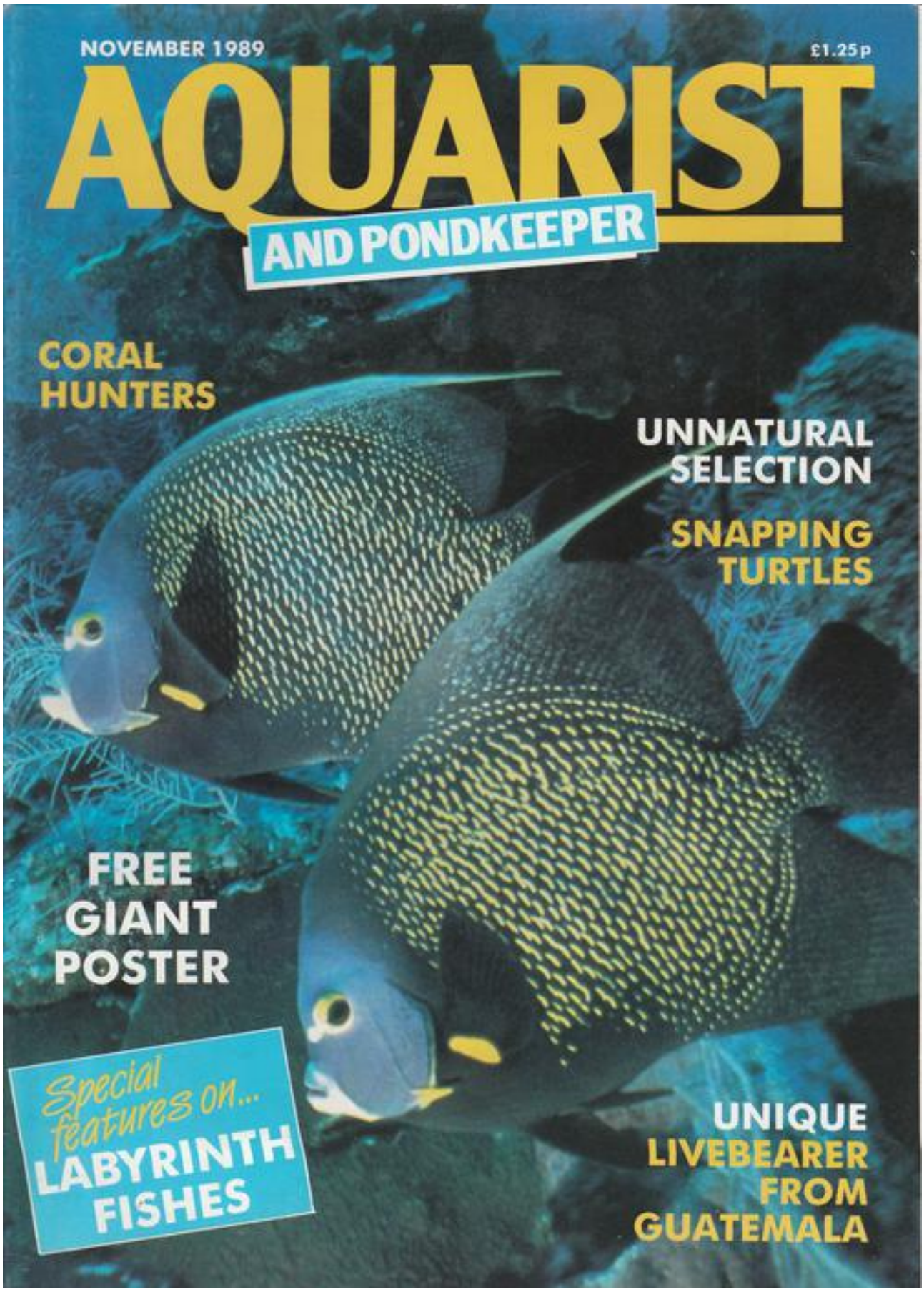
NOVEMBER 1989
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UNNATURAL SELECTION
SNAPPING TURTLES
FREE GIANT POSTER
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LABYRINTH FISHES
UNIQUE LIVEBEARER FROM GUATEMALA

AQUARIST AND POND KEEPER

NOVEMBER 1989
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FREE GIANT FISH POSTER

COVER STORY

(Photograph: Nancy Sefton/ Bruce Coleman Ltd.)
The French Angel, *Pomacanthus paru,* is a Western Atlantic fish which is usually collected around the Florida coast. As in most other Angels, juveniles look completely different to adults, the former displaying a spectacular pattern of brilliant yellow stripes on a black background. Juveniles of this species also exhibit similar "cleaning" habits to the classic Cleaner Wrasse, both in aquaria and the wild. Adults are reported to grow up to around 16 inches (c. 40.5cm) in nature, but generally remain considerably smaller than this in captivity.

TIM HENNET

MEETING THE CHALLENGE . . . AND WINNING

I've known George Candler for many years and am therefore more than aware that if I throw down a challenge, he'll rise to it . . . and probably win! The last challenge I faced him with arose out of my visit to **Aquarama '89** which was held in Singapore in June.

I was one of the judges of the Rare Species Class. We had awarded top prize to a magnificent pair of *Lepotobotia elongata* loaches which had originated from China . . . and which no-one at the show had ever seen before.

True to form, George rang me in due course. "I've got them! A pair — one fish is 7½ inches long and the other one, 6. Gorgeous, aren't they?" He'd won again.

The reason for this little story is that I've recently come across another case of a hobbyist saying that people in aquatic shops just don't know what they are talking about when it comes to fish.

This annoys me . . . a lot! *Some* people in *some* shops may not quite be up to the job, but to tar *everybody* with the same brush is, in my opinion, quite irresponsible. Fortunately, the majority of aquarists don't think like my latest complainant.

The aquatic industry is full of people who know *exactly* what they are doing and can teach us all a thing or two. What's more, as I've mentioned before in my editorials and articles, there are also quite a few who, like George, are always on the lookout for some new challenge to meet . . and to bring the fruits of their endeavours to us, the aquarists, to satisfy our unquenchable thirst for advancement in our hobby.

To those who provide us with this service go my heartfelt good wishes and thanks. To those who, possibly unthinkingly, criticise all and sundry, I would say, think before you condemn. A few badly chosen, irresponsible remarks can do untold damage to an industry that has made tremendous progress, particularly in the last ten years, and is set for even greater things, given half a chance.

P.S. The *Lepotobotia elongata* mentioned above are available from **Fishworld and Pond Supplies, 126 Wellingborough Road, Northampton, NN1 2DR. Tel. (0604) 37271.**

John Dawes
Editor

CONTENTS

UNNATURAL SELECTIO

By selecting only the "best" fish for breeding, we may well be going against Nature, or so **Dave Barnson** — who has strong personal views on the subject — believes.

Most people are familiar with the basics of the theory of Natural Selection, that is, the "pressures" that bring about changes in all living organisms through time by weeding out those individuals that are less fit for survival, thus favouring those that are better suited. This process leads to (usually) small gradual changes in a species and may eventually result in the evolution of new types over many generations.

In the world of freshwater fishes, what would appear to be a simple modification, like a new source of food, can take many generations of "mutated" offspring before the physical, and "mental" adjustments are made to utilise the new food source successfully. The challenge of pressure may be created by a type of plant never before encountered by the species, or a different form of animal matter; whatever it is, the body will take time to be able to digest the new food, to make the best use of it. This simple alteration of dietary behaviour may well ensure the survival of the species concerned if all other food sources fail.

Within each new brood of young fishes, every individual is slightly different to one another and to their parents. Those differences which may be to the benefit of the species, will tend to be passed on to future generations. Each new generation will inevitably throw up further differences and each will add to the subtle changes that result in evolution.

If, on the other hand, the mutation is not to the group's advantage, it will be less successful than others and will usually lead to the death of the individual exhibiting it, or to a lower level of reproduction success. Thus, Natural Selection only "allows" such mutations as are beneficial to the species to survive. All life on Earth has developed in this way over hundreds of millions of years, each mutation happening quite by accident, and this random pattern allowing animals to exploit every conceivable mode of existence. It obviously works; hence the huge variety of animal life on the planet. The thing to remember is, that it is the environment that exerts the pressure to evolve, and it is the environment which dictates the success, or failure of any genetic "experiment".

The only way that a new species can come into being is if the altered individuals are separated by some form of boundary such as a shift in the geological structure of the earth's crust. Such a change can, for example, turn one section of a large river into a totally enclosed lake, or even change the course of the river, breaking contact with populations elsewhere in the system.

Once some of the fishes have been isolated, any evolutionary development which arises in one group, cannot be passed to the other group. Therefore the now-separate populations of fishes will evolve along separate paths from then onwards. Eventually the differences may become so great that, if the two types were to meet again, they might not be able to recognise each other as conspecifics. They would therefore not be able to breed with each other because of this lack of identification, and as a result, would remain separate species.

The cichlid fishes of the great African Rift Lakes are testament to this sub-division of species; almost fifty species of Lamprologine Cichlids are known in Lake Tanganyika, and almost double this number are known among the Haplochromines from Lake Malawi.

Human intervention

Unnatural Selection, is brought about by the intervention of mankind in the selection process e.g. by breeding animals or plants for particular purpose. For instance, artificial breeding and living condition are created and maintained by fish-farmers and aquarists the world over. No matter how much technical wizardy, or how large the aquarium, it can only be an imitation of the fishes' natural home.

At the risk of sounding as if I am contradicting myself, I will say that, in my view, the modern face of aquatic goods and husbandry makes the average aquarist a bona-fide participant in conservation.

The Livebearing Toothcarps figure strongly in Unnatural Selection. If these fishes had not been selectively paired, and raised, giving us improved colour and longer, more graceful fins, we would probably not see them in aquaria today. The western world's work with the Siamese Fighting Fish (*Betta splendens*), has given us one of the most spectacular fishes ever seen. The Chinese people have spent many hundreds of years turning a carp-like fish into a genetic marvel; even if you are not a personal fan of Fancy Goldfish, you have to acknowledge the dedication and expertise that has gone into producing these animals. Unnatural Selection has also been hard at work on the African riverine Cichlids, making them grow larger, faster, thus providing food fish in a shorter period than would otherwise be possible.

But, there are certain aspects of Unnatural Selection that have more ominous overtones to them. For instance: it follows that if fishes separated from each other by geographical boundaries will pursue separate evolutionary paths, then captive fishes in the aquarium are just as effectively isolated. Over 85% of common aquarium species are spawned by fish-farmers, and fishkeepers; only those fishes which are not readily spawned by the farmers are caught from the wild. There are occasional imports of wild Swordtails or something like that, but, by and large, the main bulk of quarium fishes are farm-raised, or home-bred specimens.

Since the aquarium environment is quite different from their natural home, and since the food made available to them is both plentiful and artificially produced, albeit from natural products, the fishes have all the key elements needed to trigger basic adaptations in them.

If African Cichlids which graze algae in nature, are fed flake and tablet food, then they have no need for the underslung mouth to feed, and if these fishes are spawned repeatedly without encountering wild stocks, they *could* eventually lose that particular specialisation.

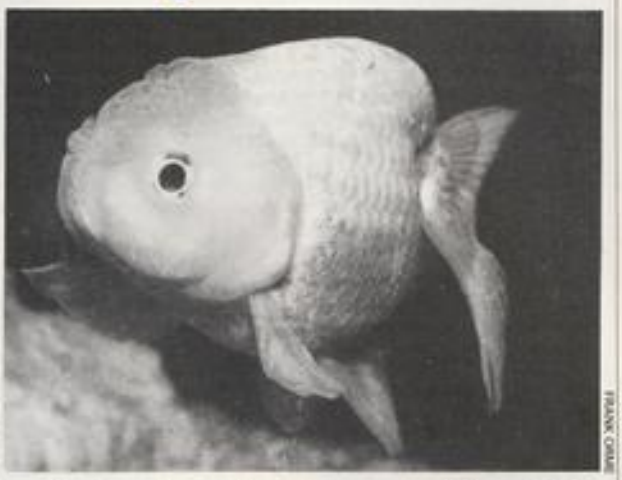
Fishes that would normally feed from the surface of the water on insects and their

Far right, Unnatural Selection over many generations has given us Fancy Goldfish varieties like this Lionhead which are far removed from the wild-type of the species.

Right, artificial varieties of Fancy Guppy would be unable to survive in the wild but do so perfectly well in the unnatural world of the home aquarium.

Above, a pair of Angels tending their eggs. Are we breeding this characteristic out of existence through Unnatural Selection?

N AND THE AQUARIST



larvae, do not need to do so now. I have, for example, watched my Platies scavenging for left over scraps on the aquarium substrate. In a pool or river the water would be too deep, and the dangers too great to go beyond their chosen feeding strata for edibles.

Behavioural changes are perhaps the more noticeable adaptations that we may be encountering. The Angel Fish *(Pterophyllum scalare)*, for example, is said to be losing its touch as a good parent. It seems that a pair is quite happy to spawn, but they have little interest in the resultant eggs. One reason that could be given for this very un-Cichlid-like behaviour is that these fish have "lost" their eggs to artifical incubation techniques so many times, that they have "lost" the instinct to protect their offspring.

Aggression tolerance

Perhaps the most disturbing idea on the theme of behavioural adaptations in the aquarium could be to do with the fishes' natural aggression tolerances.

Many fish are spawned in pairs. In almost all cases, the potential, or professional breeder will choose the largest and healthiest animals available. Unfortunately, the biggest representatives of any given species, are usually the most aggressive. They will start out small and bad tempered, claim all the food offered, often preventing others of their brood from eating, grow quickly, and attain immense proportions over their brothers and sisters.

Once fully grown, they use their superior bulk to intimidate their tankmates. They also have a tendency to claim all of the available territories in the tank and, by doing so, can effectively prevent conspecifics from breeding. They can even actually starve rivals out.

The process by which this aggression can be accidentally heightened and fixed is complicated, and yet, strangely familiar. The largest progeny from any brood are chosen as potential breeders; they are then grown on in spacious quarters, and paired off with other large representatives.

This cycle goes on and on from generation to generation, as was done by Far Eastern breeders in their attempts to produce the Siamese Fighting Fish.

Using only dominant fishes for a breeding programme can cause the dominant attitude to become "fixed" so that all fishes from the line, irrespective of size, will be aggressive. It can be argued that many amateur breeders use smaller, inferior fishes for their purposes, and that these smaller, and therefore quieter fishes will dilute the blood of the more aggressive strain.

The simple fact is, that any well equipped amateur breeder, or fish farmer, can vastly out-produce any novice's attempts. This means that the weaker strain is swamped by the genetic material of the other, and has, in reality, very little stabilising effect.

I am not knocking the fish-farmer, or indeed, the semi-professional. I myself, have spawned and raised over thirty-two species of cichlid alone, and know only too well that, to sell them, you must first grow them to a saleable size. Therefore, the larger the fry are, and the faster they grow, the sooner you sell them . . . and a faster turnover means more money.

It is a simple equation of economics and demand: breeders must keep costs down, while keeping production up. That, plus the fact that aquarists want large, healthy-looking fishes to grace their aquariums, means that the fish-farmer can only strive to meet the demand.

This type of situation could not happen in nature because of a few fundamental facts. Even the largest of any given species has predators; they are also usually just as prone to attacks from disease, with both large and small fishes dying; a fine balance between the two is always present. Also true is the fact that the "giants" of a group cannot control all of the available territories in the wild. Therefore smaller members of the group are free to find partners, and reproduce.

We, as aquarists, have no such safety net; we actually do the opposite job that would naturally occur. Unusual mutations of any description survive at the whim of the fishkeeper; there are no predators to despatch them, and any danger from disease organisms can be virtually eliminated. That is one of the reasons why so many strains of, say, albino forms are possible.

Human intervention breaks the chain of Natural Selection, or or, if you will, the fishkeeper adds an unforeseen extra link to the chain.

Closing remarks

These ideas have gradually come to me from years rooted in front of my aquaria, breeding many fishes, and taking notes on any unusual behaviour patterns seen. The theory of "independent evolution" in the aquarium didn't come as a flash of inspiration (or misguided idiocy, depending on your viewpoint), but was built up from a steady stream of observations that I carried out in order to try to understand my fishes a little better.

Unnatural Selection has given us an "Aladdin's Cave" of wealth in the shape of fishes. Because of its use, many species that would now be extinct have been rescued, and some native waters have been re-stocked with them.

Somebody better trained than I, and better equipped, may be able to expand on this theory and either prove, or disprove its merits, but when the next Guppy is born in your tank, or the next clutch of precious eggs hatches, just stop and think; you may well be witnessing the next step in the evolution of a new species of fish!

Letters

Fancy Rat!

First, congratulations on a splendid magazine. I was a regular subscriber until a few years ago, when I had to disband my tropical fish collection for various reasons. I have recently made a return to keeping tropicals and have once again started purchasing *Aquarist & Pondkeeper*. The magazine is a great improvement on its former self — and *that* was a wonderful magazine anyway!

As you may gather from the title of my notepaper, I am very interested in Fancy Rats, a domesticated version of *Rattus norvegicus*, the Common/Brown /Norway Rat, as well as several other species of small livestock. The National Fancy Rat Society has over 400 members in the UK and overseas and holds regular shows and exhibitions. Fancy Rats themselves have been kept since 1901 and, since the formation of the current fancy in 1976, are available in a wide range of colours and markings — just like fish, in fact.

As Archivist of the Society, I am constantly on the look-out for written material relating to Rats, Fancy and wild. Several such items are published as points of interest in the members' magazine, **"Pro-Rat-A"**, which is published bi-monthly and sent free to NFRS members.

Imagine my surprise when, in a non-Rat frame of mind, I was reading the letters page of the April issue of *Aquarist & Pondkeeper* and came across the letter from K E Davenport of the Department of Fishery Management and Game, regarding drowned wild rats in fishponds and their possible contamination, via Leptospirosis, of pond fish.

Unfortunately, I do not have a copy of the December 1988 issue of *Aquarist* in which John Cuvelier posed the question about contamination from wild rats in such circumstances. However, I found K E Davenport's letter highly informative and very interesting. Obviously, domestic rats do not carry Leptospirosis, nor would their owners let them fall into fishponds! Nonetheless, I feel that the letter would be of interest to NFRS members in my Archives column in **"Pro-Rat-A"**.

I would be most grateful, therefore, if you would grant me permission to reprint the letter in a future issue of **"Pro-Rat-A"**, with full credit to yourselves and the writer, of course. Also, if all possible, could you supply me with a copy of the original letter/article from the December '88 issue, for similar inclusion? I would, of course, meet all reasonable costs in this regard.

Once again, I am pleased to be a regular reader of your marvellous magazine. Keep up the good work!

Nick Mays
Vice-chairman/Archivist — NFRS

Editor's Note:
Thank you for your most interesting letter and most welcome comments regarding ***A & P****. The original item written by John Cuvelier in December '88 is on its way to you with my compliments — and full authorisation to reproduce it in your journal.*
John Dawes

Show talk

In response to the August '89 editorial (**Singapore packs them in — why can't we?**) I have applied a little more thought to the "problem" of attracting more people into the hobby. I feel that, maybe, the popular Tableaux Class at major shows could be used a little more constructively in this matter.

Having taken part in all the major shows in the South since their conception in the late '60s and early '70s, including the emergence of the newer venue at Sandown Park, and, more recently, as a member of a demonstration team showing the practical basics of setting up an aquarium, I find that two main aspects are constantly difficult to explain to visitors, especially to potential newcomers to the hobby.

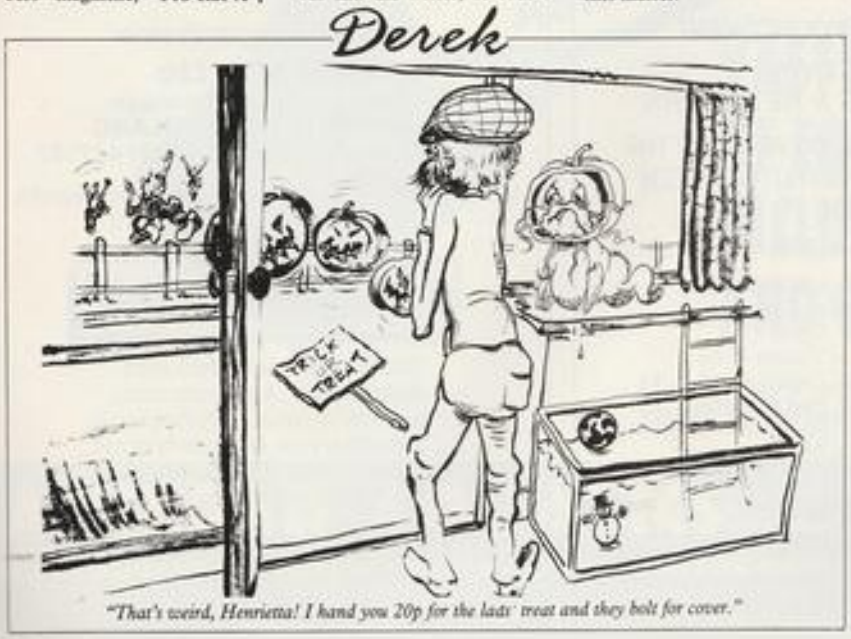
While Furnished Aquarium Classes are very attractive, it is hard for visitors to understand that they are specially set up for the period of the show and not always representative of tanks that can be kept successfully over much longer periods in the home.

This raises the second query; "Why aren't there more tank set-ups that are more suitable?" It makes me think that this is surely what the major fish shows should be all about, attracting more new people into the hobby.

Here, I feel, is a golden opportunity for the Tableaux Class to be of great help. Every year, those keen society exhibitors put in a lot of time and effort into, first thinking up an original idea and, then, creating the final product. Then it's the turn of the judges to try to make sense of the many differing themes and to come up with a worthy individual society winner (in my view they are all winners!)

My suggestion is that the Tableaux Class is given the one theme of **"Aquarium to Grace the Home"** and an oblong area be allocated to each participating society in which to show how aquariums can be accommodated into any home layout and decor. After all, this is how we all started — even if many of us then graduate to a separate fish-house at a later date.

One, two (or more) three-foot tanks could be shown: Freshwater, Tropical Community, Coldwater, Cichlid or Catfish collections could all be featured. I am not thinking of marines or more specialist species at this stage, but merely to show what might be possible as a starting point. With all the



"That's weird, Henrietta! I hand you 20p for the lads' treat and they bolt for cover."

Letters

traders' stands featuring all the necessary equipment and advisory services the would-be fishkeepers would not go away from the show uninformed nor uninterested. Such shows are our hobby's "shop-window," and we should not let potential customers slip away through lack of "selling technique" on our part.

As to how we get more people to attend shows, I'm afraid we have to rely on constructive advertising. Advance television coverage plays a great part, as does direct advertising in periodicals but, sad to say, not every potential fishkeeper realises the virtues in taking such magazines ahead of committing themselves to the hobby.

Like many people, I enjoy nature programmes, but am usually disappointed when most interesting-looking "water-filled" scenes only pay scant attention to the (more-than-likely) very interesting fish-life. While the fish may be a necessary part of the natural food chain for the local human population, it would be nice to have these fish identified and even considered as possible aquarium-dwellers from time to time. This would help to generate more "aquarium-interest" and, then, more people would see the benefits of attending the shows to see the fishes themselves.

Of course, this still leaves other questions for discussion. For example, do we want an exhibition, or a market?

Peter Caira,
Ashford, Middlesex.

Sorrento flattery

Following your response to a letter I sent to Graham Cox **(Your Questions Answered)**, I thought I'd drop you a line to thank you and congratulate you on the quality of your magazine.

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Sera and Blagdon in mutual aid deal

Following the trend which they have adopted in other countries like Germany, France and Italy, **Sera-Import & Export GmbH,** West German manufacturers of fish food, medications and care products, water conditioners, etc., are to set up their own subsidiary company in the UK: **Sera UK Ltd.**

The existing Sera importers in the UK, **Blagdon Water Garden Products,** are supporting the company fully in this development, having already witnessed the success of the concept in the other countries (in France, for example, Sera have already reached "a leading market position").

Blagdon and Sera feel that they have established a firm foothold for Sera products in the UK and that, now, a full factory effort is needed, with all the marketing muscle that is required to lift Sera products to a leading market position. In the meantime, and in order to guarantee a smooth transition until the new operation takes over, Blagdon Water Garden Products will continue to supply Sera products.

With the help of regional representatives, Sera will be setting up a distribution system to cater for regular deliveries to both the pet shop trade and garden centres. In addition, there will be regular seminars and sales demonstrations particularly tailored to the aquatic market. At these sessions, the specialist trade will be offered useful tips, information and problem solvers. Sera will also be working to set up a firm working relationship with wholesalers.

Blagdon, for their part, are also undertaking major developments in Europe with their own range of water garden products, and are being assisted in their efforts by Sera in Germany and elsewhere.

Mini reef production moves to Germany

Minireef, the aquarium filtration system researched and developed in Holland some ten years ago, was introduced into the UK in 1986 by **Xotic Fish Ltd.** of Alfreton, Derbyshire.

Since that time, demand has far exceeded supply and this has resulted in numerous problems for the distributors, particularly with late deliveries. To overcome this, Xotic Fish Ltd. are now having their Minireef systems made in West Germany.

This has resulted in much better deliveries and improved quality control but also an increase in price. Several new improvements have been made to the system and the company inform us that, in spite of the price increase, sales are now better than ever.

According to the words of Managing Director **John Tarbatt,** "With production now based in West Germany, a much improved delivery schedule and a host of new innovations, the new Minireefs have exceeded all our expectations."

For further details contact **John Tarbatt, Minireef Aquarium Systems, Unit D2, Salcombe Road, Meadow Lane Industrial Estate, Alfreton, Derbyshire, DE5 7RG.**
Tel: 0773 831831
Fax: 0629 580503
Telex: 377974 XOTIC G.

minireef

Stapeley — largest centre of its kind in the world

According to a British Tourist Authority report published in June, Stapeley Water Gardens, in Nantwich, Cheshire is "the largest water garden centre in the world, and No 2 to Kew".

Stapeley can boast of an exceptional array of displays and facilities including:

* The Palms Tropical Oasis.
* Water Lily Walk.
* Huge pools "brimming with magnificent tropical and coldwater fish".
* A musical fountain and a video theatre with regular shows.
* Shopping — "for every conceivable plant, garden product and gift, and a delightful Pet Shop".
* Restaurants — The Italian Garden Restaurant and The Palms Restaurant.
* Wide range of regular events.

There is free parking for 1500 cars and coaches. Also free: entrance to the garden centre, shops and water lily walk. Entrance to the Palms: Adults — £1.80; Children — 90p; OAP's — £1.40. Reduced group rates and wheelchair facilities are also available.

Further details from **Stapeley Water Gardens, Nantwich, Cheshire. Tel: (0270) 628628.**

Expert advice on Growing Lilies

"A venture which is a collaboration between a national collection holder and a commercial enterprise for the benefit of the home gardener".

That's the way in which **Philip Swindells,** Director/Registrar of the Wycliffe Hall Botanical Gardens, sees the recently published leaflet **How to Grow Waterlilies,** sponsored by **Lambton Park Garden Centre** of Chester-le-Street, Co. Durham.

Wycliffe Hall houses the National Waterlily Collection which is the only specialist conservation collection of its kind in the UK. Used by the International Water Lily Society in its work regarding the registration of new varieties, the collection is not only unique and historic, but also a tremendous source of material for research and education into the care and cultivation of these lovely aquatic plants.

With all that expertise to hand, it is hardly surprising to find that the leaflet contains all the essentials regarding lily cultivation, from choosing appropriate varieties to propagation, feeding, choosing growing containers, preparing plants and actual planting techniques.

Copies of the leaflet are available free of charge on submission of a stamped addressed envelope from **National Waterlily Collection, Wycliffe Hall Botanical Gardens, Barnard Castle, Co. Durham, DL12 9TS. Tel. 0833 27241; Fax. 0833 27217.**

Details of **A Preliminary Checklist of Cultivated Nymphaea** just published by the International Water Lily Society, with support from **Aqua Soil,** are also available from **Philip Swindells** at the above address/tel/fax number.

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Following the trend which they have adopted in other countries like Germany, France and Italy, **Sera-Import & Export GmbH,** West German manufacturers of fish food, medications and care products, water conditioners, etc., are to set up their own subsidiary company in the UK: **Sera UK Ltd.**

The existing Sera importers in the UK, **Blagdon Water Garden Products,** are supporting the company fully in this development, having already witnessed the success of the concept in the other countries (in France, for example, Sera have already reached "a leading market position").

Blagdon and Sera feel that they have established a firm foothold for Sera products in the UK and that, now, a full factory effort is needed, with all the marketing muscle that is required to lift Sera products to a leading market position. In the meantime, and in order to guarantee a smooth transition until the new operation takes over, Blagdon Water Garden Products will continue to supply Sera products.

With the help of regional representatives, Sera will be setting up a distribution system to cater for regular deliveries to both the pet shop trade and garden centres. In addition, there will be regular seminars and sales demonstrations particularly tailored to the aquatic market. At these sessions, the specialist trade will be offered useful tips, information and problem solvers. Sera will also be working to set up a firm working relationship with wholesalers.

Blagdon, for their part, are also undertaking major developments in Europe with their own range of water garden products, and are being assisted in their efforts by Sera in Germany and elsewhere.

Mini reef production moves to Germany

Minireef, the aquarium filtration system researched and developed in Holland some ten years ago, was introduced into the UK in 1986 by **Xotic Fish Ltd.** of Alfreton, Derbyshire.

Since that time, demand has far exceeded supply and this has resulted in numerous problems for the distributors, particularly with late deliveries. To overcome this, Xotic Fish Ltd. are now having their Minireef systems made in West Germany.

This has resulted in much better deliveries and improved quality control but also an increase in price. Several new improvements have been made to the system and the company inform us that, in spite of the price increase, sales are now better than ever.

According to the words of Managing Director **John Tarbatt,** "With production now based in West Germany, a much improved delivery schedule and a host of new innovations, the new Minireefs have exceeded all our expectations."

For further details contact **John Tarbatt, Minireef Aquarium Systems, Unit D2, Salcombe Road, Meadow Lane Industrial Estate, Alfreton, Derbyshire, DE5 7RG.**
Tel: 0773 831831
Fax: 0629 580503
Telex: 377974 XOTIC G.

minireef

Stapeley — largest centre of its kind in the world

According to a British Tourist Authority report published in June, Stapeley Water Gardens, in Nantwich, Cheshire is "the largest water garden centre in the world, and No 2 to Kew".

Stapeley can boast of an exceptional array of displays and facilities including:

* The Palms Tropical Oasis.
* Water Lily Walk.
* Huge pools "brimming with magnificent tropical and coldwater fish".
* A musical fountain and a video theatre with regular shows.
* Shopping — "for every conceivable plant, garden product and gift, and a delightful Pet Shop".
* Restaurants — The Italian Garden Restaurant and The Palms Restaurant.
* Wide range of regular events.

There is free parking for 1500 cars and coaches. Also free: entrance to the garden centre, shops and water lily walk. Entrance to the Palms: Adults — £1.80; Children — 90p; OAP's — £1.40. Reduced group rates and wheelchair facilities are also available.

Further details from **Stapeley Water Gardens, Nantwich, Cheshire. Tel: (0270) 628628.**

Expert advice on Growing Lilies

"A venture which is a collaboration between a national collection holder and a commercial enterprise for the benefit of the home gardener".

That's the way in which **Philip Swindells,** Director/Registrar of the Wycliffe Hall Botanical Gardens, sees the recently published leaflet **How to Grow Waterlilies,** sponsored by **Lambton Park Garden Centre** of Chester-le-Street, Co. Durham.

Wycliffe Hall houses the National Waterlily Collection which is the only specialist conservation collection of its kind in the UK. Used by the International Water Lily Society in its work regarding the registration of new varieties, the collection is not only unique and historic, but also a tremendous source of material for research and education into the care and cultivation of these lovely aquatic plants.

With all that expertise to hand, it is hardly surprising to find that the leaflet contains all the essentials regarding lily cultivation, from choosing appropriate varieties to propagation, feeding, choosing growing containers, preparing plants and actual planting techniques.

Copies of the leaflet are available free of charge on submission of a stamped addressed envelope from **National Waterlily Collection, Wycliffe Hall Botanical Gardens, Barnard Castle, Co. Durham, DL12 9TS. Tel. 0833 27241; Fax. 0833 27217.**

Details of **A Preliminary Checklist of Cultivated Nymphaea** just published by the International Water Lily Society, with support from **Aqua Soil,** are also available from **Philip Swindells** at the above address/tel/fax number.

A TRIP TO REMEMBER

Winner of the 'Aquarian' Orlando holiday competition, **Eric da Costa,** recalls the highlights of his trip.

August 9 had finally arrived and my wife, Wendy, and I were boarding our flight to Orlando, Florida, to the sumptious Orlando Hyatt Hotel, the International Cichlid Conference, the tropical fish farms and the sights of Florida as winners of the June '89 **'Aquarian'** competition in *Aquarist & Pondkeeper.*

The very next day after our arrival heralded the start of the Conference. Internationally renowned speakers from all over the world, including Heiko Bleher, Marshall Meyers and our own, Dr David Ford, presented illuminating lectures on a wide variety of subjects, from fish nutrition to investigations into Angelfish disease. The lecture which made the greatest impression on me was Heiko Bleher's lecture about the destruction of natural habitats throughout the world and the ensuing grave consequences for wildlife.

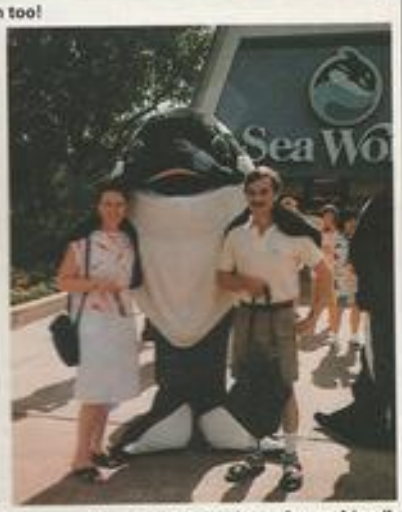
Day two of the Conference, Friday, 11 August, took us to Ekk-Will and Segrest fish farms — two of the biggest in Florida. The quantity and quality of the fish was incredible and the centralised filtration system in the marine house at Segrest had to be seen to be believed.

On Saturday we had our first viewing of the fish on show and the trade stands. Several hundred cichlids were displayed in the show room at the Hyatt Hotel. The Americans have two Best In Show categories; one is the judges' selected winner, based on the highest points, while the other is the peoples' favourite, where visitors vote for the fish they would most like to win. This year's Open Show people's favourite was a beautiful Blue Freckle Cichlid. This is a nice touch which I would like to see introduced to our shows in the UK.

Many of the showers entered their fish for the auction on Sunday and the winners in each class were at a premium, with four wild *Tropheus* fetching over 300 dollars.

As well as attending the Conference we also managed to squeeze in visits to the Living Seas at Disney World with its 5-million gallon aquarium, and the famous Orlando Sea World where you can see performances from gentle dolphins and the redoubtable killer whale, Shamu. We even managed to spend a bit of time relaxing at the hotel — and what a hotel! The Hyatt is situated in 46 acres of gardens and has many magnificent swimming pools and fountain displays.

Ready for the great adventure — and chauffeur driven too!



Above, Cichlid-viewing at the International Cichlid Conference. Above right, an embrace from a friendly Killer whale at Sea World in Orlando.

I cannot really mention any individual highlights because the holiday was one big highlight. We did and saw things that you would not normally do on a standard holiday. How many times would you go somewhere and rub shoulders with the likes of Heiko Bleher and Ad Konings, or have as your host and guide someone as esteemed as David Ford?

We met nothing but friendliness and hospitality. I am also pleased that these friendships will be lasting — we have secured a twinning association between my club, the Ashby Fishkeepers, and the Central Florida Aquarist Society. We can only thank everyone concerned with the arrangements and organisation of this prize trip, especially Dr Ford for his help and kindness and, of course, **'Aquarian'** and *A&P* for the competition that took us there.

Seaview

by Gordon Kay

Dolphin Slaughter

The end of July saw news reaching Britain of thousands of dolphins being slaughtered off the coast of Peru for their meat. At least 20,000 are expected to be killed this year for sale in the Peruvian capital of Lima, say the **Whale and Dolphin Conservation Society.**

There has been a massive explosion in dolphin hunting over the last four years and environmentalists claim that Peru's huge dolphin colonies will be wiped out by the year 2000 unless action is taken.

Dolphin hunting is not illegal in Peru and the fishermen there started to catch them as stocks of Anchovy — their traditional quarry — declined. The dolphins are hunted by motor boat, harpooned and then dragged on board the boat to have their throats cut.

Speaking as one who would only eat an animal if it died in its sleep and also someone with a great respect and admiration for dolphins, I found the story sickening. Giving the issue a less subjective perspective, however, who could deny that the loss of dolphins from our planet would be one of our greatest tragedies to befall mankind — and that could happen if we carry on like this. Anyway, the Executive Director of the Whale and Dolphin Conservation Society was due to fly out to Peru in August to try and persuade the government there to put an end to the carnage. Let's hope that by the time you read this he will have made some progress.

Coral— destroying damsels

It seems that the latest threat to coral reefs could be the very fishes that live on (and off) them! **M. W. Westneat** and **J. M. Resinghe** reported recently — in an American magazine called **'Coral Reefs'** — that the stomach contents of three Australian fish species were examined during the annual mass spawning of scleractinian corals.

Two of the three — both of which were damsels (namely, *Acanthochromis polyacanthus* and *Abudefduf bengalensis*) — were shown to become almost exclusively coral spawn feeders during the spawning period. The report ended with the statement that "fish predation during coral spawning may be an important source of larval coral mortality".

These blokes know a lot more about it all than I do but I've seen these mass spawnings for myself and I find it a little difficult to believe that predation could make much of a dent in the huge numbers of larvae produced. Also, have the damsels just discovered coral larvae?

Anyway let's get down to the return of snippets.

Dolphin And Whale Snippets — or amazing facts about whales and dolphins you probably already know.

1. A dolphin has a brain twice the size of a great ape's.
2. Dolphins live in groups as one big family, sharing the available food. They protect each other from danger and will try to free their fellow dolphins if they get caught in fishermens' nets (perhaps that should have read WHEN!).
3. Dolphins 'babysit' for each other while the mothers hunt for food (I like the sound of that, women bringing home the grub).
4. They have been known to save humans by chasing away sharks and even helping swimmers in distress.
5. Like humans, dolphins make love for pleasure — well, I suppose it can be a bit boring spending your life just swimming around.
6. A dolphin in Hawaii — called Akeakamai — is said to understand fifty human words.
7. Dolphins, as we know, are very playful characters. This is true not only of dolphins in captivity but also of those in the wild. Even when travelling around for everyday purposes, dolphins will suddenly leap from the water. It reminds us whimsical humans of children suddenly breaking into a skip and a hop when walking down the street. However, scientists believe that this leaping is done to conserve energy. How boring.
8. The efficiency of whale blubber as an insulator is so great that the heat produced in the decomposition of a dead whale can even cook the flesh.
9. Whales have been known to dive to depths of 1,500 metres. They are able to do this by means of various physiological adaptations. Before diving, the air in the lungs is changed completely; to do this the whale breaths several times in quick succesion.

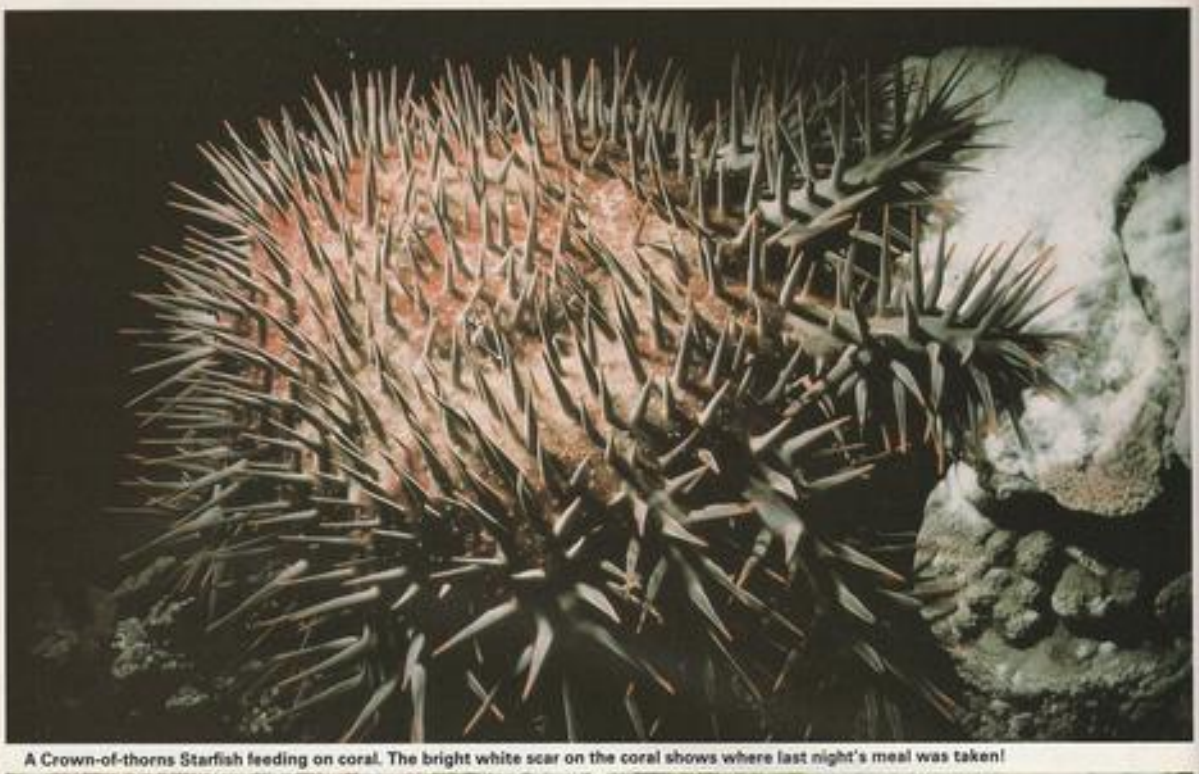
   During the dive the heartbeat slows down and blood is shunted from the muscles to the brain. The centres in the brain that control breathing, unlike those in man, are relatively insensitive to the increase of CO_2 in the blood and, as a result, the whale is not forced to take another breath when the CO_2 rises, as would a man.
10. Whales lack a sense of smell and cannot see very well, As a result they have to rely on hearing and touch. Sound is used for both echo-location of prey and orientation. The stranding of some species on sandy beaches may be due to an absence of echo-reflection.
11. Young whales can be up to a third the size of the female. They are born tail-first, thus ensuring that they do not drown during birth. after birth the female pushes the young to the surface to take its first breath.

    To allow the young whale to suckle and breathe simultaneously, the female floats on her side and ejects the milk forcibly.
12. A dolphin is killed by a human every two minutes. More precisely, by fishermen, as they are blamed for damaging nets or eating too many fish.

    In Sri Lanka, dolphins are trapped in inshore fisheries; in Chile they are killed and used for crab bait (!) and, as mentioned earlier, they are being killed in their thousands in Peru. Us Brits, of course, are polluting our seas so much that they just stay away!

    I think I'll quit on that unhappy note, friends, so until the next time. . . .

Some damsels like *Abudefduf Bengalensis* are insatiable coral spawn feeders.



A Crown-of-thorns Starfish feeding on coral. The bright white scar on the coral shows where last night's meal was taken!

Barnacles among the polyps of a Starflower Coral. Right, another Starflower symbiont: the Yellow Clawed Hermit Crab *Pagurixta*.

CORAL FRIENDS AN

Dr Lin Baldock selects a few of the most common organisms which either destroy corals or live in harmony with them.
(Photographs taken in the wild by the author)

At first glance it might seem surprising that stony corals have many predators. But they do. The vast areas of coral reef world-wide provide intricate habitats for a myriad other species including, of course, predators and symbionts.

PREDATORS

There are numerous coral predators on the reef. All contribute to the eventual breakdown of the calcareous (chalky) skeleton and the production of coral sand on which the development of coral islands depends.

Crown-of-thorns

The most infamous and conspicuous predator is probably the Crown-of-thorns Starfish *Acanthaster planci*. This sinister-looking starfish gained a place in the news headlines for its spectacular destruction of enormous areas of coral, both in Australia and on other Indo-Pacific reefs. The starfish crawls onto a coral, everts its stomach and digests the coral tissue from the outside without the need to break the skeleton apart. This leaves a characteristic bright white scar of dead coral which soon becomes colonised by algae.

Geological evidence has shown that the Crown-of-thorns Starfish has long been associated with reefs. There has been much debate as to the cause of the population explosions witnessed in recent years, with disruption of the ecological balance by man being suggested as a possible cause, either by pollution or by the removal of predators. However, no clear connection between cause and effect has been identified. Scientists at the Australian Institute of Marine Science in Townsville, Queensland, are currently studying the biology of the Crown-of-thorns and investigating possible means of controlling it before populations reach plague proportions.

A bright blue Christmas-tree Worm growing on a colony of Hump Coral, *Porites*.

A boring sponge (the brown-green patch) overgrowing a coral colony.

Gall Crab chambers, looking like cupped hands, on the common reef coral *Seriatopora*.

D FOES

Other predators

Other coral predators may not be so obvious and be more insidious in their effect. One of the accompanying illustrations shows a boring sponge (the greenish-brown area in the upper part of the picture, probably a species of *Cliona*) gradually invading a colony of the Hump Coral, *Porites*. Studies in the Caribbean have shown that populations of these inconspicuous sponges on a reef may destroy 8kg (17.6lb) of coral in each square metre every year as they bore their way through the reef. They spread at an incredibly slow rate of 4cm (1.6in) annually. Nevertheless, this speed of destruction represents twice the rate at which the corals can grow.

The density of infestation of coral colonies by sponges and other burrowing organisms such as molluscs and polychaete worms is often increased in areas where the coral is, for some reason, under stress. This has serious implications for the recovery of damaged reefs in certain areas of the world. However, it has been shown that reefs can recover rapidly from the depredations of the Crown-of-thorns.

The photograph of the sponge also shows the effect of another important coral predator: fish. Studies have shown that fish may consume up to 33% of coral growth per year. The bright white scars were produced by a species of Parrot Fish (Scaridae) which feeds on coral.

Using its powerful "beak", the fish bites off chunks of coral skeleton containing living polyps which are digested. The skeletal material is excreted in the form of a fine sand. The zone between the healthy coral and the sponge-infested area is often a site (as here) for attack by fish. This is likely to enhance the rate of spread of the sponge into the coral. Many Butterfly Fish (Chaetodontidae) are also coral predators, their delicate, pointed mouths being ideally adapted to picking off individual coral polyps.

CORAL SYMBIOSIS

In a future article I will describe the single most important symbiotic relationship for corals: their cohabiting algae, in a previous article. However, many other organisms live together with corals in a non-destructive manner, the hard coral skeleton providing their "guests" with protection from many predators.

First, what is symbiosis? Symbiosis is an association of two different organisms. The relationship may or may not be beneficial to either or both partners, but, on the other hand, it is not detrimental. If damage occurred it would be called parasitism.

Crustacea

Crustacea, in particular, have formed close associations with corals. The illustrations show a species of barnacle (rather surprisingly, from its appearance, classified as a crustacean) which has settled on a type of Starflower Coral, *Astreopora*, distorting the coral growth around the opening.

Another filter-feeding crustacean regularly associated with *Astreopora*, is the Hermit Crab (*Paguristes*). These crabs inhabit holes in the coral which, itself, often becomes discoloured and distorted around its "guests". The crabs' large yellow claws are used to block the burrows in which they (the crabs) live should they be threatened by a visiting predator.

A third symbiotic crustacean is the Gall Crab. Here the crab settles on the growing coral and modifies its development in such a way as to form a small chamber in which the female crab spends her life, unable to escape. Male crabs are much smaller and are able to move in and out of the gall without difficulty. The galls look like tiny cupped hands among the unmodified branches of the coral colony. The illustration shows the gall formed by the crab *Haplocarcinus marsupialis* in the common coral *Seriatopora hystrix*.

Other crabs in the family Xanthidae have formed a symbiotic relationship with corals in which both the crab and the coral benefit from the association. The crabs shelter within the branches of the corals during the day, emerging only at night to feed. It is thought that these handsome, mobile crabs may be important in deterring the Crown-of-thorns Starfish from feeding on their coral host by nipping the tube feet of the predator as it attempts to smother its prey.

Symbiotic worm

Another association with corals is that of the Christmas-tree Worm, *Spirobranchus giganteus*, commonly found living on Hump Corals, *Porites*. This filter-feeding worm secretes a calcareous tube which becomes deeply buried in the coral as the worm and its host grow. The spiral of colourful tentacles can be rapidly withdrawn into the tube and the entrance closed by a tough lid or operculum armed with a sharp spine. The individual shown in the accompanying photograph obviously failed to react quickly enough — the top of one of the spirals has been nipped off by some hungry fish!

Herpetology matters

By Julian Sims

Natural hybrids

Biologically, a species is defined as a group of similar individuals (animals or plants) which can successfully reproduce among themselves but which usually don't breed with dissimilar organisms belonging to other groups or species.

In this way, the members of a species form a distinct group with particular characteristics. Such characteristics include colour patterns and biochemistry, e.g. protein type, and because these features are inherited from the parents, they remain specific to the next and subsequent generations of that group or organisms.

When keeping animals in captivity, the uniqueness of each species must be respected and cross-breeding between two different species should not be encouraged. The resulting hybrids are usually infertile, preventing further "corruption" of a biological product which has evolved by the natural selection of the best characteristics and adaptive features.

However, occasionally in the wild, natural hybridisation takes place between two very similar species which live in the same area or adjoining habitats. Where two species occupy the same geographical region they are said to be SYMPATRIC and the offspring resulting from cross-fertilisation are sometimes called INTERGRADES.

Natural hybridisation can occur between the closely related Carpet and Diamond Pythons of Australia, especially in the northern rivers district of New South Wales. The classification of these snakes has in the past been confused — not helped by the Carpet Python which is found in both light and dark forms, and the existence of variable coloured hybrids. Currently the snakes are regarded as being subspecific in status as reflected in their Latin trinomials: Diamond Python (*Morelia spilotes spilotes*) and Carpet Python (*M.s. variegata*).

Another group of reptiles in which hybridisation has been reported to occur are the European tortoises: Hermann's (*Testudo hermanni*) and Spur-thighed (*T. graeca*). One of the characteristics used in the identification of Hermann's Tortoise is the presence of a divided supracaudal shield which appears to be "split". (The supracaudal is the central marginal shield at the rear of the upper shell or carapace). Spur-thighed Tortoises don't have a divided supracaudal. Hatchling tortoises which bear all the characteristics of Hermann's Tortoises, e.g. colour pattern of the carapace and a "claw" on the end of the tail, but which lack the divided supracaudal have been regarded by some herpetologists as an example of hybridisation between the two species.

Careful study has shown that in tortoise populations composed entirely of the Hermann's species, a minority of hatchlings don't have a divided supracaudal. Thus, such individuals cannot be regarded as hybrids.

Among European amphibians hybridisation occurs between the Marbled Newt (*Triturus marmoratus*) and the Crested Newt (*T. cristatus cristatus*) where the distribution of the two species overlap in France. The hybrids are very colourful, usually inheriting the green of the Marbled Newt on their back and the orange and black of the Crested Newt on their underside. In fact, because of this distinctive coloration these hybrids were at one time classified as a separate species, *T. blasii*.

J.S. IAN SIMS

Edible Frog *(Rana esculenta)* — an example of a species which has arisen by natural hybridisation.

European Green Frogs also hybridise. Edible frogs (*Rana esculenta*) are regarded as being a hybrid between Marsh Frogs (*R. ridibunda*) and Pool Frogs (*R. lessonae*). All Edible Frogs have at least one set of chromosomes from each of the other two species of frogs. If Edible Frogs breed among themselves, the species remains "true" and another generation of Edible Frogs results. If an Edible Frog breeds with either a Marsh Frog or a Pool Frog, the offspring also always show Edible Frog characteristics. Thus *R. esculenta*, which has arisen as a result of hybridisation, is an extremely widespread species on the European mainland.

However, this example of complex genetics and the satisfactory arrangement of chromosomes during fertilisation is very unusual — a rare example of successful natural hybridisation.

Single-sexed Lizards

Animal reproduction which results from the development of an egg that has not been fertilised by a sperm is called PARTHOGENESIS.

With invertebrate groups, this form of reproduction takes place among the Rotifers (miscroscopic aquatic "wheel animals") and is used very successfully by the common garden pest, the aphid of "green-fly".

However, with the more advanced vertebrate groups, parthogenesis is very rare and is only known to occur with a few species of lizard. Examples include some members of the genus *Lacerta* from Europe and Asia, e.g. the Rock Lizard (*L. unisexualis*) from the Caucasus Mountains and some members of the genus *Cnemidophorus*, the Whiptail Lizards found in the south western United States of America and northern Mexico, e.g. *C. neomexicanus*.

Populations of these lizard species are "single-sexed" (or matroclinal) — they are composed entirely of females. Of course, it is not possible to prove that these lizards are not fertilised by a male of a closely related sympatric species when they reproduce in the wild.

Such proof is also difficult to obtain under captive conditions. Some female reptiles (and amphibians) of "normal" bi-sexual species can store sperm in their oviducts for several months, even years, after copulation and then lay fertile eggs or give birth to live young. Thus, to prove that some species of Whiptail Lizard were truly parthenogenic it was necessary to rear hatchlings to sexual maturity under isolated laboratory conditions.

It takes almost a year for Whiptails to reach maturity. Only when these females gave rise to a new generation (in the total absence of male lizards) was it possible to prove that they were parthenogenic.

As no new genetic material is involved in this form of reproduction, each member of the new generation of lizard should be an exact duplication of its single female parent. Indeed, the entire population of lizards should be genetically identical and they can therefore be regarded as CLONES. Biological experimentation supports this concept.

When a piece of skin is transplanted from one lizard onto another individual of the same unisexual species, the graft usually takes without rejection. This type of "tissue compatibility" is a sure indication of a close genetic relationship.

THE AGONY . . . AND THE ECSTASY . . .

. . . or how **Jason Endfield** came to grips (?) with a Fossil Catfish . . . and lost!

Traumas seem to occur with unusual regularity in the pastime of fishkeeping, often at the most awkward of times: such as the occasion when my pet rabbit escaped from his night-time quarters and chewed his way through the electric cable to the aquarium air pump, stunning both himself and the fish in the process — and all at 1.30 in the morning!

Luckily, I was awakened by the sudden lack of bubble noise (we seasoned fishkeepers tend to sleep with "one ear open" for such potentially disastrous signs). I wasn't in the best of moods with my rabbit as I carried out emergency repair work in the middle of the night.

The most daunting task of all, however, when it comes to fish, is in transferring them from one tank to another. I had just purchased a lovely four-foot tank to accommodate the residents of an old two-footer, particularly a rather grand *Chichlasoma severum* which had grown from the little fellow I introduced long ago to the splendid, but outsized specimen that it now was. The time had come to move them all to larger quarters.

The new tank had been set up for a week or so, heaters, thermostats, pumps and filters "A, O.K.". In went three little Zebrafish as "guinea pigs" (if such a comparison is possible?!). They thought they were back home I suspect, in this vast empty expanse, but as I gradually introduced all their old friends, they realised the truth — with heavy hearts no doubt.

Everything was going fine and to schedule — even the five-inch Severum was transferred — with much difficulty in a three-inch net (in the excitement, I had forgotten to purchase a larger one).

Well, as every aquarist knows, some fish just don't take kindly to being netted. My Upside-down Cat was such a fish, though it surrendered eventually. My Brochis Cat on the other hand was most obliging . . . too obliging in fact — it greeted the net like an old friend and refused to leave; I had quite a struggle with it before it reluctantly swam away. One fish left to go and I was looking forward to a long sit-down with a cup of tea.

I might as well have wished for a win on the Premium Bonds — it just wasn't to be. The last remaining resident of "tank one" was my Fossil Catfish (*Heteropneustes fossilis*). It evaded the net with a skill that defies description. All I succeeded in doing for what seemed like hours was scooping up net upon net of gravel as I chased it around the tank. A hole appeared in the net, and I nearly sat down and cried.

One last try . . . yes! I had it . . . well half of it — the front half was trying to escape through the hole. I carefully transported my catch over to the new tank.

End of story? Just as if! The Fossil Catfish leapt with astonishing vigour out of the net, on to the floor, and slithered, snake-like under the edge of the carpet (for those who don't know, this Asian species is equipped with two accessory breathing organs in the form of air sacs running the length of its body, enabling it to breathe atmospheric air for some time, as long as it is kept moist). In the panic, I reached to pick it up. It flipped round and pierced the tip of my finger with one of its sharp pectoral spines, which are venomous and, believe me, very painful!

At this inopportune time, my mother entered the room and on seeing blood rushed to the bookcase (not the first aid box, note!), to look up "Catfish" in the encyclopaedia, just in case she could save me from dying.

I quickly washed the wound and frantically raced to get some tweezers to catch the fiendish fish, which was now enjoying a ramble across the carpet. In a cunning but delicate manoeuvre, I succeeded and the fish was placed in the new tank, a little bedraggled, but none the worse for its ordeal; which was more than could be said for me: The fish was only five inches long — but the pain!

I wasn't unduly worried — I knew that the sting was relatively harmless . . . but I went to tell my mother the good news of Fossil's transfer, to find her on the telephone to the Liverpool School Of Tropical Medicine! There was no answer, which was just as well, as the pain in my swollen finger subsided and I finally got that cup of tea.

I sat down in front of the new tank, sneering at the Fossil Catfish. It sneered back, knowing full well that, in essence, it had "won the battle".

The other fish swam lazily by and I sat back and relaxed, realising that this was a "Catch 22" situation (no pun intended): fishkeeping does indeed produce traumas, but there is no better "cure" for a trauma than putting one's feet up, relaxing, and watching the fish soothingly glide by — even if they are sometimes a pain in the neck . . . or finger . . . as the case may be. . . .

NEW PRODUCTS

If this section of this copy of *A & P* is slightly warm to touch, don't worry, it's just come off the press, such is the "last-minute" accuracy of this particular **Product Round-up** as we waited for any new product releases at Alexandra Palace's September **Pet Trade & Industry Exhibition.**

Taking the Gold Award for Best Aquatic Product at this year's exhibition was **SCHOTT GLASS'S** SIPORAX biological filter material. This was featured in an earlier **Product Round-up** (*A & P*, March '89) so it is nice to know that it has found such high favour so swiftly since its launch.

It is still hard to believe that 1gm of Siporax provides more than 1 sq metre of open surface area; the two ring sizes have areas of 18 and 40 sq feet respectively.

SCHOTT GLASS

Siporax's massive surface area per unit volume was a key factor in winning the Gold Award.

In second Silver Place, **KING BRITISH's** SAFE-WATER, another very recent release (**Product Round-up,** *A & P*, July, '89).

Also included as Star Products were **BETTER WATER GARDEN PRODUCTS'** Budget Pump and Minnow Pool, and a new **EURAQUARIUM** fully-equipped aquarium.

ALGARDE

Air-pumps make the news from **ALGARDE,**with four sizes available in two formats, with and without regulators. The pumps are exceptionally quiet and reliable and have excellent outputs, ranging from 300 to 1,000 litres per hour. Details from:

ALGARDE LTD, Enterprise House, Cranes Close, Basildon, Essex, SS14 3JB (Tel: 0268 289200).

AQUAOL INC

Originated by **AQUAOL INC,** in Austin, Texas but now available through Switzerland, macro- and micro-algae are reported to be most beneficial both in saltwater and freshwater aquarium systems. The benefits of algae include the stabilisation of aquarium environments, improved water quality and a natural buffer against changes in pH: algae also utilise nitrites, nitrates, ammonia, etc, for assimilation and/or growth Marine plant nutrients, such as vitamins and trace elements, are quickly depleted in saltwater systems: replacement by algal sources is natural and easy and will result in accelerated growth rate.

Laboratory-cultured algae have the advantage of being disease-free, are of the correct particle size and provide superior nutritional value. Algae secrete sugars, carbohydrates, fatty acids, proteins, enzymes, DNA, RNA, vitamins, antibiotics, etc.

The wide selection of algae offered by AquaOL is the largest available to the industry. They are easy to use: placing an unstoppered tube of macroalgae in the tank gives best "seeding" results; other species may need protection against grazers until established. Invertebrates may be fed directly with drops of liquid microalgae or else the aquarium's filter system can be switched off for short periods while general feeding by dispersion in the water occurs, or for a longer period, in order to facilitate colonisation.

AQUAOL INC, PO Box 5565, Austin, Texas 78763, USA; or from: **EXOTIC FISH IMPORT, 19 Rue des Lattes, Ch-1217 Meyrin/Geneva, Switzerland.**

AQUARIUM PHARMACEUTICALS INC

A new, previously-unknown, host of aquarium products were unveiled to the British market by **AQUARIUM PHARMACEUTICALS.**

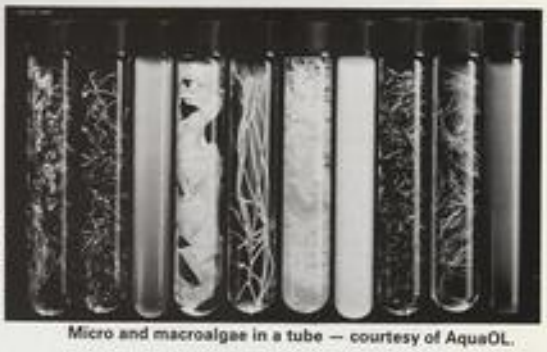
PRODUCT
BY DI
AQUARIU

To the majority of newcomers to the hobby, fish food is just another accessory that comes with the aquarium, and all that is needed is a daily 'pinch' (Oh yes, they've already learned about the dangers of overfeeding) to keep things going. If more closely-questioned, many will readily admit that the idea of 'ants' eggs' is quite out-of-date and agree that all of today's modern foods are fully nutritious and satisfying. However, the feeding of fishes goes well beyond the routine opening of a tub of food if the fish are to thrive fully.

Regardless of what particular 'brand-loyalty' you may have, modern foods are the results of very well-researched studies into fish nutrition, together with all the necessary practical and technical expertise required, so that all the theoretical goodness actually remains in the end product for the fish to benefit from it.

So, what's the problem? The problem is that fishes are often quite different in their food requirements from one species to another. This is not just true for the different dietary needs, but also in the manner in which the fish take their food.

To take a couple of extreme examples: surface-feeding fishes ideally need long-floating flake or pellet foods, while these would be no good at all for bottom-dwellers whose appetite is more readily serviced by fast-sinking or tablet foods. Another aspect is that of food content. Most aquarists soon appreciate that certain species require, say, more vege-



AQUAOL INC

Micro and macroalgae in a tube — courtesy of AquaOL.

The REEF CARE range is formulated to control and sustain a marine aquarium ecosystem. The SUPERCHARGER TANK STARTER supplies necessary food for the rapid maturation of biological filter-beds; ALGAE MICRONUTRIENT LIQUID does a similar job for marine algae and reef flora, upon a good supply of which so many grazing fishes depend.

As marine fish don't eat continuously, even on the best supply of natural foods, any lack of vitamins and minerals must be made up and VITAMIN AND MINERAL SUPPLEMENT BLOCK fills this need admirably; invertebrates are similarly looked after with the INVERTEBRATE FEEDING BLOCK.

Clearing up the waste products (after such sumptuous meals) is no problem — bacteria produced by the M-ZYME MARINE ENZYME CLEANER will make short work of the

Part of Aquarium Pharmaceutical's range of new products.

ROUND-UP

CK MILLS

M FOODS

table matter than others, just as other fishes need more 'meaty' foods or higher levels of carbohydrates.

A certain amount of 'hype' existed not too long ago where high protein content was thought to be of the utmost importance. It is now known that young fishes need higher protein levels during their initial growing periods than in their adult life, and so, food manufacturers have responded with specially-formulated 'growth foods'.

Turning briefly to outdoor fishes for a moment, a change of diet during autumn to a differently-formulated food will allow instinctively hungrier-than-usual Goldfish and Koi to lay up stores of fat for successful overwintering, another useful result of research into fish's natural eating patterns.

Grazing fish (not necessarily algae-eaters) can be given food in tablet form, attached to their favourite rock or to the aquarium glass. Another method is to make up a paste of flake-food and water and paint it on a rock, leave it to dry and then replace in the tank for the benefit of these fishes.

Although switching from Brand X to Brands Y and Z will provide some degree of change of diet for fishes (and maybe prevent them becoming bored with a monotonous, albeit, high-quality, diet), the availablity of freeze-dried and frozen foods offer an extra dimension in foods. The main benefit of these foods is that many of the 'natural' living foods can be preserved for aquarium use without losing any of the nutritional benefits of livefoods. Another bonus is that, being irradiated with gamma-rays, these foods are completely safe, without any of the risk of waterborne diseases being introduced into the aquarium, as might well be the case with 'wild-caught' live foods.

So far, we have been considering foods for growing or adult fishes. There is also, of course, the question of food for very young fishes, especially if you are contemplating getting into breeding. Once again the manufacturers have developed the right food for the right time, and in the right make-up and the right size. The well-known liquid 'food in a tube' caters spearately for egglaying and livebaring fry in this respect, and extremely small particle-sized, powdered foods are also easy to obtain.

Of all the livefoods available to the hobbyist, Brine Shrimp must be numbered among the best: it is both safe and highly-nutritious but, again, care must be taken to feed both the correct amount and size. While young fish need lots of small shrimps, it would be a waste of time feeding the same size shrimps to an adult fish when it is quite feasible to raise the shrimps to a better 'big-size' meal.

Worm-foods and wingless fruit-fly cultures have long been the staple diet of growing fry, and the relatively recent introduction of rotifer cultures augurs well for the future. The cultivation of such livefoods may well prove to be the next big step forwards in marine fishkeeping.

task. Just in case disease strikes, then COPPER CURE will prove effective in an invertebrate-free collection and it can also be used to advantage in the quarantine tank.

Stress is a well-known problem in fish-handling and transportation, with many a common ailment suddenly appearing as a result. STRESS COAT does much to reduce stress by rendering tapwater safe by removing chlorine (chloramines require the combined use of Stress Coat and AMMO-CHIPS or AMMO-CARB); it also adds essential electrolytes and detoxifies certain heavy metals; it replaces any mucus coating that may be lost during transportation, netting, etc, and contains Aloe Vera (Nature's "Liquid Bandage") to assist the healing processes. Stress Coat is available in various sizes ranging from 1oz to 5 gallons. Look for the "Doc Wellfish" character on the bottle!

BIO-CHEM STARS and BEADS provide huge areas on and, more importantly, in, which bacteria can colonise in huge numbers and so perform their nitrifying duties. Each "Star" is a ceramic block about 40mm long with a star-shaped cross-section: this section prevents abrasive action by water flow (water shear) from removing surface bacteria, and within its uncloggable internal surfaces (all 130 sq feet) the bacteria remain alive. Bio-chem "Beads" might be looked upon as a supplementary bacteria-producing factory: a pouch of Beads placed in an outside canister filter will produce a massive bacterial colony within two weeks, any surplus bacteria being released into the aquarium to colonise the gravel filterbed further. Each 3mm bead is said to have a breeding area of up to 50 times greater than other similar bacterial-growing filter media.

AQUARIUM PLANTER PADS are not nutrient plant blocks as such: plant roots are first threaded through the Planter Pad which is then buried 0.5in beneath the gravel. A special ion-exchange resin, formulated into the pad, then attracts ammonia, potassium, calcium and magnesium to the vicinity of the plant roots. Each pad has five pre-cut slots for plant insertion and come in various sizes to suit every aquarium-furnishing requirement.

Aquarium Pharmaceutical products are distributed by: **PET PHARMACEUTICAL LTD, 1 The Green, Flore, Northants (Tel: 0327 41944).**

AQUARIUM SYSTEMS

The initial version of the VISI-JET Powerhead (**Product Round-up**, *A & P*, June '89) has been upgraded to the VISI-JET 200. In addition to its greater output, there are facilities for introducing extra aeration into the water flow (even at low rates), directing the returning water **anywhere** in the aquarium from the flat, broad-area output tube and an easy-to-adjust flow control.

The flow-indicator shows at a glance how the pump is performing and any decrease in flow is instantly seen. Details of Aquarium Systems products from: **UNDERWORLD PRODUCTS, Units 1 & 2, Belton Road West, Loughborough, Leicestershire, LE11, 0TR (Tel: 0509 610310; Fax: 0509 610304).**

The Visi-jet Powerhead is now available in a more powerful version suitable for larger tanks.

DUPLA

A new range of foods was on display by **DUPLA** to extend their comprehensive range of aquarium products. The range is called DUPLARIN and comes in five forms: DuplaRin is the "standard" food in floating and sinking forms; granulate 1 covers 0.4-1.2mm size of particle. DuplaRin S features granulate size 2, 1.2-1.6mm, suitable for larger fish in freshwater or marine tanks.

DuplaRin Compretten is a tablet food for bottom-living fishes; enhanced with micro-algae, it is also suitable for all marine crustaceans and anemones. DuplaRin Haftys is also micro-algae enhanced; this time the tablet is adhesive for use on the side walls of the tank.

DuplaRin Micro is, as its name suggests, a tiny food for

NEW PRODUCTS

fry and young fishes; it can be used as a plankton-substitute in marine aquariums.

DuplaRin feeding aids include a fixed-portion dispenser, an automatically-adjusting water level feeding point, and a measuring spoon for feeding two different amounts of food.

Even the outdoor pond is catered for, and not just the fish either: DuplaRin T is a high-quality, floating universal food for all pond fish. Duplarit T is a pelleted additive for placing around plant roots for luxuriant growth. Duplaplant T is a nutrient for water plants.

Duplagan makes tapwater safe for aquarium fishes. It does not affect any plant fertilisation systems, pH or conductivity levels of the water, and is compatible with any disease or algae treatments.

A simple test using Dupla Test Cylinder and Duplatest O A/B/C Reactant A will show if sufficient Duplagan has been added to the water. Details of all Dupla products from:

DUPLA DISTRIBUTION UK, 90-92 Bromham Road, Bedford, MK40 2QH (Tel: 0234 40180; Fax: 0234 268939).

KING BRITISH

"Come to KB for BP" might make you think that Keith and the boys are into unleaded petrol, such is their enthusiasm for new products, but the BP product in question is BP NUTRITION'S POND PRIDE.

The pelleted food is now being made more easily available through **KING BRITISH's** efficient distribution service to all trade outlets. The improved recipe includes shrimp meal, Spirulina and grass meal to enhance fish colours; the highly-digestible food (with excellent floating characteristics and a typical 38% protein content) comes in three pellet sizes — small, medium and large — and is available in 200g, 450g and 2.5Kg drum sizes and also in 25Kg bags.

The new Pond Pride, specially developed for all pond fish and Koi, was produced as a result of BP's longstanding expertise as the world's largest producer of trout and salmon foods. Details of all King British products from:

KING BRITISH AQUARIUM ACCESSORIES CO. LTD., Haycliffe Lane, Bradford, West Yorkshire, BD5 9ET (Tel: 0274 576241; Fax: 0274 521245).

The Pond Pride range is now under the sole distribution of King British.

BP NUTRITION (UK) LTD

MINIREEF

For those aquarists fancying a conversion to marine from freshwater, the H39 FILTER MODULE KIT will be just the thing, upgrading the freshwater tank into a Minireef Marine System. Details of all Minireef systems, Decorawood and Euraquariums from:

EURAQUARIUMS, Unit D2, Meadow Lane Industrial Estate, Alfreton, Derbyshire, DE5 7RG (Tel: 0773 520403).

NORWOOD AQUARIUM LTD

Behind every successful dealer there must be an equally efficient wholesaler service. The **NORWOOD AQUARIUM** display was a veritable Aladdin's Cave of aquatic goodies — you could almost take in the whole of the aquatic equipment scene on their stand alone and save legwork!

To pick out but two items is quite unjust but the "jumbo-sized" SANDER POWER PROTEIN SKIMMERS (designed for power-filter operation with 240 gph turnover) and MARTIN MOE'S MARINE AQUARIUM HANDBOOK and MARINE AQUARIUM REFERENCE, all from **TMC,** certainly caught my eye.

It's fair to bet that if your dealer hasn't got what you want, (s)he can get it from Norwood — they seem to have everything, except a bottle-opener for their giant bottle of bubbly! Unfortunately, being "Trade Only," aquarists can't deal direct, but for any dealer-reader who hasn't discovered them yet, here's their address:

NORWOOD AQUARIUM LTD., Limpsfield Road, Warlingham, Surrey (Tel: 0883 625454; Fax: 0883 624157).

ROSEWOOD

The range of AQUALIFE remedies featured strongly on **ROSEWOOD's** display of aquarium equipment. Aqualife White Spot and Parasite Treatment, Aqualife Fungus Remedy, Aqualife General Medication/Bactericide and Aqualife Algae and Snail Killer provide a comprehensive battery of weapons against most aquarium fish ailments. The Aqualife Amazon Bio feed also looks after the plants' and fishes' needs by promoting growth and maintaining them in the best of health. Details from:

ROSEWOOD PET PRODUCTS LTD, 45 Coalport Road, Broseley, Shropshire, TF12 5AN (Tel: 0952 883408; Fax: 0952 884359).

VET-ARK

Peter W. Scott is a well-known author (eg Salamander's **Fishkeeper's Guide to Livebearing Fishes** — and occasional contributor to *A & P* — as in our **Fish Health Supplement** published last month) and a prominent veterinarian. He has also established **VETARK,** a company specialising in high-potency vitamin and mineral supplements.

ARKVITS is a powdered form of multivitamins for fish, (birds) and reptiles. PROTOBAN is a prophylactic mixture of formalin and malachite green effective against parasitic protozoa.

BACTICLEAR, due for release in early 1990, is particularly aimed at inhibiting/treating Myxobacterial disease and prevent fungal growth on bacterial lesions. It works well in saline conditions and can be used during spring to lessen stress in pond fish associated with skin damage caused by handling.

TAMODINE-E may be used by aquarists worried by SVC and also as a cleansing agent on ulcers found in goldfish and Koi; it has also been useful in regular use in vivariums as a disinfectant.

Vetark products are basically "in-feed" administered and are well-packaged in tamper-proof plastic tubs: the formulated treatments for fish are marketed in "easy-dose" bottles for ease of use.

Details of Vetark Products (including a factsheet on overwintering Koi) from:

VETARK PRODUCTS LTD, PO Box 60, Winchester, Hants, SO23 9XN (Tel: 0962 880376).

WATER FEATURES PUBLICATIONS

Almost, but not quite, was the scene on this stand. Sample pages were in evidence of BLEHER'S COMPENDIUM OF FRESHWATER FISH but the actual date will have been reached by the time you read this; watch for a full review in the earliest possible *A & P!*

Also in preparation are two more books — Cichlids and their Habitats: West & Central Africa, and The Language of Fishes. Details of all publications from:

WATER FEATURES PUBLICATIONS LTD, Doolittle Mill, Redbourn, Herts, AL3 7AA (Tel: 0582 853555; Fax: 0582 853288).

PENN-PLAX QUERIES/ LETTERS

Since a picture of a Penn-Plax biological filter appeared in **Product Round-up** (*A & P,* August '89), we have had several enquiries as to further information and retail sources. The following two addresses can supply all information.

BRYAN SHARPLES MARKETING, 2a Post Office Avenue, Southport, Merseyside (Tel: 0704 44662).

CAGEX LTD, The Bury Farm, Pednor Road, Chesham, Bucks (Tel: 0494 786759. Fax: 791617).

Your questions answered

Having problems? Send your queries to our panel of experts who will be pleased to be of service. Every query receives a personal answer and, in addition, we will publish a selection of the most interesting questions and responses each month. *Please indicate clearly on the top left hand corner of your envelope the name of the experts to whom your query should be directed.* All letters must be accompanied by a S.A.E. and addressed to:
Your Questions Answered, The Aquarist & Pondkeeper, 9 Tufton Street, Ashford, Kent TN23 1QN.

HERPETOLOGY
Julian Sims

KOI
Roger Cleaver

TROPICAL
Dr David Ford

COLDWATER
Pauline Hodgkinson

PLANTS
Barry James

DISCUS
Eberhard Schulze

MARINE
Graham Cox

COLDWATER

Swimbladder problems

Editor's Note

We recently received the following question from one of our younger readers, **Alison Ronald**, who, unfortunately, forgot to include her address. We are therefore unable to write to her direct but hope that publication of her letter, along with **Pauline Hodkingson's** comprehensive response, will help solve her problem.

John Dawes

I own a small Chocolate Oranda which seems to be having trouble with its swimbladder — whenever it stops swimming it immediately floats to the surface. It recently recovered from a bad attack of Fin Rot and is feeding on flake food with an occasional feed of dried Daphnia *and* Tubifex. *Would you please advise me on what to do?*

Your fish is most certainly suffering from a disorder of the air (or swim) bladder. This is a common complaint in the twin-tailed, round-bodied varieties of the Goldfish and is not always curable.

There are several causes. In some instances it is an inherited weakness and therefore a cure is unlikely. Incorrect feeding or rapid water temperature fluctuations can also bring on an attack. Eggs in the female can sometimes cause her to swim off balance as the swollen roe begins to restrict the space needed for the air-bladder. In a few instances it may be due to other serious internal conditions such as the presence of parasites or tumours.

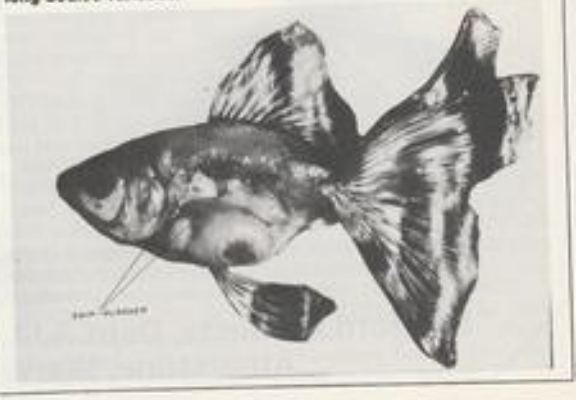
To avoid causing this condition always make sure, when doing water changes, that the fresh water is no more than 5 degrees different in temperature to that which it replaces. Rapid fluctuating temperatures are one of the main causes and small volumes of water are particularly subject to this problem. This then is an obvious disadvantage when keeping fish in small aquariums, especially if they are located where they receive the full rays of the sun or are positioned too close to a radiator.

Always hold dried flake food between the fingers and hold under the surface so that it soaks up water. If the food is eaten before it is well soaked, the dry food will be taken into the intestine, taking up the fluid within, and often causing a blockage. Another problem when feeding floating foods is that air is swallowed and short, round-bodied, fish will often become bloated and float like a cork at the surface.

Feeding the occasional meal of live foods such as chopped earthworms and *Daphnia*, not only are a great treat and help the fishes' general good health and vitality, but is also thought to act as a laxative, clearing out the system.

If the condition is caused through incorrect feeding or a chill brought on by water temperatures, then a cure may be possible. Raise the water temperature slowly to about 68-70°F (20-21°C) and withhold all foods for a few days; then offer live *Daphnia* for a further three or four days. This usually brings relief and, often, a cure.

In round-bodied varieties of Fancy Goldfish, the swimbladder tends to be "squashed" and is therefore more prone to problems than in long-bodied varieties.
L E PERKINS



HERPETOLOGY

Anolic basics

I am very interested in keeping the Green Anolis but know next to nothing about this species. Can you help?

The Carolina or Green Anolis (*Anolis carolinienssi*) — is also known as the American Chameleon.

(a) A 36 x 12 x 18 in (90 x 30 x 45 cm) vivarium fitted with an escape-proof, ventilated lid is the minimum size required for a *pair* of Anoles.

(b) Anoles need access to natural sunlight for basking purposes and to maintain healthy metabolism. Sunlight contains ultra violet rays (U.V.). Therefore, I would recommend the use of a TRU-LITE tube. Further details about TRU-LITE can be obtained from: General Acoustic Ltd., Cayton Low Road Industrial Estate, Scarborough, North Yorkshire YO11 3UZ. Telephone 0723 584250).

(c) Anoles are highly territorial. The males have a pink throat fan which is used for display purposes. A larger vivarium for these active reptiles is strongly recommended and a *trio* of one male and two females will prevent the "stress" for dominance which will occur if two males are housed together.

I would not recommend keeping amphibians such as tree frogs with lizards. Reptiles need drier conditions than amphibians. Amphibians also release skin secretions into the drinking water in vivaria. These secretions will cause the death of small lizards such as Anoles and Geckos.

(d) Anoles will feed on a variety of insects including mealworms (refer to **Herpetology Matters** January, 1989) and flies (some details were published in **Herpetology Matters** in September, 1989). The more varied the invertebrate diet, the better.

(e) Green Anoles require very similar plants in their vivaria to the Day Geckos featured on Pages 40 and 41 of the July *Aquarist & Pondkeeper*. Anoles are good climbers, having broad scales on their toes which give them a firm grip.

(f) Newspaper on the floor of the vivarium is a very practical material — even though it might not look very decorative.

(g) Regular maintenance should include changing this newspaper when it becomes soiled with white uric acid and/or faecal pellets.

The plants in the vivarium should be regularly sprayed with water — the lizards lap up raindrops and dewdrops in the wild. A shallow bowl of water should also always be available — these lizards quickly die of thirst.

Unfortunately, Anoles are not very long-lived; two or three years being normal.

(h) A good book on keeping reptiles and amphibians is as follows:

The Care of Reptiles and Amphibians in Captivity
By Chris Mattison
2nd Revised Edition (1988)
Blandford Press, Dorset

Pure cultures

Are there any laboratories which specialise in pure cultures of algae and protozoa which I could use to feed the minute tadpoles of species like Hymenochirus cultripes? *At the moment I can't keep the tadpoles alive for longer than five days.*

Three laboratories which can supply pure cultures of algae and protozoa are:

[1] Philip Harris (Biological) Ltd,
Oldmixon,
Weston-super-Mare,
Avon BS24 9BJ.
Telephone: 0934 413063.

[2] Culture Centre of Algae and Protozoa,
Natural Environment Research Council,
Cambridge.

[3] Freshwater Biological Association,
The Ferry House,
Ambleside,
Cumbria.

KOI

Personal filter choice

I am thinking of building a Koi pond, 12 x 6 x 4 ft. Can you advise me on what type of filtration to use? Can you also tell me of any books on the subject?

Filtration tends to be a matter of personal preference. Some people swear by undergravel filters, others by external ones. *Both work.* I personally prefer external filtration because I feel that, if anything should go wrong with the filter, it is easier to isolate an external filter than an in-built one.

How do you decide what type to use? The first decision must be whether you are going to build the filter yourself or buy one ready-made. Today there are many types of external filters on the market, working on various principles. Suppliers should be able to give you details of how each type works.

If you are going to build one yourself then I recommend that you take some time and read up on the subject. Three good books which cover filtration quite well are:

Understanding Koi by D E Hulse and M I George;

An Interpet Guide to Koi by Barry James;

Practical Encyclopaedia of Koi from Interpet.

A couple of general points on filtration which should be borne in mind:

External filters work much better if some form of settlement chamber is included into the system. These chambers allow much of the suspended matter in the water to be settled out before the water passes through the actual filter material, and this helps to prevent the filter material from blocking up. .

Secondly, in most situations, the filter can never be too big.

People tend to decide on the size of filter necessary to deal with the pool as it is at the present. Your filter should be designed to cover what you expect to be your maximum stocking rate with the fish fully grown. Nothing is harder than trying to expand a filter system at a later date because it is now no longer adequate.

DISCUS

Peat's purpose

Would it be OK to use peat in a Discus aquarium?

There are several varieties of aquarium peats available: some are mild and are used basically to maintain a given pH value of the water. Others are much stronger and will not only soften the water by removing the carbonates, but also acidify the water to a greater degree.

Aquarium peat will release humic acids and other biological substances into the water to give it "life" and will also help to control algae.

A suitable aquarium peat is a fine filtering material for Discus tanks.

MARINE

A question of light

Can you tell me why, if as you often say, marine tanks need so much light, especially to keep inverts, etc., that the system we have has only 2 x 60 W tubes and we are growing Caulerpa *and other algae like no one's business?*

We also have an anemone which has grown a great deal.

We only leave the lights on 10-12 hours per day and, in fact, find we have too much algae and don't know how to prevent it. Also, we've been told that we don't need to worry about keeping too many inverts in this tank as they don't contribute to the overloading of the filter. Your comments please!

1. Lighting. The amount of lighting required by an invertebrate aquarium is dependent on a number of factors of which the most important ones are:

(i) *Depth* — how deep (vertically) the inverts are below the light source;

(ii) *Surface Area* — the surface area of the tank;

(iii) *Photo - period* — the length of time for which the lights are switched on per day;

(iv) *External light* — how much extra light reaches the tank from windows, glass doors, etc.

You have obviously found exactly the right lighting conditions for your tank. However, please remember that if a fluorescent tube is burning for 12 hours per day, then its useful life of 2,500 hours is exhausted after about six months and light output falls off steeply.

2. Overloading with Invertebrates. due to the fact that all these animals respire aerobically (i.e. consume oxygen and produce waste carbon dioxide), and have to be fed, then it certainly is possible to overstock with invertebrates. However, owing to the very slow metabolism of most invertebrates, and the fact that those species possessing zooanthellae algae have most of their oxygen requirements synthesised for them when the lights are switched on, the "weight of invertebrates per volume of water" ratio is higher than it is for fishes.

HERPETOLOGY

The Great Smooth Newts spawn mystery

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

British newts, like our frogs and toads, are amphibious and reproduce in water by laying eggs covered in an envelope of protective jelly. However, unlike female frogs and toads (which lay clumps of spawn and long strings of spawn respectively), female newts lays eggs individually. These eggs tend to be deposited on or under the leaves of water plants. Fewer eggs are laid by this time consuming individual placement but because they have been carefully concealed from predators, e.g. sticklebacks, a high percentage hatch. Thus fewer eggs have to be laid to ensure continuation of the species.

TROPICAL

Definitive breeding

I would like to breed freshwater tropicals in my community aquarium and would like to obtain the definitive book on the subject. Can you help?

You cannot expect to breed too many fish in a community aquarium . . . the other fish eat eggs and fry as soon as they are produced. In the wild, a breeding pair will have a nest, or cave, etc. and drive other species away. This is difficult in the confines of an aquarium.

To breed fish efficiently you must have a separate breeding tank to house the pair or one pregnant livebearer. Unless the species are good parents it is also wise to remove the adults after spawning too.

Interpet have published a good book on fish breeding via Salamander Books, *An Interpet Guide to Fish Breeding* by Dr Chris Andrews. However, for a definitive work on the subject see the five volume series of books *Breeding Aquarium Fishes* by Dr Herbert R Axelrod *et al* (TFH Publications). Any pet or aquarium shop will have both the Interpet and TFH catalogue for ordering these books.

PLANTS

Solving the mystery of Water Poppies

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

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

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

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

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

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

FANTASTIC COMPETITION NEWS
SEE PAGE 80

GUATEMALA

THE QUEST FOR XENODEXIA

Xenodexia ctenolepis, a unique livebearer from Guatemala has only rarely been collected from the wild. **Ross Socolof** is among the privileged few who have done so.

(Photographs by the author)

In 1963 Rosen and Bailey published **The Poeciliid Fishes**. The last and most intriguing fish described in the book is *Xenodexia ctenolepis*. I managed to get a copy of Hubbs' original 1950 description of the fish to learn more and the next time I was in New York City I went to see Dr Donn Rosen at the American Museum of Natural History to talk to him about this very different fish.

There were no colour pictures. There were no living specimens, either. I learned that Rosen had twice brought them back alive but, both times, they had quickly expired. No one knew for certain anything about the unique physical features the fish possessed. "Yes, it was an attractive very blue fish (it isn't) and it has a very limited range in a remote part of Guatemala."

That was 26 years ago. Ever since, I have tried to get to them and get them back to Florida alive.

Laurence Stuart was the original discoverer. Stuart, a herpetologist connected with the University of Michigan, spent a great part of his life studying the reptiles of Guatemala. On his frequent trips to the country he also collected fish for Dr Carl Hubbs, then also at the University of Michigan. Dr Hubbs was one of the great American icythyologists and a superb taxonomist.

In 1931 Stuart found himself at Finca Chama, a large and remote cattle ranch about thirty miles from Coban in Guatemala. He collected and preserved forty specimens of a small fish but Hubbs could not have been much impressed with the 33 immature, and seven almost adult specimens, as he did not describe them until 1950.

A very different livebearer

Then he discovered that it was a new fish and was so different that a new subfamily (Xenodexiinae) had to be established.

Of the seven adult specimens only one was a male. This fish was bilaterally asymmetrical. Almost all living creatures (ie: puppies, guppies, yuppies, etc!) are symmetrical. Cut one in half and the two parts are mirror images. The example most often given for one of the rare asymmetrical fish is the Sole.

Xenodexia is also asymmetrical. Adult male fish all have a bizarre and very complicated clasping mechanism. This has evolved at the base of the right pectoral fin. Dr Reeve Bailey, who at the time worked with Dr Hubbs, postulated a purpose. He felt the male used it to clasp the female by her anal fin and that this would make copulation more effective.

Clasping mystery

It still remains only a theory. It might also work if the female was clasped by her pectoral fin. No one really knows (yet) how and what the clasping mechanism does. It remains *Xenodexia*'s secret . . . at least for the moment.

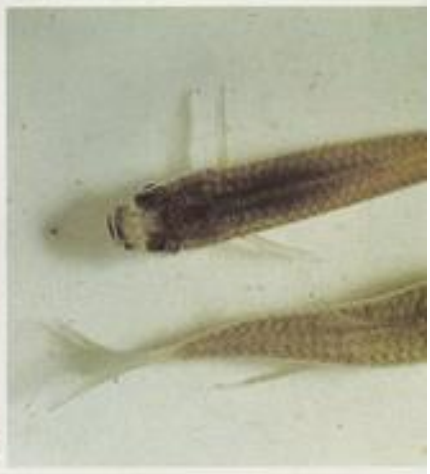
My last unsuccessful attempt to collect this fish was two years ago. Dr Harry Specht, who has been collecting with me for many years, obtained a new map of Southern Mexico and discovered a new road was being built along the Guatemalan border. That road would cut across the Río Ixcan shortly before it disappeared into the Río Lacantun. *Xenodexia* was in the Río Ixcan perhaps fifty miles south in Guatemala, so it was worth a try. Harry and I made plans for the trip.

Fresh attempt

Coincidentally, Jim Langhammer, Jurgen Kasprick, and Jeff Gee, all from Detroit, Michigan, were going to be in Mexico about the same time so I invited them to meet us in San Cristobal de las Casas and make the collecting attempt together. We all felt better about having two vehicles as that area is very remote. The road could not be easy or safe (it wasn't). We found the Río Ixcan and could not find *Xenodexia*. Our car broke down and if it hadn't been for Kasprick and Gee's genius, we would still be there.

Guatemala has been bad news for the past 15 years. Guerrilla bands had virtual control of the area we were interested in collecting but if we could find some brave soul in Guatemala who would charter his plane and fly us in I felt we could finally get the fish.

Jaap-Jap de Greef is a super hobbyist and an extraordinary collector. He had lived for some years in Guatemala and shares my interests in livebearing fish, and *Xenodexia* in particular. We decided to do it together. Specht, Langhammer, and Gee all wanted to



Top left, first on-ground view of the Río Ixcan.

Above, Jaap Jan de Greef doing his walrus act — and collecting *Xenodexia* in the process.

Far left, an unidentified cichlid collected near the Río Ixcan.

Far left, below, top view of a pair of *Xenodexia*. Note the male's asymmetry and the length of his gonopodium, the tip of which can be seen projecting backwards about two thirds down the body. Note also the clasper mechanism on the base of the right pectoral fin.

Below, the characteristic black lips of the species can be clearly seen in this photograph of an adult pair of *Xenodexia*.

Left, out of water, this female shows an attractive bluish sheen. In water it virtually disappears.

make the trip with us. Harry Specht had a meeting in Hawaii, Langhammer had back troubles, and Gee's business manager quit just before the trip. Jaap and I both felt that the horror stories we had heard for years were mostly true, but we also felt the incidents had happened years before and were still told as recent occurences. We both hoped that the time was right to try to collect the area.

We rented a Suzuki Samurai 4-wheel drive jeep and had the rear seat taken out before we left to have plenty of room for our collecting gear and holding boxes. We intended to collect for 8 or 10 days first and include an attempt to hit the *Xenodexia* watershed from Coban.

There was a new road that one of our three different maps showed crossing the Rio Sachicha which was possibly within *Xenodexia*'s range. Evidently, the map we used was the right one. However we spent three days in that area and did not find *Xenodexia*. Instead we collected *Scolichthys greenwayi* which neither of us has ever collected before. It is a very pretty fish that, unfortunately, is prettier out of the water than in it. The blue body really reflects sunlight when in the net. When we first caught it we both felt it might be *Xenodexia* but the normal length gonopodium quickly dispelled that notion. *Xenodexia* has a gonopodium that is equal to 45% of the length of its body.

Different Swordtail

We also collected *Xiphophorus signum*, a very different Swordtail. *Signum* is particularly interesting to me as it will not cross with any other Xiphophorines. I hope to see it established commercially since most of all the Green Swordtails have been in-bred for the past 90 years and are small and colourless, with many runty males.

While Jaap and I were collecting, his friend Dr Rolando Wer (one of Guatemala's few serious and accomplished tropical fishkeepers) had been making inquiries for a plane and pilot we could charter. We called him from Coban and told him to firm it up. We were back in his office on Wednesday 15 February. We finalised arrangements all Wednesday afternoon. The plane was a 220 Maulee M-5, a single engine machine that could fly low and slow without stalling and did not need much room to land. George Shippers was the owner and pilot. At his urging we hired an experienced co-pilot. Leonel Carillo had done a lot of flying in rough terrain and he was an excellent choice.

We had the coordinates for the site Rosen and Bailey used years before when they got the fish (by helicopter). We had to get permission from the military to fly into the area and I am sure they thought us crazy, but gave permission.

No one had been in that area in many years. The guerrilla bands stay in that area as it is near the Mexican Chiapas frontier and they can float back and forth when pressured. I think there is a little Guatemalan military presence in the area. Chances were that we would not run into guerrillas. We didn't, but we did stay apprehensive until on our way back out and airborne.

We were in the air before 8 am. It was a beautiful clear day. We headed north from Guatemala City and made our way through and over the mountains. The highest peak was 9000 feet and we could get up to 11,000, so had no trouble. The land is denuded. The country is badly in need of a reforestation programme. The many years of armed conflict in Guatemala have taken the monies that normally would have been used to improve the roads, schools, hospitals etc. As a result Guatemala is badly bent out of shape insofar as its infrastructure is concerned.

In about an hour we were in the area. The coordinates were off by about ten kilometers, but we could see the Rio Ixcan and proceeded to try to find a suitable landing spot. We found one and after circling low several times and testing the ground with a light brush with our wheels, we made a sucessful landing. We were on a bluff about 200 yards from a feeder stream that entered the Rio Ixcan less than a half mile away. This was it!

Machete-waving welcome

We got out of the plane and reeled back in terror when we saw three horsemen armed with machetes rapidly approaching us accompanied by a dozen more men on foot. As they came closer we saw the smiling faces and knew we were not in trouble. It was a welcoming committee from a small village of about 20 huts we had seen just before landing!

They were wonderful, helpful, and friendly people. They stayed with us the entire time we were there and helped us carry our gear. We had a twenty foot seine with a double set of weights, a small mesh casting net, a variety of 14 stout hand nets, and one 30-inch push net.

We started collecting the feeder stream even though *Xenodexia* would not be there as it is restricted to the fast—moving, cold, heavily oxygenated water in the main river.

We had had a good look at the Ixcan from the air. It was white, boiling, and moving fast. What I did not know until later was that it was cold— not everyday cold but 66—68°F COLD!

We took our time collecting the feeder stream as it was full of interesting fish. Many we could not identify with any certainty. We made a good preserved collection and kept a number of fish alive to bring back with us. We had 14 or 15 different species that included six cichlids (two not known to us), two *Rhamdia* catfish species, a synbranchid eel, a pretty atherinid (silverside), a new—looking *Heterandria*, several Mollies, *Xiphophorus helleri*, and *Astyanax* characins.

The final assault

We worked our way to the bank of the Rio Ixcan. In minutes we would know if we could collect *Xenodexia*. Each of us with hand net and plastic bag gleefully headed into the water. It was shockingly cold. The warm feeder stream left me unprepared.

We immediately saw juvenile fish in very shallow water. We each caught several and dumped them into our plastic bags to observe. They were all baby Mollies. Suddenly, we both yelled as we spotted a smaller stranger among them. It was *Xenodexia*! We worked right there and together accumulated about 25 baby *Xenodexia*. It was now time to get into the river and see if we could get adults.

Quickly the "we" became "he", as my body closed down. I could not handle the cold. I turned blue and started to shake all over. It did not bother Jaap at all. I became his pail and bag holder, camera man, cheering section, etc. He was great and I apologise now for telling him he was part Walrus!

The bottom was covered with large rocks so all of the collecting gear was useless. The big fish *were* there. The problem was how to get them. Jaap, with a face mask on, used his left arm to spook fish towards his right where he held the large push net. Slowly and laboriously he collected. I shivered and cheered. In the next hour he managed to capture almost 100 specimens.

We had decided to go further down the stream where we had seen some more interesting bays and, possibly, a better bottom when George Shippers came to us and said we had to leave immediately. A bad storm was rapidly approaching and a look up confirmed it. We had been oblivious to anything but the *Xenodexia* collecting project. We had about 150 additional pounds (mostly water) to lift. We were all nervous.

In the air we had trouble gaining altitude. The sky was ominously black. The winds now were over 35 knots and forcing us north. We found ourselves over Mexico and being pushed west toward the Pacific Ocean. The idyllic hour trip there became a three hours nightmare back. Twice the pilot lost control. We had some very disquieting moments heading earthward at crazy angles.

Back home

Our return to Florida was made without problems and we lost only seven *Xenodexia*. The fish were housed in Jaap de Greef's fish house in large aquariums with water moving about as vigorously as possible. In a very few days the fish settled down and we kept waiting for problems. Two months have passed now and, at the time of writing, we have had two broods. All of the fish are well, eating indiscriminately and best of all, our higher water temperatures do not bother them. Still better news is that the babies are growing in still water.

The bizarre clasping mechanism is present on all the adult males' right pectoral fins. Our hope now is to be able to build up enough stock to be able to spread *Xenodexia* around to advanced hobbyists and photographers in the hope that someone will be able to observe, at least, and, ideally, to photograph the use of the strange clasping device.

One word of advice to anyone who tries is to be sure to start with very young animals and keep them separated until adult. *Xenodexia* practises (as do many other Poeciliid fishes) sperm storage. This means that one impregnation will provide as many as five different clutches of babies. Best opportunity would be to put virgin adults together and then watch closely. I am anxiously looking forward to the news that someone has solved the *Xenodia*'s secret.

Spotlight on Anabantoids

KEEPING AND BREEDING LABYRINTH FISH

First STEPS

David Armitage, editor of *Labyrinth,* the official publication of the Anabantoid Association of Great Britain, offers sound advice for beginners to this branch of the hobby.

AQUARIAN FISH FOODS

In *Malpalutta kretseri* the male (top fish) has more spectacular finnage than the female.

DAVID ARMITAGE

Only very large aquaria or indoor ponds will provide adquate accommodation for *Osphronemus goramy.*

I suppose learning to keep fish of any species must come in a number of stages. First, putting them in the right captive environment to keep them alive; second, conditioning them to perfection with appropriate food; third, learning to sex and breed them and, finally, raising the young.

Labyrinthfish, or anabantoids, have one adaptation that simplifies the matter of tank design. Most take air directly from the surface and do not rely on oxygen dissolved in the water. This means we can often dispense with additional aeration. As many of the fish come from stagnant and polluted water as well, they are often quite tolerant of poor water conditions, so complicated filtration is unnecessary, although regular partial water changes must not be neglected. The only essential piece of hardware for anabantoid tanks is, therefore, a heater-thermostat.

There are exceptions to this generalisation, of course. Some anabantoids are mouthbrooders (eg) *Ctenops,* the Chocolate Gourami and some Bettas. These often come from flowing water which would disrupt bubblenests and, therefore, benefit from gentle sponge filtration.

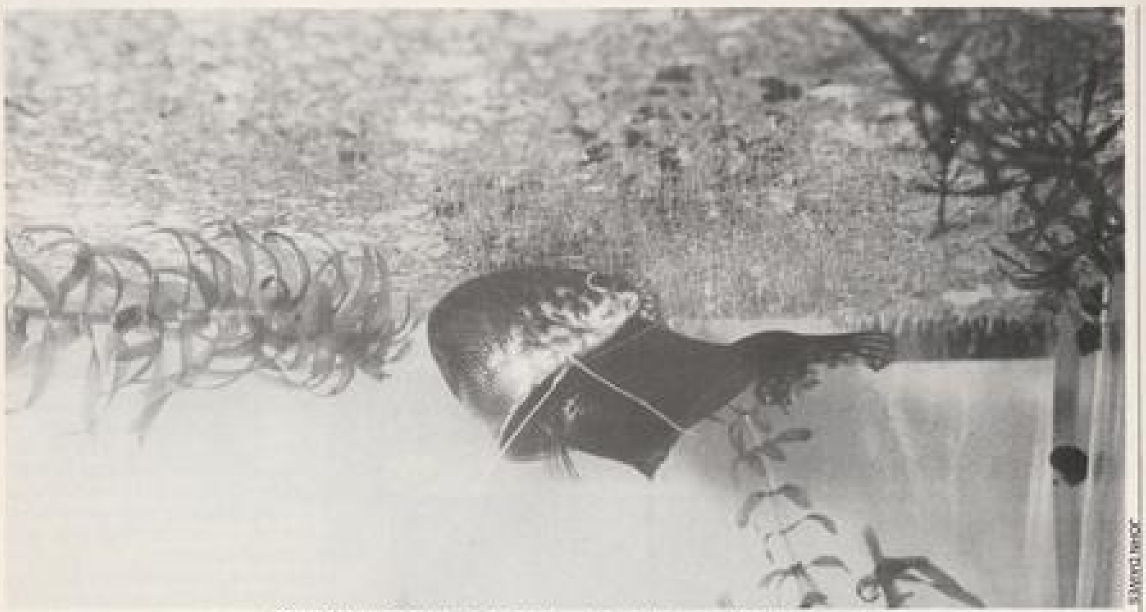
Possibilities

So much for the machinery. The next stage in the process is to decide on the size of tank and what we should use to furnish it. Below, I suggest a number of possibilities

1. Large, unplanted, vigorously filtered indoor pond (!) — *Osphronemus goramy.*
2. Four-five adult fish in tanks of 4 ft (120 cm) minimum. Furnish with rocks, wood and robust plants in pots. *Anabas, Helostoma* and the free-spawning Ctenopomas.
3. Pairs in normally-planted 2-3 ft (60-90cm) tanks — *Trichogaster, Colisa, Macropodus, Belontia, Trichopsis,* Bettas and bubble-nesting Ctenopomas.
4. Five-ten fish in filtered, planted tanks of 3 ft (90cm) minimum — *Sphaerichthys.*
5. Pairs in 2-5 gallon (9-22 litre) tanks, sparcely planted — *Malpalutta, Parosphromenus, Pseudosphromenus, Betta coccina* and *B.persephone.*

Aquarium requirements

Generally, the furnishing should comprise dense plant thickets at the sides and back of the tank, with free-swimming areas



Classic spawning embrace in *Trichogaster trichopterus*, the Blue Gourami.

toward the front. Plant pots on their side or coconut shells are popular refuges for harassed fish. They also provide a centre for the territories of cave dwellers and allows them to show themselves at their best.

A 2 x 1 in diameter (5x2.5cm) floating plastic tube (anchored for *Malpulutta*) is an essential ingredient for the dwarf fish listed in category 5. You will gather I am tending to suggest single species tanks and, in this environment, you will quickly note the difference from the normal, timorous, colourless specimens that cower in quiet corners of community aquaria.

We now come to temperature and water condition. Most species can be kept at 20-22°C (68-71.5°F)which is beneficial for electrical economy and longevity of the fish. However, they undoubtedly do best around 26°C (c 79°F). Once again there are exceptions: *Macropodus chinensis*, the most northerly species, must not be kept constantly warm and needs seasonal variations. If acclimatised, it will tolerate 10°C (50°F).

Tapwater tolerant

Water chemistry is of little importance to most African species, although *Ctenopoma ansorgii* may prefer acid water. Although most Asian species come from acid waters (*Betta unimaculata* being a notable exception), few species are harmed by tap water. (It is the shock of change that kills fish). However, I must admit that I use rain or distilled water.

One must bear in mind that most gravel will turn the water hard and alkaline in time, so if we wish to avoid that, the plants must be kept in pots on a bare base and the water must be acidified with sphagnum moss peat. Even Chocolate Gouramis are now apparently acclimatised to European tapwater — put in their natural water (i.e.) soft and acid, the shock will often kill them!

Having set up the tank and spent the intervening 1-2 weeks reading up about anabantoids in Pinter's (Barron's) or Vierke's and Richter's (TFH) books, you are now ready to buy stock. Choice is determined by availability and suitability linked to experience. Many of the most interesting species are, unfortunately, only available through specialist breeders within AAGB.

Recommended stocking

If you are really determined, that species will eventually turn up. We never thought to see *Ctenops* alive in this country, but, eventually, it turned up in the shops. However, if you are a beginner, I wouldn't advise you to start with Chocolate Gouramis. I would recommend a good pair of *Colisa* sp. They are not as aggressive as *Trichogaster* or *Macropodus* and will probably spawn in a few days at 27°C (80°F). You will then see all the behaviour that makes this group of fish so fascinating.

Choosing a pair is really only easy with *Colisa*, *Trichogaster* and the bubble-nesting Ctenopomas. With the first two, the males have pointed dorsals, the females rounded ones. With the Ctenopomas, the males' dorsal, anal and pectorals are longer than the females' (although they are pointed in both sexes). In mature specimens, the males' dorsal extends to, or beyond, the end of the caudal. With other species, ripe females are often plump. The real problem is that fish offered for sale are often too young to be sexed and you will just have to buy four or five fish and let them sort themselves out.

There are many little signs to look for that only become familiar with experience. Wild *Betta* experts look for the "egg spot" of the female, while the sex of *Trichopsis* or *Pseudosphromenus* may be determined by the shape of the gonads (sex organs) when illuminating the fish from behind (hardly practical in retail premises!) Male Licorice Gouramis have colour in their tail, females don't; *Malpulutta kretseri* males have diffuse body spots while those of the female form a more discrete line. Free-spawning *Ctenopoma* males have the special quill-like scales behind the eyes, which the females don't.

When you have sorted out your pair, you will want to breed them and watch their territorial, courtship and brood-caring behaviour. It is only under these circumstances that you will appreciate the true beauty of the fish. I won't deal with how the fish spawn here, as I have covered that in an earlier article (*Aquarist & Pondkeeper* Oct '87).

Spawning success

The key to spawning success is correct nutrition. I feed flake in the morning and frozen bloodworm in the evening. Obviously, specialist vegetarians like *Helostoma*, need something different — a lot of flake and fresh vegetation like tinned peas — if they are to reach their potential. *Osphronemus* is partial to Brussels sprouts. The bigger fish can be fed economically on meaty petfoods and earthworms. However, I find some fish will just not eat dry food, *Ctenopoma ansorgii* being an example. At least it will take frozen food, which is more than can be said of my Licorice Gouramis. If it doesn't wriggle, they're not interested.

Spawning may need no outside help if the conditions I have outlined are maintained. Sometimes though, spawning can be triggered by dropping the water level (e.g Licorice Gouramis) or by raising or dropping the temperature suddenly (e.g. Chocolate Gouramis).

Some fish are almost seasonal in their breeding; for instance, Ctenopomas definitely are most active in autumn and spring. The bubblenesters of that genus sometimes spawn if the tank, or one half of it, is left in

darkness for a week. If all else fails, male and female can be separated into different tanks and then re-united. I found this worked for my Slim Bushfish in April 89. Direct sunlight may be another trigger you can use.

Generally, female bubblenesters are removed after spawning to prevent their mates damaging them, or to stop them eating the eggs. The male is left with the fry till they are free-swimming and then removed. Free spawners can be removed as soon as the eggs are fertilised. Always remove the parents from the the tank, not the fry.

Things are a little different for the mouthbrooders. The fish, be it male (Bettas) or female (Chocolate Gourami) that carries the eggs, will have a swollen mouth and will be clearly seen 'chewing' the eggs. As far as I know, these have never been succesfully raised outside the parent's buccal cavity, so they must be given peace and quiet. I know of at least one instance where the spare bedroom was out of bounds for this reason.

Gently separate the brooding fish from their tank mates or remove the latter cautiously. A darkened tank also helps in the case of the Licorice Gouramis, which are also sensitive to disturbance; like the mouthbrooders the eggs are likely to be eaten. In this instance though, the eggs can be incubated artificially, in a shallow aerated basin with a drop of Methylene Blue.

The fry are usually tiny and known as larvae. They need Infusoria, Infusyl or Liquifry for two weeks, starting on microworm or Brine Shrimp nauplii after one week and graduating to grindal worm and chopped *Daphnia* or powdered flake.

At three-five weeks they will take their first breath of air and your troubles raising these should be over. The mouthbrooders spit out their young after 10-14 days and these will take Brine Shrimp nauplii immediately, while *Belonna* young are also particularly large. At all times though, you should be vigilant for Velvet Disease and try to prevent it by water changes and not overcrowding as the disease is difficult to cure on fry, which may be equally susceptible to the medication.

So now you've gone through the full circle and only one problem remains — disposing of the young. You may think that's easy or is a nice problem to have, and so it is really. On the other hand — does anyone want any *Belontia hasselti*?

NOTE: For further details of the fish mentioned in this article, plus many other related species, contact the **Anabantoid Association of Great Britain, c/o Tim Groom, 44 Springwell Gardens, Balby, Doncaster, South Yorkshire.**

Further reading

Labyrinth Fish by Helmut Pinter. Published by: **Barron's** (1986).

Gouramis and other Anabantoids by Hans-Joachim Richter. Published by: **T F H Publications, Inc.** (1988).

Bettas, Gouramis and other Anabantoids by Jörg Vierke. Published by: **T F H Publications, Inc.** (1988).

Sometimes, finnage can help identify the sexes. In *Ctenopma fasciolatum* for instance males (top) have longer fins than females (above). Right, recently-hatched *Belontia hasselti* fry.

Spotlight on Anabantoids

THE SPIKE-TAILED PARADISE FISH

Pseudosphromenus cupanus
(Cuvier and Valenciennes 1831)

Still deservedly popular among anabantoid fans after all these years, this beautiful labyrinth fish — first introduced into Germany in 1903 — receives typically detailed treatment from **Arend van den Nieuwenhuizen.** *(Photograph by the author)*

The first time that this labyrinth fish, which may grow to a length of about 7cm (c 2.8in), was described was in 1831 by Cuvier and Valenciennes (1831, *Natural History of Fish*, 7: 357, Paris). Synonyms for this fish are *Polyacanthus cupanus* (Cuvier and Valenciennes 1831), *Pseudosphromenus cupanus* (Bleeker 1879) and *Macropodus cupanus* (Regan 1909), and it is by this last incorrect scientific description that many enthusiasts know this species even now.
The explanation of the scientific name is as follows: the genus name refers to the Gourami *Osphronemus goramy*: pseudo = false or not genuine, and thus *Pseudosphromenus* = not genuine Gourami. The species name *cupanus* is derived from a river name from the former province of Pondicherry on the Coromandel coast of India, south of Madras.

Natural distribution and habitats

The catchment area for this species has been firmly established as the southern part of India on the Malabar and Coromandel coasts as well as the north-western part of Sri Lanka. There are also reports of finding this fish (by Hora, for example, in 1942) in Thailand, the Malay peninsula and Sumatra, and by Chevey in 1929 in North Vietnam (Tongking).

From the areas of India and Sri Lanka in which it is found, we know that this labyrinth fish originates in the lowlands near to the coast (as well as in brackish water and water which is subject to the tides) and for that reason, it favours ditches, small stretches of water and such like. In this type of environment, individuals spend their lives hiding between the plants, other types of foilage, submerged wood and so on. They may also inhabit running water (in the rainforest, for example), as well as standing water such as small pools, or partly dried out ditches, and so on.

Aquarium requirements

It is important to note that these fish are best kept in smaller aquaria rather than sharing large tanks with other, lively fish, for then it would be difficult to see them. Small aquaria of 50 x 30 x 30 to 70 x 30 x 30cm (20 x 12 x 12 to 28 x 12 x 12in) for example, are perfect for keeping these fish and observing them, if the tank is suitably arranged. In other words, the edges of the tank should be partly covered with thick plant growth, with small niches or open spaces between them so that leaves of plants, such as Java Fern *(Microsorium pteropus)* or small floating *Ceratopteris cornuta* may grow on the surface of the water.

Spawning requirements

If you want to provide places which the fish are certain to use during the mating season and which are easy to observe, then you should provide plants around the tank which consist of single groups and do not grow in bunches on the surface of the water, but, rather, grow only to about 10cm (4in) below the surface. If you have a porous synthetic rock or a cork wall, you can use a knitting needle to attach Java Fern or *Anubias barteri* variation *nana* to the wall directly under the water level.

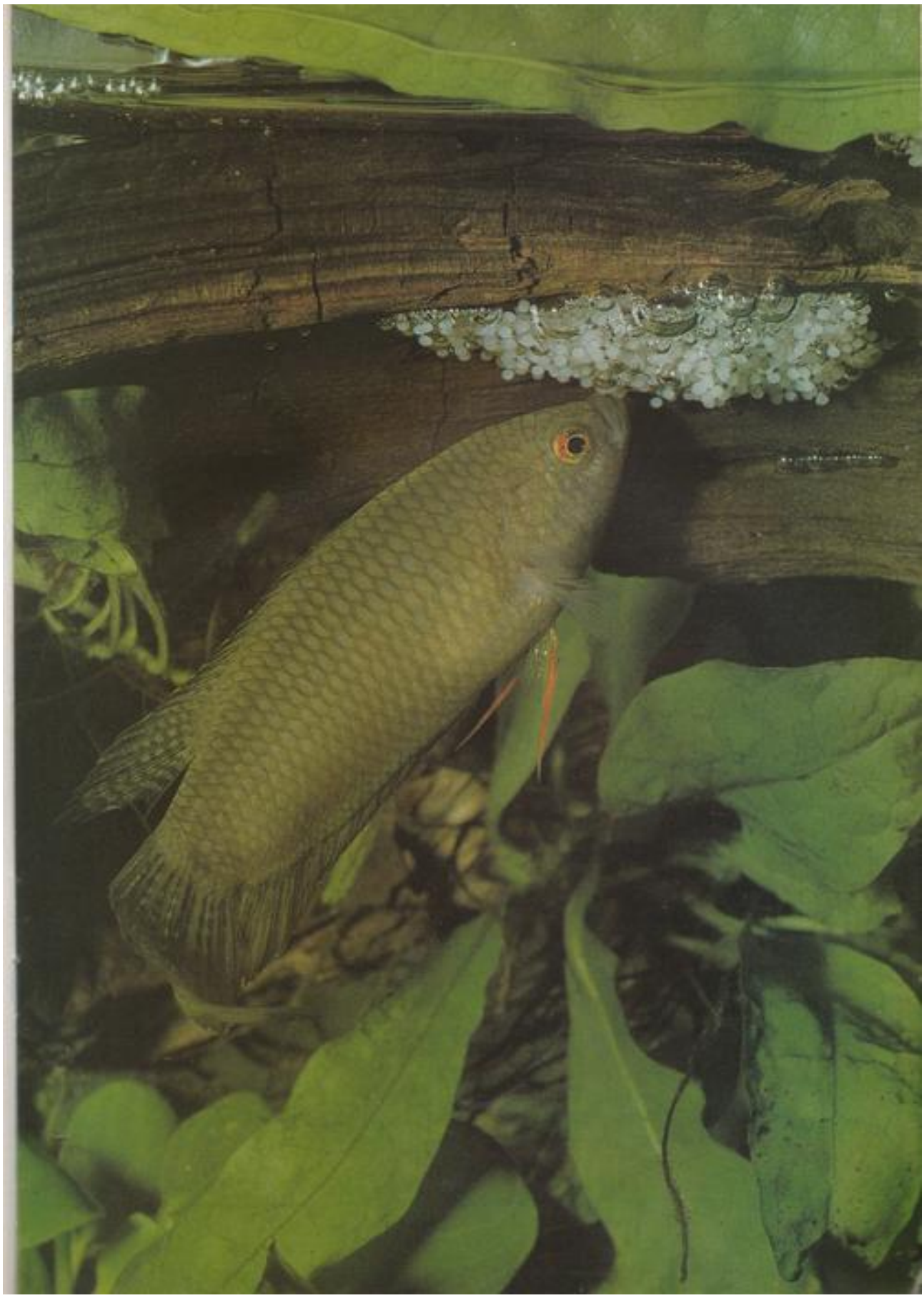
It is under the cover of leaves along, or slightly under, the water that the male *Pseudosphromenus cupanus* prefers to build the bubblenest, for then he may retreat when danger threatens to the safety of the plants growing beneath. There is a noticeable difference between the related *Pseudosphromenus dayi*, which builds its bubblenest more often underneath, or preferably even between, thick, interlocking leaves which are far below the surface of the water, sometimes even only a few centimetres above the bottom of the tank, if it has the opportunity.

Pseudosphromenus cupanus also accept caves in the form of coconut shells when no other dense foliage or dark places are available in the tank. That is not to say that it is a good idea to make the fish breed in a cave, but only that this species prefers a place where it feels most protected. I have also established other small labeyinth aquaria using a dark and partly overgrown bottom and plants such as *Cryptocoryne willisii* and/or small pieces of marshy pinewood covered with Java Moss *(Vesicularia dubyana)*, Java Fern *(Microsorium pteropus)* or *Anubias barteri* variation *nana*. This produces a normal level of lighting, rather than being too bright. If the tank is lit too brightly, the fish remain rather timid and rarely swim into the open.

Water conditions

The composition of the water has very little significance. I have kept fish at almost any degree of water hardness (up to 18 degrees) as well as in neutral to slightly acidic water. Although it is often said of labyrinth fish that they (can) live in dirty water, it is important to keep their water clean.

I take care to ensure that the water is



crystal clear and is constantly running through a biological filter so as to produce a gentle current. This is not absolutely necessary, though, for I have now been breeding this small labyrinth fish for three years in a meter aquarium planted only with Java Ferns and without filters or oxygenation, and the fish have reproduced continually under these conditions. To summarise: keeping this species is quite easy and the fish are very amenable. They prefer to eat live food but also accept frozen or dry food. They are good eaters relative to their size.

Tankmates

If you want to combine these fish with other fish in a small tank, then they must be peaceful species and not too lively swimmers. Appropriate examples are, for instance, *Barbus gelius*, *Barbus canus*, *Aplocheilus blockii*, *Rasbora borapetensis*, *Rasbora somphongsi*, *Rasbora dorsiocellata*, *Chela dadyburjori*, or *Acanthopthalmus* or *Noemacheilus* species. You can also keep *Pseudosphromenus cupanus* with other fish to form a very attractive Asian combination.

Breeding behaviour

If kept under the conditions described above, the fish breed spontaneously. If you want to observe them well at all stages of the mating, then it is best to place a pair in a breeding tank of 40 x 25 x 25cm (16 x 10 x 10in), with a little plant growth on the bottom and smaller groups of plants where the female may hide while the male builds the nest under a leaf or piece of cork or whatever is floating on the surface of the water. The male then appears very attractive and a female willing to mate may (though not always) turn an almost black colour. When the nest is finished, the two fish perform their courtship display, where they both indicate to each other their willingness to mate. When the male entices the female, she reacts by extending her fins widely and often adopts a rather oblique stance with her head tucked down.

In this position, the fish push against each other beneath the bubblenest until they arrive at the customary mating position. The male then enfolds the female as she turns onto her back. At first, she releases only a few eggs, but soon that rises to about 20-30 eggs per pairing. The final number depends on the size of the fish and their condition. Fully-grown, well-cared-for fish with a healthy diet produce 400 eggs.

Brood care

The eggs sink to the bottom and are collected by both partners to be put into the froth of the nest. Normally it is the male who tends to the brood, though it has been known for the female to look after the brood if the male is removed after spawning. I have never removed the male, however.

As with all the other labyrinth fish (such as *Pseudosphromenus dayi* or *Macropodus chinensis*), it sometimes happens that the male builds a second bubblenest and places the eggs in it. That is often the case when the nest is disturbed, though it also happens that the new nest is built in an even more concealed place and the eggs are then brought to it.

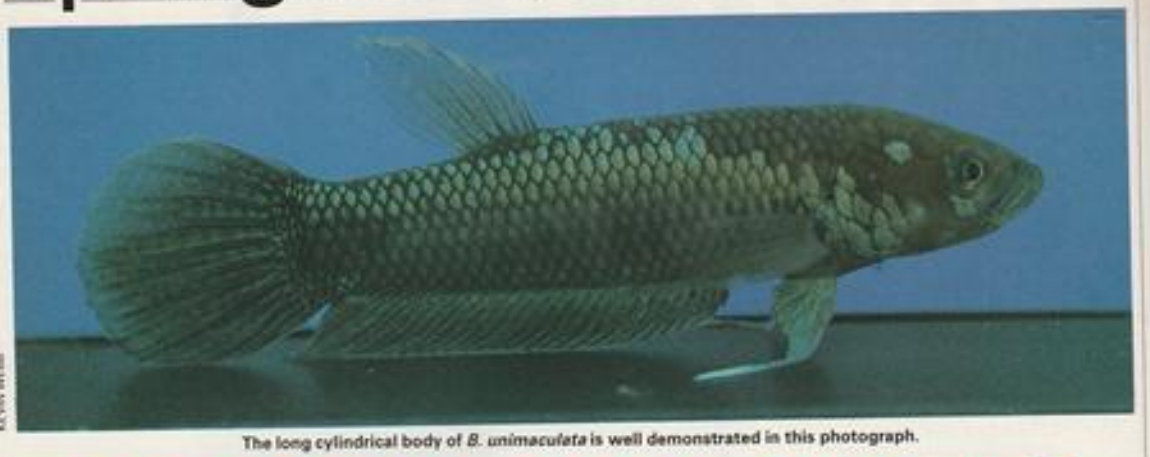
At a water temperature of 25-27°C (c 77-80°F) [23-25°C (c 73-77°F) is sufficient for normal purposes], the fry hatch after about 48 to 60 hours. The embryos linger with their white, though already slightly pigmented, yolk sac below the nest. In the course of the next 24 hours, the yolk sac becomes smaller and the pigmentation more intense. At the given temperatures, the fry are fully developed after five to six days and swim freely.

First feed

At first, I feed them with Slipper Animalcules (*Paramecium*) and/or corn cockles, but as early as the second or third day, they begin to eat freshly hatched Brine Shrimp nauplii. Nonetheless, it is necessary to check with a magnifying glass that they are eating them, and it is also worth giving infusions of pond water for the first few days, together with the Brine Shrimps.

As soon as the fry are definitely eating all of the shrimps, they grow quickly and I start to change part of the water every day. I also give larger food in accordance with their growth. Bringing the fish to maturity poses no further problems and it is a treat when the fry, a good centimetre long (c 0.4in) and already with their colours, are put into a rearing tank planted with slender plants in order to continue their progress.

Spotlight on Anabantoids

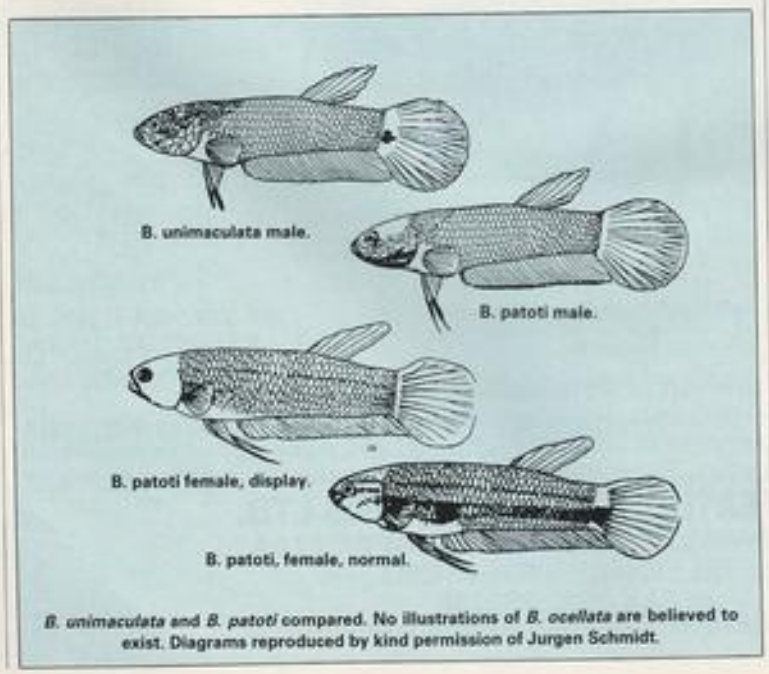


KEVIN WILKES

The long cylindrical body of *B. unimaculata* is well demonstrated in this photograph.

THE ONE-SPOT BETTA . . . AND FRIENDS

Stephen Clark takes a close look at four closely related "tubular-bodied" Bettas currently being kept within the Anabantoid Association of Great Britain.



B. unimaculata and *B. patoti* compared. No illustrations of *B. ocellata* are believed to exist. Diagrams reproduced by kind permission of Jurgen Schmidt.

In the February 1986 edition of *Aquarist & Pondkeeper* (Volume 50, No 11), Chris and I introduced *Betta unimaculata* to the aquarists of Great Britain. The reason for the article was to share our experiences and help others to keep and breed this interesting newcomer to the hobby. At the time the Anabantoid Association of Great Britain (A.A.G.B.) was adolescent and our European friends and counterparts in the Internationale Gemeinschaft fur Labryinthfische (I.G.L.) helped to plant the seeds of the young fish in the association.

These were bred and distributed throughout Britain and the artistry of fishkeeping revealed further facts that have aided both aquarists and the scientific fraternity alike. Advances by biologists in *Betta* taxonomy (linked to this increased knowledge) have now recognised the large sized, rounded caudal (tail fin) tubular fish inhabiting the rivers of Borneo as a group. However, it is extremely difficult in some cases to differentiate between some of the species, as they seem to have evolved only recently and differences are not always distinct.

Easily identified Bettas

Two species easily identified are:

Betta unimaculata Popta, 1906.

Betta macrostoma Regan, 1910.

The four-inch (10cm) long gaudily-painted Peacock Fighting Fish, *Betta macrostoma*, can be found in the pools and streams

of the ancient state of Brunei, nestled in the north-western corner of the island of Borneo, hence its alternative name, the Brunei Beauty.

The similarly sized, subtle-coloured *Betta unimaculata*, lives in the extreme metamorphic environment of the turbulent alkaline rivers and still rockpools in the province of Sabah (formerly British Northern Borneo).

Little-known Bettas

Intensive studies conducted by the West German biologist, Jurgen Schmidt, since 1987, have now strongly suggested the following, previously obscure fish, are distinct species:

Betta ocellata, De Beaufort, 1933.
Betta patoti, Weber & De Beaufort, 1922.

These little-known anabantoids are of a similar shape to the types described earlier and the differences in their morphology (the form and structure of the body) and coloration are subtle. Comparing *Betta ocellata* and *Betta patoti*, it can be concluded that the former has a larger eye and the maxillary (upper jawbone) reaches further forward to the front border of the eye.

In life, the slightly smaller *Betta patoti* lacks the shining irridescent scales of *Betta unimaculata* and the males display a black chin similar to *B. macrostoma* when aroused. Confusion surrounds the status of *B. ocellata* and *B. unimaculata*, however. Inger & Chin (1962) amalgamated the two species but neglected to include several important characters, namely, the transverse series (scales counted at the back of the gill cover, above and below the lateral line) and the caudal ray count. Tentative assumptions should be discounted until further studies are made. To date, no photograph of drawing of *B. ocellata* is known to exist.

B. unimaculata update

Apart from the information gained from ichthyological data, what else have aquarists learned from *Betta unimaculata* in this time? This long torpedo-shaped fish, delicately shaded in pastel green, turquoise, brown and yellow, when first imported, was hard to sex due to the lack of information and experiences. At breeding time, however, the female developed a swollen abdomen full of eggs. After spawning, the male gently picked up the white eggs from the base of the aquarium and incubated these in his mouth for a period of 10 days.

A friend and fellow aquarist, Allan Brown, pointed out to me that, by viewing the fish from above the tank, several large, metallic green and brown scales could be observed on top of the male's head.

The notable French aquarist, Jacques Nicolas, writing in *Der Makropode* (the official publication of the I.G.L.), identified a particular breeding season — from January to April — in the natural habitat of *B. unimaculata*. At this time the normally peaceful fish becomes aggressive and rival competitors battle for supremacy over each other and over females, sometimes causing damage to one another.

Three years ago, my male *Betta unimaculata* began to swallow the fertilised ova in its mouth and, although the water was clean and clear (26°C — 79°F) the addition of several males to one female in a roomy (36 x 12 x 12in — 90 x 30 x 30cm) well-planted aquarium solved the problem. This gave the female the opportunity to shed her eggs frequently with other males, who would then resist the urge to cannibalise the 60-150 developing young in favour of the natural urge to spawn again.

When the rapidly growing fry emerge from the buccal cavity and are feeding on most aquarium foods relative to their size, they can be transferred to large, long tanks in shallow water (approx 6in — 15cm). This helps organ development.

It must be stressed that it is important to keep the aquariums *extremely well covered* as these inquisitive fish have the ability to leap up to 5ft! (1.5m) in the wild, as a result of which some fishkeepers have found their prized possession, as a dried up corpse on the floor the next morning!

Morphometric comparison between *Betta ocellata* and *Betta patoti*

CHARACTER	*B. ocellata*	*B. patoti*
Length	63-87 mm	99 mm
Eye length/Head length	x 3.4-4.5	x 5
Eye length/Snout length	x 1.7-2.6	x 1.6
Dorsal ray count*	0/7.8	0/8
Anal ray count*	11/27-29	11/29
Ventral (Pelvic)* ray count	1/5	1/4
Caudal	Spoon-shaped	Broadly rounded
Ocellus on the caudal peduncle	Absent	Present
Preserved colour	Uniform grey or dusky	Brownish/grey lighter below
Location	Pulau Laut, River Kajan, River Bonga, Kalimantan S/E BORNEO	Bettotan, Sandakan N/E BORNEO

*The first figure refers to the number of spines on these fins — the second refers to the number of soft rays.

A juvenile male Brunei Beauty *(Betta macrostoma)*.

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Spotlight on Anabantoids

TWO AFRICAN BUSHFISH

Member of the German magazine DATZ and vice-president of the IGL (the European counterpart of the AAGB) **Michael Krokoscha,** examines possible relationships between two closely related species and reports on the first-known spawnings of *Ctenopoma ocellatum.*
(Photographs by the author). (Translated by Mary Bailey)

THE African representatives of the Labyrinth Fish, the Bush Fishes, are far less well known in the aquarium hobby than their Asian relatives. This may be because they are rarely imported, but alternatively, because many species are not so attractive in coloration and, in addition, grow fairly large.

Bush Fish species

With the exception of the South African Cape Bush Fish (*Sandelia*) all the Bush Fishes belong to the genus *Ctenopoma*. Three groups can be clearly distinguished (Peters 1976). There are the bubblenest builders, to which belong small, colourful, species as the Orange Bush Fish (*C.ansorgii*), the Banded Bush Fish (*C.fasciolatum*), and the Dwarf Bush Fish (*C.nanum*). The species which do not practise brood care are distinguished by the specialised quill-like scales behind the eyes and caudal penduncle in males, which probably play a role in courtship. In the slender, elongated, species, such as *C.multispinis*, *C.nigropannosum*, and *C.pellegrini* there is only a single area of spiny scales behind the eye. Possibly these groups should be sub-divided, as there are probably species with eggs that sink and others with eggs that float (Benl & Foersch 1978, Seegers 1988).

In the species of the third group males have a "spiny scale" patch on the caudal peduncle as well. To this group belong the species occasionally imported, *C.kingsleyae*, *C.oxyrhynchum*, and *C.acutirostre*. The last of these is particularly striking by virtue of its marking of spots which has earned it the German trivial name of Leopard Bush Fish.

Very closely related is the rarely imported *C.ocellatum*, which can barely be distinguished by shape, size, and scale/fin formulae. Only its coloration contrasts with that of the Leopard Bush Fish, being uniform brown with more or less visible light, vertical, zig-zag lines. This species does not have a trivial name. "Eyespot Bush Fish", the translation of the Latin name, could easily lead to confusion as most representatives of the group have a spot on the caudal peduncle or central flank. Moreover, *C.kingsleyae* is usually known as the Tailspot Bush Fish in Germany. On account of the colour I would suggest the American comon name "Chocolate Bush Fish".

C.acutirostre, as well as *C.ocellatum*, are typical "Leaf Fishes", ie they have evolved in body form and behaviour to a lurking predatory way of life. The high-backed shape with the relatively pointed mouth is reminiscent of a leaf, and the coloration adds to the camouflage. Further, at first glance, the striking spots of the Leopard Bush Fish serve to break up the outline of the body.

In these two species, as well as in other Bush Fishes, the mouth is extremely extensible. Their behaviour is very quiet, and they often rest, unmoving, among the plants, with the head inclined diagonally downwards.

The Bush Fish aquarium

The aquarium for their maintenance should be thickly planted and have hiding places, such as roots or similar, even if there is a danger of not seeing much of the fish as a result. The tank should be large enough to accommodate animals 20cm (8in) long and proportionately deep, although in the aquarium, they generally remain smaller.

C.acutirostre and *C.ocellatum* should not be kept with lively fast-swimming fish, as they will not get their share of food. Bush Fishes eat almost everything; one should, however, feed large specimens suitably large bulky foods. A temperature of 20-24 °C (68-75 °F) is perfectly adequate for normal maintenance. In their habitat, the Congo Basin, the temperature is often no warmer than this.

Bush Fish have no special water requirements. When catching them, however, one must be very careful, as the spiny gill covers often become almost inextricably tangled in the net. For this reason, nets with very fine mesh are desirable.

Breeding Bush Fish

Breeding of the Leopard Bush Fish (*C.acutirostre*) in captivity has been reported only once, by the Basel Zoo Aquarium (Nann 1983). The aquarium used was a thickly planted 7500 litre (1660 gal) tank (250 x 200 x 150cm — c100 x 80 x 60in), containing a shoal of small characins. The water had a hardness of 3GH and less than 2KH, temperature 26°C (78°F), and a slightly acid to neutral pH. The fish were more than 10 years old and performed no brood care. Nevertheless 10-15 fry grew on in the aquarium. Prior to this, there had been no reports of this species being bred.

My four Chocolate Bush Fish (*C.ocellatum*), which I bought in Frankfurt in 1987, then 10cm (4in) long and were placed in a 160 litre (36 gal) aquarium (80 x 50 x 50 cm — 31 x 20 x 20in). Based on the presence of spiny areas they were a male and three females. They were fed on red Mosquito larvae and Mayfly larvae (literally, one-day-fly larvae), which were available in large quantities at the time.

After three weeks they were moved to a 375 litre (83 gal) aquarium 1.5 metres (5ft) long, which had previously contained a few *Lucicephalus pulcher*. There were no fish apart from the Bush Fish in this aquarium. The water was already mature and had needed a change as soon as the first traces of blue green algae appeared. It was filtered over peat by a centrifugal pump filter with a turnover of 360 litres/hour (80 gal), and water conditions were: 8GH, 3KH, pH about 7, temperature 22°C (71.5°) at night and 24°C (75°F) by day. But I do not consider these measurements particularly significant. The important factor in breeding these fish, and also *C.oxyrhynchum* and *C.kingsleyae*, was the sudden change in quality which accompanied the move.

About a week after the move I found a few fungussed eggs among the floating plants. I had not observed the actual spawning; it had probably taken place at night. I managed to transfer a few un-fungussed eggs into a small tank, where they, too, fungussed, possibly because this was the female's first spawning, or because she was already too old. The eggs of *C.ocellatum* are, as in *C.oxyrhynchum* and *C.kingsleyae*, clear as glass and lighter than water. In this respect they resemble the eggs of the bubblenest-building Bush Fishes. By contrast, however, these three species, together with *C.acutirostre*, do not practise brood care.

After 12 days I again found eggs at the water surface, and I transferred these into a prepared 50 litre (11 gal) tank. Unfortunately, there were only a good dozen. As it is known that *C.kingsleyae* and *C.oxyrhynchum* produce several thousand eggs, I assumed

C.acutirostre: note the contrasting pattern of spots.

C.ocellatum, light form; the breeding described in the article was by this form.

Above, juvenile *C.ocellatum*. Right, *C.ocellatum* can extend its mouth very wide.

Above, juvenile *C.ocellatum*. Right, *C.ocellatum* can extend its mouth very wide.

that the majority had already been eaten. Who knows whether some other aquarist may not have already bred these fish and overlooked the fact for this reason?

Eight fry hatched from these eggs, and these were given rotifers for the first few days. Soon, they were able to take newly-hatched *Artemia* and sifted pond foods.

The coloration of the fry is interesting, and gives clues to the interrelationships of the Bush Fish species. In young *C.ocellatum* the anterior part of the body, the middle of the body, and the caudal peduncle are all dark in pigmentation; in young *C.oxyrhynchum*, only the anterior body and the caudal peduncle are like this. By contrast the young of the bubblenest-builders have, initially, a spotted coloration, and only later, dark pigmentation of the anterior body.

In *C.oxyrhynchum* and *C.kingsleyae*, the dark areas grow towards each other as the fish develops, so that there is a vertical light line in the centre of the body. Moreover, there is a light band running from the snout, through the eye, to the back just short of the dorsal insertion, such that, when viewed from above, it appears to form an ellipse.

This, however, is exactly the same marking as Ahl gives for *C. argenteoventer* (Arnold & Ahl, 1936). Thus, either *C.argenteoventer* apparently derives quite recently from a common ancestor, or else it must be a synonym of *C.kingsleyae* or *C.petherici*, which it otherwise resembles.

C.ocellatum also shows the band through the eye, but the banding of the body is not so distinct, as, when the fish is about a month old, the dark areas break up into spots. Thus, young *C.ocellatum* look exactly the same as young *C.acutirostre!* It is just the same with my fish now, at 10 months old. In the trade, however, we have seen Chocloate Bush Fish which, at the same size, are already uniform brown. This must be a case of geographic forms distinguishable by the timing of their colour change.

Meanwhile, I have obtained other *C.ocellatum* which are distinct from my original specimens in that they have darker coloration and fainter banding. Similarly, in *C.acutirostre*, there are forms with both clear and rather washed-out spotting. I expect that in the course of time, all sorts of intermediate forms will show up. An exact differentiation of the two species will then be even less easy!

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A TALE OF TWO AQUARI

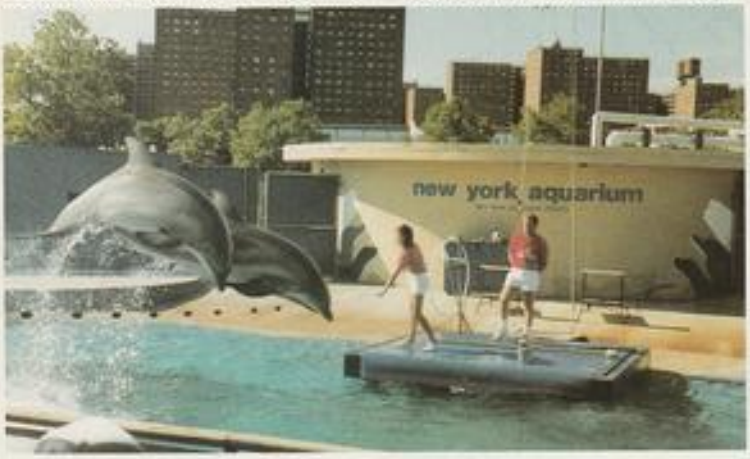
Billy Whiteside had great expectations before he set off to visit the world-famous Public Aquaria in New York and Amsterdam. He found some great exhibits . . . plus a few surprises.

(Photographs by the author)

Having kept tropical fishes and plants for about 40 years, and having read lots of aquarium books and magazines over the years — not forgetting 22 years as a regular writer and photographer for *Aquarist & Pondkeeper* — I created in my head a sort of ultimate public aquarium that would contain dozens of tanks sprouting forests of aquatic plants and housing shoals of brightly-coloured fishes. Many years ago I visited the public aquarium at Milan, in Italy, and was quite impressed by the fishes and plants. The display at Belfast's Belle Vue Zoo was a little disappointing; the one at London Zoo much better but still not quite what I expected.

Subsequent visits to London Zoo Aquarium were much more encouraging: years later I was given a conducted tour of the Aquarium and permitted to take lots of photographs for an article or two for *Aquarist*. Only a couple of years ago I made another visit to the London Aquarium and was able to film and edit a nice little video programme about it.

However, I still had an idea in my head that there had to be absolutely amazing public aquaria in cities such as New York — and in Amsterdam. After all, the Dutch are famous for their aquaria and their aquarium plants. Perhaps there was a connection: the Dutch founded New York — and called it New Amsterdam. I was quite convinced that the best public aquaria in the world had to be in New York and in Amsterdam, and I was determined to visit both at some time.



The N.Y. porpoises performing at the Aquatheatre.

Red-bellied Piranha at N.Y. Aquarium.

NEW YORK

I hit New York in a heat wave and wondered about the wisdom of going on the subway or walking in Central Park. After all, the guide books advised that it could be dangerous and that most people were not over-friendly.

The heat was dancing off the sidewalks, and so was I as I walked the short distance from the subway station to get my first view of a boardwalk, a New York beach and New York Aquarium, alive and well and parked beside the Coney Island Fun Fair, the boardwalk and the beach.

Such are the things that dreams are made of, and I was delighted to have my camera with me so that I could share it with you — or so I thought until I discovered that my £150 flashgun had developed a fault. Fortunately, there were plenty of exhibits at the aquarium lit by daylight — and there was strong sunshine that day. The cost of admission was $3.75 for adults, $1.50 for children under 12, and free for kids under two. The N.Y. Aquarium remains open from 10 am until 4.45 pm (5.45 pm holidays and summer weekends).

A useful notice board near the entrance gave a good, coloured plan of the layout which even I could follow. Carefully I read down the list to find the heavily-planted, freshwater, tropical tanks of which I had dreamed. I couldn't find any on the list — or else I did not understand some of the labels, e.g. Bermuda Triangle. I puzzled at the label Aquatheatre — which at first I read as Aquat-heater. Was that warm water? No. It was "theatre" with the prefix "aqua" added. It was about then that I decided that New York Aquarium is not really directed at aquarists.

Rather, it is geared towards entertaining and amusing the average American family, kids and all, on a day out. And that's a fair enough reason.

I'm not really a great fan of performing animals; but a quick walk around the Aquar-

Aerial roots, branches and *Cryptocoryne* set off Amsterdam's Cardinal tank beautifully.

ium indicated that my dream aquaria do not exist there. Freshwater, tropical fishes and plants do not appear to hold much sway at the N.Y. Aquarium; so, having accommodated that disappointment I decided to make the best of what was left.

A short stop at the penguin pool enabled me to take a couple of pictures. Penguins were cute and appealed to the children. Not long after I joined a mob who were getting in line — forming a queue to you and me — for the next performance at the Aquatheatre. I thought I could manage a ten-minute stand in the sun — although the notice forbidding strollers had me wondering until I decided they were children's push-chairs and not happy wanderers! I enjoyed photographing the audience and the performing seals and porpoises. The large aquatic mammals went through their trained routines and appeared to be perfectly happy and healthy, and well cared for by their trainers.

Circus Act

My only reservation was that their performance, in my mind, was better suited to a circus than an aquarium — but I think the visit simply went to show me that my long-time conception of a public aquarium was not the same as the realities. Well, it's not every day that I get splashed by seals and porpoises, or indeed sit in the sun without feeling guilty.

After the outdoor show I headed indoors and tracked down an aquarium housing some Red-bellied Piranha which certainly attracted the children. Tropical marine fishes were represented and I managed to get some flash shots just before my flashgun developed a problem. The bright colours of the marines continue to fascinate me, as does the symbiotic relationship that may develop between a fish and an anemone. Coldwater marines were less interesting to me.

A view of a shark's mouth is not something one sees everyday so I headed for the display of sharks, and cursed my faulty flash; but I did manage to get one shot of a passing shark that could certainly have starred in "Jaws" without any make-up being required.

Spectacular Belugas

I finally ended up visiting the Beluga whales at the N. Y. Aquarium. These spectacular animals more than made up for the things that were not there. Belugas are social animals and go around in the wild in numbers of up to a few hundreds. Males reach maturity at eight years, females at five years, and gestation lasts for 14 months. Pregnancies can occur every two years. Mother Belugas are caring mothers and nurse their calves for up to 20 months — by which time their cone-shaped teeth begin to appear.

Is the New York Aquarium worth a visit? Certainly! It makes a splendid afternoon out in New York and will appeal especially to children. The subway trip alone is worth the visit, crossing, as it does, Brooklyn Bridge.

Once again, I asked for directions on the subway train and found people to be more than helpful.

If you make it to New York, do include a subway trip down to Coney Island to see the N.Y. Aquarium. If the weather is good I'm sure you'll enjoy the visit.

AMSTERDAM

In its own way Amsterdam is as exciting a city as New York — and, like New York, when darkness falls the city lights up and continues, even if the amazing tram system of transport stops shortly before midnight. When travelling to Amsterdam's Aquarium it's cheap, convenient and quite fast to go by tram from almost any part of the city.

Although I do not speak Dutch, most Dutch people speak Dutch, English and a third language, and most are very helpful if asked for directions on trams, Metro or trains. I was also lucky on my visit to Amsterdam and enjoyed the trip in warmth and sunshine, even though it was still spring. Incidentally, it's also the best time to visit the Keukenhof and the many Dutch bulbfields.

Having decided not to try out the ancient bicycles that crowd the streets of Amsterdam and other Dutch cities, left me ready to board a tram for the Aquarium. The Amsterdam Zoo, Aquarium and Planetarium are all

An underwater gallery provides a unique view of swimming seals at the Amsterdam Aquarium.

situated in the same grounds, and the entrance fee of fl15 (15 Guilders) covered the admission charge for all three. For several pounds only I had a most enjoyable day out and got my money's worth out of all three.

I tried the Planetarium first: and although I speak only one word of Dutch — Concertgebouw — I got the general gist of the commentary as the stars and planets soared over my head. After the star show I had something to eat and then set off into the Zoo and Aquarium, wondering if Amsterdam Aquarium would resemble New York's and concentrate on the bizarre, or if it would have dozens of rows of beautifully decorated and planted aquariums such as one sees in the occasional aquarium magazine.

Unique display

Like New York's Aquarium, the one at Amsterdam had its display of penguins, seals and sharks, but they were not trained to take part in any sort of exercises. I was particularly impressed by the seal display: there was an underwater gallery where windows set into a wall afforded an excellent view of the seals swimming underwater. The water was crystal clear and the seals soared and swooped through the water like giant, prehistoric birds in a science-fiction movie. Each window enabled the viewers to stand in darkness, while the seals were in full daylight and were thus clearly seen. The crowds of children and adults around each window indicated the popularity of this useful way of allowing the public to see underwater mammals swimming freely.

I soon entered the main Aquarium building and glanced at some sticklebacks on display before heading upstairs. I was not disappointed.

I was particularly struck by the several tropical marine tanks on display. They contained the sorts of fishes one would keep in a home tank, and there were also plenty of invertebrates — as well as good growths of green algae of the *Caulerpa* genus. One could get one's nose — or camera — close to, or right up against the glass.

Seahorses and large, red Hermit Crabs were next on my list for the camera; and shortly afterwards I was pointing it towards Moray Eels and Nurse Sharks, none of which I'd like to meet in my local swimming pool at home! Many visitors were intrigued by the tank housing anemones and by the symbiotic association evident between certain marine fishes and anemones. The poisonous Scorpion Fish, *Pterois volitans*, were also attracting a lot of younger visitors.

Soon I turned the appropriate corner and there, before me, were the well-planted

tropical tanks, complete with fish, that I had been hoping for. They were few in number — about four — but the yellow of the tungsten lighting combined with the strong greens of the plants really displayed the fishes to advantage. A shoal of Cardinals in one such tank — with the aerial roots of a land plant stretching down into the water — provided a really beautiful sight showing life above and below water level.

There was a good variety of other freshwater tropical tanks, containing fewer plants and concentrating more on fishes. They looked well — but nothing I saw looked better than the properly-planted aquariums, complete with fishes and plants.

Amphibians

After the freshwater tropicals I headed for the insects and the amphibians. The displays were good, and I took a few shots of the frogs and toads. Most of the display tanks were well decorated with plants.

Subsequently I went round the rest of the Zoo and enjoyed photographing and looking at the usual collection of elephants, lions, monkeys, camels, polar bears, etc. They were well displayed, despite the age of the Zoo, and seemed as if they were very well looked after.

As I headed back to my hotel I made a mental comparison of the Aquariums at New York and at Amsterdam. Both were well worth a visit for any aquarist; but, of the two, the Amsterdam one appealed more to me as an ordinary aquarist who likes to see plants and fishes thriving together.

A red Hermit Crab rests on a rock at Amsterdam Aquarium.

OUT AND

SEAQUARIUMS WATERLIFE CENTRE

by John Dawes

A short time ago I received a letter from John Sprague, an *A & P* reader who lives in Sorrento (see Letters page for full text). Among the several things John appreciated were "people like Graham (Cox) who are prepared and caring enough to pass on the benefit of their experience". John also regards Graham "as being the best in his field".

By sheer coincidence, I was due to visit Graham Cox only a few days after I received this very welcome letter. I therefore passed on all the "head-swelling" compliments to the man himself. His eyes lit up because, no matter how long you've been in the business, a pat on the back is always extremely uplifting . . . and there are far too few people like John Sprague who are open and generous enough to offer praise where praise is due.

The fact is that, over the years, Graham Cox has developed and refined his many ideas, tested them, and put them into practice to the extent that every hobbyist in the UK — and numerous ones overseas — know about him and his products . . . and respect both for their dependability and quality.

One of the results of Graham's dedication is that his SeAquariums Waterlife Centre offers as wide a range of facilities as you are likely to find at any other retail aquatic outlet in the country. In fact, by the time you add the Waterlife Research Industries Ltd. manufacturing unit, plus the import/quarantine/trade centre (over 340 tanks, ponds and vats — offering tropical marine, tropical brackish, tropical freshwater and coldwater species — all under one roof), you'd be hard pushed to find a more diverse, self-contained unit anywhere else in the country (even if only part of it is accessible to the general public).

JOHN DAWES

One of Graham's Cox's colourful tropical marine tanks.

JOHN DAWES

Sansui — home of Britain's largest tropical marine community aquarium.

In addition to the retail facilities, which embrace everything from a Guppy to a Koi, and a Damsel to a Moray, plus every conceivable thing they may need, the Waterlife Centre has become deservedly famous for its Sansui Aquarium which houses several show aquaria, plus the largest tropical marine community tank in the UK.

This massive aquarium contains 100,000 gallons of artificial seawater (Ultramarine Sea Mix, of course!) — approximately ten times more water than the average domestic swimming pool. The tank measures 40ft from end to end, is 21ft wide and 12ft deep. The windows are each 6ft x 3ft and are made of 2-inch thick glass overlaid, on the viewing side, with ¼in bullet-proof glass designed to resist scratching.

Monos, Angels, Butterflies, triggers, a 2½ft Lemon Shark, a small (18in) Cat Shark, a 3½ft White Tip Shark (an 8-year resident, this one), Remoras, Wrasses, Look-downs (showing signs of courtship/breeding activity), a rather large, rock-crunching Parrot Fish . . . and numerous other tropical marine fish swim to and from in an ever-changing display that needs at least a good 30 minutes of unbroken viewing to reveal most of its secrets.

As from last month, there will have been even more to see with the arrival of a long-awaited selection of fish from the Sea of Cortez — all for a modest entrance fee of 60p for adults and 30p for children.

October also marked the start of SeAquariums' annual Koi sale during which the already highly competitive prices become even more attractive. The sale is scheduled to run throughout the winter months — so ring for details anytime between 10.00 a.m. and 6.00 p.m. (seven days a week — except Christmas Day, Boxing Day, and New Year's Day.)

The SeAquariums Waterlife Centre is within a stone's throw (and well inside earshot) of Heathrow Airport, so it's easy to find . . . and well worth finding.

SeAquariums Water Life Centre, Bath Road, Longford, West Drayton, Middx., UB7 0ED. Tel: 0753 682487; Fax: 0753 685437.

Above right, apart from the fish themselves, Koi-keepers' trophies are often the most spectacular items on display, and the BKKS Open show was no exception.

Right, excellent weather and a first-class venue combined to make the event highly successful, with over 8,000 people flocking to Billing Aquadrome in Northampton over the two days of the show.

Above, who'd be a judge?! With over 360 fish, all of the highest quality, laboured deliberations are called for from the judging teams.

BKKS OPEN SHOW SUCCESS

By Stephen Smith

The spacious environment of Billing Aquadrome in Northampton was again the prestigious venue for the British Koi Keepers' Society annual Open Show, held under the bright sunshine of a hot August weekend.

Assisted by the excellent weather, around 8,000 people attended over two days and, despite the heat, in excess of 360 of the UK's finest Koi provided a display of awe and colour as the centrepiece of the show.

Around 40 exhibitors supported the event, which, itself, was sponsored by **In-filtration** and the huge marquee area was lined with all manner of traders providing hobbyists with fish, equipment, food, etc. In addition, the show featured items of interest to the non-fishy members of the family, such as clown performances and a craft tent, which proved extremely popular.

OUT AND ABOUT

HAMBRIDGE FISHERIES

by John Dawes

The weather was glorious — and the spectacle equally so. It seemed as if **Peter Penfold** had booked even this totally unpredictable "luxury" to coincide with the opening of his extensive new showroom at **Hambridge Fisheries** on 2-3 September.

Many *A & P* readers will, no doubt, remember that we carried a feature on Hambridge early last year (Feb. 1988) shortly after Peter had moved west to Somerset to go into so-called semi-retirement . . .!?

However, as they say, you can't keep a good person down . . . at least, not for long. In no time at all, Hambridge Fisheries started to attract keen aquarists and pondkeepers from far and wide and, as demand, reputation and business soared, so did the pressure to expand and improve.

Those of us who know Peter Penfold recognise that he doesn't go in for half-measures. Either you do something well and thoroughly — or you don't do it at all. Which brings us to the new showroom . . . or should it be showrooms?

JOHN DAWES

Hambridge's brand-new and impressive water treatment room.

JOHN DAWES

A rare sight — a genuine Altum Angel *Pterophyllum altum* — available at Hambridge Fisheries.

There seems to be little point in going through an annotated list of facilities and services here. Far better for the interested reader to make the trip down to Hambridge to discover everything that's on offer for him/herself. Nevertheless, a few mentions would not go amiss.

For instance, some of the leading companies and personalities in the aquatic trade hold Peter in such high regard that they got together and set up a sort of mini-trade show to celebrate the opening of the extension. **King British, Eheim, Hagen, Interpet, Tropical Marine Centre** and **Tetra** were there, each with their display stand and staff on hand to offer advice to the huge crowds that attended over the two days.

Inside, the displays were absolutely spotless and the quality of the fish of the highest order. Mind you, Peter has spent thousands of pounds in installing large, centralised TMC filtration systems to ensure that his fish, plants and invertebrates are kept under the best environmental conditions possible.

As a man who practises what he preaches, he also has an extensive behind-the-scenes quarantine section which, at the time of my visit, was undergoing even further extension.

I left the celebrations feeling that I had had a tremendous time and had seen some really good fish, plants, hardware . . . and service. By the looks on the faces of the thousands who turned up, I wasn't alone, either!

Opening Hours: Tuesday-Sunday, 10 am to 6 pm.

For further details contact **Hambridge Fisheries, Hambridge, Nr Langport, Somerset. Tel 0458 251879.**

WENG WAH'S AQUATIC SURPRISE

by John Dawes

Go into any Oriental restaurant in the Far East and, more likely than not, you'll find one or more aquaria stocked with large fish or a selection of invertebrates (usually prawns).

At first sight, the **Weng Wah House** might appear to be just such a restaurant. However, there are several significant differences between it and most Far East restaurants. For a start, it's in Hampstead — right in the main thoroughfare. Then, its aquaria contain fish which are there for public admiration, and not — most definitely *not* — for public consumption!

I popped in for a meal after a recent aquatic show and must admit that I was taken by surprise at the sight of six immaculate, 39in, fully-stocked and furnished aquaria (each with its own stand) in the main restaurant on the ground floor; and an equally impressive five-footer upstairs.

JOHN DAWES

Hampstead's Weng Wah House — a great place for aquarists who like good Chinese food.

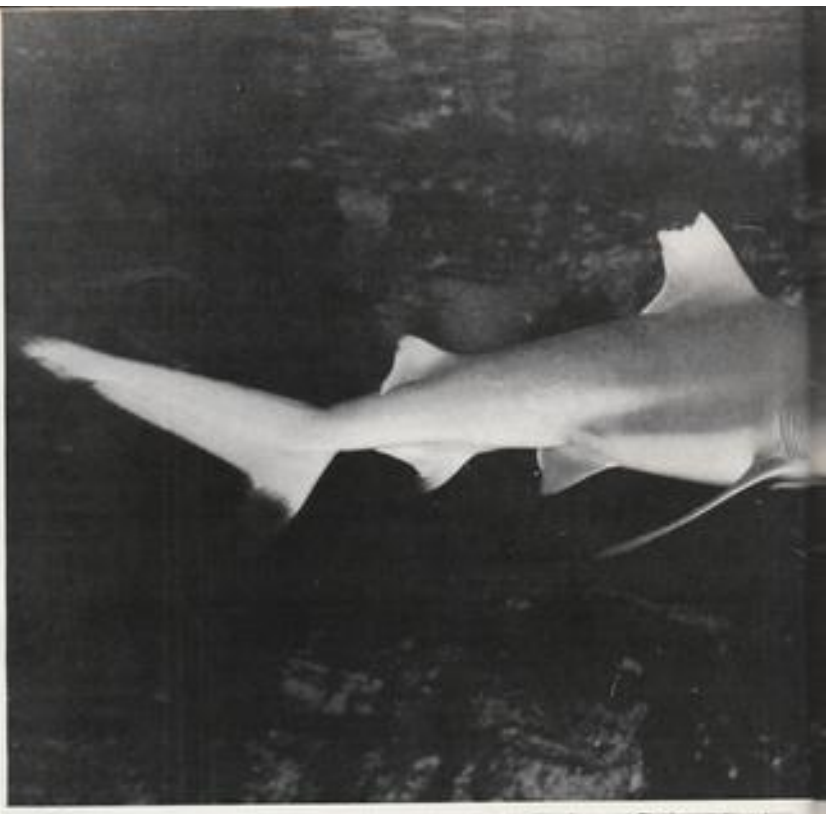
It turns out that the Manager, **Patrick Tsang** is a keen aquarist himself — and a keen *A & P* reader as well — enlightened chap that he is!

So, blend together an enthusiastic love of aquatics, an equally enthusiastic love of good Oriental food, in attractively laid out surroundings, and add helpful staff, and you've got the perfect recipe to satisfy both the eyes and palate of the aquatically inclined gourmet.

For details of what's on the latest menu, as well as the latest additions to the restaurant's aquaria, contact **Patrick Tsang, Weng Wah House, 240 Haverstock Hill, Hampstead, London NW3 2AE. Tel 01-794 5123.**

A Week in the Life of...

CHRIS ANDREWS



Dr Chris Andrews is probably best known to long-term subscribers to *Aquarist & Pondkeeper* for his work as the head of the Tetra Information Centre. However, four years ago he left his position to become Assistant Curator in charge of the Aquarium at London Zoo, where he is now also responsible for the Insect House. He is married with two children.

(Photographs: Courtesy of London Zoo)

Living in Hertfordshire and working in London, Monday, like any other working day, begins with a sprint to the train station to join the throng of long-suffering commuters making their way into the capital. With a daily commute of around an hour each way, this means that I usually have time to catch up on some reading — such as reports, journals and, of course, *Aquarist & Pondkeeper!* There is also time to attempt to plan the day ahead, although the very nature of my job at the Zoo means that even the best-laid plans can change very quickly — and frequently do.

A brisk walk from Camden Town tube station with its early-morning clutter of fast-food cartons, and yesterday's newspapers, — a slightly more leisurely walk around Regent's Park, and I am at the Zoo.

London Zoo is set in 36 acres of Regent's Park and houses the most diverse collection of live animals that can be seen anywhere in the UK — everything from elephants to sharks, and leaf-cutting ants to gorillas. Until the public are admitted at 9 am in the summer (10 am in the winter), the staff have the Zoo to themselves, but are usually too busy tackling the daily maintenance and cleaning tasks to be able to enjoy it.

MONDAY MORNING

On arrival on a Monday morning, I catch up on the weekend's events in the two houses for which I am responsible — the Aquarium and Insect House. The Aquarium is 65 years old and the Insect House is 76 years old, so you can imagine that they are not without their routine maintenance problems.

Fortunately, I have eight full-time keepers, three part-time seasonal staff and a number of volunteers who take care of most of the day-to-day running of each house. In the Aquarium this relies on a blend of long-term experience and carefully disguised enthusiasm, with more unabashed enthusiasm from the Insect House staff. Most importantly, each house has a Head

We are using this species of Weta to familiarise ourselves with the captive requirements of Wetas in general before we obtain the severely threatened Giant Weta for a breeding project.

Above, Batfish are among the unwanted fish quite frequently offered to the Zoo. Left, Sharks are very popular with the public . . . and the media!

Keeper without whom, quite simply, neither the Aquarium nor the Insect House would function properly.

Hopefully, the weekend has been relatively uneventful. Doubtless the Zoo in general, and my two houses in particular, will have been busy, since around half of the 1.3 million annual attendance visits the Zoo on weekends — and most of these people come into the Aquarium and the Insect House.

Over the weekend there may have been a problem with (for example) the heating or cooling in one of my two houses, or perhaps a minor disease outbreak such as White Spot (*Ichthyophthirius*). However, despite the age of the Aquarium and the Insect House, mortalities among the animals are very low, and our breeding results good, often as a result of the ingenuity of the keeping staff and the care with which we choose the species we exhibit.

The day progresses with the first "I-wonder-if-you-can-help-me" telephone call. These occur throughout the week and feature such items as a lady from Essex who is frightened to go out into her garden because of a plague of frogs, to more down-to-earth problems featuring "Bubbles" the goldfish, or the "Pacu/Giant/Gourami/Catfish that have grown too large for my tank" syndrome.

We try to be as helpful as we can, often suggesting that the caller seeks the help of his or her local aquarium shop or vet. By the way, even London Zoo hasn't got room for any more Giant Gouramis!

One particularly unusual call came from a lady in a restaurant in Euston, asking if we had room for another lobster. The live crustacean was part of the menu where she was having lunch but she took pity on it, purchased it and then presented it to the Zoo — and later "adopted" it as part of the Zoo's "Adopt an Animal" scheme.

During the course of Monday, I try to walk around the displays in both my houses, checking on their general appearance, the condition of the livestock and how the exhibits "work" for the public. We have to be careful and take account of what the public are interested in seeing, as well as displaying the animals in a suitable and sympathetic fashion. We also try to link exhibits together, where possible, with a common theme.

A telephone call or a visit to the relevant department within the Zoo, to check on the progress of any recent requests for maintenance jobs or new tank signs or labels, and lunchtime has arrived. Lunch is usually a sandwich in my office, more rarely a pub or canteen lunch.

SHARKS & OCTOPUS

A meeting with the editors of a television nature series indicates that they would like to come in and film the Black-tipped Reef Shark and the piranhas being fed (no problem!), and that they would also like us to take our octopus to the studio (no chance!).

We attempt to be as co-operative as we can with most of these requests, but we always stop short of anything that will result in any suffering or undue stress in our animals. Eventually the TV company settled on a "tarantula" (really a Mexican Red-kneed Bird-eating Spider) for the studio piece, as this animal is more easily transported and less easily upset by such an experience.

The week progresses in a rather planned, unpredictable fashion. A section meeting with the staff of the Insect House has to be fitted in around a meeting with a college student who would like to carry out a project on water chemistry in the Aquarium, and an urgent telefax message from an airline which says that the Wetas (a primitive grasshopper) from New Zealand will not be arriving next week, but tomorrow, and can we collect them from Heathrow?

In addition to the maintenance of existing displays, two aspects of forward planning for new displays also takes place. One of these is what we would like to do over the next six to twelve months: so how can that 2,000-gallon pool be turned into an Amazon River display, and what equipment will be needed to ensure a 12°C (53.5°F) maximum for a small display of cool water North Atlantic invertebrates, and how can we convert an off-show area into a holding (and hopefully) breeding room for our Robber Crabs?

RENEWING THE ZOO

The other slightly longer term aspect of forward planning involves our much-publicised (and often mis-quoted) plans for renovating and renewing the Zoo. These plans include a new gorilla exhibit, a remodelling of the Mappin Terraces along an oriental theme, a renovation of the Aquarium and a new Invertebrate, rather than just Insect, House.

Much internal discussion has taken place at the Zoo regarding what kind of exhibits we would like, how we can best achieve our overall aims of education, conservation and research, *and* ensure that the exhibits are stimulating and enjoyable for the animals and the public alike. We are fortunate to be working with a group of world-class exhibit designers from North America, so be prepared for some stunning new exhibits.

Thoughts of a 20,000 gallon shark tank and walk-through locust exhibition are interrupted by yet another "I-wonder-if-you-can-help-me" telephone call from a vet requiring some advice on treating a sick fish, along with a call from a newspaper wanting a comment on shark attacks in British and Mediterranean waters.

NATURAL SETTINGS

Visitors to the Aquarium and Insect House see a marvellous range of animals exhibited in natural settings and showing completely natural behaviour. However, what you see is only part of my work, and the work of my keepers, at the Zoo.

For example, as a member of the IUCN Captive Breeding Specialist Group, I have to comment on proposals on captive breeding programmes on a range of aquatic animals, including, most recently, Lake Victoria Cichlids, and the Mediterranean Monk Seal.

As chairman of the IUCN Freshwater Fish Specialist Group (of which our editor, John Dawes, is also a member), I am also busy building up a network of like-minded

colleagues around the world to highlight the plight of severely threatened freshwater fish faunas. Much of this work is done by correspondence, but occasionally a telephone call will come out of the blue regarding the status and conservation needs of (say) *Cynolebias* species, and there are also meetings to attend in Bristol, Stuttgart, Cincinatti or sometimes even further, like (I hope) a meeting in Central Africa later this year.

CONSERVATION

At London we are also tackling the problem of invertebrate conservation — not just by education but also by a series of captive breeding efforts. Consequently, I currently spend periods of my time organising the installation of a cooling system for our *Partula* snails, and (with the staff of the Insect House) working out which is the best environmental control system for our colony of *Chrysocarabus* beetle. Both these invertebrates are severely threatened, even extinct in the case of *Partula*, in the wild, and captive breeding may be their last chance of survival.

The marvellous thing about invertebrate captive breeding projects is that the whole future of a species can be guaranteed at relatively low cost — "table-top conservation" if you like. Nonetheless, funds are always short, and we are currently seeking around £5,000 to establish a breeding colony of, not only the *Chrysocarabus* beetle but, also the New Zealand Giant Weta.

As Thursday approaches, the weekend beckons attractively. I am fortunate that I only work weekends on a relatively infrequent basis, although for keepers at the Zoo, Saturdays, Sundays *and* Bank Holidays are just like any other day, but just more busy!

A series of telephone calls track down some stock for the Aquarium, and the assistance of a number of UK aquatic importers, wholesalers and retailers is very much appreciated in this context. We also have an excellent network of contacts with other public aquaria in the UK, Europe and North America. Consequently, a telephone call to an aquarium colleague in the south of France indicates that the moral eels, octopus and cuttlefish eggs that I have requested will be ready for despatch in a week or so, and so a pick-up has to be arranged at Gatwick Airport.

Although over half of the 250 or so species of fish in the Aquarium can, or do, come from captive-bred sources, a proportion still come from the wild. In such situations we never take endangered fish from the wild unless we wish to undertake a captive breeding programme, and we also tend initially to obtain relatively small numbers of juvenile fish — not mature breeders.

Of course, some fish species do breed in the Aquarium, and an on-going project with an American student has provided much useful information on the culture of live foods for marine fish fry and helped in the recent successful breeding and rearing of Anemone Fish by one of the Aquarium keepers. In contrast, most of the 100 or so species of invertebrates in the Insect House regularly breed there. This reflects their endangered status and/or the difficulty with which they can be obtained, both of which make our efforts at captive breeding all the more worthwhile.

FRIDAY AFTERNOON

A number of reports from the Zoo's Veterinary Department arrive. A beetle which died in the Insect House was suffering from a bacterial infection, and isolation of the rest of the stock is recommended.

Faecal samples from our group of Giant Toads suggest that at least one of them has a nematode infection, and although this may not be pathogenic, a course of antithelmintic treatment is to be started. In addition, the recent death of a Koi was caused by a combined *Vibrio* and pseudomonad infection, but no further losses have been observed.

Friday afternoons are not a good time to carry out any major routine maintenance, since, if problems develop, these may occur over the weekend when there are fewer staff available to deal with them. Therefore, if it is working on a Friday afternoon, you leave it alone!

As Friday afternoon draws to a close, a telephone call requests that someone from the Zoo visits the Middle East to advise on setting up a new public aquarium — and they want someone to fly out next week. We discuss it and settle on the week after next for my visit — and I run for the tube before the telephone rings again . . .!

News from the societies

North West Area Cichlid Study Group

(NEW SOCIETY)

"I am writing to inform you of a new fishkeeping society in the hope that you will be able to mention it in the **News from the Societies** column of the *Aquarist & Pondkeeper*. We are called the North West Area Cichlid Study Group, and we hope to affiliate with the British Cichlid Association, as most of us are already members of the B.C.A. We are planning a programme of quizzes, shows, talks and discussions which will complement the activities of the B.C.A., as these types of events are very difficult for the national society to run. We hope that they will appeal to all aquarists in this area who are interested in cichlids, whether or not they already belong to the B.C.A.

We meet on the first Friday of each month at the 'Old Engine Hotel' British Legion Club, Liverpool Road, Skelmersdale, Lancs. At out next meeting (scheduled for **3 November**) I will be giving a talk about fish photography and will be showing slides of my Tanganyikan cichlids breeding.

We have already had two preparatory meetings, and our founder members have considerable experience of a wide range of cichlids. **Brian Wilson** has agreed to act as **Chairman** and **Geoff Fowler** as **Secretary** (I was asked to write this letter as both of them have just gone on holiday). For further information, please get in touch with the Secretary, Geoff Fowler, 11 Thorpe, Skelmersdale, Lancs. WN8 8QQ or ring 061 797 2311.

ALAN HILL
(On behalf of N.W.A.C.S.G)"

Note from the Editor

Thank you for your letter, Alan. We are pleased to publicise the formation of your society and wish you a long and successful future.

John Dawes

Johannesburg Aquarist Society

The Johannesburg Aquarist Society was established in 1984 from the now defunct Reef Marine Aquarist Society. It was felt that changing the name would attract the tropical and coldwater enthusiasts, as well as retain the marine hobbyists. The Society now has about 70 members.

Meetings are held on the third Monday of every month (except December) at the Emoyeni Club, corner of Queen and Jubilee Roads, Parktown, Johannesburg. Meetings start at 8.00pm. The Meetings offer a wide range of topics to suit both beginners and the more experienced aquarists.

Generally, at each meeting, there is at least one guest speaker, together with a video, an auction or a fish show. Various additional activities include visits to fish farms, Public Aquaria, University Laboratories, a furnished aquaria competition, a photography competition and the annual open show. The Open show is held in November each year at the Johannesburg Botanical Gardens Hall, Emmarentia Dam, Johannesburg. Although this show does not compare with the British shows it is unique in South Africa and is an indication of the progressive attitude of the society.

The JAS committee would like to establish regular contact with UK-based societies. For further details write to Geoff White (Secretary), PO Box 161, Walkerville 1876, South Africa, or phone him on Johannesburg 946 — 1758.

Dr David Ford

Seemed just another Club Lecture . .

Head of **Aquarian Advisory Service, Dr David Ford,** spent his summer holidays this year in Florida, visiting Disney World and Cocoa Beach etc. The Central Florida Aquarium Society heard he was in town and asked to hear his lectures 'The Aquarian Story' and 'Aquaria International', so David took along the necessary slides and talked to an audience of 95.

The venue was the world famous Church Street Station in downtown Orlando, in a room over Rosie O'Grady where the Can Can girls and Jazz Bands play for the tourists. After the lectures everyone went down to Rosie O' Grady's. . . "Perhaps that's why 95 people turned up," David said!

Diary dates

Johannesburg Aquarist Society
J.A.S. are holding their fourth Open Show on **Sunday 12 November** at the Johannesburg Botanical Gardens Hall, Emmarentia Dam, Johannesburg. Further details from Geoff White, PO Box 161, Walkerville 1876. Tel Johannesburg 946-1758.

Bradford & District Aquarists' Society
The BADAS 1989 annual Open Show will take place on **Sunday 12 November** at Clayton Village Hall, Clayton, Bradford. Full details available from the Secretary, A D Fisher, 14 Fourlands Drive, Idle, Bradford.

C.A.G.B. (Northern Area)
The autumn Grand Auction of the Northern Area Group of the Catfish Association of Great Britain will be held on **Sunday 19 November** at the Girl Guides Headquarters, Moorgate, Ormskirk, Lancs. Booking in: 12.00 noon - 1.00 p.m. Details from the Secretary, Dorothy Hodges, 46 Victory Road, Blackpool, Lancs., FY1 3JT.

Sandgrounders' Aquatic Society
The Sandgrounders' Aquatic Society are holding an Auction of Fish and Equipment on **3 December,** at the Arnside Road Synagogue Hall, Southport Lancashire. For further details contact Sylvia Stringer (Secretary) 14 Larch Street, Southport Lancashire, Tel. 0704 41518.

Naturalist's notebook

By Eric Hardy

Reptilian mixed bag

Geckos feed on a wide range of invertebrates, chiefly insects; but one of the leaf-toed geckos, *Hemidactylus leschenaulti* surprised members of Bombay Natural History Society when it ate a Common Shiny Skink, *Mabuya carinata*.

The horny end of the short tail of the primitive, blind, Burrowing or Worm Snake, *Typhlops*, is usually considered to have developed to anchor it inside its burrow. That was upset when the Common Brahminy Blind Snake of India and southern Asia was recently discovered rattling it like a rattlesnake.

These are two recent discoveries to interest the herpetologist. The Marine Science Research Labs at St John's Memorial University, Newfoundland, have also discovered that although turtles, like other reptiles, are cold-blooded, the brown, fatty tissue in Leatherback sea-turtles acts as a heat-producing organ.

Sea-going turtles have always been worthy of more attention than the soup-traders. Their salt-glands excrete via the eye-duct.

Incidentally, biologists used the age and species of tropical barnacle parasites hanging on the Leatherback to discover it only arrives in tropical waters shortly before coming ashore to nest, refuting the theory that females spend most of their lives in the tropics.

Jellyfish "plague"

One effect of the sunniest and hottest May for years was the unusual numbers of the huge jellyfish, *Rhizostoma pluma*, drifting north through the Irish Sea — 30 stranded one weekend on Walney Island.

Thrice the size of the common purple *Aurelia* jellyfish, the bell can be a metre in diameter. It doesn't have tentacles but sucks diatoms through eight arm-like mouths. Young horse-mackerels often associate with it, but its chief nuisance is entangling in fishing nets which require much time to be cleaned again.

By the end of June, millions of *Rhizostoma* were in the Irish Sea, clogging fishing nets from Cardigan Bay to Barrow, drifting like dancers' flimsy skirts blowing out in great rosettes, as they made their pulsating way. In 1½ hours 491 drifted ashore at Walney Island in Morecambe Bay where boat-transects by Blackpool & Fylde College estimated tens of millions, possibly 90 millions, one day, and 60 another. They were not yet so numerous off Anglesey as their cluttering masses in autumn 1988, but more were still to come.

Straying sturgeon

At the end of May a young sturgeon, a fish formerly spawning in our western rivers, was the first to be stranded at Hilbre Island, though a few had entered the Dee estuary in previous years. The warden expressed surprise that I should be informed before H M the Queen!

Danger of Overstocking

A lot of fish were asphyxiated in one of our city parks, Liverpool's Sefton, as the heat deoxygenated the shallow water, all because the water had been over-stocked continually with pike, rudd, tench, roach and predatory perch in the interests of maximum angling with minimum reference to natural ecology.

Though a large lake, it is shallow and thus heats up quickly in this sort of weather, and though it has 10 species of pond snail, including 4 ram-shorns, and the freshwater limpet, it is very short of pondweed.

No attempt had been made to provide adequate oxygenating plants like *Elodea*, *Lagarosyphon*, *Myriophyllum*, etc. which thrived there in my youth. In fact some use of algicides to destroy the algal bloom caused by excessive stocking under such conditions had not improved things.

Moreso, the lake had lost its original flow when it was formed by a dam, and fed by two springs from city suburbs. One of these dried up pre-war, through building, while the other, reduced in modern times to a small inflow through the Dell and out at Aignburth to the river, dried up in May and ceased to bring any movement.

Things improved when the wind turned north and the weather cooled, but this has long been a common experience at northern angling pools in heat waves, with some authorities having to use fire engines to spray the water into the air to aerate it.

Pancreatic necrosis, research, et al

Pancreatic necrosis has continue at intercals in various parts of the country since last winter. It looks as though this disease might become endemic in Britain, unless strictest control of fish-stocking is observed. The Institute of Freshwater Ecology was formed this year by the government's Natural Environment Research Council to further research, largely incoeporating the famous Freshwtaer Biological Association whose laboratories at Ambleside beside Windermere, by the River Frome at East Stoke in Dorset and the eastern rivers group at Monks Wood, produced much new information about our native water life. The FBA will still function and be funded by NERC. NERC has also set up a Centre doe Deep Sea Oceanography at Southampton, in a £30,000,000, five-years programme joining the Deacon Lab of Oceanic Sciences, Research Vessel Services and some Southampton university departments.

One of the urgent gaps in research which could have the most profound effects upon our freshwater life is the "greenhouse" gases effect of global warming and sea level changes. The Institute of Hydrology is giving some attention to this alarming emission of more carbon dioxide into the atmosphere, with long wave radiation trapped in the lower atmosphere.

In their research, willows have been found to grow twice as large when soil phosphorous levels are between 4 and 10 ppm which like the carbon, affects the mycorrhizal fungus growth at their roots. Unfortunately, a greta deal of funded research is never heard of by the public or even the specialist hobbyist, because of the reluctance of many scientists to communicate.

Threat to relics

With support from the Freshwater Biological Association and the Nature Conservancy Council, Lake District Special Planning Board refused planning consent for Lakeland Smolt Ltd mooring 20 fish-rearing cages on Haweswater Reservoir. There was considered to be too much risk for salmon, etc, escaping and threatening the population of Lonsdale's Arctic Char and the Whitefish, the Schelly, both relics of glacial times migration from the Arctic Ocean. A fish farm is already established in tanks below the dam and it was fish from here which would have been contained in the proposed cages.

KEEP IT COOL

One of the greatest dangers facing native marine organisms is overheating. Ingeneous use of beer coolers and refrigerators have, traditionally, provided adequate, though cumbersome, ways round the problem. However, as our coldwater marine expert **Andy Horton** explains, more efficient, easy-to-operate, purpose-built equipment is now available, albeit at a price.

(Photographs by the author)

It took the hot summer of 1989 to realise that some form of cooling the water is essential if a wide range of fish and invertebrates from British shores are to be kept successfully in a home aquarium.

Temperature is the most important factor in the distribution of species throughout the seas and oceans of this planet. Or rather, species have evolved to survive in a certain range of temperatures, and would perish if placed in water too hot or too cold.

Temperature dependence

Research into the living habits of the various fish and invertebrates is fundamental to the British native marine aquarist who should endeavour, as far as possible, to provide conditions identical to those in the wild. A lot of information can be gleaned from straightforward observations on the shore. However, the successful aquarist will also need to resort to books and journals to supplement, and confirm or contrast his/her own experiences since it is essential to maintain the appropriate temperature in which each species is naturally found.

METHODS OF COOLING AQUARIUM WATER

Three methods of cooling the water are used by aquarists. They are:

1. Pumping the water through a **Beer Cooler**
2. Pumping the water through a **Refrigerator**
3. Using a purpose-built **Cooling Unit**

Beer coolers

The use of a beer cooler is by far the most popular method and suitable for use with the common sizes of aquarium, i.e. 20 gallons (90 litres) and 30 gallons (136 litres) — standard 36 x 15 x 12in and 48 x 15 x 12in tanks (90 x 38 x 30cm and 120 x 38 x 30cm).

Obtaining your cooler

Second-hand coolers are sometimes available from breweries and public houses. New models are expensive and not generally available to the general public. It is suggested that you choose coolers that are designed for beer and cider. Lager coolers are sometimes thermostatically controlled in a range that is too cold, and will therefore require a separate thermostat.

Coolers are noisy. They make more noise than a diaphragm air pump, and are far from desirable in the sitting room. Most coolers need to be filled with water, although some are dry.

Pumping the water through the cooler

If the cooler is mounted on the same level as the aquarium, a pump or powerhead capable of delivering 500 litres (c 110 gal) per hour should be suitable, if the cooler is situated under the tank, a more powerful pump may be needed.

The pump submerged in the aquarium is connected to a special inlet on the cooler by a plastic pipe, and returned to the aquarium by an identical pipe. Most units use piping with an external diameter of 7mm (externally, 9mm). This is readily available from home-brew shops, including Boots the Chemists. Unfortunately, powerheads and external pumps use larger bore piping, typically 12mm, but also 9mm. Try aquarist shops stocking Eheim products for hose connectors and clamps. *(I was lucky that my old-style Aquaclear 200 powerhead fitted the 7mm siphon tubing. Current models use a 12mm bore).*

Thermostat control of temperature

Beer coolers have a thermostat control marked in numbers. On the lowest (No 1) setting, producing the highest temperatures, several coolers tested maintained a steady temperature of 14.4°C (58°F). This may be too cold for the species that the aquarist wishes to keep. Fish and crabs become livelier at slightly higher temperatures.

There are two methods in use to increase the temperature. Firstly, there is the use of a time switch to control either the cooler or the pump. Obviously, the varying temperature of the room is going to affect the time schedules. This method is usually unreliable and involves erratic fluctuations of temperature.

Secondly, the water temperature is raised by an aquarium heater coupled with one of the external thermostats with a wide temperature range at the lower end (e.g. Uno Electronic and the Rocon Dig-Stat). Aquariums situated in garages and outhouses may require the heater during cold winters.

Cheaper to run, and the most promising method, would be to use a thermostat specially designed to control a cooler or pump with a maximum differential of 1.6°C (3°F). The differential is the temperature difference between, say, 18.3°C (65°F) when the cooler or pump is activated, and 16.7°C (62°F) when it stops. The aquarium thermostats for use with heaters require a special relay electrical switching to work with a cooler. At the time of writing, no thermostats

Sea Surface Temperature (60°C)

Information from the Marine Information & Advisory Service (MIAS) Institute of Oceanographic Sciences Deacon Laboratory

	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	OCT	NOV	DEC
N. Scotland Thurso	6.7	6.7	6.7	6.7	7.8	10.0	11.1	12.2	12.2	11.1	8.9	7.8
Northumberland Newcastle	5.6	4.4	5.6	5.6	7.8	11.1	12.2	13.3	12.2	11.1	8.9	7.8
W. Scotland Outer Hebrides	7.8	6.7	6.7	6.7	8.9	11.1	12.2	13.3	12.2	11.1	10.0	8.9
Isle of Man	6.7	6.7	6.7	7.8	8.9	10.0	12.2	13.3	13.3	12.2	11.1	7.8
London Thames Est	6.7	6.7	5.6	7.8	8.9	13.3	15.6	15.6	15.6	13.3	11.1	7.8
N Ireland Donegal	8.9	7.8	7.8	8.9	8.9	12.2	13.3	13.3	14.4	12.2	10.0	10.0
Sussex Brighton	7.8	7.8	6.7	7.8	8.9	13.3	14.4	15.6	15.6	13.3	11.1	8.9
W Country Plymouth	8.9	7.8	7.8	8.9	10.0	13.3	14.4	15.6	14.4	13.3	12.2	10.0
S Ireland Co Kerry	8.9	8.9	8.9	8.9	10.0	13.3	14.4	14.4	14.4	12.2	11.1	10.0
Biscay St Navarsi	10.0	8.9	8.9	10.0	12.2	15.6	16.7	17.8	16.7	15.6	12.2	11.1
N Spain Santander	11.1	11.1	11.1	12.2	13.3	15.6	18.9	20.0	17.8	16.7	13.3	12.2
Gibraltar	14.4	14.4	14.4	15.6	16.7	18.9	20.0	21.1	20.0	18.9	17.8	15.6
Naples	13.3	13.3	13.3	14.4	16.7	21.1	23.3	24.4	23.3	20.0	17.8	15.6
Cyprus	17.8	15.6	16.7	16.7	18.9	22.2	25.6	26.7	25.6	24.4	21.1	18.9

for coolers are available on the general market in the UK.

Refrigerator

Ingeneous use is often made of an old redundant appliance. Holes are drilled in the door of the refrigerator and long lengths of pipe are coiled into a bucket containing anti-freeze. This method is not popular because most aquarists seem to be limited for space.

Further, the refrigerator is any significant distance from the aquarium, powerful pumps will be necessary to pump the water. Controlling the temperature can also prove to be difficult.

Purpose-built coolers

Eheim market a cooler that is designed for use with their 2217 external filter. In a 121 gallon (550 litre) aquarium, a temperature reduction of 12°C (21.5°F) should be attained. This cooler can also be used with smaller tanks.

A temperature reduction of 20°C (36°F) is possible in a 40-gallon (200 litre) tank, using External Filter 2213. [External Filter 2215 can also be used.] Aquariums up to 198 gallons (900 litre) can be satisfactorily cooled by 10°C (18°F). A thermostat is included with the unit. Extensive spare parts are also available.

Anti-freeze needs to be added to a canister in this type of cooler. These specially imported units should be ordered through your retailer. They are suitable for marine aquariums and the British 240 volt, 50 HZ, electrical supply.

For a serious British marine aquarist with ample funds, for Public Aquariums and Marine Research Laboratories, "titanium chillers" can be imported from the U.S.A. They are designed for larger tanks. Even with the smallest model, a powerful pump capable of delivering at least 600 gallons (2,727 litres) per hour through a 1in (2.54cm) bore pipe is required to obtain maximum efficiency. Thermostats enable the aquarist to select the desired temperature throughout the range found in British seas.

In the smallest model, a reduction of 5.5°C (10°F) from the outside ambient temperature is possible in an uninsulated aquarium containing 84 gallons (382 litres) of sea water. The capacity rises to 156 gallons (711 litres) if the tank is insulated on five sides with 2in (5 cm) styrofoam.

Several firms supply the cooler, including Aquanetics Inc and Universal Marine Industries Inc, with their four smallest units suitable for the British electricity supply.

Lahaina Aquarium Systems Ltd, of Elgin, Scotland, include a high capacity "titanium chiller" for use in aquariums up to 300 gallons (1,363 litres) among their selection of sophisticated equipment, including a "Tidal Tank" that coincides with the phases of the sun and moon.

By the time that you read this article, Lahaina should have a smaller capacity "titanium chiller" in stock.

Grant Instruments of Cambridge sell an expensive immersion cooler, with copper cooling coils, only suitable, without modification, for use with freshwater.

Hermit Crab *Pagurus prideauxi*, and Cloak Anemone (enfolding its shell), *Adamsia maculata* (=*A. carciniopados* and =*A. pallata*). All species of Hermit Crab seem to fare better in tanks cooled below 9°C (66°F). This particular deep water species has proved difficult to keep for more than a few months.

Top. Two-foot aquarium with cider-cooler connected. It is advisable to purchase your cooler during the winter, and install it, and check that it is working properly before the hot temperatures in spring and summer.

The Plumrose Anemone, *Metridium senile*, prefers cooled water.

TEMPERATURE CHART

Notes. This Temperature chart is presented to enable aquarists with thermostat controlled coolers to calculate the temperature suitable for the species kept. Consult the distribution range of the species shown in the better guide books. Approximate temperatures only are given, as actual temperatures are likely to vary according to climatic changes, and the precise location in which the readings are made. Serious aquarists are encouraged to take their own temperature readings when visiting the shore.

Further Reading: *Advanced Techniques*, by **Andy Horton**, *Aquarist & Pondkeeper* (April 1989). *Manual of Fish Health*, by Dr C Andrews, A Exell & Dr N Carrington (Published by **Salamander Books Ltd**).

ACKNOWLEDGEMENTS

I wish to take the opportunity to thank the many people who helped in providing information for this article, especially **Allan Riley** of **John Allan Aquariums Ltd**, who provided technical details of the Eheim "cooler", **Ron Barrett**, of Gloucestershire, who provided advice and confirmation regarding the installation and performance of beer coolers, **Chick Holland** of **Lahaina Aquarium Systems Ltd** who advised me on the availability and performance of their "titanium coolers", **Universal Marine Industries Inc**, of California, U.S.A., for detailed performance details of their "titanium coolers", **Aquanetics Ltd** U.S.A., for some details of their "coolers", and **Gary Webber** of **Grants Instruments**, Cambridge, for a catalogue and discussion, **Paul Galea** of **M.K. Refrigeration**, Leicester, for a discussion, **Allen Varley**, Head of Library and Information Services, of the **Marine Biological Association of the U.K.**, **Colin Pelta**, of the **Marine Information and Advisory Service**, Institute of Oceanographic Sciences Deacon Laboratory, for providing details of the sea temperatures, and **Chris Tan**, and other people who have kindly written or telephoned me with helpful information.

BEAVER WATER PLANT AND FISH FARM LTD

The aggressive nature and worm-like "lure" of the Alligator or Temminck's Snapper *(Macroclemys temminckii)* are well-illustrated in this superb specimen owned by Beaver Water Plant and Fish Farm.

ANYONE FOR SNAP?

They may not score many points in beauty terms, but Snapping Turtles still have a great deal going for them, as **Dr Gareth Evans** explains.

Active, with bright attractive markings, the ubiquitous Mississippi Red-ear, (*Chrysemys scripta elegans*), is virtually synonymous with the word "terrapin" in common parlance. Though undoubtedly the most commonly encountered aquatic chelonians, they are far from the only ones either available, or suitable, for private keeping.

Snapping Species

The Snappers, while not competing in looks, colour, or activity, provide an experience in functional, sedentary ugliness that is well-nigh second to none. There are two genera of these animals, each genus having one single species.

The Common Snapper, *Chelydra serpentina serpentina*, growing up to 20in (50cm), is found from southern Canada to Mexico, with additional sub-species occurring in Florida, central and north-east South America.

The Alligator or Temminck's Snapper, *Macroclemys temminckii*, inhabiting the south-eastern parts of the USA, grows even larger — to around 26in (65cm) — and with a full-grown weight approaching 200lb (91kg), this is probably the largest of freshwater turtles.

GARETH EVANS

Like all other reptiles, this young Snapper will moult at intervals during its long life.

Both species have a well developed carapace (upper shell), though the plastron (lower shell) is small, and the head, tail and limbs are too stout to be withdrawn fully in the traditional tortoise manner. Indeed, many of their body characteristics reflect structures found in fossil remains — hinting at the level of evolutionary adaptation of this ancient group of animals.

Lure of the turtle

Snappers feed by swift lunges of the head, combined, as their name suggests, with powerful snaps of the horny, though, as in all chelonians, toothless, jaws. Temminck's has the additional refinement of a fleshy and worm-like "lure" upon its tongue. By wriggling this appendage in a wholly life-like fashion, the turtle encourages fish within range of its gin-trap jaws.

The "bite" of these animals, although powerful, has been greatly exaggerated in popular imagination — creatures that can effortlessly chomp their way through steel bars, tree trunks, etc, etc, exist only within the confines of travellers' tales (or nightmares!).

In the wild, these turtles spend much of their time in water, breaking surface from time to time to breathe. They are not active swimmers, tending instead to lie on the bottom, waiting to ambush any potential meal that strays too close. On their rare forays onto dry land they move somewhat diliberately, raising themselves up upon their legs, rather in the manner of crocodiles. Their sedentary natures render them prone to algal accumulation, particularly on the carapace. While this burgeoning plant life serves admirably to camouflage the creature in its native habitat, it does appear unattractive on captive specimens and requires careful removal.

Captive care

In captivity, the water-loving habits of these species allow them to be kept in an aquarium with, at most, a small island as land area. A suitable, reliable heater/thermostat unit and a thermometer are essential furniture in the arrangement, as *Macroclemys* in particular, eats little or nothing if kept at a temperature below 70°F (21°C). Filtration will make maintenance easier, as, in common with many other terrapins, large pieces of food seized are torn to manageable size by use of the front claws. This messy feeding technique quickly clouds the water and scatters rapidly decomposing material, which, coupled with the prodigious appetites of Snappers, makes cleaning frequently required.

Feeding these animals should present no real problems — these greedy beasts are far from faddy! Almost anything of suitable size will be readily taken (e.g.) raw meat, worms, shrimps, etc. Good, adequate nutrition is, ultimately, the key to health and successful development, and as with most reptiles,

there simply is no substitute for variety. The temptation to offer convenient foodstuffs exclusively most be resisted.

Whole animals are to be preferred to just bits of meat or fish, in order that the Snappers get a balanced mix of the required vitamins and minerals. This is particularly true of juveniles. Mealworms, especially, although readily available, should not make up the bulk of the diet, since they are low in the calcium that is so necessary for the production of a sound skeleton and shell.

Careful handling

Keeping these fascinating animals is not, however, entirely without its problems. Firstly, although as previously mentioned, the power of their jaws has been vastly over-stated (a 40lb (18kg) specimen can sever a pencil but certainly not a broom stick!), they can inflict nasty bites. Handling and feeding Snappers calls for a certain amount of care and commonsense.

Secondly, the greedy and aggressive nature of these turtles means that they must be kept singly if they are not to injure their cohabitants. Thirdly, although when freshly out of the egg, the youngsters frequently seen on offer in pet shops seem appealing, they may outgrow their quarters at a depressingly rapid rate. Before making a purchase, it is imperative that their final size is fully taken into consideration.

Some angling clubs and water authorities, notably in Oxfordshire, have expressed concern regarding the arrival into their waters of Snappers that have simply grown too big for their homes. There can be no excuse for irresponsibly dumping an animal under these circumstances and there should be no need for such behaviour with a little forethought. Stupidity like this does nothing to enhance the image of private reptile keepers. Further, it is illegal.

There can be few people — no matter how ardent "Snapper fans" — who would contend that these creatures would win any reptilian beauty contests. However, they do have much to offer the erstwhile turtle keeper, being long-lived and fairly easy to cater for, despite the problems mentioned. Fascinating and unusual, Snappers can provide many hours of interest — but watch those fingers!

BEAVER WATER PLANT AND FISH FARM LTD.

The Common Snapper *(Chelydra serpentina)* can grow to 20in (50cm) in captivity.

Books

Where the Zebu Grazed

By: C. H. Keeling
Published by: **Clam Productions, 13 Pound Place, Shalford, Guildford, Surrey, GU4 8HH.**
Price: £8.00, post paid (UK)
£10.00, post paid (overseas)
(Cheques made payable to C. H. Keeling)

Where the Zebu Grazed is quite unlike any other book I've read before. Then again, Clin Keeling, its author and publisher, is also quite unlike any other author or publisher I've met before.

Some *A&P* readers may have met, or heard of, Clin Keeling in connection with **Zoologica,** the "all-pet/animal show" (see our report in the December '89 issue of *A&P*).

Those who have spoken to Clin will also know that he is no ordinary petkeeper. With a razor-sharp mind, and enthusiasm and humour to match, it is therefore hardly surprising to learn that some traditional publishers have reacted to his ideas by saying things like: "Yes, very interesting . . . (we) like your racy style of writing, and your sense of humour — but who is going to read it?"

Fed up with such responses, Clin set about doing the job himself and has, so far, published some six books — books so "different", so personal, and so full of absolute gems of information, that they almost defy description.

Presentationwise, **Where the Zebu Grazed,** would score low marks, consisting, as it does, of a typed script, simply bound and not liberally or particularly well illustrated.

Contentswise, though . . . it's something else. For someone interested in the development/history of animal collections, it almost certainly represents the only source of a great deal of hitherto unpublished — and probably unknown — information.

Two chapters are particulary relevant to *A&P* readers:— Chapter V: Reptiles in Retrospect, and Chapter VI: Early Fishkeeping — both presented in unique Clin Keeling style.

Did you know, for instance, that, despite the widespread acceptance that the Paradise Fish (*Macropodus opercularis*) was the first fish to find its way into the UK, there is no unequivocal statement that this was, indeed, so? The relevant entry for Sunday 28 May 1665 (old calendar) recorded by Samuel Pepys in his diary reads: "Thence home and to see my Lady Pen, where my wife and I were shown a fine rarity: of fishes kept in a glass of water, that will live so for ever; and finely marked they are, being foreign".

This, the only reference from which the conclusion was derived, is followed by a series of arguments from Clin Keeling as to why the species, in all probability, was the Paradise Fish.

Where the Zebu Grazed is a companion volume to two other books, **Where the Lion Trod** and **Where the Crane Danced.** Based on the contents of the **Zebu** volume, I would say that, together, the three would represent a very "individual", readable and complete personal account of the history and development of animal collections and zoological gardens.

As Clin Keeling says: "Just when you think, at long last, you've finished the washing up there's always the teaspoon in the bowl, and the mug soeone's taken into the other room".

Going by **Zebu,** I'm certain that there are numerous teaspoons and mugs left for Clin to find . . and write about in his own, very unique, way!

John Dawes

The Tropical Marine Aquarium
(Revised Edition)

By: Vincent B Hargreaves
Published by: **David & Charles**
ISBN: 0 7153 9375 8
Price: £14.95

Remember Vincent Hargreaves' highly successful 1978 book of the same title? Well, fans of that edition will, no doubt, be pleased to learn that a longer revised version is now available.

Packed with colour photographs (most of good quality, plus a few rather "ropy" ones), Part 2 of the latest edition is both informative and easy-to-use. Even so, I found it a little bit disappointing to see that traditional (and correct) scientific procedure had not been followed with regard to the Latin names which, of course, should have been italicised. This also applies to pages 145-150 which include a full listing of all the fish species illustrated in Part 2. It's interesting that the invertebrate section (Part 3) does, in fact, carry italicised figure captions, reflecting a little bit of mismatching or inconsistency, either at the editing or proof-reading stage.

As Vincent Hargreaves, quite rightly, points out, there have been some tremendous technological advances in the marine hobby recently. Many of the species which are included in this book are therefore likely to receive a much better deal than they would have done when the original edition was published.

Guidance on how this may be achieved is, of course, provided (Part 1) and the advice given is pretty sound. It would have helped, though, if topics like reverse-flow filtration, reef-type aquarium set-ups and other relative "newcomers" to the scene had been dealt with alongside the more traditional ones adequatley covered by the author.

I was left with the feeling that this book — written by someone who is, without any doubt, a very knowledgeable biologist and aquarist, and a very competent and readable author — could have done with a larger budget to allow for the insertion of additional pages in which the above-mentioned topics could have been dealt with as they deserve . . . and for more/newer/better photographs of some species to have been included.

Having said all this, £14.95 is a pretty fair price to pay for a book that covers so much ground and provides guidance, not just on setting up, but also on a wide selection of fish species, plus a respectable assortment of invertebrates.

John Dawes

NEXT MONTH

As winter tightens its grip, all sorts of plants and animals, from pond fish to tortoises, and frogs to barnacles, "close down" until favourable weather conditions return.
Our December issue focuses on the problems posed by the cold and on the ways in which some organisms manage to survive them.

- **Dr. David Pool** concentrates on pond fish
- **Jim Wright** offers guidance on how to care for tortoises over winter
- **Terry Stephenson** tackles an unsual but fascinating subject: the survival strategies of the "humble" barnacle

December is also our **Favourite Marines Supplement** month, with major contributions from:

- **Dr. Lin Baldock** — Clownfish
- **Gordon Kay** — tropical marine community fish
- **Dave Garratt** — invertebrate selection
- **Gordon Walker** — favourite seaweeds
- **Andy Horton** — most popular native species

COMPETITION

There's also a really super prize to be won:
An **H39 Marine Aquarium System** measuring 100 x 50 x 50 cm complete with cabinet — currently valued at £885.40 — offered exclusively to *A & P* readers by **Minireef Aquarium Systems.**

So, in order to make sure that you don't miss out on this fantastic opportunity . . . not to mention the feast of top-quality features, cartoons, reports, new, and timely advice, book your Christmas issue of *Aquarist & Pondkeeper* now.

PRODUCT ROUND-UP

CONTINUED FROM PAGE 28

BETTER WATER GARDEN PRODUCTS

If you take into consideration all the things a pool should have, add a few more, you would probably end up with something identical to **BETTER WATER GARDENS'** range of DESIGNER POOLS. The four highly-polished, black gel finished pools will cater for all watergarden interests. The PARIS is a 7ft 10in diameter circular pool, 18in (46cm) deep; it is ideally suited as an 'above-ground' base for a fountain display. The remaining three pools (AMSTERDAM, BONN and LONDON) have a water depth of 2ft 7in (80cm) and incorporate a host of features: circular sump area with bottom drain for 100% drainage (2in deep drainage channels also add strength to the pool base), two sets of marginal shelves, a marsh area, bank zone with uniquely-designed waterflow slots, an escape ladder for the use of amphibians, flat vertical face for ease of plumbing external filter-pipes and a ridged pool lip for extra adhesion to cemented edging stones.

If you can't quite run to a Designer Pool, then the new ABSAT LINER (at 39p per sq ft) will provide the next best thing — all you do is supply the hole! The material it is claimed outstretches all others, is harder to puncture and should last a lifetime.

Ready to get you under way for the new season are two modestly-priced products: the MINNOW is the smallest of two NATURE POOLS. This inexpensive pool, complete with marsh area and amphibian escape ladder, is ideal as a 'starter pool' in which children can safely develop their interest in nature and water gardening. Then there is the BUDGET PUMP; this low-cost, attractively-designed pump can generate 142 gph at 4ft head and comes with Fountain jet, Flow Adjuster/Waterfall Connector and attached foam filter. Its price of £35.00, and a two-year guarantee, should ensure its popularity at the bottom price end of the pond (sorry, market!).

Among HENRI STUDIO fountain ornaments and stone statuary are four self-contained ornaments: the 3 piece THREE GRACES FOUNTAIN; the 4 piece set PETER PAN; NATURE'S BROOK (water runs down over five animal-inhabited ledges) and the 5 piece FLUTED FOUNTAIN. The new SPILL BOWL converts many existing Henri designs into two-tiered fountains. For any bare areas around Koi pools there are two ISHI-DORO lanterns.

In addition to pool-associated products, BWG are also offering a FISH SERVICE. Heavy investment has resulted in a fish-house together with personnel to staff and market a fish service to garden centres and aquatic outlets. Fish-holding and display units have been specially designed and are now available.

Details available from: **BETTER WATER GARDEN PRODUCTS, Blagdon Water Garden Centre Ltd, Bath Road, Upper Langford, Avon BS18 7DN (Tel: 0934 852973 Fax: 0934 852998).**

Coldwater jottings

Stephen J. Smith

Early pond books for Christmas?

Two books stand out among the "plethora of publications" which have been introduced for coldwater enthusiasts over the past twelve months, and both should be on this year's Christmas lists.

One, of course, has to be **John Dawes'** excellent and well-received volume on ponds and watergardens (*John Dawes' Book of Water Gardens*, published by **TFH**, £13.95). So well-received, in fact, that its popularity extends far beyond the shores of this island. I was surprised to note the comments of many of my fishkeeping colleagues in Singapore that John's "pond book" is very popular in South-East Asia — where ponds themselves are not so common!

I am sorry, John, but you are pipped to the post for my personal choice for "book of the year". *The Interpet Encyclopaedia of Koi* (price £19.98) is just about unbeatable. Even to those hitherto uninterested in Koi — or even in fish! — this is an impressive volume. I have no doubt that this book will produce a few converts to Koi-keeping and, at very least, will provide many with a greater appreciation of this enthralling area of the hobby.

Sensibly, this is published in a large format, and it is no surprise to note that the *The Interpet Encyclopaedia of Koi* covers all aspects of the hobby — so it should with such a title. But how! No, not as an alphabetical reference book, but as comprehensive an appraisal and advice-centre as possible for just about every situation in which Koi-keepers or potential enthusiasts are likely to find themselves: whether planning and constructing a pond, with its inherent considerations of filtration and landscaping, or identifying, selecting, breeding, and showing Koi.

Needless to say, photographic references are first-class, as are the numerous colour diagrams. But my favourite photograph is the one which forms the double-page spread of the title page to the section "Water Quality and Filtration", and which certainly raised a smile.

The photograph is a close view of the surface of a pea-soup murky green pond, complete with floating dead leaves and odd stalks of brown grass and, somewhere, just about discernible, are vague blurred coloured shapes which may, just, be a couple of Koi.

Recognise the scene. . . ?

When to stop feeding

One of the advantages of this year's hot weather is that fish have had the opportunity to achieve a good deal of growth. My own collection of Fancy Goldfish, as well as the handful of Koi and Orfe in my ponds, have shown significant development. Even Goldfish fry have been hatched and grown outdoors to quite some size within a period of just two or three months.

Such rapid growth is helped considerably by the fact that, under such weather conditions, the digestive systems of the fish have been able to cope with just about every type of food thrown into the pond — from proprietary foods to small pink earthworms (my own preference for my fish) to the myriad insects which stray into the ponds.

However, the onset of cooler, and subsequently cold, weather conditions indicates that feeding should be reduced.

Goldfish and Koi do not incorporate a stomach in their digestive systems, and the lower the temperature, the slower the fish's gut can handle its responsibilities.

Therefore, feeding should, by now, have been reduced to twice or even once a day. Generally, at this time of the year, I feed my own fish just first thing in the morning — and only enough food is administered which will be taken by the fish within fifteen minutes or so.

Feeding is reduced to nothing by the end of December, and is not resumed until the last frosts are receding at the end of March.

Far from being cruel, such a regime is doing the fish a kindness. Any undigested food in the gut will undoubtedly cause problems for the fish as it becomes rotten. Likewise, uneaten food in the pond will also cause problems of pollution, again causing stress to the fish during a time when they least need it.

As a precaution, towards the end of December, before the onset of the worst of the winter, my favourite fish are brought into the fish-house (nothing fancy — just a few tanks in the garage). This enables me to monitor the progress of the fish throughout the winter and to provide a controlled amount and type of feeding for conditioning, in readiness for the forthcoming spawning season.

The *Interpet Encyclopedia of Koi* just pipped *John Dawes' Book of Water Gardens* to the post as my personal choice for "Book of the Year". Both should be on your Christmas list!

DENNIS BARRETT

An adult pair (male above) of Catemaco Livebearers *(Xiphophorus milleri)*. Note the tiny black spot on the caudal peduncle of both specimens.

THE CATEMACO LIVEBEARER

Peter Capon introduces one of the lesser-known members of the Swordtail/Platy complex.

The presence of the Catemaco livebearer *(X. milleri)* in the UK and, indeed, in my own tanks, is directly attributable to the second trip that two British aquarists, Howard Preston and Chris Lyons, made to Mexico in 1973. These Mexican trips were organised to collect various Xiphophorids and other Central American livebearers.

Around Christmas 1972 Chris and Howard arrived at the small Mexican town of Catemaco with its lake, Laguna Catemaco, ringed by mountains, some of which are of volcanic origin. The lake covers some fifty square miles and, with limited time (since they still wished to travel further south to collect wild *X. maculatus* (Platy), they were unable to catch a single *X. milleri*. It was not until their trip the following year that they managed to catch any *milleri* at all. It is from this importation that my present stock is descended.

Recent discovery

The Catemaco Livebearer was only discovered in 1960, receiving its specific name in honour of Dr Robert Miller. The original fish were found in a tributary of Laguna Catemaco and do not appear to exist in any other area. It is the study of this fish and its relationship with both the Swordtails and the Platies which gave rise to the amalgamation of the genus *Platypoecilus* with *Xiphophorus*.

The *Platypoecilus* genus was first erected in 1866. In 1951 Myron Gordon and Donn Rosen suggested that *Platypoecilus* should be regarded as a subgenus of *Xiphophorus*. In 1963 Rosen and Bailey amalgamated *Xiphophorus* and *Platypoecilus* — with *Xiphophorus*, as the older generic name, taking precedence — after studying the newly-discovered Catemaco Livebearer.

Body characteristics

The general shape of this fish is similar to the Swordtail but the structure of the gonopodium is more closely related to the Platy. The body colour is pale olive brown and there is a slight green irridescence in suitable side lighting. In the male there are one or more dark stripes extending from the head to the caudal peduncle, although these are not always obviously apparent in every specimen.

There are also, on many fish, several dark transverse bands on the side of the body, and, more rarely, some males have a dark patch on the rear half of the body.

An unusual occurrence is that both sexes carry a gravid spot. In fact, the male's spot can even be more intense than that of the female. This has, in the past, confused experienced aquarists and even judges. Some specimens have spots on the tail and caudal peduncle but, usually, the fins are clear.

There is never the slightest hint of a sword on the male's tail. Although I have not observed any other colours, some authorities claim a tuxedo-patterned variety with traces of orange or yellow on the sides and belly, which raises the question of this variety being a hybrid. Both males and females have a reticulated pattern caused by the dark edges to the scales.

In my experience, *X. milleri* females grow to only 2in (c.5cm), and the males occasionally reach 1½in (3.8cm). Males, in particular, have a tendency to be diminutive and it is difficult to grow them on to full size. Indeed, there is a tendency for both males and females to become smaller and smaller with each generation.

In general the fish is inconspicuous and, to the best of my knowledge, is never to be seen in the shops. The only source of supply being aquarists who specialise in the rarer livebearers.

Danger of hybridisation

Here, a word of caution is in order for Catemaco Livebearers will cross with other Xiphophorids on rare occasions. I have kept wild *X. helleri* and *X. milleri* together in the same tank for years and, about a year ago, I noticed some slightly darker fry swimming with the adults.

These fry were caught and separated and appeared to be fully grown at about 1½in (c 3.8cm). They looked like large male *milleri* with strong bars to their flanks and sported vestigeal swords. I only managed to rear four of the fry, all of which turned out to be males. They were kept segregated from the other Xiphophorids as I did not wish to contaminate my wild strains of either *helleri* or *milleri*, preferring to keep the strains pure.

Undemanding fish

Gestation is between five and seven weeks depending on temperature, and brood sizes range between ten and forty fry. Suggested temperatures are in the low to mid 70's°F (22-24°C) although I have maintained colonies over winter at a temperature of 58-65°F (14-4-18°C) without any apparent ill effect, excepting the fact that fry did not appear to be produced at all at this temperature range.

X. milleri are so undemanding that it is easy to forget them, excepting for the occasional feed, only to find that their numbers have diminished over the passage of time. In fact, at one time, my stock dwindled to just one female and two males from which I was, luckily, able to replenish my stock.

The Catemaco Livebearer is not for the aquarist who prefers the more showy species, but more for those who take pride in maintaining the more unusual species of livebearers.