were dipped in methylene blue to make them look blacker, when fins were trimmed with a razor blade, or an eye smeared with vaseline to keep the fish facing the same way all day (fish like to be able to see what's going on outside their tanks) — thus hiding a blemish on the other side. Fortunately, competitors don't get away with this sort of thing these days . . . or do they? I'm only a Class C judge after all!

I'm sure that condition and deportment must apply to dogs as well, for their judges seem to spend a lot of time watching the competitors jogging round the ring (usually they watch the dogs — though not always, I suspect).

This category is the one that dogs the fishkeeper (Sorry!). I've lost count of the number of times that a fish of mine has sulked pale and wan in the corner of its tank while being judged, only to sit up and sparkle, fins erect, colour glowing, as soon as the judge has passed it by.

Judges are not normally allowed to touch either the tank or the fish and owners are banned from the judging arena. Not for us the pockets of alert tasty morsels to bring our exhibits to a quivering state of alert expectation as the judge's eye goes over them.

A fish should do what it normally does — so it's no good if your Headstander is sitting on its tail, or your Hatchetfish is residing on the bottom. And woe betide the livebearer that drops a brood, or a greedy fish that drops yesterday's breakfast. The presence of anything but the exhibit in the tank is grounds for disqualification — though judges will always use their discretion and give the benefit of the doubt when they can — they're usually on your side.

Handle with care . . . and love

For every fishkeeper who loves to show there is another who is not interested, or maybe believes it to be unnecessarily stressful to aquatic pets.

It is certainly the case that fish can become damaged in transit and are vulnerable to disease — or even death — brought on by stress during or after a show. But if owners handle their fish with care, provide them with every comfort and, most importantly, with a big enough show tank filled with water brought from home (oh — and there are rules about tanks, too!) then healthy fish do not appear to suffer.

Some even seem to enjoy their day out, showing off to all and sundry and making you wonder who's looking at who. The thrill of winning first place and walking through the crowds to collect your trophy with applause ringing in your ears takes a lot of beating, especially when your winner is a fish you've bred yourself.

So, have a go. Above all, have FUN, because that's what it's all about. Whatever your views on showing, the beauty of this hobby is that there's something in it for everyone. I expect that goes for doggy people, too. . . .

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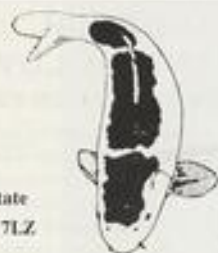
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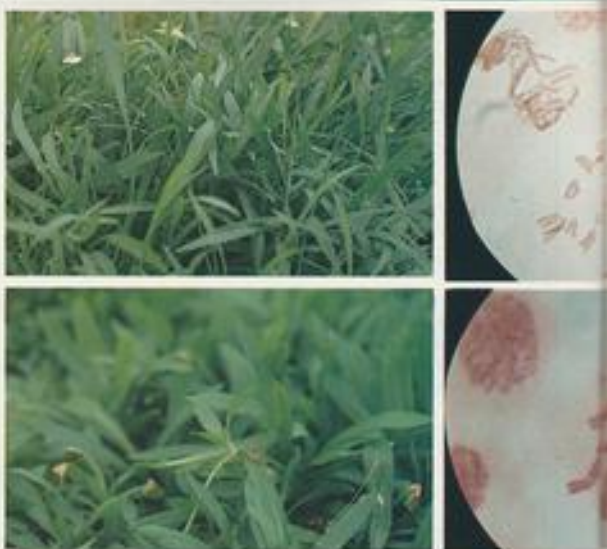
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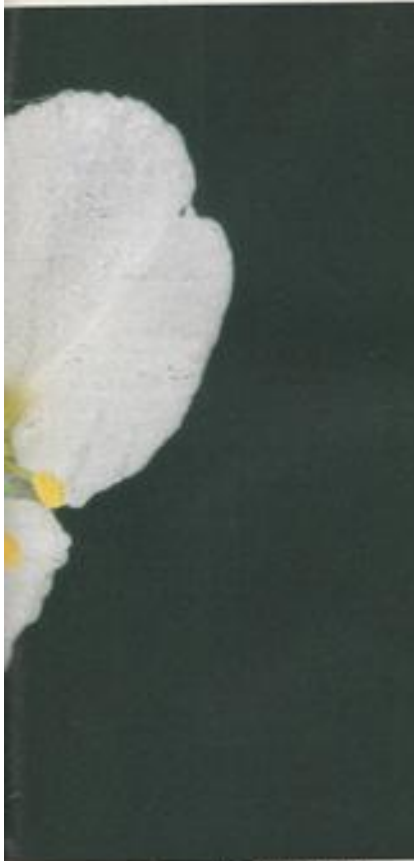
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Detailed studies of the "genetic carriers" (chromosomes) of a plant can provide very important clues to its true identity. Arie de Graaf is involved in just such a research programme aimed at unravelling the complicated and hotly disputed relationships of some of the popular aquarium plants generally referred to as Dwarf Swordplants. (Photographs by the author)



Far left, *E. bolivianus* emerged (aerial) form. Far left below, the emerged form of *E. quadricostatus* looks very similar to its close relative, *E. bolivianus*.

Above, the flower of *E. bolivianus*. Because of its triploid nature (see footnote), *E. quadricostatus* can hardly produce flowers and when it does, it cannot produce fertile fruits or seeds.

Left, below the chromosomes of *E. bolivianus* ($2n = 22$).

Left, above, in *E. quadricostatus*, the $2n$ number is 33.

In the sixties the Dwarf Amazon Swordplant was a very popular aquarium plant. Because it was a creeping and permanently low plant, it could be used very effectively for the building of so-called "Streets" in the middle part in aquaria.

The plant normally known as the Dwarf Amazon was specifically called *Echinodorus magdalenensis* Fassett (De Graaf, 1966 a and b). Fassett (1955) distinguished *Echinodorus magdalenensis* Fassett from *Echinodorus quadricostatus* Fassett by the lack of the ribs on the achenes (the fruits).

Rataj (1975) concluded that *Echinodorus magdalenensis* was a variety of *Echinodorus quadricostatus*, stating "Before the identity of both species will be confirmed by further finds, I place *E. magdalenensis* as a variety of *E. quadricostatus*."

Rataj (1975) described a new species, which is closely related to *E. quadricostatus* Fassett, namely *Echinodorus austroamericanus*. However, Holm-Nielsen (1979) synonymised *Echinodorus austroamericanus* Rataj with *Echinodorus bolivianus* (Rusby) Holm-Nielsen and stated that this species is closely related to *Echinodorus quadricostatus* Fassett.

De Wit (1983) considers *Echinodorus magdalenensis* Fassett as being identical to *Echinodorus bolivianus* (Rusby) Holm-Nielsen but says: "It could appear that the only way to correct all mistakes would be for specimens of all mentioned species, originating from the type localities, to be cultivated comparatively so that their life histories and characteristics become known."

This is the background to the cytotoxicological research concerning the genus *Echinodorus* which I am carrying out at the Department of Plant Taxonomy of the Agricultural University at Wageningen (The Netherlands). In July 1987 I had the opportunity to investigate the cytology of the species *Echinodorus quadricostatus* Fassett and *Echinodorus bolivianus* (Rusby) Holm-Nielsen at the water plant nursery of Heiko Schlichting in Berlin. The somatic chromosomes (those found in the "normal" vegetative cells) of *Echinodorus bolivianus* (Rusby) Holm-Nielsen (AdG 925) proved to be $2n = 22$. (See footnote). The somatic chromosomes of *Echinodorus quadricostatus* Fassett (AdG 926) proved to be $2n = 33$.

Conclusion

Up to the present a chromosome number of $2n = 33$ is found in three closely related *Echinodorus* species: the triploid cytotype of *Echinodorus uruguayensis* Arechevalata (synonym: *Echinodorus oeris* Rataj; (De Graaf 1988), *Echinodorus portogalensis* Rataj and *Echinodorus opaca* Rataj (De Graaf, 1980 and 1981 a, b, c, and d).

In a single plant belonging to the subgenus *Helianthium* (*Echinodorus quadricostatus* Fassett and *Echinodorus bolivianus* (Rusby) Holm-Nielsen belong to the subgenus *Helianthium* too) which I could not identify before it died, I also counted $2n = 33$ chromosomes (AdG 203).

The evidence which I have obtained so far (*E. bolivianus* — $2n = 22$; *E. quadricostatus* — $2n = 33$) indicates that these plants belong to separate species. However the cytotoxicological research programme is still awaiting conclusion, so the final report (and final conclusion) on these Swordplants has not yet been published.

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Footnote

Chromosomes are tiny structures found in living cells. They contain the genetic information that determines the characteristics of the organism, from the colour of blooms, to the maximum attainable size for the species.

In the normal "body" cells (somatic cells) of a plant or animal, these chromosomes are generally found in pairs, the total usually being given the "label" $2n$. Therefore, in a plant like *E. bolivianus*, where the $2n$ total is 22, this means that it is made up of 11 pairs of chromosomes. In *E. quadricostatus*, the fact that its $2n$ is 33 may indicate that it consists of three sets of 11, thus making it a triploid. (22 would be diploid and 11 would be haploid).

In cytotoxicology, the number, types and arrangements of chromosomes are studied, the results often allowing conclusions to be made regarding how certain species or varieties are related to each other.

Acknowledgement

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Coldwater jottings



Stephen J. Smith

Saline solution

"Imported fish bring imported disease" has been a phrase which I have come across many times over the past decade or so. But is this really a fair comment?

True, many fish which eventually find their way into the garden pond or home aquarium do so after a series of severe stress-inducing conditions encountered during their perilous journey from fish-farm to fishkeeper.

Reputable dealers take extensive precautions to ensure that fish sold to the public are in the best possible condition. For example, Koi are usually kept in darkness for several days immediately after arrival, are treated to prevent outbreaks of stress-related diseases, and carefully selected for condition before they are put on sale.

Such measures help to ensure that the fish reach the customer in the best possible condition; and thus ensure not only healthy fish but also satisfied customers.

Despite such extensive, and highly laudable measures, coldwater fishkeepers still tend to encounter problems, such as fungus and dropsy, for example.

The reason for this has never really been clear, and the opening phrase of this particular "Jotting" has often been the result. However, perhaps some light can be shed on the subject by means of the following titbit of information.

On a recent visit to Goldfish

farms in Singapore — the world's capital of live fish exports — I was surprised to find that the water in which young Goldfish are reared is 25% sea-water — and thus saline.

Now, a major symptom of dropsy in Goldfish is excess water retention within the body. My suspicions over the past several years have been that this could be related to osmotic action (whereby a less dense liquid is transferred through a membrane towards denser ones).

The fact that a Singapore-reared Goldfish raised in partially saline conditions, and is subsequently kept in a totally freshwater environment when it arrives at its destination, could well be a significant factor in the outbreak of so-called "imported diseases."

Indeed, many people have advocated the use of salt in the aquarium as a "tonic" for the fish, and in moderation this

may well be a useful expedient for newly-imported fish (excess use of salt will, in my opinion, serve only to strip the protective coating of mucus off the body of the fish and leave it open to further bacterial attack).

"Monstrous" debate

Is the following letter from John Slave, PRO to the Goldfish Society of Great Britain really the last word on the debate over Goldfish "monstrosities?"

John writes: "Apart from the aesthetics of Fancy Goldfish, the main point of the letters published in recent issues of *Aquarist* and *Pondkeeper* seems to be that Fancy Goldfish would not survive in the wild and are virtually incapable of feeding themselves.

"The object of breeding Fancy Goldfish is not to release them into the wild, but to admire them for their apparent

beauty. Most Goldfish breeders in the UK keep their fish in outside ponds for at least ten months of the year, only bringing them into aquaria for breeding. The first two years of their lives are spent (almost) totally outside.

"The fact that these fish breed is an indication that they are, in fact, living normal and happy lives." John concludes: "How many aquarium fish have this sort of liberty?"

Perhaps not the last word; any thoughts . . . ?

Designs on safety

The use of netting is a popular means of protecting the pond and its inhabitants from predators, such as cats and birds, for example. However, its use can often spoil one of the very purposes of having a pond — to provide an attractive garden feature.

Two most useful ideas to consider are to construct the pond so that it is raised; and to stretch netting over a frame.

A "raised" pond need entail simply building a low wall of three or four courses, capped with small slabs or coping stones (or even incorporating a flower-bed). The advantages of such a design are that the pond is less accessible to predators, while at the same time, and for the same reason, making it safer for inquisitive youngsters.

Also, the permanent use of netting is not required. Instead, netting can be stretched over a lightweight frame which can be placed in position overnight or during periods of absence. This can also be used to support shading material during periods of direct sunlight.

And finally . . .

The Goldfish Society of Great Britain will be holding its annual Open Show on Saturday, 7 October, at St Paul's Church Hall, Chigwell Road, Woodford Bridge, Essex. The event commences at 1 pm with an auction. Further information, as well as the new GSGB Standards, are available from GSGB secretary Roger Saltrick at 38 Herent Drive, Clayhall, Ilford, Essex, IG5 0HE (Telephone: 01-550 1252).



Netting, stretched over a lightweight frame provides an ideal method of protecting the pond against predators; while a raised design — here, roofing joists have been used — makes the pond safer for inquisitive youngsters. See *Designs on Safety*.