JUNE 1989

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AQUARIST AND PONDKEEPER

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FAVOURITE ASPECTS OF WATERGARDENING

FABULOUS aquarian FLORIDA HOLIDAY COMPETITION

AQUARIST AND POND KEEPER

JUNE 1989
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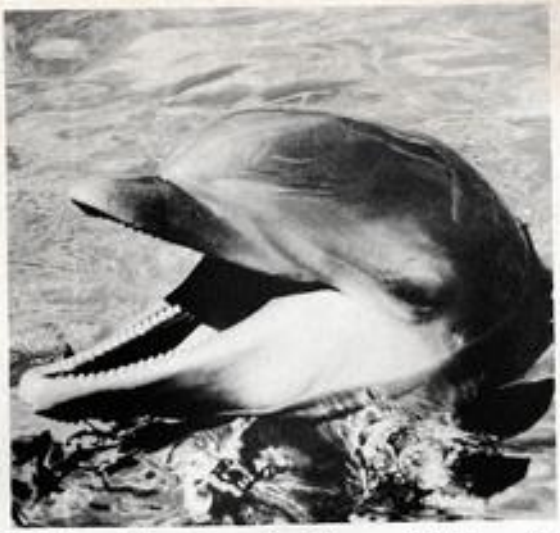
COVER STORY

(Photograph: Jane Burton/ Bruce Coleman Ltd.)
Despite its large size (around 12in — 30cm), the Oscar *(Astronotus ocellatus)* is a firm favourite among aquarists wanting something a little bit special and different . . . and having a sufficiently roomy aquarium to hand. Once they get their act together, a well matched pair of Oscars will develop into exemplary parents, something that, no doubt, adds further to the desirability of this robust cichlid. Several forms of Oscar exist, including a long-finned variety which has never achieved the popularity of its shorter-finned cousins.



Who's Training Who?

(Photo: John Dawes)

Colour Supplements are marvellous educators. Only a few months ago, the *Sunday Times* did a great and, in my opinion, less-sensationalising but more effective job than most, in championing the cause of our beleaguered rainforests and other threatened habitats.

More recently, it's been the turn of the whales and the very distressing plight of the thousands of dolphins that are slaughtered in Yellowfin Tuna nets. Happily, the spectre of extinction no longer seems to hang so ominously over the heads of these irreplaceable creatures and those other closely related leviathians, the Blue, Fin and Humpback Whales.

We are told over and over again, just how intelligent cetaceans (whales, porpoises and dolphins) are . . . and all the evidence indicates that this is, in fact, so.

More than once this has started me off along one or other of my customary, tortuous lines of thought. For example, it's often struck me that we may be getting it all wrong when, in our customary inflated way, we assume that we can actually train a dolphin or a killer whale to jump through hoops, do somersaults and generally perform according to our whims.

Who's to say that it's not *they* who are training *us*? Just think of it — a dolphin knows that, if it swims backwards, retrieves beach balls, "kisses" its keeper . . . or whatever, it can actually *make* humans drop food right into its mouth.

I can just see it — a hardened veteran "performing" dolphin turns to the naive, innocent, frightened recruit and says (in Dolphinese, of course) "Now just relax kid. These humans are not all they're cracked up to be. We've got them trained really well here. Just watch what I can get them to do simply by jumping out of the water and drenching them".

A few seconds and an almighty drenching later, the proof is there for all to see . . . a generous handful of herring, or sardines, or sprats, or some other equally delectable delicacy.

Now, we've heard it said that Oscars are very intelligent too. I wonder . . .

John Dawes
Editor

CONTENTS

THANKS FOR THE MEMORY

It's hankies-out-time as **Amanda Grimes** says her goodbyes after three enjoyable, stimulating and successful years with *A&P*.

This is my final feature for the magazine and so I won't waste time with my usual from A-to-B-via-Luton introduction.

Straight to the point, I have shut down my tanks and am leaving the hobby. No problems, no regrets. Though I've got half a cynical eye on the privatisation of the electricity and water industries. . . .

As this is my last fling, I crave the indulgence of explaining something of the background to these features. I was commissioned, originally, to bring a touch of humour to a hobby magazine. I hope I have done that.

The more observant of you might have noticed the position I have been given in *A&P*, that has always, for me, added an extra dimension to the fun. I'm a Page Three Girl (or was . . . until we changed the page numbering)! Sorry I can't offer a picture to back up that dubious claim to fame, but if I did, you would see why the Editor and I have had our own private joke going for several years. . . .

While I have been busy poking fun, breaking rules and generally admitting to making more mistakes in a few short years than most make in a lifetime, I hope I have never been dismissed as a flippant, superficial writer who makes much of nothing and can never be sensible for a minute. Most humour — if I have attained that — is written with a great deal of seriousness.

An Aquarist's Responsibilities

I can go on at length — usually do — about the fun you can have keeping fish, arranging tanks, playing with water, etc. But behind all the wisecracks I have felt committed to the responsibility that fishkeepers accept when they enter the hobby.

We *must* be concerned. We cannot afford to accept that there is an endless supply of fish in the wild. We have to educate ourselves in the needs and habitats of fish. We must ask questions and think about what we are doing, even if those questions deal with delicate subjects like humane disposal, the destruction of the rainforests and the suitability of certain fish for our small aquaria.

I have watched with pleasure the raising of controversial issues, not because I'm a mischief-maker (I am), but because controversy makes people think and, hopefully, enter into the argument by making their views heard. It is not just a battle of giants — the experts fighting it out — but a chance for people like me, non-scientific amateurs, who also keep and breed fish. We have a stake in these arguments. Whatever conclusions are drawn, whatever legislation is engendered, the results can be seen in — and out — of our tanks. You might not care about the Amazon now, but will you care when your tanks can no longer display *Corydoras* in their dazzling variety?

Humorous/Serious Messages

These features have never been written with a wide and reliable knowledge of the subject. They have been formed around ideas which, I believe, you all share. It might be a laugh reading about my curious methods for measuring water capacity, but the importance of knowing that capacity remains.

When I recounted the tale of the filter-raised, prize-winning Danios, it was in the hope that you might check your filters before cleaning them — in case you were throwing life away with the water. Even my passing references to aquaria being like life-support machines have been carefully thought out. That is exactly what they are. And we would be wise to give careful consideration to that thought. I have killed fish through negligence — or simple lack of knowledge.

Having said all that — and if you haven't fallen asleep or turned the page through boredom at my digression from humour — I would return to that laughter before I go.

Humour is important. I don't believe that anything should be approached without a large helping of fun. One recurring thought has stayed with me throughout my time in the magazine, a thought that started and now ends as a silly rhyme:

"Tell me, experts, if you wishes,
Are they fish, or are they fishes?"

That has been the story of these features. Commitment, concern and questions. And one simple query that, as yet, I've never been able to find the answer to. Here we are, up to our eyes in information and technology — and we still don't know the basic name for what we've got in our tanks.

You've got to laugh. . . .

THANK *YOU*, AMANDA

Amanda Grimes has given us all a great deal to think about — and smile about — over the past three years or so, always in her unique, inimitable way. Without a doubt, we are all richer for it. Also, without doubt, we'll all miss her terribly.

The Open University's gain is our loss. In fact, it is Amanda's growing workload as she does battle with her degree credits — regularly coming out brilliantly on top (no surprise here!) — that has forced her to wind down her fishkeeping activities.

As all of us who have followed her sometimes hilarious, always interesting, experiences know, a genuine affection for the fish themselves, coupled with a deep commitment to preserving their environment (both natural and aquarium-based) have always held top place in Amanda's extensive list of priorities.

It was always on the cards, therefore, that the fish would have to go if circumstances indicated that they might run the slightest risk of not receiving the sort of dedicated care they need and deserve. Well, circumstances have indicated precisely this — so the inevitable has happened.

It's our turn to say a sincere "Thank you for the memories", Amanda. We wish you all the best in your studies . . . and beyond.

Should desperation strike at any time, forcing you to put your aquatic thoughts on paper again, there'll always be room for them in A&P.

John Dawes
Editor

As from next month, Jason Endfield — he of the wicked sense of humour and man-eating Featherback (see the December '88 issue of *A&P*) will be starting his own personal series of experiences and mishaps . . . and there's a whole host of them just bursting to be published. Make sure you join Jason and his exploits from July onwards . . . you'll be pleased you did!
Welcome aboard, Jason.

Herpetology matters

By Julian Sims

Herpetological Societies

Joining a herpetological society can be a most rewarding decision. Societies publish must useful information in their newsletters and journals.

In addition, you can talk to, and exchange ideas with, fellow enthusiasts at the monthly meetings. If you intend to go to organised events (illustrated talks, films, quizzes, etc.), then the distance you will have to travel to and from the meeting place is an important factor to be considered. However, if you are happy to benefit from (and contribute to) the newsletters and other publications by post, then there are a number of herpetological societies from which to choose.

In the next two or three editions of **Herpetology Matters**, the activities of the larger societies will be outlined, together with contact addresses from which a prospectus and membership application form can be obtained. As herpetological societies depend on subscriptions to meet their operating costs, please enclose a large stamped addressed envelope with your request for information.

The Association for the Study of Reptilia and Amphibia (ASRA)

Formed in May 1977, ASRA meets regularly on the second Saturday of every month in rooms above the Reptile House of the Cotswold Wildlife Park. The Association publishes a very informative monthly newsletter, *The Rephiberary*, an annual journal and an occasional publication, the *ASRA Monograph*. Captive breeding of livestock is actively encouraged.

Further details can be obtained from:

The ASRA Membership Secretary
Cotswold Wildlife Park
Burford
Oxon, OX8 4JW

The South Western Herpetological Society

This Society was formed in 1972. Meetings are held in Teignmouth, Devon, during the afternoon of the second Sunday of each month. Publications include a monthly newsletter and an annual journal. Again, the captive breeding of reptiles and amphibians is an important objective.

The S.W.H.S. Secretary can be contacted at:

"Acanthus"
59 St Marychurch Road
Torquay
Devon, TQ1 3HG

The British Chelonia Group (BCG)

The Chelonia Group was formed in Bristol in June 1976. Since that first meeting thirteen years ago this month, a regional network has been developed from Morpeth in Northumberland to Hampshire in the south. In addition to holding regional meetings, the British Chelonia Group publishes six newsletters per year and *Testudo* — the annual journal.

If you have an interest in tortoises and terrapins, then write to:

The BCG Membership Secretary
39 Brambles Farm Drive
Hillingdon
Uxbridge
Middlesex, UB10 0DY

Pondwatch

There is a current survey (PONDWATCH) taking place throughout Britain to investigate the wildlife which inhabits local ponds and canals.

Due to their dependence on water, the size of amphibian populations are quickly reduced when field ponds are filled in or stretches of disused canal become polluted with oil-spills and choked with rubbish which has been dumped illegally.

Populations of Grass snakes (*Natrix natrix*) also decline if ponds and canals are destroyed. These water-loving reptiles used to be common around farm ponds, where they would hunt for frogs and toads. Grass snakes are also accomplished swimmers and catch and eat fish.

In the Birmingham area, fish are a particularly important component in the diet of these snakes. This is because Birmingham has retained many of its canals — not necessarily for navigation, but for drainage purposes.

Take a look under Spaghetti Junction where the old canals (often reinforced with concrete banks) collect the "run off" from the surrounding roads. The lead content of the water and mud in these canals is, consequently, very high indeed, with the lead then entering the food chain.

In addition to monitoring the amphibians, reptiles and fish present, PONDWATCH will also collect information on freshwater invertebrates (particularly dragonflies), water plants and water fowl.

This is an ideal project for students following GCSE and A-level biology, environmental science and pre-vocational courses at school, Scout and Guide groups, Community groups, e.g. W.I.s and individuals — especially local residents.

An information pack about this waterlife campaign, including identification charts and a survey form, can be obtained by sending a large addressed envelope, at least A4 size, together with stamps to the value of 50 pence to:

PONDWATCH
The Wildfowl and Wetlands Trust
Slimbridge
Gloucestershire, GL2 7BT

These children are rescuing invertebrates from a field pond that is being infilled.

JULIAN SIMS

Books and videos

The Interpet Encyclopedia of Koi

Edited by: Anne McDowall
Contributors: Bernice Brewster, Nicky Chapple, John Cuvelier, Mark Davies, Deri Evans, Glyn Evans, Keith Phipps, Yvonne Rees, Peter Scott
Published by: **Salamander Books Ltd.**
ISBN: 0—86101-405-7
Price: £19.95

If you are thinking of taking up Koi-keeping, or if you are already a Koi-keeper, either novice or experienced, then this is the book you *must* have.

It is well-written, well-edited, well-illustrated, well-priced . . . and, very importantly, it is eminently readable.

You'll struggle, like most of us do (but not all of us admit!), when it comes to the finer details of Koi classification. You'll also probably wonder, like I did, why on earth the scientific name for Koi, *Cyprinus carpio*, is not even mentioned in the introductory section on the history of Koi (it *is* mentioned — eventually — on page 122, the first of the 79 pages in the excellent Koi Varieties section). You'll probably even be disappointed, again as I was, that so little is made of the biological ancestry of Koi. After all, there's nothing wrong in being descended from what some would regard as "humble" origins, i.e. the Common Carp.

Yet, the book is so magnificent in so many other aspects that you'll end up feeling that the omissions/oversights are not that important. Consequently, the fact that "vacuuming" of ponds receives no more than passing mention, or that no biographical details of the contributors, including our own **Koi Talk** specialist John Cuvelier, are provided (something that I always like to see), will do nothing to prevent you from coming to the inescapable conclusion that **The Encyclopedia of Koi** is likely to become *the* Koi book of the year.

Captivated as I was when I went through the book during the preparation of this review, I must mention what I consider to be, perhaps, its main omission: "centrifugal" settlement chambers (they actually work contripetally). These relatively recent introductions to the art of Koi-keeping are so highly regarded by so many enthusiasts — and appear to be so effective at removing solid wastes before pool water is passed through the filter proper — that they must surely warrant consideration in any present-day publication.

Even if I had known this beforehand, though, it wouldn't have stopped me buying a copy of this high-quality, unmissable book. It's bound to be a winner . . . and thoroughly deserves to be.

John Dawes

Thailand Discus

By: Stan Kemp (Kingfisheries Ltd.)
Available from: **Kingfisheries Ltd., 308 Croydon Road, Beckenham, Kent, BR3 4HR. Tel. 01-650 3716.**
Price: (1) Purchase, £9.95 plus 70p postage
(2) *Rental, (a) £1.00 per night; (b) £3.50 per week.
*Deposit: £10.00

Go anywhere to observe or collect fish, and you end up with a great deal more than you first suspected. Keep your eyes and ears open, and you'll pick up priceless bonuses left, right and centre.

That is precisely what Stan Kemp did during his trip to Thailand to visit some of his Discus suppliers. The result is a 90-minute video which shows not only some really knock-out Discus, but Rift Lake Cichlids, Golden Sucking Loaches, Glassfish, short and long-finned Siamese Fighters, Goldfish, Catfish, so-called Asian Arowanas (more correctly known as Asian Bony Tongues or Dragon Fish), parrots, rabbits, squirrels, orchids, handicrafts, ethnic dances, spectacular fruits and plants, even one of unknown parentage or character . . . and a host of other facets of life in and around Thai markets. Enough to turn armchair adventurers green with envy and make a dash for their nearest travel agency to book their flights to Bangkok.

All the filming, plus the commentary, are provided by Stan who set out to produce an enjoyable and informative video — not designed for the mass, high street market, but for those of us who are nuts about fish.

The film may be just a trifle over-long and may not show Discus actually spawning, but its unhurried pace and honest, low-key commentary — both absolutely jam-packed with the sort of detail that fishkeepers crave for — together provide a leisurely and educational 90 minutes' worth of viewing. It's all there, from the mind-boggling Friday

Books and videos

night/Saturday morning live fish market, to the swarms of baby Discus grazing off their parents' bodies . . . not to mention cracking fish like fully adult Marbled, Turquoise and Cobalt Blue Discus (among others).

If you want a non-commercialised, non-trivialised flavour of what it's all about — here's your opportunity. And if you're a club secretary, you could do a lot worse than rent one of Kingfisheries' ten videos for an evening. Besides the Discus one reviewed here, there are nine others which concentrate on dives in the Philippines, including visits to shark caves, night dives, deep dives and sea snakes.

Well worth a try.

John Dawes

Nishikigoi International

Managing Editors: Nigel Caddock and Gregory Peck
Editor: Clare Humphreys
Published & Distributed by: **Nishikigoi International, 106/114 Liverpool Road, Eccles, Manchester N30 0WR**
Price: £25 for four issues (Subscription only)

Unhappy at the amount of UK generated literature currently available for out-and-out Koi specialists, *A & P* regular contributor Nigel Caddock and his fellow "Koi Kichi" (Koi Crazy) friend, Gregory Peck, decided to take their lives into their own hands and produce their very own journal.

The result is **Nishikigoi International** just launched at Nishikigoi '89 on **13 May.**

As Nigel says, "*A & P* does a great job for Koi fans but, being a general magazine, it cannot, obviously, dedicate its whole output to Koi-keeping."

N.I. is therefore designed for the real specialist and concentrates exclusively on all aspects of the Koi hobby. It is produced in full colour throughout and will appear every quarter — to coincide with the four seasons.

The first issue (Spring) contains the following features: Editorial Introduction and Review, Nishikigoi the Hobby?, Changing Patterns of Continuity, UK Koi Ponds, A Guidance on Koi Appreciation, Nishikigoi Centrefold, Origin of Nishikigoi, A Tale of Two Hobbies — Koi and Bonsai, Show Review — 1988 Show Season, and The Eve of Destruction.

All the articles are written by people who are really in the know and, as such, are both instructive and thought-provoking.

This, added to the attractive layouts and presentation, should ensure that **Nishikigoi International** finds a home among the many Koi-keepers who are looking for something a little bit special to satisfy their insatiable hunger (or should it be, thirst?) for knowledge.

I wish Nigel and Greg success in their bold venture, and hope that the Koi Kichi fraternity responds with a flood of subscriptions to this new and exciting journal.

John Dawes

NEXT MONTH

If you are into reptiles, then our July **Spotlight** issue is just what you need during those long, warm, balmy(?) summer evenings.

We've got some really super articles, including:

- The Marine Iguana (by **David Alderton)**
- Day Geckos (by **Robert & Valerie Davies)**
- Pythons and Boas (by **Dr Gareth Evans)**
- Box Turtles (by **Jim Wright)**

● If you're not reptile-crazy, though, don't despair! July will also feature Koi, Tropicals, Marines, Plants and a whole host of other goodies.

● Then, of course, we've got the next in our spectacularly successful series of FREE giant, full-colour posters — totally unmissable.

● And, if all this weren't enough, there's an exciting competition in which you could win the pond of your dreams from **English Water Gardens'** superb new range — just out this season and already proving to be real winners.

Join us in July . . . for the very best in aquarium and pondkeeping.

FLORIDA '89

PART 1

A&P editor **John Dawes** reports on the excitement and challenge of this year's outstanding show.

(Photographs: Harry Grier/ Florida Tropical Fish Farms Association)

It was minus 10°C outside . . . in the middle of the afternoon! Everything, other than the strict essentials, was draped in a polished, almost unreal, glass-like, glistening sheet of ice. Anything that wasn't thus entombed — or hadn't been cleared by a growling, hungry pack of ice-crushing, snow-scraping monster-mobiles — was being held in suspended animation under an unyielding, deceptively innocent-looking, and soft-looking, blanket of rock-hard packed snow.

It was cold! Very cold! The airport at Bangor, Maine, is not my idea of paradise in the middle of March.

It was almost impossible to grasp that a mere three-and-half-hour hop down the road, was a sun-filled haven, as different to Maine as the Costa del Sol is to the Outer Hebrides. Yet, this was indeed the case — and I was, thankfully, on my way there (via the scenic, deep-frozen route) to judge, once more, at Florida's outstanding and unique annual event, the Florida Tropical Fish Farms Association Professional Show.

As some of our readers may remember, I was absolutely knocked out by the best of the fish I had judged there last year. I wondered if (and hoped that) the experience would be repeated. I was not to be disappointed. . . .

Record-breaking event

There were 22 of us this year (judges, that is) — split into six teams of three and one of four. Our task? To find the best fish that Florida has to offer the fishkeeping world in 1989.

The difficulty of the job facing the judges grows year by year, and not just because of the quantity of fish on display. Admittedly, at over 570 entries, this year's crop was the largest ever — but it was also the outstanding and closely matched quality of the top fish that made such heavy demands on those of us trying to split them into First, Second and Third positions.

At the end of the day, an exhausted and bleary eyed group of judges had to conclude

F.T.F.F.A. SHOW (CLASS WINNERS)

CLASS	FISH	EXHIBITOR
Swordtails	Marigold Painted Swordtail	Blackwater Fishery Inc.
Fancy Swordtails	Painted Lyretail Swordtail	Blackwater Fishery Inc.
Mollies	Sunset Sailfin Molly	Blackwater Fishery Inc.
Fancy Mollies	Gold Sailfin Molly	Snyder Tropical Fish Farms
Variatus Platy	Sunset Variatus	Burnetts Tropical Fish Farms
Platies	Sunburst Platy	Blackwater Fishery Inc.
Fancy Platies and Variatus	Rainbow Sword Variatus	Ruskin Tropicals Inc.
Guppies	Red Snakeskin Guppy	Providence Tropicals
Any Other Type of Freshwater Livebearers	Asian Half Beaks	Tropical Gardens Fish Farm
Killifish	*Cynolebias constanciae*	Tampa Bay Aquafarms
Dwarf Cichlids	*Microgeophagus altispinosa*	Valley Fisheries Exotic Fish Inc.
Aequidens and Geophagus Cichlids	*Geophagus balzani*	Ruskin Tropicals Inc.
South & Central American Cichlasoma and Oscars	*Aequidens awani*	Pataky Inc.
Any Other Cichlids	*Steatocranus tinanti*	Old World Exotic Fish Inc.
Mbuna Cichlids	*Pseudotropheus elongatus* Red	Old World Exotic Fish Inc.
Haplochromide Cichlids	*Haplochromis flavimanus*	African Cichlids Inc.
Tanganyikan Cichlids	*Lamprologus sexfasciatus* Gold	Old World Exotic Fish Inc.
Common Angel Fish	Marble Angel	Sunshine Aquatic Farms Inc.
Veiltail Angel Fish	Dusky Veil Angel	Sunshine Aquatic Farms Inc.
Tetras	Emperor Tetra	Bethsaida Inc.
Fancy Tetras	Hifin White Tetra	Ekk-Will Tropical Fish Farm
Barbs	Odessa Barbs	Ekk-Will Tropical Fish Farm
Fancy Barbs	Longfin Rosy Barb	Morrill's Tropicals
Danios and Minnows	Rainbow Dace	Ekk-Will Tropical Fish Farm
Fancy Danios and Minnows	Longfin Leopard Danio	Gordon Aquatics Inc.
Glassfish	*Chanda wolfii*	Ruskin Tropicals Inc.
Rainbows	Yellow	Southern Tropicals Fish Hatchery
Rasboras	*Rasbora heteromorpha*	Ekk-Will Tropical Fish Farm
Plecostomus	Armoured Plecostomus *(Pterygoplichthys)*	Tropical Gardens Fish Farm
Corydoras and other Catfish	*Corydoras paleatus*	Gordon Aquatics Inc.
Anabantoids	Longfin Dwarf Gourami	Sunshine Aquatic Farms Inc.
Goldfish and Koi	Calico Fantails	Summerland Tropical Fish Farms
Sharks, Loaches and Botias	Redtail Black Shark	Ekk-Will Tropical Fish Farm
Amphibians	Florida Bull Frog	Blackwater Fishery Inc.
Molluscs	Gold Snail	Gardenville Aquatic
Crustaceans	Royal Blue Crawfish	Tropical Gardens Fish Farms
Bunch Plants	*Hygrophila polysperma* "Tropic Sunset"	Florida Aquatic Nurseries Inc.
Freshwater Fancy Plants	*Aponogeton madagascariensis*	Florida Aquatic Nurseries Inc.
Pool Plants	Madagascar Lily — *Nymphaea*	Riverview Plant Supply
Grow Out 0-4"	Bleeding Heart Tetra	J & B Tropical
Grow Out 4-10"	Clown Loach	Tropical Gardens Fish Farms
Grow Out 10" +	Black Shark	Rawlins Tropical Fish Farm
Best New Freshwater Livebearer Variety	Black Marble Swordtail	Gordon Aquatics Inc.
Best New Freshwater Egglayer Variety	Zebra (Albino Red)	Florida Exotic Fish Sales, Inc.
BEST IN SHOW: Freshwater Livebearer	Rainbow Sword Variatus	Ruskin Tropicals Inc.
BEST IN SHOW: Freshwater Egglayer	*Haplochromis flavimanus*	African Cichlids Inc.
BEST IN SHOW: Aquarium Livestock Other Than Fish	Florida Bull Frog	Blackwater Fishery Inc.
BREEDER'S AWARD: Edward Levy Award	Cardinal Tetra	J & B Tropical

FLORIDA '89 (PART 1)

that, with very few exceptions, the overwhelming majority of entries were, at least, very good and, in many cases, exceptionally so.

As one of those judges myself, I felt that there were no real losers at this year's show. True, only relatively few ended up winning the glittering trophies. However, all the fish on show, irrespective of whether they won a trophy or not, did their owners proud and served as vivid, living, two-day advertisements for the companies concerned.

Best-ever attendance

Importers, exporters, wholesalers and retailers flock to Tampa every year to catch up on all the latest developments and place their first orders for the new season.

I'm certain that the fact that the Pet Industry Distributors' Association (PIDA) show is staged concurrently with the Florida Tropical Fish Farms Association (FTFFA) one, helps considerably as well. A further contributing factor this year was, without doubt, the presence of Ornamental Fish International (OFI) who held a number of meetings during the show.

The cumulative effect of all this was that this year's event, probably more than any other recent one, enjoyed the attention of members of the aquatic trade from countries as far away as Singapore, the UK and Australia.

Selected highlights

In addition to a wide array of well and less well established species and varieties, there was the now-expected sprinkling of brand-new types never before seen, either in Florida or anywhere else for that matter.

In terms of new *species*, in the strictest sense of the word, I spotted only one . . . but what a one! It was exhibited as an Armoured Pleco. In scientific terms, it was a *Pterygoplichthys*, but which one nobody seems to know. I believe that it may well be an, as yet, undescribed species. In South America, it is apparently known as "lagarto" which means "lizard", but this is undoubtedly a common or trade name — not a scientific one.

The fish is already being bred in Florida by, at least, Tropical Gardens Fish Farm, so it may well be on several lists by now . . . or soon will be.

Therefore, if you have a special penchant for the newest and latest, talk to your retailer. It should be possible for him/her to track down stocks via the growing body of importers who are now regularly shipping in fish from Florida.

Other completely new fish included an Ebony and Ivory Molly — *Poecilia sphenops* — which, although it didn't win any prizes is, in my opinion, a very striking fish indeed. Produced by Sanchez Tropicals, it is, without doubt, a fish that deserves to do extremely well.

So do all the other new types which included, on the livebearer side, a superb Black Marble Swordtail — *Xiphophorus helleri* — (Gordon Aquatics Inc.), a 24 Karat Redtail Lyretail Molly — *Poecilia sphenops* — and a 24 Karat Lyretail version, both from Summerland Tropical Fish Farm (a word of caution here — the Redtail version has orange/red streaks in its caudal fin, i.e. it is *not* red).

On the egglayer front (and in addition to the Pleco "lagarto" mentioned earlier) there were also other exciting innovations such as an Albino Red Zebra — *Brachydanio rerio* — (Florida Exotic Fish Sales Inc.), a Champagne Tiger Barb — *Barbus tetrazona* — (Gordon Aquatics) and a *Pseudotropheus zebra* Red Top Albino OB (Everglades Tropical Fish Farm).

Monumental effort

As anyone who has organised or visited a fish show will know, it is extremely difficult to maintain tip-top conditions in the exhibition tanks over a long period.

Professional shows are no exception — although organisers of such events can generally handle such matters with a great deal of expertise. Even so, it is inevitable that some fish will not show off as well towards the end of two/three-day event than at the outset.

Yet, even allowing for a marginal dropping off of quality of some of the exhibits as the weekend drew on, late visitors to the FTFFA show still saw some truly magnificent fish.

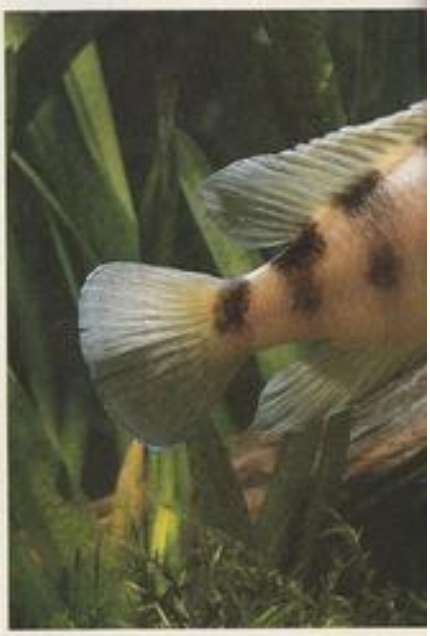
Those who attended the farm tours which were specially laid on for the occasion also saw the conditions under which the fish are produced and maintained. They therefore got a taste of the monumental effort, investment, dedication and sheer hard work that goes into producing fish of the quality that they had previously seen at the exhibition hall.

That special gleam

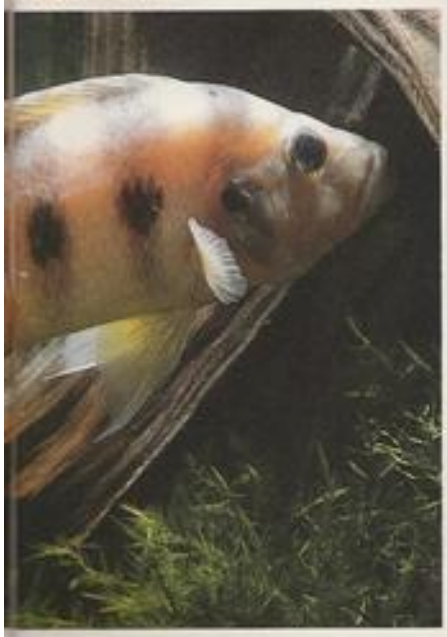
I think it is fair to say that not every new fish that puts in an appearance at a show will stand the test of time. It may also prove very difficult for some of the creators of really successful new fish to be able to produce them in the vast quantities which such success demands, week in week out, throughout the year.

Nevertheless, I found it extremely heartening during my discussions with some of these innovators, to see that they all had that very special gleam in their eyes — the unmistakable gleam that tells you, in no uncertain way, that they'll be back next year, and the year after that . . . almost certainly with yet another new fish, laying down a challenge to the world at large . . . and to the already stretched capabilities of merely-mortal judges!

TO BE CONTINUED



Above, this stunning Black Marble Swordtail from Gordon Aquatics won the Best New Freshwater Live-bearer trophy.
Left, is it Pleco "lagarto" . . . or what? The name given to it at the FTFFA show was Armoured Pleco. It was produced by Tropical Gardens Fish Farm and was awarded top prize in the Plecostomus Class.
Below, left, Old World Exotic Fish did very well this year. Among their winners was this magnificent *Lamprologus sexfasciatus* (Gold).
Above left, second placed in the Best New Freshwater Egglayer Class was this Champagne Tiger Barb from Gordon Aquatics.
Below, Blackwater Fishery's Sunset Sailfin Molly came out on top in the Molly Class.
Far left, the Longfin Fire Gourami from Sunshine Aquatic Farms — winner of the Anabantoid Class.



FLORIDA '89

Your questions answered

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

TROPICAL
Dr David Ford

COLDWATER
Pauline Hodgkinson

PLANTS
Barry James

KOI
Roger Cleaver

DISCUS
Eberhard Schulze

MARINE
Graham Cox

HERPETOLGY
Julian Sims

Herpetology

Aquatic frogs

I am thinking of buying some aquatic frogs and would welcome information on looking after them.
The two best known types of aquatic frogs are the various African Clawed "Toads" (*Xenopus* spp) and Dwarf Frogs (*Hymenochirus boettgeri*).

The details for maintrianing a totally aquatic system are very similar to those described for Axolotls in the March edition of *Aquarist and Pondkeeper* (pages 35 and 36). However, aquatic frogs and toads need warmer temperatures than Axolotls, thus a submersible heater and aquarium thermostat will be necessary.

Suggested temperatures to promote active feeding, digestion and breeding are: — 22°C (71.5°F) *Xenopus* and 24°C (75°F) *Hymenochirus*.

If spawning occurs, the adults should be separated into another tank to avoid cannibalism. Hatching frog and toad tadpoles are herbivorous, feeding on microscopic algae suspended in the water and growing on the glass tank. As the tadpoles grow, they become carnivorous, feeding on rinsed Brine Shrimps (*Artemia*), then *Daphnia*, mosquito larvae and *Chironomus* larvae.

Adult frogs feed on small (moving) earthworms but **not** the red worms from compost heaps. Many aquatic frogs and toads will also feed on small pieces of lean beef, but uneaten food must be removed from the water to prevent fouling.

JULIAN SIMS

The African Clawed "Toad" is the best-known of the aquatic frogs.

As with Axolotls, gravel on the floor of the aquarium might improve the "look" of the tank but will make regular cleaning much more difficult.

One important difference regarding aquatic frogs versus Axolotls — frogs and toads are real escape artists. Therefore, an overhang or, preferably, a ventilated lid (**not** made of perforated zinc) must be fitted over the tank.

Declining lizards

I keep a number of Lacerta viridis *(Green Lizards) and am having trouble with them at the moment. One has mouth ulcers, while others are refusing to eat, either indoors under blue light or outdoors in my greenhouse. Most of them are mysteriously declining and getting thin. Can you help?*
The problem with your lizards losing condition is, almost certainly, directly related to (i) diet, and (ii) the environmental conditions in which they are kept.

Live invertebrate food lacks vitamins, especially vitamins A and D. Lack of vitamin A causes a breakdown of epithelial tissue, eg, the lining of the mouth and the surface of the skin. As these tissues break down, they no longer act as an effective barrier to the entry of bacteria and fungi. These pathogens then cause diseases such as "mouthrot."

Thus, improve the vitamin content of the diet, eg, dust the mealworms with a multi-vitamin and mineral powder such as VIONATE, or feed mealworms on bran mixed with VIONATE and/or COMPLAN. Also add ABIDEC to the drinking water in the vivaria.

The glass of greenhouse, windows and vivaria all filter out Ultra Violet rays from natural sunlight. Thus, certain types of artificial illumination, eg, "TRU-LITE" fluorescent tubes should be used to supply the missing UV for basking reptiles.

Plants

Alismatics

I would like to buy some Water Plantains for my pond. Would you please tell me how many types of this plant I'm likely to find and how to cultivate them?
You will probably only find two kinds of Water Plantain. The more likely of these is *Alisma plantago-aquatica*, native to the UK and Europe.

In nurseries which sell some of the more unusual/rarer pond plants you may be able to find *Alisma parviflora* which originates in North America. This species has distinctive wrinkled oval leaves.

Both kinds of Water Plantain need a marginal pond position with 2-3in (5-7.6cm) of water over the roots, rich clayey soil and full sun.

Sag or Vallis?

How can I tell the difference between a Sagittaria *and a* Vallisneria *undertwater? To me they both look very much the same.*
To tell the difference one must snip off a leaf blade. The difference lies in the venation.

Near the tip of a *Sagittaria* leaf there are three or more longitudinal veins of approximately the same thickness. The lateral longtitudinal veins do not reach the tip but run into the margin

JOHN DAWES

***Sagittaria* — probably *S. platypylla* — photographed in the wild in Florida. Its resemblance to *Vallisneria* can be clearly appreciated from this shot.**

of the leaf lower down. The transverse veins are close together, approximately at right angles to the longitudinal veins and are nearly always straight.

In *Vallisneria*, the midrib near the tip of the leaf is much stouter than the other longitudinal veins of which there are at least two on either side. All veins anastomose (branch out) at the apex of the leaf. The cross veins are more widely spaced, less conspicuous and much fewer in number than in *Sagittaria*.

Marine

Illuminating inverts

Would two Florasets be sufficient for an invertebrate tank having a surface area of 560 sq in and a depth of 24in (60cm) — or would tubes, (eg) actinic, be better?

For a tank such as yours you will need three Florasets to give adequate lighting for *photophilic* invetebrates.

Should you change your mind and decide to make it a "fish only" system, then two Florasets would be adequate. Site the three lights within 1in (2.5cm) of the cover glasses to avoid wastage of light and place all photophilic invertebrates, ie, living corals, polyps, anemone, clams, etc, immediately beneath the lights.

Triangular filtration

Having kept marine fish for three years, I have now decided to keep marine inverts and have had a tank specially made. My tank is a corner-fitting one of the following dimensions: —

In plan view the tank is a regular right angled triangle with the hypotenuse measuring 47in (120cm) and the other two sides 33in (84cm) long. The vertical depth of the tank is 24in (60cm). Concerning filtration, which of the following two alternatives would be the better one?

(a) an undergravel filter powered by two powerheads, plus one internal power filter containing a polyfilter; or

(b) an undergravel filter in the reverse flow mode using two internal power filters, or one external filter running an undergravel filter plus a protein skimmer.

Your new corner tank will have a *gross* capacity of 48 gallons (216 litres) of seawater, which is not a bad *minimum size* in which to begin keeping a mixed invertebrate/fish community.

In my opinion, the first option for any marine aquarium system is REVERSE FLOW UNDERGRAVEL FILTRATION. My reasons for stating this are as follows: —

a) There is no form of filtration known to aquatic science which has a greater nitrification capacity than a properly designed coral gravel/coral sand under gravel filter. The minimum filterbed covering your u/g filter will require is 1in (2.5cm) of coral gravel covered by 2in (5cm) of coral sand. By nitrification capacity, I mean the filtration system's innate or natural ability rapidly and efficiently to convert the aquarium animals' toxic excretory products into relatively harmless nitrates.

b) In order to give a natural appearance to the aquarium, you need coral sand on the floor of the aquarium anyway. It makes good ergonomic sense, therefore, to use this layer of coral sand for filtration purposes.

c) Many of the fishes and invertebrates commonly kept in marine aquaria like to hide in a good depth of coral sand if they feel threatened, and during the night.

d) It is also the least expensive system known, both to install and maintain.

If you doubt the accuracy of (a) above, visit Brighton Aquarium and closely examine the new 20,000 gallon shark tank which I designed there using the principles stated above. This tank contains three adult Blacktip Sharks, a huge Lemon Shark, a large Leopard Shark and two large Nurse Sharks. As if this weren't enough, the tank also contains two large and voracious Shark Suckers (*Remora remora*)! The tank is fed many kilos of food every other day. THERE IS **NEVER** ANY AMMONIA OR NITRITE READING AND NITRATES ARE LESS THAN 20mgs/litre (=ppm).

This is quite remarkable in view of the appalling mess which the sharks make of their food when eating and of the enormous biological loading on the seawater. The water is always crystal-clear and the pH remains at a steady 8.1 to 8.3. The system uses no trickle filters, ultra-violet sterilisation, ozonisation protein skimmers, cartridge filters, etc. It is simply a REVERSE-FLOW UNDERGRAVEL FILTER, as described above.

It would be better to use two external power filters to operate your u/g filter.

Coldwater

George's dilemma

We have had a goldfish (George) for two years. He has lived on his own up to now but we are thinking of putting him in a tank measuring 18 x 12 x 12in (45 x 30 x 30cm) with our other two goldfish. However, we've been warned that one of the following is likely to happen;

(i) George would consider the other two fish as food.

(ii) The other fish would attack and kill George.

(iii) The shock of transferring George to the new tank would kill him.

Are any of these things really likely to happen?

L. E. PERKINS

Male Goldfish (such as this Shubunkin) become pushy during the breeding season. At other times, though, they are peaceful gentle creatures.

Goldfish are very gentle and peaceful fish not normally in anyway aggressive, although males often become overzealous during the spawning chase. Occasionlly, some of the commercial farm-bred and reared fish may be pushy at feeding time because they are used to competing for food, but once established in less competitive environments, they soon settle into less hectic behaviour.

I am sure that your problems would not come from aggression from any of your fish, if housed together, but from the small tank in which they would be kept.

Small volumes of water very quicky become polluted and problems may also arise from rapidly fluctuating temperatures of the water — one of the dangers of small containers.

The rule of thumb dictates that the limit for keeping fish such as the Goldfish in aquaria is 1in (2.5cm) of body size to 24 sq in (150 sq cm) of surface area. Therefore your tank would house only 9in (23cm) of fish.

But, really, only the more experienced fishkeeper would be capable of maintaining this amount of fish in good health. So, in my opinion, half this amount would be advisable. Even so, small partial water changes should be carried out, at least, every other day though, ideally, every day, if the water is to remain in good condition and your fish in good health.

Koi

Long-finned Koi

I have recently seen several long-finned Koi. Are these really Koi or are they some other form of carp?

In the past couple of years "Koi" with long fins have begun to appear on the market in this country.

Their histoey is still vague but it appears that the Crown Prince of Japan suggested crossbreeding Koi with some long-fined carp found in Indonesia in 1977. It has been recorded that, in 1982, a long-finned black carp was crossed

with a platinum Koi and that long-finned metallic fish resulted. Over the next year, patterned long-finned fish appeared and, since then, fish of this type have become more common.

As to whether they are Koi or not, there appears to have been no scientific proof to date, but the Japanese Koi-keepers and dealers do refer to them as Long-finned Koi.

Although referred to this way, the largest Koi Society in Japan, the Zen Nippon Airin-kai, have ruled that, for the present, these "Koi" are not eligible to be entered into Koi shows. Worldwide, Koi societies generally accept the decisions of ZNA as being correct, as far as definitions of Koi types and showing Koi are concerned.

For now, these fish are going to be known as Long-finned Koi and some people will like them and find them attractive, while others will hate them. Until scientific proof as to exactly what these fish are has been established, I can see many arguments over the pros and cons of these fish in Koi circles.

L. E. PERKINS

The Target Fish is a marine species which will tolerate brackish and even (for a time) freshwater conditions.

Tropical

Off target

I have recently obtained two fish which (I think) are called Target Perch. However, I can't find anything in any of my tropical freshwater books. Can you help me with details regarding their upkeep, maximum size, etc.

Your fish is not a Target Perch (which does not exist) but a Crescent Perch, also known as a Tigerfish, Zebrafish, or Target Fish, *Therapon jarbua*.

It is a saltwater fish from estuaries in China, Philippines, Africa and Australia. This is why you found no information in the tropical fish books. It will live in brackish water and will even swim into freshwaters, which is why the fish manages to survive in your tropical aquarium.

It is a food fish in Japan and is also famous for producing loud noises from its swim bladder.

As a young fish it shoals but becomes solitary with age. It can be aggressive and will eat smaller fish, being carnivorous. In the wild it reaches 12in (30cm).

If you want to keep the fish I would recommend isolating them and adding salt to the water until slightly brackish. Feed on chunky foods and Carnivore Flake. If you leave them in the community tank you may get problems . . .

Barbed query

I have two 5in (12.3cm) Leptobarbus hoeveni *but can't find any information on them. Can you offer any assistance?*

Leptobarbus hoeveni, also called the Pinktailed Barb, is a peaceful, undemanding fish (some specimens are quite shy). In its native Thailand, Borneo or Sumatra, it grows to 18in (c 46cm) so it can become too large for most aquariums.

A mixed diet is best because the fish is omnivorous. All good water qualities are acceptable and the temperature range can be 22° to 27°C, (71.5 to 80.5°F).

There are no breeding details because the fish is easily available in the wild (it is even caught on a rod and line baited with a piece of prawn!). The females are fatter when filled with eggs so try placing a pair in a breeding tank and let us know what happens.

One thing is predictable — the fry will look different to the parents. They have a body length black stripe that fades with age.

News

Queen's award to Interpet's sister company

Interpets's sister Company, **Carri-Med Ltd** has gained a 1989 Queen's Award for Export.

Carri-Med was started about 8 years ago by Interpet's chairman **Dr Neville Carrington,** to manufacture computer-controlled scientific instruments. Most of the business is in machines which measure the flow properties of materials, but other instruments measure the flexibility of blood cells.

The Carri-Med business operates as a totally separate company from the same site as Interpet in Dorking, Surrey. For further information contact: **Dr Neville Carrington, Interpet Ltd, Vincent Lane, Dorking, RH4 3YX. Tel 0306** 881033. **Fax 0306 885009.**

The new Fountain World at Wootton

An exciting new theme in tourist attractions came to Wootton on the Isle of Wight when Fountain World opened on Good Friday, 26 March.

The new 8,000 sq ft greenhouse which houses the attraction, is linked to the already popular Butterfly World which was opened in 1983. The £150,000 project was started in August 1988 and completed with just two weeks to spare.

Fountain World is split into an Italian Garden and a Japanese Garden. It has seven major water features, including two computer-controlled fountains, a seven-foot drop water cascade, a water curtain walkway and several other novel features. There are four pools, two of which are twenty feet long, featuring fish, including Koi nearly three feet long.

The Italian Garden has elegant balustrading, a Roman temple facade, and classical statues and murals to enhance the atmosphere, while statuesque conifers, palm trees and showy plants complete the Italian scene.

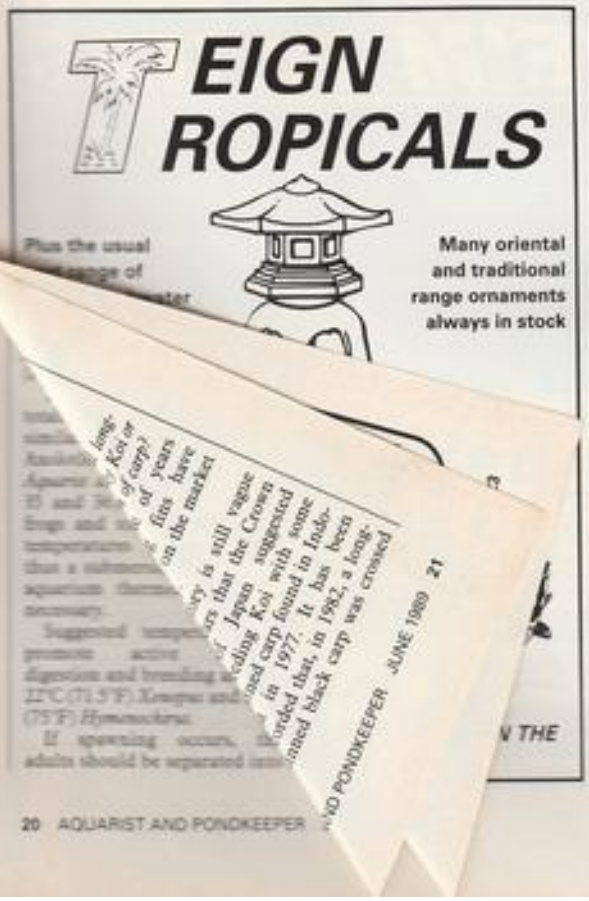
Admission to Fountain World and Butterfly World is £2 for adults and £1.35 for children and senior citizens.

The attraction is open from Easter to 31 October every day from 10.00 am-5.30 pm with last admissions at 5 pm. It is located between Wootton and Newport on the alternative Wootton Common/Staplers Road.

Further details from **Barrington Leisure Ltd, Staplers Road, Wootton, Ryde, Isle of Wight. Tel. 0983 883430.**

Part of Fountain World's Japanese Garden.

More news on page 89



Koi Talk

by John Cuvelier

Stop/go start

Writing this in early April, I seem to be keeping a much closer eye upon the weather than in previous years as, just a fortnight ago, I was sitting in my shirt sleeves basking in hot sunshine and at the same time throwing the odd pellet to our hungrily feeding Koi. Just one week later a howling blizzard sent me and fish scurrying for cover and removed part of our sun lounge roof! What can you do with weather like that?

Spring cleaning of the pool has now been completed ready for the coming season thanks to my vacuum scraper device which is remarkably effective in removing the "gunge" sticking to the pool floor. I often wonder how the owners of liner pools fare when it comes to cleaning.

Dangerous embrace

The first disaster of the year came about as the result of an amorous male toad being unable to find a mate and so latching on to a passing 10-inch Koi. At first glance I thought it simply a fish resting on the bottom with its head buried in the growth of blanket weed. A second look revealed the worst!

Managing to net the fish I was horrified to find both its eyes compressed by the front legs of the toad. Using the usual technique of slipping a fingertip between fish and the belly of the toad, the animal was persuaded to release its grip and the fish released, as there was no obvious signs of damage.

Since the event, there has been only one sighting of that particular Koi since it disappeared back into the water quite obviously bent on keeping a low profile! Hopefully there will be no lasting damage.

It's very difficult to know what to do about frogs and toads, particularly if you are as conservationist minded as we are. We do actually tend to encourage their presence in spite of keeping Koi, and one has to say that, in all the years of keeping pool fish, this is only the second time we have suffered such an experience, the previous episode concerning an 18-inch Golden Orfe which survived uninjured. I think the slight risk is more than justified in order to protect these endangered creatures.

S.V.T.?

A long-established Garden Centre in our area has embarked upon construction of a water garden department, and we went along to have a nose, the way one does. A couple of very nice lined mini-lakes are almost complete and it was nice to see the edges of the liners covered with loam serving as boggy areas with not a trace of liner visible. Would that all retailers were as sensitive about the appearance of their displays, as first impressions are so important.

The most interesting part for us was the display of small Koi on sale — 3-4in Koi (7.9-10cm) from Israel selling at around a fiver apiece, with some real beauties among them! Do keep an eye open for these imports as they are definitely improving. I'm not saying these will grow into show-stopping fish mind you, although you never know.

The only jarring note from our visit was in overhearing an assistant talking to a customer about last year's disastrous visit of a disease known as S.V.(T)?

Koi fry and bedsheets

If, like me, you have an aquarium full of the results of last year's Koi spawning, you are no doubt wondering what you can do with them now that they are growing so large. Although quite large, you feel uneasy about releasing them into your main pool in case you never see them again. Also, they are outgrowing their living quarters, particularly if you have a lot. Most of us cannot afford to have a second pool just for growing fry, what with the need for filtration, etc, etc, even though you would like to keep an eye on their continued well being.

Here's a suggestion you might like to consider. If you can get hold of an old nylon bedsheet (or even buy one — it's worthwhile), make up a wire frame, rectangular in shape, some 3ft x 2ft (c 1m x 60cm) and sew part of the sheet to the frame making, in effect, a nylon box net. You might be well advised to ask your wife to do this if your sewing is as good as my own attempts!

The completed net is then suspended over the water in your main pool, a weight in the bottom ensuring that it maintains its box shape when immersed, and Hey Presto, the ideal growing on compound for your babies, having good ever-changing water, yet out of harm's way as regards their boisterous parents.

It's quite simple to provide some shading should we be blessed with some sun this year. Specialist separate feeding is also ensured so the growth rate should be excellent.

I have to admit that this is not my own idea but one which was spotted many years ago when visiting a Koi breeder in Cornwall, but it's the simple ideas which always seem to work!

I shall be starting my own version anyday now as I've already had to transfer four of my own fry into the pool as one of them had already reached an incredible 6in (15cm) in length. I feel sure that the surviving 17 assorted Sankes and Ogons will be delighted to get out of their aquarium.

A thought in passing! Once our masters have finished with the privatisation of the water industry, how long do we think it will be before we are asked to pay a premium for water used in keeping fish? Think about it!

L.E. PERKINS

During the breeding season male toads and frogs will clasp anything that moves, including Koi, although fish are usually fast and slippery enough to escape . . . most of the time.

Spotlight

CORYDORAS — THE GREAT IMITATORS

(Corydoras adolfoi and *Corydoras imitator)*

These two catfish, from a tributary of the Rio Negro, share the same colour pattern — so do two other so-called "species". **David Sands** discusses the significance of this in the light of recent findings. *(Photograph by the author)*

Is it purely coincidence that certain fishes appear to share an almost identical cryptic colour pattern? Investigative scientists suggest nature never leaves form and design entirely to chance and that there is an answer to everything; it just has to be searched for.

Recent work on spider and ant mimics suggests shape/colour sharing mimicry is commonplace among insects and arachnids (spiders, scorpions). But, apart from mimicry between the saltwater Cleaner Wrasse *Labroides dimidiatus*, and its scale eater mimic, *Aspidontus taeniatus*, there has been very little corresponding detail relating to mimicry (apart from disguise) in freshwater tropical fishes.

Latest discoveries

Recent importations of *Corydoras adolfoi* Burgess 1982 and *Corydoras imitator* Nijssen and Isbrucker 1983 (which share an almost identical colour pattern) have revealed an intermediate form, plus another entirely different *"elegans"* form.

This now means there are **four** sympatric *Corydoras* species (living side by side), sharing the same striking orange and black pattern. The discovery of these additional two new "species" may reinforce my original theory on why species living side by side should share the same colour pattern.

Species inhabiting the same waters sometimes exhibit some form of mimicry (the definition of a mimic is an animal that has clearly evolved in imitation of another species — called the model). Colour pattern sharing is one type and I have suggested previously that this may be zoomimesis (colour pattern sharing).

Possible reasons

What could be the reason(s) for several species sharing an identical pattern?

Some possibilities may be:

1. The colour pattern is successful (in a cryptic — camouflage — sense) in that the fish can blend into their surrounding, thereby avoiding predators.
2. The pattern may be striking enough to act as a warning to would-be predators. Once a predator is aware that a prey with orange/black patterning = a difficult meal (because *Corydoras* are able to spread, and lock into position, dorsal and pectoral spines which effectively doubles their size and defends them), they will subsequently avoid a prey fish with that patterning.

This explanation must be considered extremely doubtful because **all** *Corydoras* are armoured (bony-plated) and hard-spined, and this makes **all** of them difficult for a predator to consume.

An added complication is that there are several other catfish mimics of *Corydoras* peripheral to this discussion, some of which are not armoured and may benefit from mimicking *Corydoras*.

3. The shared pattern allows the four phenotypes (forms) to blend together, and therefore increases the total shoal size and makes predation of an individual more difficult when a predator strikes out. This would decrease the kill : failure ratio and, as such, provides added protection through increasing numbers. "A pattern shared is a predator's workd doubled(?)"
4. Four types have evolved (in recent terms) from the one primitive form and share an "environmentally successful" pattern.
5. The group sharing the same colour pattern might be modern and have evolved rapidly (in evolutionary terms), adapting to changes in the environment.

The original division from one species into four morphological, rather than pattern, phenotypes (forms), could be the direct result of environmental demands. Perhaps rapid changes in the Amazonian Basin (the Amazon is said to have been raised up from the ocean in millions, rather than hundreds of millions, of years) has demanded morphological changes (naturally selected variances in snout shape and body size) rather than pattern changes.

This theory may provide the real answer as there are several such incidents in other *Corydoras* species — although most large South American rivers have four or five sympatric *Corydoras* species which are usually different in pattern, being spotted, striped or blotched in body.

The *"elegans"* phenotype, could be the next step in the chain of adaptation/natural selection demand related to the environment (*Corydoras elegans* is thought to be a modern widespread species in evolutionary terms — personal conversation with Dr. Nijssen),

6. From a common ancestor, four phenotypes may have rapidly developed (through accelerated natural selection or macro evolution): One to feed deeper into the substrate (*imitator* phenotype); another to feed in the midwater areas (undescribed smaller *"elegans"* phenotype); another may have remained in the basic form (*adolfoi* or *imitator* phenotypes) and the final phenotype may simply be an intermediate between two (*adolfoi* and *imitator* phenotypes).

Discussion

The complete answer as to why it is beneficial to share a colour pattern may lie in any, or all, combinations of the six possibilities.

One unlikely "outside-theory" (which could put the "cat among the pigeons") would be that there are *not* four distinct species, but simply four forms of the same species. This, if correct, would change all the rules on what actually constitutes a species.

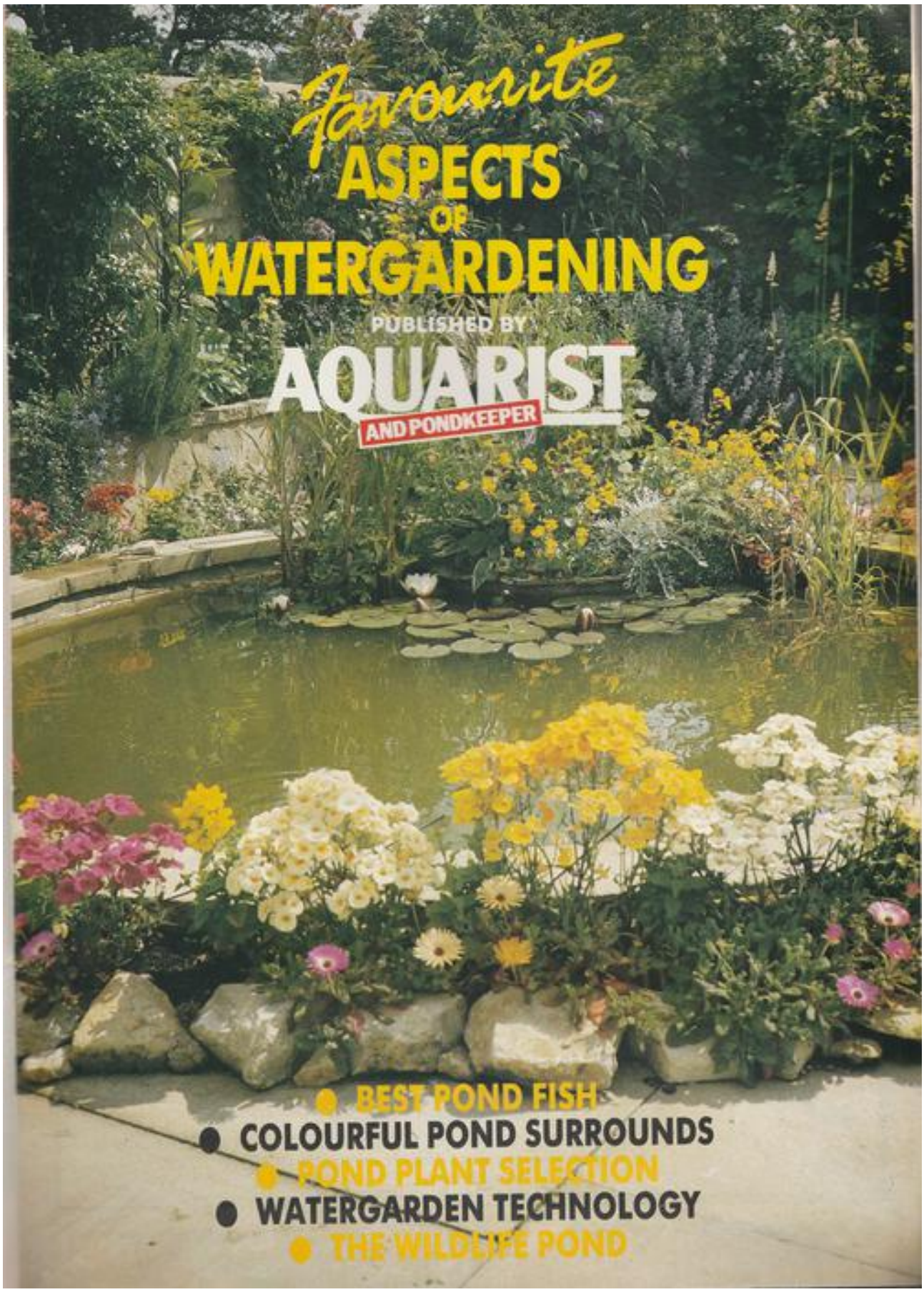
But why have distinctly morphological different forms of one species in the one environment?

Perhaps this allows the various forms to adapt to the different feeding/spawning zones in same the environment. . . . If this were true, though, the forms (belonging, as they would, to the same species) would interbreed and produce average percentages of each form. If so, then aquarium spawnings would have produced the four phenotypes — but they have not. *Corydoras adolfoi* bred by me and many other fishkeepers have produced *Corydoras adolfoi* — nothing else. This is also confirmed from aquarium spawnings of *Corydoras imitator*.

I named "colour pattern sharing" (zoomimesis) among sympatric species Wicklerian Mimickry because it was Wickler who first offered a plausable explanation for the "unobvious" forms of mimicry which seem to abound in the animal world. In Wicklerian mimicry a species resembling a similar species does so "to be lost"in the "majority".

However, the final answer will probably have to wait until comprehensive field studies have been undertaken. All of which just goes to prove what a wonderful subject zoomimesis is!

Corydoras adolfoi and *Corydoras imitator* offer one of the most fascinating insights into fish colour pattern sharing, something which the genus *Corydoras* appears to have an unusually high incidence of. At some future date it may well be discovered that zoomimesis, or "blending into the environment and cryptic coloration", also plays an important role in other animal and insect/crustacean patterning. Time will tell. . . .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AND PONDKEEPER
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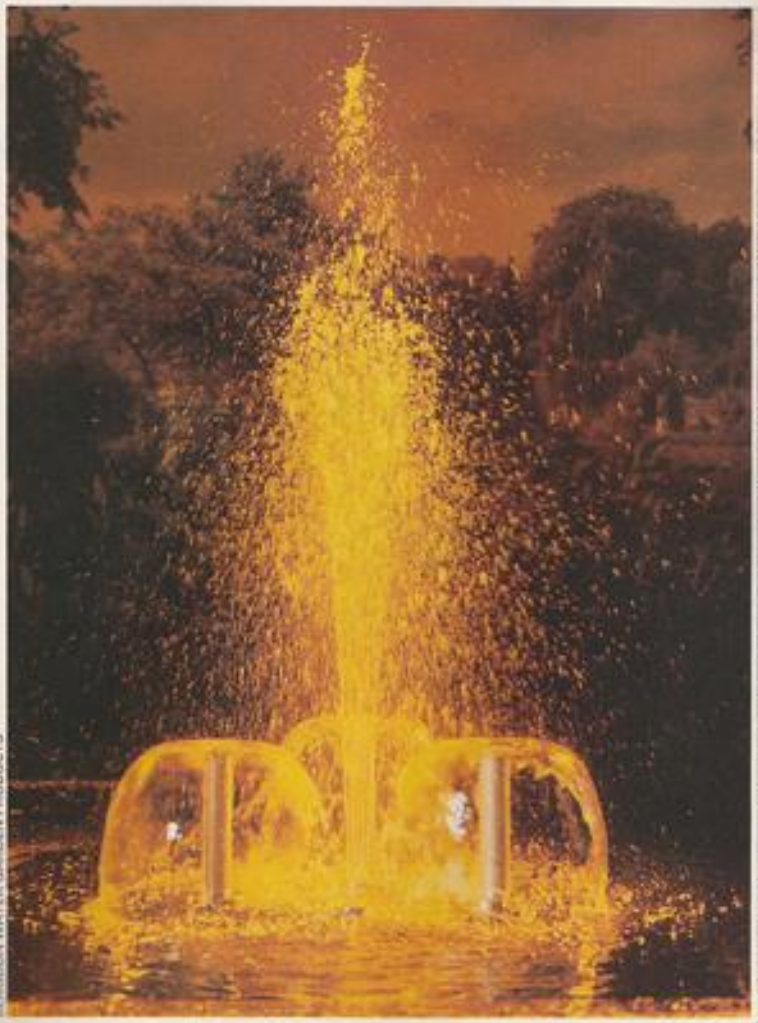
COLOURFUL POND SURROUNDS
POND PLANT SELECTION
WATERGARDEN TECHNOLOGY
THE WILDLIFE POND



BLAGDON WATER GARDEN PRODUCTS

Some specialised units, like this one marketed by Blagdon Water Garden Products, come complete and ready for installation with submersible pump, underwater floodlights and range of fountain jet sprays. This particular model also incorporates an automative four-phase spray display.

WATERGARDEN TECHNOLOGY

Sitting by the pond on a warm summer's day, it would be hard to imagine that anything quite so peaceful and beautiful needed to be associated with any technicalities at all, and yet, beneath that tranquil exterior, there may well be a host of man-made "additives" working away, either to keep it as natural looking as possible, or to "improve" on Mother Nature herself. **Dick Mills** explains.

Cleansing

One of the worst factors of the pond (especially smaller ones) is that there is little in the way of natural self-cleansing; wind and rain result in very little water renewal and, being landlocked, there is no continuous flow of fresh water running through the pond.

At a simple level, immediate clearing of floating objects, suspended dirt or, more usually, debris from the floor of the pond can be achieved by the use of a "Pond Vac" — a long, wide-bore hose linked to a powerful suction motor; this combination may also be used for partial, or total water changes or for the rapid removal of surface leaves in autumn.

Maintaining the water in good condition all year round requires an efficient filtration system. This is best incorporated when the pond is first installed as all the necessary pipework (including the indispensible bottom drain) can then be inconspiciously fitted. The choice of pump (surface or submersible) is one for the individual pondkeeper, as both have their merits and drawbacks (see **Product Round-up**, *A&P* May 1989), and don't forget that, whatever type is chosen, it will require regular maintenance.

The advertising pages of this magazine provide many examples of exterior pond filters, ranging from trickle cascade types to back-flushable, by-passable multi-chamber, multi-flow state of the art units. Brushes, foam sheets (flat or dimpled), Canterbury Spa, zeolite are all pressed into service in a bewildering profusion of combinations.

Mechanical and biological filtration occurs simultaneously and is especially effective where the water flow rate through the filter is adjusted to suit the type of filtration occurring in any specific area of each unit. Manufacturers of these units (and their associated accessories) offer really worthwhile Fact Sheets, so there is really no excuse for equipping your pond with the wrong size or type of filter.

As if to match the numerous models of filters, pondkeepers have come up with many ingenious devices to disguise their presence alongside the natural pond; Wishing Wells and Lighthouses are but two suggestions of late.

"In-pond" biological filtration is one aspect which needs planning right from the start. At least one-third of the pond's area should be devoted to the filter-bed and relatively large bore plastic piping will be necessary (30mm), both for the filter grid itself, and for the feed and return pipes. To prevent foraging fishes uncovering the sub-gravel pipework, some form of "gravel tidy" could be used, or a final top layer of larger pebbles as an effective deterrent.

A pumpless form of water removal, which utilises a standpipe to provide the necessary "head" of water is often incorporated within a Koi pond. When in operation, the outgoing water takes with it all the bottom debris and detritus. Of course, because it is such an integral part of the pond's construction, this system cannot be added to an existing pond.

In addition to the strictly technical hard-

ware used in maintaining water quality, mention must be made of water conditioners, algicides, plant foods and other pond treatments. These are just as "technical" in their own way and, if used correctly, play an equally important role in supporting excellent pond life.

Water movement

Water movement within the water garden perhaps serves the fishkeeper better than the fishes or other pond life in many respects. You should make sure that any water flow through the pond will not be detrimental to the fishes or plants (especially Lilies). In summer, extra water movement may be beneficial but in winter, it may actually level out the temperature and destroy the warmer bottom layers of the pond.

However, waterfalls and cascades can, in addition to being purely visually pleasing, also contribute to the water conditioning process, if used constructively. Aquatic plants grown in the cascade path will help to remove nitrates from the water, but a close check should be kept on the growth of such plants, and frequent harvesting may be necessary to prevent the cascade from becoming restricted to a non-appealing, soundless trickle.

One area in which there have been quite major advances both in design and engineering techniques is the pond fountain, but some thought may be exercised as to the virtues of installing one, and where to site it.

The fountain will be most beneficial to the pond during very warm days, assisting greatly in the absorption of oxygen and, of course, cooling the water. The water movement caused (if too vigorous) may not always be appreciated by the pond's inhabitants. Neither should the spray be allowed to fall continuously on Lily leaves. Make a mental note of any prevailing winds and site the jet so that all water falls back into the pond and not outside it!

Despite the great range of varied fountain heads available (mushrooms, multi-jets, fans, etc) fountains need not always be sited within the pond, many new designs allow them to be used to excellent decorative effect with statuary around the water garden, or even just providing a gentle, musical trickle of water over large stone arrangements.

Lighting

Control of the natural illumination of the pond is important if water conditions are not to degenerate into a green soup every summer. Once the best pond site has been selected (a sheltered position away from trees which catches some sun and is visible from the house), the careful stocking of surface plants to provide shade, together with enough submerged plants to compete for waterborne nutrients, will do much to keep algae at bay.

Not everyone has hours to spend at the waterside, and the brief moments available during the rapidly shortening hours of autumn daylight can be extended by the use of poolside lighting. Similarly, the use of submerged lighting and fountain lamps will bring added attractions (particularly at barbecue times), although a submerged equivalent of the Blackpool Illuminations may be overdoing things a little!

A feature of recent years has been the introduction of safe, low-voltage lighting. It is a simple matter to site the step-down transformer somewhere both convenient and safe near to the pond and nearby shrubs, and then run out the lamps to give the desired effect, using the corresponding weighted submersible bases and land-based earth-spikes.

Security

While nobody has yet stolen a complete pond, the contents often become the focus of unwelcome predators, both natural and human. "Naturals" include cats and herons and deterring these may involve netting, trip wires, electrical fences (see this month's **Product Round-up**) or floating guards (see **Product Round-up**, *A&P* March 1989).

Guarding against human predators requires perhaps a little more sophistication, particularly where valuable fish such as prize Koi may be involved. Security systems range from infra-red presence or movement detectors allied to spotlights (similar to house security systems) to the full-blown "Fort Knox" equivalent.

Above right, it is essential to remember that water and electricity don't mix. The use of safe connectors is, therefore, an absolute must. Left, security is becoming ever more important these days, so, investment in a suitable alarm system is to be recommended. Above left, there are numerous types of pond filter. Some, like this cartridge model from Cyprio, come complete with a fountain attachment. Left, trickle, and some other types of biological pond filters, work on the sewage-farm principle of spraying water onto a bacteria-holding medium where impurities are removed, leaving clean water to return to the pond via a gravity-fed outlet.

Winter warmers

Winter brings its own problems for the pond and here, too, some technical assistance may not come amiss to help maintain life-supporting condition in the water.

Any ice over the pond must be opened to allow the escape of gases from the pond, especially those generated from decaying vegetation. Floating pond heaters will maintain a hole in the ice, while lowering the water level below any captive ice will also help.

A recent accessory, a captive expanded polystyrene lookalike miniature Eskimo igloo, floats on the pond to keep a volume of warm air over the water; this simultaneously prevents ice forming and allows gases to escape. Another possibility is to take a leaf out of the swimming pool owner's book and cover the pond with a plastic bubble-sheet to conserve heat (but be sure to keep a gap around it to allow the passage of air under the cover).

Finally, make use of the hours you can't spend at the waterside by catching up with all the pond technicalities at your disposal through good books, manufacturers' catalogues and, of course, the special **Supplements** in *A&P*!

JACK ENGLISH

JOHN DAWES

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Above right, Robust, healthy Fantails are good fish for the garden pond. Above left, Young non-pedigree Koi will bring a touch of bright colour — at a modest price. Right, Golden Orfe (these are young specimens) always look at their best in a shoal. Top, Perch are highly carnivorous — so treat with extreme caution and keep them in a pond on their own or with fish that are too large to be attacked.

FAVOURITE POND FISH

Stephen Smith provides a run-down on his (and many other people's) favourite pond fish.

However extensive one's interest in outdoor fishkeeping may be — whether as a gardener with only a passing interest in a pond as part of a greater scheme, or as a dedicated hobbyist with an all-consuming interest — there has to be a place in every garden for a pond.

In my own opinion, no garden can be said to be complete without water and, occupied by an attractive selection of fish, it can provide a worthwhile and fairly maintenance-free complement to any garden for very little outlay.

Stocking the pond, too, can be achieved for a modest sum — unless, of course, you specialise in high-quality Koi or Fancy Goldfish, for example.

For the "general purpose" pondkeeper, there are a number of options open and, as with the siting and construction of the pond, consideration should be given to your choice of fish before you go out and make your purchase.

Obtaining fish

A few words of warning here — and which will come as no surprise to regular readers: obtain your stocks only from reliable sources.

By far your safest guide as to where you can obtain reliable fish stocks is the coldwater section of your local aquarist society. There are a number of specialist coldwater societies up and down the country whose members themselves may well be more than willing to supply you, not only with fish

L. E. PERKINS

Rudd are active surface shoalers which do well in most ponds.

ailments in other fish, giving rise to its nickname of the "doctor fish". I would reserve judgement.

The Dace
(Leuciscus leuciscus)

This is splendid fish, similar in shape to the Orfe, and reaching in excess of seven inches (18cm). Yellowish green fins, sometimes tinged with red, are featured on a mainly silver body with a green dorsal margin.

As with the Orfe, I would suggest that these are kept in some numbers, as they make an arresting sight when seen shoaling in clear waters.

Perch
(Perca fluviatilis)

If you intend to keep Perch, do keep them in their own pond, as they are carnivorous feeders and aggressive in mixed company. However, the Perch is well worth keeping for its striking colour. One of my favourite native species.

Golden Rudd
(Scardinus erythrophthalmus)

This is also an attractive fish and very hardy. Part of the attraction lies in that the Golden Rudd enjoys spending considerable time at the surface. The fins and upper parts of the fish are a deep brown-red colour offset against a silver belly.

Trout
(Salmo trutta and others)

Although an attractive sight at the trout farm, the trout requires specialist treatment and should not be considered for the pond.

An especially high oxygen level is called for and few people have achieved any success in keeping trout in the garden pond.

Minnow
(Phoxinus phoxinus)

Another shoaling fish and, although also requiring well-oxygenated water, can live quite happily in a good-size pond. Do keep it well-filtered, though, or you will rarely see the fish.

When in spawning condition, male Minnows lighten in colour from their olive-brown, and add a tinge of red; while their tubercles become quite pronounced around the gills.

FINALLY

Of course, there are scores of further options to be considered if you wish to stock your pond with something different from the ubiquitous Goldfish or Koi. By all means try something new: it may work for you.

But do not try to fill your pond with several species of fish in ones and twos. Far better to have a dozen or so good quality specimens of similar size in one good size pond than a "menagerie" of different sizes and varieties.

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FAVOURITE PLANTS FOR THE

With such a bewildering selection of watergarden plants available nowadays, how do you go about making a choice? **Philip Swindells** offers some colourful possibilities.
(Photographs by John Dawes)

Among the many lovely pool plants, there are some that stand head and shoulders above the others. Such opinions about plants are often coloured by the writer's experience or perhaps, more emotively, by his/her nostalgic associations with them. Despite this there are a number that transcend all personal prejudices and come out tops, whatever the criteria.

LILIES

Waterlilies are the queens of the watergarden, and deservedly so. Flowering from early June until the first autumn frosts, they are available in almost every shape, size and colour imaginable. For small pools there are miniature starry flowers rarely as large as a fifty pence piece. They will grow in as little as 9 inches of water and are excellent for tub culture. Among these the canary-yellow *Nymphaea x pygmaea* "Helvola" is superb, although *N. x pygmaea* "Alba" is exceptional when growing in conditions to its liking.

For slightly deeper water I prefer the "laydekeri" hybrids, the wine red *N. x laydekeri* "Purpurata" and crimson *N. x l.* "Fulgens" being my favourites, although I would not deny the beauty of *N. x l.* "Lilacea" with its soft carmine blossoms ageing to deep plum, or the quite extraordinary *N. x l.*

Far left, Attraction — a superb lily requiring about 2ft of water.

Left, Water Crowfoot has delicate submerged leaves, broader floating ones and lovely white blooms.

Left, above, no watergarden can really be regarded as complete without at least some irises.

Above, *Pontederia cordata* has broad glossy leaves and a (pointed) blue flower head.

WATERGARDEN

"Alba" sporting pure white flowers with a strong tea fragrance.

The paeony-flowered deep crimson *N.* "James Brydon" and garnet-red *N.* "Attraction" are more vigorous and require at least 2 feet (60cm) of water, but will then delight with soft green lily-pads and beautifully sculptured blossoms. However, it is the pure white *N.* "Gonnere" that I vote as the best water lily of all, an absolute delight, with apple green foliage and globular, snowball-like flowers.

DEEPWATER SURFACE PLANTS

Apart from waterlilies, there are other plants that can be grown in the deeper part of the pool.

The most desirable, in my view, is the sweetly-scented Water Hawthorn, *Aponogeton distachyus* with its striking icy-white blossoms and jet black stamens.

For ease of cultivation and reliability though, the pick of the deepwater aquatics must be the poor man's waterlily or Water Fringe, *Nymphoides peltata*. This has tiny floating "lily pads" and golden buttercup-like flowers that are produced in profusion throughout the summer months.

MARGINALS

Of the poolside and marginal plants I have the strongest affection for the Bulrush or Reedmace. These are the typhas, a genus of vigorous reeds which produce those lovely dark chocolate brown poker-like heads which are so popular with flower arrangers. What could be more evocative of a watergarden than these?

Typha stenophylla is the most refined species, having slender willowy leaves and well proportioned flower heads, while *T. minima*, which rarely exceeds 18 inches (45cm) in height, produces masses of short, fat, brown flower spikes amidst a waving sea of grassy foliage.

I always hold Marsh Marigolds in high regard, for they produce a bright splash of colour early in the year when the pool is looking drab. *Caltha palustris* is the most frequently encountered, our native King-cup, with dark green glossy foliage studded with waxy blooms of intense golden yellow and an indefinable charm of its own.

The double form, *C. palustris* "Flore

Pleno" is even more lovely — an altogether smaller plant which forms neat hummocks of foliage smothered in fully double blossoms of the deepest golden yellow.

Caltha leptosepala is the finest White Marsh Marigold. A tidy plant with broad icy-white blossoms with a distinctive silvery tinge. A variety of this, *C. l. grandiflora*, has even larger white flowers and foliage of corresponding magnitude.

Irises are splendid for poolside planting, but only *Iris laevigata* and *I. versicolor* and their various cultivars can be unreservedly recommended.

Our native Yellow Flag, *I. pseudacorus*, is much too vigorous for the garden pool, except in the golden and green striped foliage cultivar "Variegata".

The Cotton Grass, *Eriophorum angustifolium*, is generally well behaved, producing stiff grassy foliage which, during early summer, is sprinkled with silky cotton wool-like seeding heads. Unfortunately it needs an acid soil if it is to prosper.

Not so the Greater Spearwort, *Ranunculus lingua* "Grandiflora". There are few plants in the winter watergarden that can persuade the gardener that spring is just around the corner. Apart from its summer buttercup-like flowers, it has some of the most exciting early season foliage — great spears of olive-green and purple.

The majority of marginal subjects are at their best during the spring and early summer. It is left to stalwarts like the Flowering Rush, *Butomus umbellatus*, and Pickerel, *Pontederia cordata*, to provide colour during late summer and early autumn. I always find these two amiable plants admirable companions, the soft pink umbels of flowers produced by *Butomus* contrasting well with the powder blue spikes of the *Pontederia*.

Even when not in flower the foliage is complimentary, that of the *Butomus* being narrow and triquetrous and the *Pontederia* broad and glossy.

SUBMERGED PLANTS

Of the submerged aquatics, although not the most decorative, water gardeners generally concede that *Lagarosiphon major* is the best for most situations. This is the thick, dark green snake-like submerged plant popularly sold as "fish weed" or "Crispa". It is almost evergreen, a strong grower, but not particularly invasive.

The most elegant submerged plant has to be our native Water Violet, *Hottonia palustris*. During late spring this little beauty thrusts up stout stems bearing delicate pale lilac blossoms above handsome whorls of finely divided apple-green foliage.

Water Crowfoot, *Ranunculus aquatilis*, is a worthy companion, producing quite striking flowers just above the water. Glistening white and gold chalices as large as a penny, which are borne among broad dark green floating leaves.

The Milfoils are (generally) totally submerged and have dense whorls of narrow submerged leaves. Two native species, *Myriophyllum spicatum* and *M. verticillatum*, are commonly grown and these differ principally in the colour of their insignificant flower spikes. However, it is not the flowers for which they are grown, but their handsome filigree foliage which is just perfect for the deposition of fish spawn. If you are a fish fancier, these are a must.

FLOATING PLANTS

Floating aquatics have a different way of life to anything the gardener normally encounters. Not only do they infrequently produce roots for anchorage or absorption of plant foods, but most develop turions or winter buds and effectively disappear for the winter.

Water Chestnut, *Trapa natans*, is a prime example, although it does not so much retreat into a bud, but over-winter as a spiny nut or seed. For me it is the most attractive floating aquatic, during the summer months, sporting rosettes of dark green rhomboidal leaves and gorgeous creamy-white axillary blossoms.

Our native Frogbit, *Hydrocharis morsus-ranae*, comes a close second. This forms a tiny bud in the autumn and seldom reappears until early summer. For this reason it is wise to keep a few in a bowl during the winter so that they can be given a little warmth in early spring to encourage premature growth — a fine unblemished succulent growth that yields soft papery white flowers. The Frogbit is a good example of what, for me, makes a plant a favourite aquatic.

A CIRCLE OF COLOUR

Sunken ponds are relatively easy to enhance with a wide selection of bedding plants. But what do you do if your pond is of a raised design and your space is limited? **Ruby Bell** faced precisely this problem ... and came up with the perfect answer.

(Photographs by the author)

Right, very effective snow-melting pattern on the paving stones that encase the pond. But it was crying out for some colour.

Top, all requirements at the ready. Grow bags, knife, stones, and, a little prematurely, a hand shovel for planting (the hose pipe is not used).

Above, the completed circular bed, planted with *Nemesia* and *Mesembryanthemum*. Such an easy tak, but one that soon grows into a successful scheme.

During the long winter months, evergreens and variegated shrubs certainly come into their own. This is the time to plan for more colour. There is a limit to the placing of tubs and containers around a tiny paved garden like mine, however. For example, my pond has rather a severe, plain edge to it. Paving stones encase it, and any disruption of those would be unwise.

So, what could you do if you are faced with a similar situation? Well, what about a bed placed *on* the slabs? Grow bags could be the answer.

Measure the circle, and work out how many bags would be necessary to form a narrow bed. Assemble all the tools needed, the bags, a knife to slit them, and stones (or bricks).

Work on one bag at a time, bending it to the curved wall, and tucking the edge well under the ridge of the pond. Slit the bag lengthways; folding back one side of the slit and pushing the soil contents up against it to keep it in place. The other slit side will lie flat and the stones will be placed on that edge. Place the next bag, overlapping the ends slightly. Continue with each bag, until the circle is complete.

It is quite amazing how quickly the job is accomplished, making a vast improvement to the pond. The grow bag soil can be augmented by mushroom compost, or good garden soil mixed with sharp sand and fertiliser.

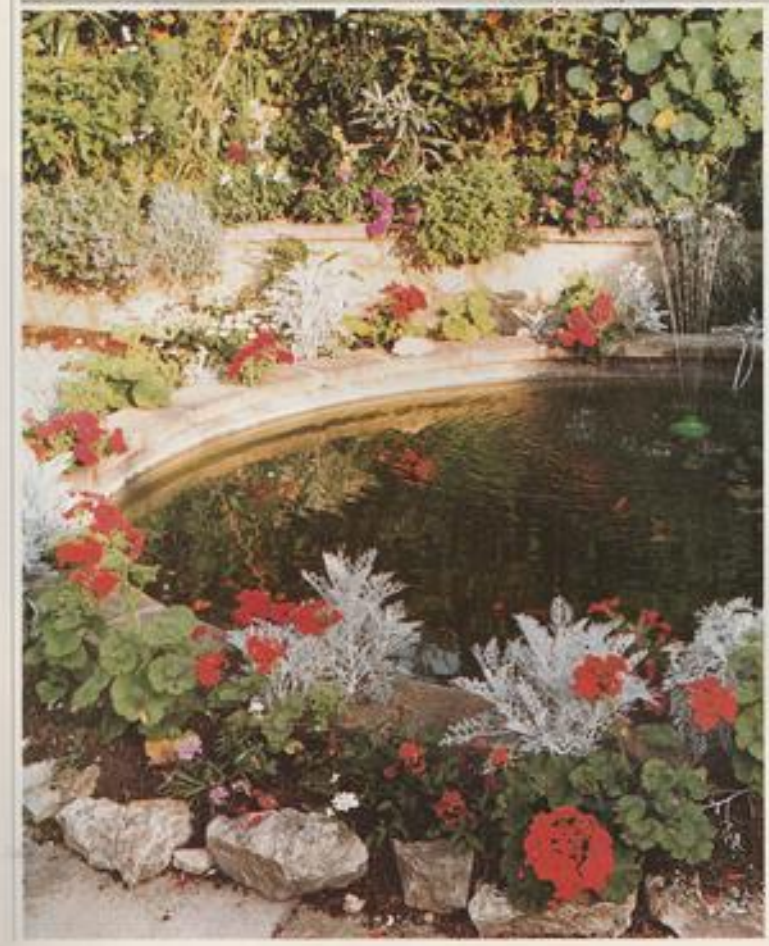
Adding the colour

Now for the wonderful task of planning the colour schemes. There are so many suitable annuals for this narrow, little bed that it is difficult to know what to leave out.

Plants should not exceed one foot in height, though some cannot resist the rich soil and open site, and tend to over-reach this limit, eg Silver Cup, *Lavatera*, which, in my case, made lovely reflections in the water, but proved rather leggy as the summer progressed. Great success was obtained with *Nemesia*, the variety "Sparklers", which ranges from cream right through to a deep scarlet and flowers from May until July, allowing for a further colour scheme to be attempted.

One packet of *Mesembryanthemum* yields hundreds of easily grown plants, which are ideal for ground cover, and the colours are superb, despite their tantalising habit of only revealing them when the sun is out.

"Golden Gem" Tagetes make a splendid second planting, with their bushy growth of



Left, an autumn scheme. To me the idea that the garden is finished at this time of year, is only a challenge to prove how long the flowering season can be maintained. Trailing petunias provide plants to peg down, so that the blooms reflect in the pond. Upright growth comes from geraniums with *Senecio* dividing them.
Above, circle of *Nemesia*, with wonderful shades from cream to salmon and scarlet.

feathery green, covered with masses of yellow, orange and red daisy-like flowers, related to the African and French Marigolds. They will see the summer out, with the most popular of all edging plants, "Crystal Palace", deep blue *Lobelia*, spreading into mounds over the stones, or the good-natured scarlet (zonal) geraniums with *Senecio greyi*, planted in between. The tops and small yellow flowers must be sacrificed to maintain short compact plants. They can be left in the autumn, to give silvery colour through the winter.

A narrow bed such as mine has an added bonus, as it forms a deterrent to curious cats or herons, neither of which have been troublesome (at least, the number of fish has remained steady). This narrow bedding scheme is now in its third year, giving no reason to disturb it, apart from topping up with enriched soil after heavy rains or foraging birds, who love to scatter the earth.

To avoid Pansy Wilt, one season has been missed out, but this spring they were back, to spread between mixed *Dianthus* (Pinks) . . . the proof of the planting.

Our small formal raised pond has always been attractive and a strong favourite, both with us and our friends. However, since its colourful, quick and easy "upgrading" it has become an even greater source of enjoyment.

Window gazing in the winter certainly has its inspirations and rewards!

GOING *WILD*

Few of us are lucky enough to have a truly natural wildlife pond in our garden — but many of us would like to own one. If you fall into this category, then *A & P* editor **John Dawes** has the right advice for you.

As the hobby of pondkeeping and watergardening expand, and as awareness of, and concern for, some of our threatened amphibians and aquatic species increase — so does interest in wildlife ponds.

Choice of materials

There is, obviously, no rule which dictates that a wildlife pond must only be built out of natural materials.

In fact, if one defines a wildlife pond according to its contents, then the actual material out of which the pond itself is constructed is, in a way, almost irrelevant.

However, the recommended shape for a wildlife pond (saucer-shaped, as opposed to steep-sided and shelved), means that liners and cement/concrete are perhaps better suited for this type of system. This does not mean that prefabricated informal ponds can't be used. What it means is that the other types of materials allow one to approximate a natural shape more easily.

The plants and animals won't worry too much either way. If the body of water provides for their basic needs, they'll be fine.

Choice of species

By definition, fish such as coloured Goldfish, Koi, Golden Orfe, Golden Rudd, Golden Tench and other man-made types of fish do not make ideal occupants, colour-wise, for a true wildlife pond. Neither do cultivated, "fancy" varieties of aquatic and marginal plants.

They can look attractive and will survive perfectly well, of course, but their inclusion somewhat defeats the purpose of a wildlife system which should, ideally, only contain native species of plants and animals.

In reality, though, most garden wildlife ponds include a mixture of native and non-native species, thus providing a wider range of organism than would otherwise be the case. In addition, some native species are difficult/illegal to obtain (eg Great Crested Newts and Natterjack Toads), while some exotic plants, like "Crispa" (*Lagarosiphon major*) are so widely available that many people actually regard them as natives.

Pond construction/installation

Assuming that the pond is not going to be a prefabricated one, then the following guidelines should help avoid major problems. If the pond *is* prefabricated, then appropriate insulation guidelines are usually supplied with the pond itself. One thing one should aim for, of course, irrespective of materials, is a fully sunken pond. A raised wildlife pond is virtually a contradiction in terms.

Whether you plan to use cement or a liner, the first step, having chosen a site (details of what to look for in a suitable site are available in all pond/watergarden books and are too extensive to go into here), is to excavate a

WILLIAM HOWES

L.E. PERKINS

JOHN DAWES

Above, Green Tench will rise to feed at the surface but tend to stick fairly close to the bottom where their grubbing activities can stir up the sediment.

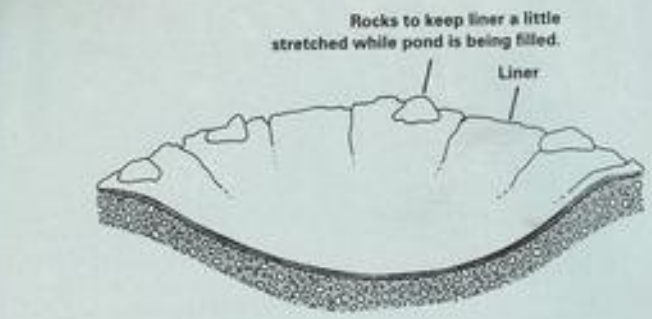
Left, the Chub is only rarely seen in aquatic shops these days.

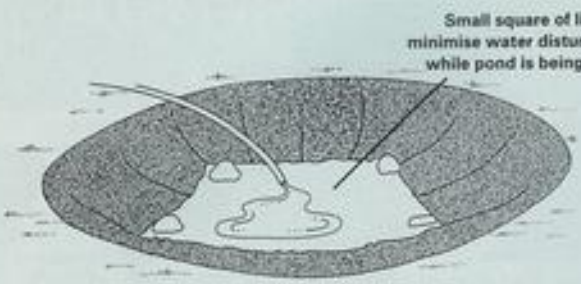
Top the Minnow (the classic "tiddler") should be kept in shoals.

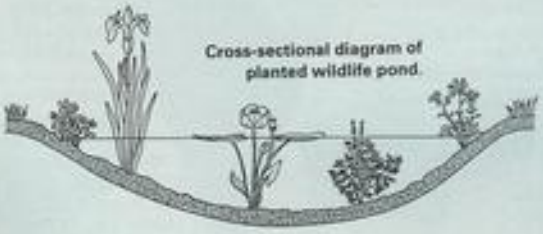
SOME FISH FOR THE WILDLIFE POND

Common Name	Scientific Name
Crucian Carp	*Carassius carassius*
Green Tench	*Tinca tinca*
Carp (Common)	*Cyprinus carpio*
Dace	*Leuciscus leuciscus*
Silver Orfe (Ide)	*Leuciscus idus*
Chub	*Leuciscus cephalus*
Rudd	*Scardinus erythrophthalmus*
Roach	*Rutilus rutilus*
Minnow	*Phoxinus phoxinus*
Bleak	*Alburnus albidus*
Gudgeon	*Gobio gobio*
Three-spined Stickleback	*Gasterosteus aculeatus*
Nine-spined Stickleback	*Pungitius pungitius*
Bream	*Abramis brama*

Note: Two native species, the Perch (*Perca fluviatilis*) and the Pike (*Esox lucius*) are far too predatory for most garden ponds.







saucer-shaped hollow with an absolute **MINIMUM** depth of 18ins (45cm).

If cement is going to be the chosen material, then a three parts sharp sand to one part cement worked into a malleable but stiffish consistency should be prepared and spread (with or without reinforcement, like embedded chicken wire) to a thickness of around 5-6in (12.5-15cm). In fact, a concrete layer of about 4in (10cm) rendered with a 1-2in (2.5-5cm) layer of cement will prove just as durable (or more so) and may end up being somewhat cheaper.

One warning if cement and/or concrete is being used: these materials are highly toxic. Therefore, either repeated scrubbings, fillings and drainings extended over weeks or months or, much more conveniently and easily, sealing with one or other of the effective, easy-to-use compounds currently available, is absolutely essential before the pond will be safe to use.

If a liner is used instead, then the following steps will provide an effective way of installing such a pond.

1. Having dug the hole to the appropriate depth (add a few inches to allow for pond underlay), remove all stones and sharp objects from the excavation.
2. Cover the excavation with suitable cushioning material such as sand, thick plastic bags, old carpets or (perhaps best of all) proper pond underlay.
3. Drape the liner over the hole and smooth it into place, making sure it is in contact with the whole of the pond surface.
4. Trim the liner edges.
5. Lay a complete covering of non-toxic material over the liner, making sure that you go well over the trimmed edges. (Several layers of newspaper are ideal for this, providing a good non-slippery surface for clay/soil to adhere to.)
6. Cover the newspaper with a layer of clay/soil several centimetres thick (an inch), pressing it down to avoid bare patches later on. (Even these will fill up in time, though, so you need not worry unduly if some appear after filling.)
7. Lay a largish piece of liner on a fairly level patch of pond bottom (but within reach so that it can be removed later) and weigh it down around the edges with a few small, smooth stones.
8. Lay your hose on the weighted-down piece of liner and allow water to trickle in gently to avoid excessive turbulence and turbidity.
9. Continue until the pond is full, then remove the weighted-down piece of liner. (Despite these precautions, some turbidity is likely, but it will disappear after a few days.)

Stocking

Planting can start straightaway with bunches of oxygenators being weighed down with stones (preferable to lead weights) and marginals pushed into place, at their appropriate depths, around the edges. If surface plants such as lilies are being used, these can be lowered into place using the technique shown in one of the accompanying diagrams (if they are being planted in containers). Alternatively, they can be planted in situ (but away from the liner patch mentioned in

Step 5) before the pond is filled.

Once things have settled down and the water has matured a bit, say, for about a week, stocking with the fish can start. The additions of pondwater dechlorinators and/or conditioners will, obviously, help considerably and will shorten the waiting time if you're in a hurry.

Whether you stock your pond with frog or toad spawn, or tadpoles from an appropriate source having surplus supplies or not, your pond will eventually attract these highly desirable creatures, along with newts, dragonflies, damsels . . . and all the rest.

To me, one of the great delights of a wildlife pond is its complement of truly "wild" creatures. I therefore make no effort to discourage any of them — but would take remedial steps if I were to get an over-population of unwanted guests such as Great Diving Beetles (*Dytiscus marginalis*) or Fish Leeches (*Piscicola geometra*). Fortunately, I've always managed to stay clear of major infestations of such organisms to date.

Filtration, edging and aeration

These aspects of the wildlife pond depend, very much, on personal opinion.

Filtration will undoubtedly help maintaining water quality parameters under control — but do ensure that the inlet pipes are kept well clear of the bottom of the pond and that the outlets are directed in such a way that they don't stir up the substratum. Suspended material will not only cloud the water but it will also shorten the life of your pump and will do a fantastic job of clogging up your filter.

Paving stones or slabs (preferably informal) will provide a firm dry footing around the pond, but a complete pond surround of this type can look a little unnatural.

Aeration by means of a fountain spray needs careful thought. Fancy sprays and wildlife ponds don't make ideal partners. Therefore, the simpler the spray, the better. A low, "bubbling brook-type" of water jet is, perhaps, the most compatible with such a pond.

At the end of the day, personal choices, force of circumstances, and numerous other factors, will determine the overall shape, design, size, contents and characters of a wildlife pond.

Few people can provide strictly natural conditions for their pond inhabitants. This does not, however, mean that the rest of us cannot enjoy the thrill of owning a quasi-wild pond. We *can*, and the more of us who take the step in this direction, the more likely we are to come to appreciate the great beauty and value of our native plants and animals . . . to say nothing of the considerable contribution that we will be making towards ensuring their survival in an ever-shrinking world.

NOTE: The diagrams for this article are reproduced by kind courtesy of **TFH Publications** and come from **John Dawes's Book of Water Gardens,** ISBN: 0-86622-662-1, Price £13.95.

JOHN DAWES

Cotton Grass — a potentially invasive, but nonetheless attractive, marsh plant which prefers acidic conditions.

JOHN DAWES

The Marsh Marigold is an excellent spring flowering marginal/marsh plant for the wildlife pond.

SOME PLANTS FOR THE WILDLIFE POND

Marginals and Marsh Plants
(Roots under water or on marshy ground — aerial leaves and flowers)

Common Name	Scientific Name
Water Mint	*Mentha aquatica*
Yellow Flag	*Iris pseudacorus* (not variegated type)
Water Plantain	*Alisma plantago-aquatica*
Cotton Grass	*Eriophorum* spp
Water Forget-me-Not	*Myosotis palustris*
Marsh Marigold (King Cup)	*Caltha palustris* (not the double variety)
Bugle	*Ajuga reptans*
Creeping Jenny	*Lysimachia nummularia*
Bog Bean	*Menyanthes trifoliata*
Dwarf Bullrush	*Typha minima*
Arrowhead	*Sagittaria sagittifolia*

Surface Plants
(Roots in bottom — leaves on surface)

Common Name	Scientific Name
White Water Lily	*Nymphaea alba*
Yellow Water Lily (Brandy Bottle)	*Nymphaea lutea*
Water Crowfoot	*Ranunculus aquatilis*
Broad-leaved Pondweed	*Potamogeton natans*
Parrot's Feather	*Myriophyllum brasiliense/aquaticum/proserpinacoides* (All three names are in use. This plant could also be regarded as an oxygenator or even a deep marginal when it produces its aerial leaves)

Oxygenating Plants
(Roots and leaves submerged)

Common Name	Scientific Name
Milfoil	*Myriophyllum spicatum*
Curly Pondweed	*Potamogeton crispus*
"Crispa"	*Lagarosiphon major*
Canadian Pondweed	*Elodea canadensis*
Hornwort	*Ceratophyllum demersum* (does not produce roots)

A colourful display (albeit with somewhat "over-colourful" artificial corals) at Sea World.

Sharks, like this seven-foot Sand Tiger at Mystic Aquarium, are always great crowd pullers.

SHARKS, 'SHAMU' AND 'SEABASE-ALPHA'

Dr Chris Andrews of London Zoo Aquarium invites us along on a spectacular and fascinating tour of some of America's best-known and most professional public aquaria.

(Photographs by the author)

During the autumn of 1987, I was fortunate enough to spend five weeks touring North America, visiting a number of their major public aquaria. This trip was kindly sponsored by Salamander Books (U.K) Limited, and Tetra Sales (U.S) Limited, and enabled me to get a detailed insight into the planning, design and maintenance of a range of facilities, the like of which we have not yet seen in the U.K. During the trip I covered something like 16,000 miles, by train, plane, and airport bus, rarely spending longer than three or four days in any one place.

The tour began in Boston, at the New England Aquarium, and then proceeded to the Mystic Marinelife Centre, the New York Aquarium, the National Aquarium in Baltimore, Chicago's Shedd Aquarium, the Steinhart Aquarium in San Francisco, the Monterey Bay Aquarium, the Waikiki Aquarium in Hawaii, and, finally, Sea World and Walt Disney's Living Seas exhibit in Florida. I actually returned to America in the spring of 1988, to visit the Seattle Aquarium and the Vancouver Aquarium, but that is another story!

Incredible Collections

The Shedd Aquarium and Steinhart Aquarium both house incredible collections of aquatic animals from all around the world. Although the emphasis was on fish at both facilities, a range of amphibians, reptiles, and aquatic invertebrates were also displayed, along with some aquatic mammals. In fact, the Shedd Aquarium is currently undertaking a 40-million dollar expansion, so that it can display sea mammals such as dolphins and Beluga Whales.

However, the main attraction at the Shedd Aquarium at the moment is the 90,000 gallon Caribbean Reef tank, which was refurbished about two years ago with breath-taking attention to detail. Although the coral formations are all artificial, they look real enough, and form a suitable backdrop for the 200 or so fish, plus turtles, which inhabit the tank. Naturally, the regular diver shows, where a diver enters the tank to feed the fish, are very popular with the public.

The, now rather dated, 'fish roundabout' at the Steinhart Aquarium is another popular display. Containing 100,000 gallons of salt water, a one-knot current is produced which the fish orient to, and swim against. When I was there, the tank contained a range of fish such as Striped Bass, rays, groupers, Sand-bar Sharks, and Leopard Sharks, although sometime previously a Great White Shark had been on display. Unfortunately, it had to be released as it did not adjust well to life in captivity.

Local Marine Life

The aquaria at Mystic, Monterey and Waikiki all placed an emphasis on exhibiting local marine life. Fish and invertebrates were the main display animals at the Monterey and Waikiki aquaria, although there were also some impressive displays of dolphins, Beluga Whales, seals and sealions at Mystic. The 30,000 gallon shark tank at Mystic, with its six- or seven-foot long Sand Tigers, was also very striking, and there was a small-scale, but innovative, use of interactive devices (such as touch-screen video) that seemed very popular with younger visitors.

Since it is situated right next to Waikiki beach, the Waikiki Aquarium had the best location of any aquarium I visited! Although relatively small, there was an imaginative blend of museum specimens and live animals, and some quite stunning displays of local corals and reef fish.

I assume that most people enjoy hunting

around rock pools when on holiday. Well, at the Waikiki Aquarium there is a large, outdoor artificial rock pool with its own tidal surge, that contains a range of Pacific invertebrates and fish such as tangs, blennies, damsel fish, squirrel fish, etc. Another advantage that the Waikiki Aquarium has, is that when its Black-tip or White-tip Reef Sharks get too large for their tank, they just take them down the beach and let them go!

The recently opened Monterey Bay Aquarium is, without doubt, one of the finest public aquaria in the world. Specialising in the diverse marine fauna of that part of the Californian coast, it has brought together a number of aspects of tank design, aquatic animal exhibitry, and information presentation that makes the aquarium a fascinating and highly-educational place to visit.

There are not many places where you can watch Sea Otters cracking open clam shells, and then turn to observe gently-pulsating jellyfish, real Californian kelp growing in a huge tank with its own tidal swell, or even an artificial beach and sand dune where waves break around wading birds — and all without leaving the aquarium building! Opened less than five years ago, at a cost of something like 60 million dollars, the Monterey Bay Aquarium is a must for anyone visiting California.

New and Newer Still

The New England Aquarium in Boston, and the National Aquarium in Baltimore, are two relatively-new 'stand-alone' public aquaria. Baltimore was, in fact, modelled on the Boston Aquarium, although both are magnificent. At Boston the 180,000 gallon giant ocean tank contained 600 fish, of around 100 different species, that were of mainly Caribbean origin.

In addition to a range of typical reef fish, such as angel fish, dwarf angels, tangs and damsel fish, the tank also contained moray eels, rays, groupers, barracuda, Nurse Sharks, Sand Tigers, *and* a 500 lb turtle. The ability to view across the top of the tank is an added bonus, and, of course, divers feeding the fish were very popular as a public display.

The Baltimore Aquarium took the basic design of Boston and developed it. Therefore, there is a 200,000 gallon shark tank, and a 300,000 gallon Caribbean reef tank, *plus* a large glazed walk-through Amazon rain forest exhibit. Like Boston, the Baltimore Aquarium also has a range of smaller tanks, exhibiting animals such as Giant Pacific Octopus and Flashlight Fish, as well as a range of local and exotic freshwater and other marine species.

Although both of these public aquaria are very entertaining facilities to visit, their educational role is also important, aided by stunning graphics and information labels, and a very active aquarium volunteer programme.

Children's 'Cove', a series of artificial rock pools in a specially-created indoor beach setting at the Baltimore Aquarium, puts the public, but especially children, in close contact with a range of marine animals, which they might have seen at the beach or

Not all tanks in American public aquaria are large — imaginative use of small exhibits can work very well too.

on TV, and then enables them to find out more about their way of life.

Rejuvenation

The New York Aquarium, situated between the high-rise apartment blocks of Coney Island, a fun fair and a beach boardwalk, is undergoing a massive rejuvenation. It currently consists of a number of 'houses', rather like a zoo, and exhibits, in addition to fish and aquatic invertebrates, a number of sea mammals, and also penguins.

The smaller displays of squid, octopus, seahorses, and African Lake Cichlids, were very attractive, although for me, the Walrus and Beluga Whales were the most fascinating.

Any day now, a new exhibit entitled Discovery Cove, should open at the New York Aquarium. This will be a unique, very varied exhibit, dedicated to highlighting the nature of life beneath the water, and will contain freshwater and marine, tropical and temperate fish and invertebrates. This aquarium is going to be very special indeed!

'Mega-aquaria'

Sea World of Florida, and the Living Seas exhibit in Disney's Epcot Centre, cannot really be called 'aquaria'. At Sea World, among the dolphins, Killer Whales, penguins, Walrus and otters, was a 660,000 gallon walk-through shark tank, and a 180,000 gallon Indo-Pacific reef tank, plus around 20 other small tropical marine tanks.

Being able to pass through an acrylic tube, inside a tank containing 30 large sharks, and then go and watch a diver feeding several hundred, very colourful reef fish, was breath-taking indeed. In a rather different way, so was the 'Wally the Walrus Show', and the 'Baby Shamu Celebration Show'!

Similarly, a visit to 'Seabase-Alpha' at the centre of the Living Seas exhibit, with its six-million gallon Caribbean reef tank, was a piece of pure Disney magic. You do, I think, actually feel as if you are 50 feet below the water surface, on the ocean floor. And, looking out into the 'sea' there are reef fish, sawfish, turtles, a 10 foot Tiger Shark, and a 500 lb grouper. The Tiger Shark has been known to stalk the divers that enter the tank to feed the fish, which must be un-nerving to say the least!

While in 'Seabase-Alpha', the theme centred on the exploration and exploitation of the sea, with a number of related exhibits and inter-active devices. One problem, however, is that there is so much to see at the Epcot Centre as a whole, that you really need to spend two or three days there.

Fishkeeping at Home

Clearly, visiting the above facilities was of great value in terms of our present and future plans at London Zoo. But were there any items that were relevant to fishkeeping at home?

Seawater

Many of the aquaria I visited were situated on the coast, and hence some of these had an abundant supply of fresh, clean seawater. Smaller tanks were often filtered in a fairly rudimentary way, but with a continuous, though very small, in-put of new seawater, with an overflow to waste. This is a luxury that few hobbyists, and only some public aquarium managers, are familiar with. Therefore, it was very interesting to see at one or two facilities that, not only were they relying on dry salt mix to keep a wide range of marine fish and invertebrates, but that the salt mix sometimes consisted of a fairly basic in-house recipe.

In fact, one or two aquarium managers queried the almost obsessive interest shown in some quarters regarding the need for a plethora of trace elements and minerals in an artificial salt mix, and claimed that, as long as the animals were properly fed, even quite delicate invertebrates could be successfully kept in a fairly basic textbook mix. Seawater is very complex, but which of its constituents are essential for the captive maintenance of the organisms we are interested in? Not a very easy question to answer!

Lighting

The importance of good lighting, which can be natural sunlight if you are in Waikiki, or metal halides if you are not, is very important for successful maintenance and growth of marine macro-algae, and many marine invertebrates. At many aquaria, there was a tendency to utilise relatively small shallow tanks for the maintenance of marine invertebrates, and particularly corals, where it is much easier to feed these animals, and achieve adequate illumination levels. Metal halide lighting equivalent to 5–6 watts per gallon was not exceptional.

Feeding

The use of cultured foods, such as live rotifers, newly-hatched Brine Shrimp, and algae for the feeding of marine corals and similar marine invertebrates was quite widespread, and it was also apparent that relatively few fish were kept in displays dedicated to marine invertebrates.

Dry, flaked or pelletted fish foods were quite widely used at the aquaria visited, as was chopped fish, squid, and the like. With regard to the feeding of tropical marine fish in particular, many aquaria make up their-own mix of chopped fish, shrimp, squid, vegetable matter, and so on, to which they add vitamins and then bind it into a gel-based block. This is convenient to use, and accepted by a wide range of fish.

The over-frequent use of frozen foods, such as frozen Brine Shrimp, was not favoured at all. To encourage difficult feeders, some aquaria dip dead coral heads into their molten gel mix, and then allow it to dry. When placed in the tank, some of the coral 'pickers' will often be encouraged to feed. Parrotfish, by comparison, are often fed on a plaster of Paris food block, with colour-enhancers to keep their striking colours.

Health Problems

Not that the aquaria visited were without their problems. Fish diseases occur, even in modern aquaria, and outbreaks of pests, such as *Oodinium* and *Cryptocaryon* among tropical marine fish, were, unfortunately, quite common. Freshwater dips and/or prolonged copper treatments were commonly used to combat these problems, and generally-speaking, most aquaria quarantined their fish for long periods before introducing them to their set up tanks. Nonetheless, having to treat a large, several-hundred thousand gallon reef tank with copper is not unheard of, and is quite a daunting task!

Filtration ozone & skimmers

The filtration systems serving many of the large tanks in the aquaria I visited, were often fairly simple, although they did achieve a turn-over time of the tank volume of around once every one or two hours. Something that appears to be gaining wide acceptance in North America, however, is the use of ozone, whether it be on large reef tanks or smaller exhibits. The ozone is usually injected into the water, whereupon it is then de-gassed before passing back into the display tank.

The use of ozone does, of course, bring with it a number of problems, including potential toxic effects to humans, as well as aquatic animals, along with possible damage to plastics in the vicinity. However, when used at the correct concentration, these disadvantages can be eliminated, and ozone can have a very obvious effect on removing the colour from seawater, as well as, if present, enhancing the performance of protein skimmers.

Generally speaking, ozone was not employed at sufficient concentrations to act as a disinfectant, as is often assumed by some hobbyists. It was interesting to see that, at one or two facilities, ozone was bubbled directly into small display tanks for around eight or ten hours per night, and that the reef fish that these tanks contained did not suffer any ill effects, but were swimming around in water completely lacking in colour with crystal-clear clarity.

Tank Decor

With regard to tank decor, it was interesting to see the extent to which artificial corals and seaweeds were being used in public aquaria in North America. Clearly, when you have to fit-out a two or three thousand gallon reef tank, it is not only impractical, but also undesirable from a conservation point of view, to utilise real corals, whether they be living or dead.

The artificial corals that are available in North America are really very impressive indeed, although few of these appear to be available to hobbyists, and the same can also be said of some of the artificial seaweeds. Perhaps it is time someone started marketing these kinds of products for hobbyists, much in the way that similar decorations are marketed for the freshwater aquaria.

Closing Thoughts

I hope that this article creates an impression of what the public aquaria in North America are like, and provides an indication of how they tackle the very same problems and difficulties that amateur hobbyists face at home.

In conclusion, I would just like to add that the staggering popularity of aquaria in North America has to be seen to be believed, with attendances at all the major public aquaria increasing steadily from year to year, and with numerous proposals to renovate existing aquaria or build new ones to capitalise on the public's thirst for information on the aquatic world.

Overall view of the tank.

THE LIVING ROOM REEF

(THE BASICS) Part 1

Marine aquarists today can reach heights (or depths?) that their predecessors of a few years back could only dream about. **Peter Bienias** and **Jane Tabern** of Aquatic Design show how they went about transforming their fantasies into reality.

(Photographs by Peter Bienias)

"Is this the real life, is this just fantasy . . ." (**Queen, 1975**). The "real life" that graces the tropical reefs of the world is becoming more a reality to hobbyists' living rooms, largely due to the new technological era in marine aquaria.

This advancement supports hobbyists' confidence when it comes to making the initial progressive step from freshwater to saltwater environments. With the new "all in one" systems and up-dated information, etc, hobbyists had reached new "depths", and challenged their ability to maintain the more exotic life forms successfully in a controlled environment.

It is now possible to enjoy and be astounded by Nature's artistic talent as she creates with vibrant colour and rich textures the treasures of the tropic seas. However, this is only the exciting beginning; the most important development of any successful miniature reef keeping relies on the hobbyists' observations and constant questioning about what is happening in their aquaria.

This constant questioning has always played a big part in the way that we have approached aquariumkeeping. After all, if the inhabitants of our aquaria have come directly from the reef, it's only fair that the artificial environments which we provide them with should match as closely as possible those found in Nature.

This beautifully delicate *Euphyllia divisa* comes from the reefs around Singapore.

First STEPS

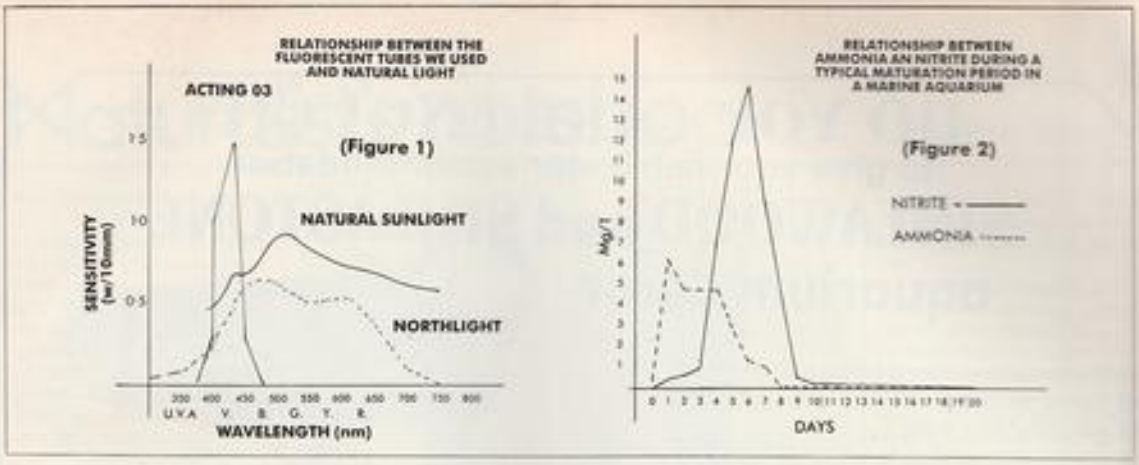
With this in mind we set out some time ago to establish an artificial reef environment in a 48-gallon aquarium (actually water content is 42 gallons — c 190 litres — owing to rock displacement). The external dimensions of our aquarium are irrelevant; just because it is X" x Y" x Z" doesn't mean that if yours isn't this size it won't succeed! What follows, in our short series of three articles, is the story of this venture.

In the first instalment we will be dealing with filtration, temperature, lighting and saturation factors, as well as the building of the environment.

The second instalment will revolve around the coral community, with an in-depth report on a few individual corals, the growth of coral on the living rock, expansion and contraction cycles and the positioning of corals relevant to the light saturation. The third instalment will be on invertebrates (and some problems that can occur), fish introduction, and the development of the system.

THE BASICS

Filtration used is the basic undergravel system i.e. filter plates covered with a layer of a 50/50 mixture of Calcium Plus and crushed coral, with the usual top layer of coral sand



— the layers are separated with a gravel tidy. An extra pre-filter is used on an intermittent basis, this providing a sudden surge of water movement which we have found is beneficial to the corals.

Temperature is monitored around 26° (c 79°F), certainly no higher than 28°C (82°F), as this has been found to disagree with some corals.

Lighting saturation was given the rule of 1ft (30cm) of Actinic 03 and 1ft (30cm) of Northlight per foot (30cm) length of aquarium at a duration of between 10-12 hrs per day. This was in a seasonal rotation — roughly 9.30 am-10.30 pm during the winter period, and 9.00 am-10.00 pm during summer. The reason for this was to use the natural daylight to awaken the reef while, in the evening, there is nearly always some sort of artificial light in use when the aquarium lights switch themselves off. This choice of lighting was made because of the combined wavelength ranges. Also, Actinic 03 has a light distribution peak of 420 nanometers, the same peak as blue chlorophyll absorption (see Fig 1).

We tend to regard the mechanics of an aquarium as being separate, independent entities i.e. light, water depth, water movement, etc. In nature, though, they are very much interrelated and viewed as a whole. As hobbyists we should adopt the same approach, e.g. coral species live at different depths in the sea and receive varied light intensities, therefore when creating a coral reef which has a mixture of coral species, the siting of the corals in relation to the lighting is extremely important.

Nature does not increase its intensity of light so that corals at, say, 15 metres (50ft) receive the same light as those at 5 metres (16ft). Therefore, we did not increase the light factors in our aquaria. We just positioned the corals, so that they had the best environmental factors for them to live.

INSTALLATION

The basic foundation for the system was all living rock. Although a living rock/tuffa rock combination can be used, the more living rock the better. Approximately 30 kgs (66 lb) were introduced directly in the "imported" state i.e. straight out from the box into the aquarium, as the foundation for maturing the aquarium.

Over the next few days the rock went through various stages, along with a rich distinct aroma similar to that of the seaside.

Day 1

The crustacea and mollusc species came to life.

Day 2

The sponges on the rock started to decay. If a large amount of sponge is introduced, then a slight clouding of the water may occur. This happened in one of the aquaria undergoing this cycle but it was not detrimental to this system.

Day 3

The tubeworms and the coral polyps started to emerge on the living rock.

Day 4

The deterioration of the sponges started to slow down at this stage. The development of algae was observed.

Day 5 and onwards

From this point onwards the aquarium began to look like a miniature reef. Sea squirts, tubeworms, polyps (both soft and hard coral varieties), small algal fronds, crustacea and various molluscs began the renovation and refurbishment of their new home.

While all the visible activity was busying itself, the invisible factory set about its task of establishing the environment. Fig. 2 shows a typical maturation period for one of our aquaria.

As you can see, the first significant value was the ammonia level. A very steep rise in level was recorded over the first two days, followed by a quick return to its norm. The ammonia never returned to nil, but a constant slight fluctuation was, and still is, recorded.

The reason for this is the possible theory that if one were to take a continuous reading on a coral head, it would more than likely show an irregular series of sharp rises and falls of concentration of ammonia. This is because the ammonium ion is the main excretory product of invertebrates but, in turn, the primary food for reef algae.

In contrast to ammonia, nitrites show a slow initial rise. Then, as soon as the ammonia level begins to fall, the nitrite quickly rises to a peak over the 5th and especially the 6th day, followed by a rapid fall-off.

These results have been found in every system that we have set up. In this case, there were no real noticeable differences, giving a maturation period of about 14 days. Algal growths continued to flourish during this period and, once this stability had arisen, corals were added.

The corals were introduced in a bulk load and it was found that there was no significant change to the environmental factors. The following tests were carried out over a period until the system returned to its original levels, normally 5 days.

Test results: **pH** 8.3 (constant); **Nitrite** 0.05mg/l-0.07mg/l; **Ammonia** 0.05mg/l-0.1mg/l.

Corals added were:

Bubble coral (*Plerogyra simplex*) x 2, *Euphyllia divisa* x 2, *Goniopora* (long polyp) x 2, sea fan (red variety) x 1, *Xenia* (green eye-and-tip variety) x 3, colonial anemones x 2, Mushroom Coral x 2, sponges (orange cup shape variety) x 2, *Tubastrea* x 3, Fire coral x 2, soft coral (Sea Cauliflower) x 3, Honey Coral (*Lobophyllia* species) x 2, tubeworms x 10, sea urchin x 1.

Each coral was taken from its bag and existing water and roughly arranged in the aquarium. Final positioning of the corals was left until the following day as we found it was more important to "close" the aquarium down, i.e. switch the lights off, to allow the corals to settle in.

A few corals opened up immediately, while others took days, and some even took a couple of weeks to expand fully. Each coral was observed on an individual basis to see its reaction to the artificial environment and it was found that most of those listed above went through a cycle of expansion and contraction, some with a regular, and some with an irregular, pattern, depending on the species.

The aquarium is an ever-changing and maturing picture of reef life, drawing our observations and questions constantly. With an aquarium creation such as this, the most important factor is patience. Nature takes centuries to build even small reefs, so it is important not to jump to the most dramatic conclusion if a particular piece of coral doesn't look "full" of life. During our observations we have witnessed a coral in a collapsed state for days only to return to its former glory.

The coral inhabitants of this miniature reef will be discussed on an individual basis in the next article, **Captive Corals.**

Naturalist's notebook

By Eric Hardy

Any pond-dipper spending a life in the ditchwateristics of collecting *Daphnia* and sorting out aquatic plants will have noticed not only changes in pH, water-flow and exposure causing ups and downs in native species, but the unending invasion of foreigners with the transplanting of fish, things adhering to passing boats, or an aquarist's discarded surplus.

Invading Crayfish

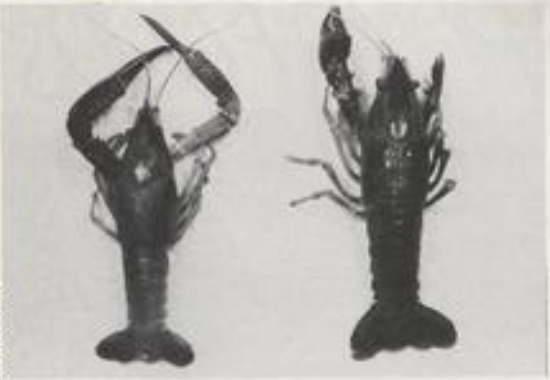
Recent research into invasive alien molluscs, flatworms, amphipods and aquatic plants brought a recent conference of West Midlands and North-west England Freshwater Biology Group to Liverpool University.

I was intrigued by a tank with four different species of crayfish troubling British waters, brought by Prof. D. M. Holdich of Nottingham University. Our native White-Clawed Cray (*Austropotamobius pallipes*, formerly *Astacus fluviatilis*), found by turning over stones in limestone (calcium) streams, or using a funnel net-trap, is threatened not only by a notorious fungus disease but four introduced aliens which climb out of ponds and tanks at fish-farms and crawl overland.

Our natives are at their most northerly range. They don't usually inhabit igneous rocks unless introduced and have only one Scottish haunt where they were introduced to Durness Loch, near the craft centre at Cape Wrath. All five European crays will nip your finger and hold on with their claws and all are susceptible to the fungus. But the large, red-clawed American Signal Cray (*Pacifastacus leniusculus*) only carries it, and isn't affected except under stress.

Reaching Britain in 1981, Ireland 1985, it has recently invaded Turkey, Sweden, Spain and Portugal. It extends here to Anglesey, Lleyn, upper Lune, the River Kennet near Reading, etc., probably as escapees from crayfish-farms. In display it shows the red underside of its claws by lying on its back when handled.

From 200 introduced to the Bristol Avon in 1981, it increased by 1987 to 3,000 in one brook alone, eliminating natives, though others were still



JOHN DAWES

***Procambarus clarkii* — the Louisiana Red Swamp Crayfish — just one of several invasive foreign species currently spreading in British waters.**

a mile downstream. It also damaged carp in a carp fishery near Cambridge. So far, it has over 250 British sites, but none yet known in Ireland.

The American Striped Cray (*Orconectes limosus*) is the commonest in France and is in Germany and southern England. The Louisiana Swamp Cray (*Procambarus clarkii*), was also introduced to Britain and Spain where it became an abundant pest in 10 years, entering the underground water system. The large Turkish Cray (*Astacus leptodactylus*) has many British locations teeming in two Tooting Common ponds and with colonies in London docks, the Grand Union Canal into London and is eaten by mink and otters in south Shropshire.

The major plague area, the Thames, Lee, Coln, Bristol and Hampshire Avons, Wey, etc., got it in 1970 with the introduction of Signal Crays. It is on the edge of Britain's major native crayfish area, the Wyre Forest and Wye Catchment. Signals failed when introduced to Norfolk where many natives exist but succeeded in Suffolk where natives were absent. There is no legal restriction on importing and farming foreign crayfish and they don't respond to electrical fishing.

Foreign "shrimps"

Clinging to passing boats, a tube-dwelling Russian amphipod crustacean *Corophium curvispinum* is spreading through British canals and may prove a useful new food for fish like Gudgeon and Perch. It's distinguished from common Gammarus "Water-Lice" by its long 2nd antennae and by crawling and hopping, not swimming. It feeds by pumping water through the tube with its feet, and carries eggs in a summer-autumn pouch.

Originating from the lower and middle Volga, the Caspian and two lakes in the Caucasus, it tolerates turbid and, even, seawater. In 1935 it was introduced to the Tewkesbury Avon, probably with imported timber, but then disappeared. In 1960 it was found in the Grand Union Canal in Leicestershire, then the Coventry Canal, the Severn at Stourport and, in 1980, the Lee Navigation. It's widespread in the Leeds and Liverpool, Macclesfield and Shropshire Union Canals.

It is normally sedentary unless attaching to passing boats, and thrives especially on hard concrete or brick canal retaining walls like the Shropshire Union, rather than on muddy margins and, in the Lee, attaches itself to the base of *Vallisneria spiralis*. The latter, incidentally, appears to be spreading from the Rochdale Canal after many years' colonisation of Manchester canals.

Exotic flatworm

A tiny American Triclad (flatworm), *Dugesia tigrina* with four British localities in 1956, increased to 65 by 1985 and 83 by 1987, mostly rivers and canals in the east and south; also in the Lancaster Canal and shallow, eutrophic, standing waters like Anglesey's Llyn Coron and Maelog, as well Shropshire's Colemere since 1968.

The last body of water, unlike Coron, has competing native species. It is probably limited by climate and needs at least 6°C to reproduce and is best at 20°C. It has the advantage over native species of being asexual too, hence it continues to oust them in eutrophic lowland waters.

Russian . . . and other mussels

A new use has been found for the variously striped Russian Freshwater Zebra Mussel, *Dreissena*, introduced in 1824 and a well-known pest of Scottish fish farms and London water mains — to filter algal bloom from the Salford Basin recreation end of Manchester Ship Canal.

Ropes of sea-mussels are used this way to keep Liverpool's Albert Dock public complex clear; but present experiments show 20 times as many Zebra shells would be required (4.6 millions at 10°C) and some algae stimulate a resistance to filtration. Its filtering increases with temperature (80ml an hour at 20°C) but the researchers found Manchester tapwater less pure than the Glossop Brook they turned to!

The sedimentary Swan Mussel, *Anodonta*, is less efficient. American, French and New Zealand molluscs are also spreading.

Non-native plants

A tank of invading alien water plants at the conference included the tiny American water fern *Azolla filiculoides* which fixes atmospheric nitrogen by its association with a blue-green alga, *Anabaena azollae*.

This differs from a rare American introduction, *caroliniana*, by the smaller, single cell leaf-hairs on the female; but it needs a ultra microscope to see that. Size is not always a distinction. African *Lagarosiphon major* is another problem from the south-east to Manchester, but less able to compete where more species like Quillwort are in Lakeland waters. It's a great pest in New Zealand, growing to 5m in warm waters.

PRODUCT ROUND-UP

BY DICK MILLS

POND FOODS

I wouldn't be surprised if there are a good few people out there who think a garden pond looks after itself, and that this goes for the fish too. "Well, there's all that natural food dropping into the pond all summer, and the fish sleep all winter don't they?"

Little do these unbelievers realise that foods for pond fish are not only essential, but also fulfil another, more deeply social purpose — bringing fish and owner closer together.

It is hardly likely that a pond fish will acquire all the nutrients, vitamins and trace elements it requires simply by letting nature take its course. Research into foods has resulted in the development of many sophistications: not only food to satisfy the fishes' dietary needs, but also to enhance coloration, build up stamina and resistance to disease. Add to these factors the preparation of foods in different forms to suit the fishes' feeding manner through the changing seasons, and you may realise that modern fish foods are very much a different bag of Spirulina!

BILLY WHITESIDE

Hand feeding — One of the great joys of owning a pond.

The warm waters of summer encourage fish to bask at the surface, so long-floating foods are the order of the day. In cooler months when the activity dies down a little, the fish descend to the warmer bottom levels of the water and require foods that build up their reserves for winter; in this case, faster sinking foods are the requirement.

Feeding pond fish is also a question of correct timing; it's true that in the very mild winter we enjoyed this year the occasional venture up to the surface gave rise to eager anticipation of things to come (and was rewarded by a titbit or two), but feeding should only seriously commence once the water temperature remains stable — above say, 45-50°F (8-10°C).

The best way to gauge the amount of food needed at any time is by observation: as long as the fish take the food eagerly then a little more can be given. A loss of interest is the signal to stop.

In warm weather food digestion is relatively rapid and fish can be fed two or three times a day . . . or more, as long as the food is entirely eaten at each feeding (water pollution is equally rapid — "non-clouding" foods still decompose and foul the water if overfeeding occurs).

In autumn there will be a revived interest in feeding as the fish "stock up" for winter, so be prepared for this with the relevant foods. Remember too, to feed the fish the correct size of food — with today's foods being available in various sizes, all fishes can be catered for easily; just watch they don't spit out (and ignore) the too-large pieces.

The next time you stand by a pond and see the fish rise to greet you, will you have the heart to turn away without feeding them the best they deserve, and leave them to fend for themselves?

NEW PRODUCTS

GALLAGHER POLYWIRE

It may sound more like an aviary accessory, but **GALLAGHER'S POLYWIRE** can play a very important role in protecting your valuable pond fish and does, indeed, have a bird connection.

Two lengths of the six-stranded, stainless steel Polywire erected around the pool at 6 inches and 15 inches (15-22cm) high will, the makers report, deter cats and herons more effectively than other forms of trip wires due to an added ingredient — electricity! Yes, the wire is electrified by a low voltage battery energiser, enough to give unwanted trespassers a short sharp shock, enough to educate them into not repeating the trespass but without injuring them.

The wires are thin enough to be unobtrusive and the system has proved to be more successful against would-be predators than previous methods. A typical garden pond can be protected for under £100. Details from:

GALLAGHER AGRICULTURAL LTD (EUROPE), Curriers Close, Canley, Coventry, CV4 8AW. (Tel.: 0203 470141).

GALLAGHER AGRICULTURAL LTD.

Gallagher General Manager, Gary Satchwell, checks the electrical output on the anti-heron Polywire fenceline. In attendance is Roger Cleaver (*A&P*'s Koi queries expert) who erected the fence.

TRUE-LITE

Feeling sad? According to **GENERAL ACOUSTICS LTD.**, this is an acronym for Seasonal Affective Disorder which is brought about by the long dark days of winter and the absence of the full spectrum of sunlight. The remedy is to use TRUE-LIGHT fluorescent tubes both in the office and home and, naturally enough, in the aquarium.

TRUE-LITE's ability to produce simulated sunlight in turn affects the pineal gland into convincing the body that it is summer time, so you feel better in a more "true-to-life" lit environment.

Applying the light to the aquarium will, it is claimed, result in the fishes' colours being rendered more exactly on the visual scale while their health and breeding potential is also said to be enhanced. The extra convolution in the tube's design produces more light output per standard length of tube. Full details of the True-lite range from:

GENERAL ACOUSTICS LTD., Salter Road, Cayton Low Road Industrial Estate, Scarborough, North Yorkshire, YO11 3UZ. (Tel.: 0723 584250).

AQUARIUM SYSTEMS

One important difference between freshwater and marine fishkeeping is that of "exactness". Whereas most freshwater fishes have a fairly wide tolerance to changes in conditions, marines do not, and their aquarium conditions have to be maintained within the narrowest of parameters.

AQUARIUM SYSTEMS' last introduction was the VISI-THERM aquarium heater which incorporated a moving red indicator of temperature as the control was altered. Now they've come up with the goods again, with their VISI-JET powerhead.

This aquarium pump/powerhead lets you see exactly the water flow rate as you alter the control: it is variable between 100-400 litres/hour (25-100 gallons/hour). This variable flow facility also means that you can use this powerhead on varying sizes of aquarium

AQUARIUM SYSTEMS

The Visi-Jet — the first flow-indicating aquarium pump and powerhead — is the latest innovative product from the manufacturers of the Visi-Therm.

without fear of the plants leaning over too much or buffeting small fishes around.

Another advantage of a visually-indicated water flow rate is that you can instantly detect when the filter needs cleaning, thus taking the guesswork out of maintenance needs. Made to withstand both marine and freshwater conditions, the Visi-Jet has an extra-wide outlet for improving oxygen/carbon dioxide exchange rates.

Details of Aquarium Systems products from:
UNDERWORLD PRODUCTS, Units 1 & 2 Belton Road West, Loughborough, Leicester, LE11 0TR. (Tel.: 0509 610310. Fax: 0509 610304).

FISH SERVICE LAUNCH (ON-SITE REPORT)

Early March was the time for a trip to **Blagdon Water Garden Centre** at Upper Langford in Somerset for the inauguration of their "FISH SERVICE" excellently presented under the expert guidance of Publicity Director, Peta Chivers.

The FISH SERVICE principle is to provide garden centres with a Blagdon-designed and supplied fish-holding system and stock them with Blagdon's fish for resale.

It really is an almost instant installation; the four circular stock-holding tanks come with a two-tank biological filtration plant, recirculating pump and associated pipework. The automatic functions include self-levelling between tanks and water-changing. The conical bases to the holding tanks lead to bottom drains for easy maintenance — all you have to do is to fill up and switch on!

The only delay is the recommended four-week waiting period for the biological filter to mature before livestock is added. A further refinement is to divide each holding tank into four compartments, thus allowing sixteen different varieties of fish to be kept in each system.

Success depends on healthy stock, and the imported fish (principally from the U.S.A. and Israel, where the risk of SVC disease is minimal) in the large indoor holding area were in prime condition. Furthermore, Blagdon's Overnight Delivery or Cash & Carry facilities ensure that fish reach their new outlets with the minimum of stress. In the unlikely event of problems, a telephone call energises the full Blagdon after-sales, advisory service.

The interior retail premises have undergone a massive refurbishment. In addition to the expected coldwater fish, pools, accessories and statuaries (from the Henri Studios range), there were tropical freshwater and marines on view too. The central "lounge area" featured furnished aquariums in a room setting, with the idea of giving examples of how they would look at home and also providing a relaxed environment — perhaps in which some hard bargaining could be done with visiting clients?

BLAGDON WATER GARDEN CENTRE

Blagdon's newly launched self-contained fish retailing system.

A highlight was seeing plastic ponds being made — three different shapes at once, while you waited! The vacuum-forming process was entirely automated, the only human intervention being to trim off the surplus plastic edging as the ponds came off the machine. If you can imagine a "heat the plastic", "blow a bubble into it", "insert the mould", "evacuate the air", "cool and release the finished product", sequence of events you will have grasped the principle in no time. Over 50,000 ponds were made by this process last year.

BLAGDON WATER GARDEN CENTRE LTD., Bath Road, Upper Langford, Avon, BS18 7DN. (Tel.: 0934 852973. Fax: 0934 852998.)

THE YELLOW WINGED CHALLENGE

Experienced and dedicated Rainbowfish fan **Robert Kirkup** proves that perseverance, patience, trial and error . . . and skill, can yield rich rewards, when dealing with difficult spawners like *Popondichthys furcatus*.

Do you wish to keep a species of fish, or a whole group of species, which is hardy, active, easy to breed, but most importantly, beautiful?

Then look no further than the Melanotaeniidae, commonly known to us as Rainbowfish.

These stunning fish, which are endemic to Australia and New Guinea, are now beginning to appear in most of our shops.

Australia has always had restrictive policies concerning the collection of native species. In fact, all the Rainbows offered in pet shops in Australia have, reportedly, been imported from Singapore breeders. But thanks to dedicated collectors, these fish are now regularly finding their way to our shores from the last untouched rainforests, and almost inaccessible lakes and highlands of New Guinea.

For example, at least one British fish farm (Belton Fish Farm) will usually have half a dozen species of Rainbows in stock — something that was almost unheard of some ten years or so ago.

Everywhere that I have read about Rainbowfishes I find the same statement that they are fish without problems.

True, Rainbows do adapt to most types of water chemistry. They are peaceful occupants when put into our aquarium "puddle" and are always on the go. It is also true that most Rainbows spawn spontaneously, and can lay as many eggs as our barbs and characins. But the ease of breeding stops right there, as raising the fry can be very problematic.

After twelve years of breeding Rainbowfish, they still pose a difficult challenge for me in terms of raising strong healthy, and large fish to adulthood. In fact, of the thirty-one species I have, there are still a few which have not completely settled in and reproduced.

Any skills which I may have developed in raising these gems have been the result of trial and error, and much perseverance; having many times, been led astray by misleading articles on water conditions and the feeding of the fry.

Exciting challenge

One particular small Rainbowfish that has presented me with an exciting challenge is *Popondichthys furcatus*, the Yellow Winged Popondetta, a fish I first acquired at the British Aquarist Festival in 1984.

There are two species of *Popondichthys*, *P. conniexe* (caught by Allen in the surrounding area of Popondetta in New Guinea 1978), and *P. furcatus* (caught by Nicholas in 1955). Both have only recently found their way into our aquariums.

Popondichthys Rainbows like clean, well-filtered, moving water that simulates the conditions found in a flowing stream. In small aquaria, sponge-type filters are good for this, while in larger ones internal filters like the Rena 225 are ideal.

When I first attempted to breed and house these fish, I tried to copy their natural habitat as closely as possible, ie clean rainforest streams, thick in vegetation. Despite what these conditions might suggest, though, the pH recorded in the wild where these fish are found is *not* acid. In fact, it is 7.6 and is caused, I believe, by the presence of some sea water.

P. furcatus comes from the Peria Creek in the Kwagira River of Papua New Guinea, close to sea level. At the yearly high tides, sea water enters into their habitat making the whole area brackish.

Normally I don't mess about with water chemistry. If a species does not like my tap water, I move onto another species. This fish was to prove the exception. Because of its rarity and beauty, I tried to re-create its own little environment using 50 grammes (1.8oz) of sea salt to 10 litres (2.2 gals) of aquarium water (I always use sea salt instead of tonic salt). I also use one or other of the many brands of brown water tonic on the market, plus fine gravel or sand for the base of the tank.

These fish should not be able to see their reflection as this upsets them. I therefore plant the tank out making sure there is ample cover in each of the corners for the fish to rest or hide in. I also leave a clear runway for the fish, usually at the front so that they can dart up and down.

Java Moss is an excellent plant for all Rainbows and should reach almost to the surface of the aquarium. Hopefully this is where the eggs will be laid in due course. In addition I provide fine-rooted surface plants to supply food and cover for the fry.

I try to have three males and three females present in the breeding tank and feed only live foods. This cuts down on pollution and creates infusoria among plants.

The fish are very active, yet peaceful, growing to around 4-5cm (1.6-2in). They eat very heavily and have a high metabolic rate, I have found that a 4cm (1.6in) fish will eat as much as a "normal" 10cm (4in) Rainbow. Yet, as fast feeding as they are, they do not eat or attack their fry.

Giant eggs

P. furcatus is not as prolific as *P. conniexe* and I regard myself as quite lucky if I get five fry a week. Sometimes I may have none for many weeks.

The size of the *P. furcatus* eggs, fry and rate of growth can be compared to those of *Bedotia geayi* and *Telmatherina ladigesi* (Madagascar and Celebes Rainbows) which is to say they are quite large; three or four *Melanotaenia* eggs could fit into one *furcatus* egg.

As the fry develop, the eggs show a sparkling gold colour as if they were dusted with gold. In fact, if I collect a fry from my community aquarium and it is a yellow-gold colour instead of black, I can be sure it is a *Popondichthys*.

I like to remove my *Popondichthys* fry from their aquarium into a "fry tank" where their needs can be better catered for. I use a 10-20 litre (2.2-4.4 gal) aquarium with the water level at around 15cm (6in). The tank is

planted with Java Moss and surface plants, and its water is exactly the same as that in the parents' aquarium.

A sponge filter provides ideal aeration for the tank, especially since it can be adjusted to give a streaming effect across the surface of the water, thus agitating the plants and freeing them from infusoria so the fish can eat. It also helps in bringing food up from the aquarium floor to the surface.

At this stage, the most difficult part in breeding *Popondichthys* is over. The fry are large enough to see clearly and can therefore get enough infusoria over the next few days. By this time they will be 5mm (0.2in) in length, with their blue eyes sparkling.

I now begin feeding with *Artemia* (Brine Shrimp) — only a few shrimps at first, watching the fry closely, to make sure that the shrimps don't choke them, as they have tiny mouths.

After 10-14 days the fry will be eating 20-30 shrimps each at every feeding time. They will also take microworms, etc and even powdered food. Sifted *Daphnia* is also an excellent food. I siphon the *Daphnia* through a fine net and then filter the water

Top, the elegant delicate nature of *Popondichthys furcatus* is well illustrated in this photograph.

Above, left, seven-day old *P. furcatus* eggs — the eyes of the embryos can be seen.

Above, right, at five weeks most of the *P. furcatus* characteristics can be distinguished.

that passed through the net through a Brine Shrimp sieve. The life left in the sieve will be the finest of live foods and also allows one to check things over to make sure that no "beasties" are introduced into tank.

After only 5 weeks the fry will be 10-15mm (0.4-0.6in) in length and the black forked tail, which is characteristic of *P. furcatus*, and not present in *P. connieae*, can clearly be seen, as well as the yellow fin flashes.

At this point I adjust the feeding to what I like, varying the diet since the young fish will eat anything. I also carry out a small water change.

Precise water changes

A 5-10% water change is recommended with *P. furcatus*, as they are very sensitive to large changes. I always try to copy the pH of the source water when adding fresh water.

Many a fine aquarist has lost an entire tank of *P. furcatus* by adding too much fresh water in one go. Under such circumstances the fish will actually turn over within a few hours. So a little care is needed.

I change my water every week, adding about a level teaspoon of sea salt to each 5 litres (1.1 gal) of water. These changes will lessen the brackish water content of the tank but, because the changes are small, the fish are able to cope with it and the plants will grow a little better.

And just as all tropical fish, tank-bred fish will be more tolerant of tap water than wild-caught fish. Even so, it is a good idea, as soon as enough of these little jewels have been produced, for some to be passed on to fellow aquarists, thus hopefully safeguarding stock of *P. furcatus* for the future.

Seaview

by Gordon Kay

Elitism is alive and well

I thought that the "elitist syndrome" within this hobby had finally been laid to rest. I was wrong. After a year of talking to many aquarists, it would appear to be alive and well.

You know the sort of thing: freshwater aquarists seem to think that the keeping of marines is next to impossible, and the people who do manage it must have some God-given talent that sets them apart. Of course, the marine aquarist loves this, swells his/her chest with pride and agrees that it IS difficult and advises the adoring listener to stick to tropicals and so the myth is perpetuated.

What nonsense! Marine fishes are no more difficult to keep than any other. I will admit, they are more demanding, but only from the point of view that they call for more commitment on the part of the aquarist. Well, if you aren't prepared to meet that commitment, then you would do better to forget it and stick to Guppies. Better still (because I like *all* types of fish) collect stamps.

Keeping marines also entails learning a few new skills, but is this not the case with every new venture? I'm not in the business of persuading people to take up marine aquatics, but if you ARE thinking of taking the plunge, then rest assured you have nothing to fear.

Golden Rules

The following may set you on the right track:

(1) First get it into your head that you are assuming the responsibility for the lives of various creatures which are not disposable ornaments to be discarded when you get fed up. Remember also, that the animals you will be keeping are, largely, wild-caught and have been "deprived" of their freedom for YOUR benefit.

(2) Spend all the time you can, READING. Invest in a couple of good books which contain up-to-date information. Aquatic magazines are also very worthwhile. Read until your books make sense before you go any further.

(3) Find yourself a good marine dealer with a commitment to selling healthy marines. Talk to him/her and ask for advice from the start. A good marine dealer can be distinguished by the following (among others):

(a) The shop will be clean and well run and will *probably* not sell dog food or cat litter. A prosperous dealer is obviously enjoying lots of repeat business from satisfied customers (unless you live in Invercockyleeky and there are no more shops for 200 miles!).

(b) The shop will have a good selection of fishes and invertebrates (not two tanks in the corner). The tanks will look clean, and ALL the animals will appear healthy and happy.

(c) The shop will carry a good range of equipment and books.

When you have found a good dealer then stick with him or her. Believe me, your loyalty will be rewarded. Just one thing, though. After you have been a few times to your dealer for a chat and some advice, do realise it is only reasonable to expect a return on the investment of valuable time, in the form of money in the till!

(4) Always buy the best equipment you can afford. Skimping is always a false economy.

(5) Join a club or society which specialises in marine aquatics. There is nothing like mixing with other fellow aquarists — listening, sharing ideas and drawing on each other's experience. You will also make new friends.

It is also worth joining the BMAA. Their journal "**Marinews**" is packed with useful reading and, again, you would be able to draw on a wealth of knowledge and experience.

(6) Finally, remember that, if I can keep them, then anyone can!

As I said, it's not for me to sell the marine hobby, but if you're hovering on the brink, then maybe I have nudged you a little in right direction.

JOHN DAWES

A good selection of fish and invertebrates — kept in well-maintained tanks such as this one at Home Marine — are signs to look for in a good retailer.

Two useful products

Look out for two products in the shops about now, one brand spanking new, the other not quite so'

The "Visi-Jet" is a new powerhead by Aquarium Systems and is marketed here by Underworld Products. This piece of equipment has a gauge which shows the actual flow rate which the pump is delivering. The flow is also adjustable.

The benefits of such features are that you can actually measure the amount of water passing through the filter, and can also see when the flow diminishes — due to blockages — or actually stops — due to pump or power failure.

The "Visi-Jet" should be in the shops this month in two sizes. One is capable of turning over 400 litres per hour, the other 800 litres per hour. Underworld say that there will be other products available soon, including power-filters.

The other product is a new improved Algae-Scraper/Planter from Algarde, a company which is constantly coming up with new ideas.

Owners of deep aquariums like mine often have problems when scraping unwanted algae from the front of their tanks. They either employ a large magnet which can fall off, just at the wrong moment, leaving them to grope in two feet of water or more, getting their sleeves wet. (They may forget the magnet and use the "inner" part of it by hand — soggy sleeves again!), or use one of the long-armed algae scrapers, some of which have flimsy plastic arms that can snap under even the lightest pressure.

Algarde's new scraper has a strong, tubular arm with a detachable (reversible) head. The head has a tough scourer, which really gets that algae off, on one side, and a sponge on the other. The planter end, I find useful for stirring the bottom sand. At under £2, this is one of the most practical pieces of equipment I have ever used.

THE MEXICAN FLIER

Dennis Barrett recalls the discovery of this delicate livebearer which was subsequently named in honour of his friend and fellow collector, John Scarll of Belton Fish Farm.

(Photographs by the author)

It was a Saturday morning. The time 7.30 am. The sun was about 20 ft above the road surface. John Scarll, Dave Thompson and I were on highway 200, heading south from a small village called Playa Azul.

We had been in Mexico for a week collecting livebearing fish. Like most fishkeepers, we had talked for years about going and collecting our own wild fish and here we were in the state of Michoacán doing just that.

We had flown into Mexico City, rented a car and driven off, visited the pyramids just to the north of Mexico City and then moved across the mountains west until we reached the coast.

We had collected six species of fish as we moved across to the coast. We had been travelling for about half an hour when we came into a small village.

The only name we could find was "El Bordqueral". As we were passing through the village we noticed an irrigation canal running alongside the road. The canal was approximately three metres wide, with fast-flowing water.

It didn't take long to find a place to park the car for closer investigation, and found a small track alongside the canal. We hadn't taken much along with us, apart from a couple of ten-inch nets.

When we reached the canal top we could see fish swimming in the fast-flowing water, so I was soon on my way back to the car for big nets and cameras.

The water in the canal was used by the village women for washing clothes, and other daily needs. Also in the canal was a small Mexican boy catching freshwater shrimps which measured some 5cm (2in) in length. On my return from the car, John and Dave told me of a large frog which they had encountered while I was away, it was some 12in in diameter.

By this time Dave and John had moved some distance along the dyke, away from the village people, and were in the water up to their waist and fishing with the ten-inch nets. They were catching numerous cichlids (species not known) as well as Green Mollies (*Poecilia sphenops*).

I stayed on top of the canal bagging the fish which had been caught. As I was inspecting what was going into the bags I noticed we had some form of *Poeciliopsis*. By this time Dave and John were some ten to fifteen yards

An adult *Poeciliopsis scarlli* male. Note the very long gonopodium.

The coloration of the female is very similar to that of the male.

John Scarll — after whom the Flier was scientifically named — carrying out water tests at the original collecting site.

downriver. I shouted across for them to come and inspect, but they both had difficulty in getting back across to me as the bottom of the canal was very muddy.

After a close inspection, we all agreed that none of us had seen this species before. So it was back to fishing for some more of this species, even though they were complaining about the water being cold (74°F — 23°C — pH 7.1).

For the last two or three days we had been used to temperatures in the 80s°F. After a fair bit of moaning about me being on top of the canal and them in it, they started catching *Poeciliopsis* again.

I have no idea just how long we stayed at the dyke, but we all knew it was time to move on. This is the only problem when you are collecting from the wild — you never want to move on, and when you are collecting with John Scarll it's "Just let's have a few more bags."

We had a problem keeping our new-found species alive while we were in Mexico. The fish had to be kept in their bags for a week, although we did change the water every day.

The temperature on the west coast of Mexico in December is around 90°F (c 32°C), especially in Acapulco. The reason we chose this time of the year to go was because it is the dry season and the rivers are very low, thus making it much easier to catch the fish.

On returning home to Yorkshire we found we only had three of the new species alive; two males and one female, so it was decided I should keep them all in my fishhouse. After we had been home for about a week I got in touch with *AGtP* editor John Dawes and Jim Chambers of the British Museum. After a number of phone calls we decided that we should try to breed the species before any microscopic examination of the gonopodium (modified anal fin of the males) was carried out.

Keeping & breeding Collection 6

The specimens were known simply as "Collection Six" (every collection we had made was given a number — this way we never mixed up any species together).

Collection Six was placed in a well-planted tank in the top row of my fishhouse, but after a week had gone by, it was plain to see that they were not happy.

I thought that I might lose the only remaining specimens, when I remembered what Dave and John had said about the water being cold, so I moved them down to a bottom row at a temperature in the low 70s°F (22°C).

The next day when I went to inspect them there was a vast improvement. The fish were much more lively and were eating well. Two days later I lost one of the males (that did not go down too well!) but ten days after returning home, I had four fry from the female.

My joy was soon turned to sorrow however because a week later the remaining male died. Now I was left with four fry and one female. I was hoping that my female ran true to form with all other *Poeciliopsis* and drop

The irrigation canal at El Bordqueral in Michoacán, Mexico, where we caught the Flier.

fry at around fourteen days. She did even better than this by dropping another four fry nine days later. Fourteen days later when inspecting my only remaining female I found another six fry but my female was dead.

Second-generation Fliers

By six weeks my fry had begun to sex out. There were four males to begin with, but when they had all sexed out, I had two females as well.

It was twelve months before I was able to release any specimens to anyone. Even then I was only able to let four pairs go, but I'm sorry to say that everyone who had this species only managed to raise males.

Meanwhile things were taking off as regards getting them identified. I had sent some males over to Germany with Bob Macintosh for ichthyologist Manfred Meyer to examine. John Dawes had also taken some for Jim Chambers to make a closer examination of them. (The holotype going to Manfred Meyer in Germany.)

The following specimens were logged with the British Museum (Natural History).

Reg No:	Description:
1984 6.11.1-2	1 male; 1 female (Aquarium specimen).
1984 6.11.3-5	3 females (Aquarium specimens).
1984 6.11.6	1 male (wild-caught) specimen (Gonopodium stained for examination).
1984 6.11.7-9	3 males (Aquarium specimens) (cleared and Alizarin stained for examination).

Ivan Dibble from Clevedon acted as the liaising "agent" between Manfred Meyer, John Dawes, Jim Chambers and me. It was what you might call a joint international effort.

After many more letters and phone calls and hard work by a lot of people we were finally told that we had discovered a new species of *Poeciliopsis* and were asked to suggest a name. We suggested that it should be named after John Scarll of Belton Fish Farm, Belton, S Yorkshire. It was therefore decided to name the fish *Poeciliopsis scarlli* (see Reference).

I would like to take this opportunity to thank everyone who made this possible for us. I would also like to say that I have a friend going to Mexico in May of this year and he's hoping to bring more specimens back with him.

NOTES: 1. The common name Flier was chosen for this fish because the length and position of the pectoral fins, along with the angle at which they are held, particularly on males, give the impression that the fish is about to take off — especially when viewed head-on.
2. Although all the fish that were bred from the original stocks eventually died out, there are now plans to bring in fresh supplies which will, hopefully, be made available through the Southern Livebearers Aquatic Group.
3. For further details of SLAG and livebearers in general, contact: **John Corbett, 26 Durban Road, Liverpool, L13 5SY.**

Reference: *Poeciliopsis scarlli* spec. nov., a new taxon from Michoacán, Mexico (Teleostei : Poeciliidae). Manfred Meyer, Rüdiger Riehl, John Dawes, Ivan Dibble. **Rev. fr. Aquariol.**, 12 (1985), 1, 2 September 1985.

News

Bridgemere Water World to host Japanese weekend

In just over the two years since it opened at Easter 1987, Bridgemere Water World has become one of the country's leading coldwater fish retailers.

Every week literally thousands of people visit their 7000-gallon inside pond to view the jumbo Koi it contains. The largest and most expensive of these are specially imported from Japan, and, to celebrate their success, a number of Japanese firms based in the area have agreed to attend a two-day show at Bridgemere Garden World on **Saturday and Sunday 3 and 4 June.**

In addition to the selection of Koi and other exotic coldwater fish, **John Ravenscroft,** Bridgemere Garden World's proud owner is arranging a display of plants, shrubs and trees which have an oriental flavour.

Bridgemere Garden World, covers 25 acres and it can take a whole day just to walk around. In The Garden Kingdom, John Ravenscroft has created not only a vast variety of plants for gardens of all types, but has also recreated the Cheshire Cottage Garden which won the Supreme Award at the 1988 Chelsea Flower Show.

There is a large car park and an Egon Ronay cafe which is open until the Garden World closes at 8pm'

Bridgemere Water World's manager, Nigel Thomas, is looking forward to the big day. "It is a considerable accolade that Japanese firms have agreed to exhibit at Bridgemere and shows that the Japanese recognise the quality of the Koi that we sell and display. Marine and tropical fish enthusiasts need not feel left out either, because we have one of the best sales area for all fish in the country".

This event is believed to be the first of its kind in the country.

Bridgemere Water World can be found on the A51, six miles south of Nantwich. It is signposted from Junction 15 on the M6. For further details ring **NIGEL THOMAS on 09365 321.**

More News on page 24

Letters

Artificial fluoridation

Until a few years ago, like most people, I had the vague notion implanted at some stage that fluoride was good for teeth and was blissfully unaware of the controversy that surrounds fluoridation. Since this time, the more I read up on the subject, and the more information I gather, the more horrified I became at the thought that this substance should ever be added to the water I drink. I am only pleased that our local health authority (Sheffield) have voted against its use by a margin of 11 to 6, though the pro-fluoride lobby sees this as a "hiccup" and will not be satisfied till they get the whole country fluoridated.

Fluorides are very toxic/corrosive chemicals, even when administered in small doses over a long period of time. Even after 40 years there is still heated debate over its purported benefits to teeth and whether it is a risk to dental and general health. Water Authorities are asking the government to provide insurance, if the water authorities are privatised, before they are prepared to add fluoride — why should they be so worried about this if there is no risk to public health?

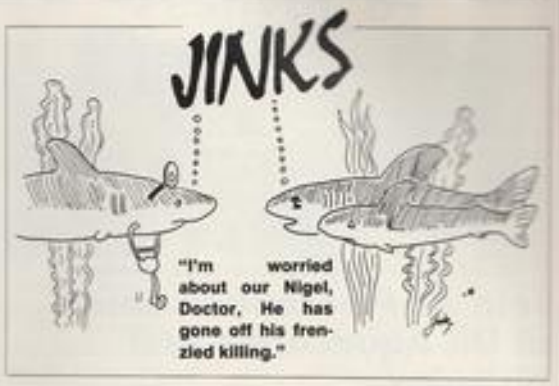
Fluoride is added to the water not to treat the water, but to treat the consumer. This makes it mass medication without consent. Not doctor has this right — why then should the local / health authority? Of course, this will also add yet more pollutants into our rivers, seas and general environment, corrupting the food and drink we produce grown in fluoridated areas — as if there was not more than enough of this already!

Perhaps an article on the effects of fluorides on aquatic life would make for an interesting article in your publication?

C. D. Marshal (Ms)
Sheffield

Editor's Note:
We are already following up an earlier suggestion by one of our readers on additions to tapwater and their implications for aquarists and pondkeepers.

John Dawes



Monster replies . . .

1. Thank you for your kind reply to my letter about the breeding of freaks.

I do appreciate that your position as magazine editor must be to reflect all aspects of the hobby, as past months' issues have scrupulously shown. In fact, this is probably the foremost reason I have stayed a loyal subscriber for so long, my interests being in aquatic life in general, whether animal or vegetable.

However (you knew this was coming), my main objection to what you call "the fancies" is not merely aesthetic, ugly as I do find most variants. My view is, that the deliberate enhancing of characteristics making normal self-supporting life impossible cannot be defended, but I await other opinions with interest.

John Jenner
Hornsey


HARRY GRIER, FLORIDA TROPICAL FISH FARMS ASSOCIATION

Young Goldfish such as this Bubble-eye from Gordon Aquatics (Florida) elicit strong emotions among aquarists — some for, some against, the development of these strains.

2. Your March issue featuring a Bubble-eye Goldfish on the cover made me wonder how far we are going when breeding such freaks.

A common Goldfish is a mutation, but it looks like a fish and would survive in a predator - free environment. The skills of breeders could be put to better use than turning out such monsters.

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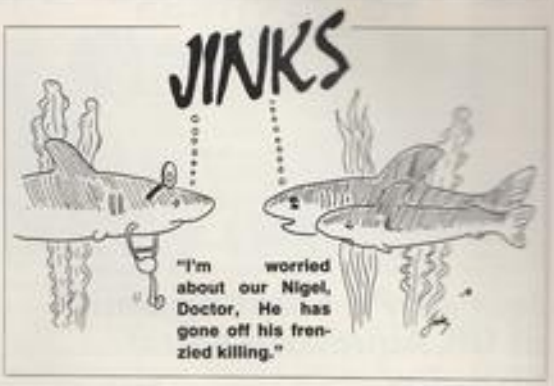

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OUT AND ABOUT


KEN HUGHES

Bob and Julie Jones — proud owners of U.K. Aquacare.

Join *A&P's* Stephen Smith at UK Aquacare's first birthday

U.K. Aquacare was opened almost a year ago in the Cheshire village of Marple. It is situated in the historic Goyt Mill, a relic of the cotton spinning industry of years gone by. The mill was built alongside the canal which was used for transportation. However, nowadays, the canal is only used by pleasure craft. U.K. Aquacare must be one of a very few aquatic shops where boaters can moor alongside, and many do!

The owner, **Bob Jones,** chose this site in order to allow himself the space to set up a "worthwhile" shop. This he has done admirably with 12 tanks devoted to coldwater fish, together with a pond for larger Koi, Shubunkins, etc., 100 tanks devoted to tropicals and a marine section that has had to be extended to cope with the demand, for fish and invertebrates.

The stock is a healthy mixture of common and unusual fish. For instance, there are five different strains of Guppy, Red Hook Metynnis, Birchirs and various unusual catfish. There are also Discus, currently selling for as little as £6.95! The same balance exists in the coldwater section where recent oddities have included Sturgeon, while on the marine side, the range extends from damsels to sharks.

As well as the fish there is an extensive range of dry goods. Bob Jones' aim is to give the customer a choice and this he achieves by carrying the full range of medications and foods from three major manufacturers, as well as many types of frozen and live food. The same sort of choice extends into filtration, air pumps and the myriad little gadgets that the modern aquarist demands. Tank decoration is not forgotten and U.K. Aquacare offers a big selection of corals, plants (both live and plastic), rocks, including tufa, and what must be the biggest choice of bogwood in the area.

Bob's involvement in the hobby is not just as a supplier, and wherever he can help, he is willing to do so. For example, a conversation with one of the first customers to enter his shop led to the formation of the Marple Aquarist Group. After a hesitant start, this club now has over 40 members and is affiliated to the F.N.A.S.

For an aquatic shop to become so well established in its first year is a testament to the effort of those involved. Bob Jones and his staff, through hard work and long hours (not many shops are open 10 am-7 pm seven days a week) have achieved his ambition of owning a first-rate aquatic establishment.

U.K. Aquacare's first anniversary comes up this month and to help celebrate the event, *A&P's* **Coldwater Jottings** author **Stephen Smith** will be at the shop on **June 4** to meet customers and members of the **U.K. Aquaclub,** Aquacare's Sunday Club. So make a date with our coldwater expert, your invitation to U.K. Aquacare's first birthday.

For further details contact **Bob or Julie Jones, U.K. Aquacare, Goyt Mill, Upper Hibbert Lane (access on Sheppley Lane), Marple, Stockport, Cheshire. Tel. 061 426 0074.**

Northern Area Group — Catfish Association

(1989 Convention Tenth Annivesary)

Report by David Sands

It was very hard to believe ten years had passed. I remember clearly a few enthusiasts turning up at my new home. Could we form an area group? . . . that was the burning question.

Looking around the spacious Wigan Pier Convention Hall I could see at least two founder members of the first committee working hard — and I could see plenty of our original members in the 300 + audience — enthusiasts gathered in the first few years.

This year's convention had attracted two new sponsors:— **Wigan Pier Aquatics** (appropriately enough a local North West business, who graciously gave the convention a tremendous boost with a considerable financial and retail-display involvement) and **Interpet,** one of the largest UK aquatic companies. **Dr David Ford** represented **Aquarian** with a display stand.

The Wigan Pier venue was superb and the speakers, **Heiko Bleher** and **John Dawes,** more than met the challenge of the occasion.

John, editor of *Aquarist and Pondkeeper* and author of various aquarist books, opened up with a happy lecture. He has an easy style of speech which I admire. John worked hard to illustrate interesting points for the catfish-thirsty audience and his handling of my pet-theme, "mimicry in fishes" (to which I had loaned acknowledged illustrations) was perfect. I found the lecture easy going and an ideal launch for personal thoughts and ideas.

When **Heiko Bleher,** West

ESCOT '89

Until recently if you wanted to plan a watergarden in the south-west there were few places that could really advise you. Garden centres held some stock but were unable, in the main, to give professional advice, particularly with fish.

Pet shops had limited space for displaying watergarden equipment, and so, tended not to stock glass-fibre ponds, filters or even Koi. People were often afraid to install a water feature because there was nowhere to go for imaginative ideas and no back-up service.

Five years ago this gap in the market was filled by **Mish Kennaway** and Escot Aquaculture was born in East Devon. Mish's training is in fish farming management and, having worked in Israel and in Florida, he initially intended just to farm coldwater ornamentals for the wholesale market. Using technology from Europe, he built a hatchery geared to producing large quantites of ornamentals.

The first real problem was to back up the hatchery with enough water to grow the fish produced. With the help of a colleague he formed a co-op with farmers in the south-west. Escot would produce the fish; then stock them out to farmers' ponds, instruct the farmers on feeding, and then harvest and market the fish, giving the farmer a share of the profit.

Selling the fish was easy. Too easy, in fact. It was very apparent that there was a huge demand for English fish. It was also obvious from the number of casual callers asking to buy fish, that there was a market opening for an aquatic retail centre in Devon.

Derelict farm buildings became available for conversion on Escot Estate and the opportunity was grasped. Initially the intention was to display and sell only coldwater ornamentals and coarse fish. Soon the centre was selling tropical fish and plants, then all the associated dry goods. This was a testing time as Mish and his staff (now, four) had no real knowledge of the aquatic retail trade.

Time and experience are

DAVID BLUNDELL

Heiko Bleher and John Dawes, the Convention speakers, with their highly prized presentations and their uniquely talented creator, Brian Walsh.

German fish collector in the "Indiana Jones" style, took to the stage the eager audience were really ready for the rare and exotic.

Heiko, a successful fish importer/exporter, began with his own early experiences in South America and then proceeded to illustrate his travels throughout the African and Asian continents. He must have shown a thousand slides, to the information-hungry fishkeepers.

When I presented John and Heiko with specially carved mementoes of the occasion (wonderful craftwork by Northern Area Group/Darwen Aquatic Society Chairman, **Brian Walsh**) the day seemed complete. What I will always remember about the day more than anything else — the happy atmosphere of the occasion, as **George Waterhouse** (Chairman) joined with me to wish everyone in the crowded hall a safe journey home.

At that point the main organiser, **Adrian Morris**, sighed with relief. A lot of people had made the Northern Area group's tenth anniversary a wonderful success.

Yorkshire Aquarist Festival '89

"It's nice to be back!" This was the most frequent comment to be heard at the Yorkshire Aquarist Festival, held at the Doncaster Racecourse over the weekend of April 15 and 16. The YAF Committee decided to try other venues in 1987 and 1988, but a refurbished Exhibition Centre was available for 1989 and so the Festival returned "home" for its 15th annual exhibition of fishes.

With 20 traders, 19 society tableaux and 8 specialist society stands, it was a busy show with something for everyone. Lectures were given by **Dr David Pool** of the **Tetra Information Centre** (Fish Behaviour — don't just look at your fish, observe them) and **Dr David Ford** of the **"Aquarian" Advisory Service** (Aquaria International — fishkeeping in 16 countries).

The largest stand was JMC Aquatics with 45 display tanks of fish and 10 ponds with a "select your own" system. The most expensive fish was a pair of Torquoise Discus at £460 on the stand of Northern Discus. Ernie Stanton was happy to be on his old stomping ground, this time with his own petstore "Pets are Pals" based in Chapeltown, Sheffield.

The familiar traders were all in attendance with their fantastic range of aquatic items: Hagen, John Allan Aquariums, King British, Rosewood, Tetra, Tropicure Books, plus livestock from Belton Fish Farm, Trans Continental Goldfish, AKA Exotics and millions upon millions of Brine Shrimps from the Yorkshire Brine Shrimp Supplies. Ornamental Wood Supplies were surrounded by their usual petrified forest.

Specialist societies were strongly represented with something for the marinist, the cichlidophile, anabantoid fancier and livebearer keeper. These were the West Yorkshire Marine Group, British Marine Aquarist Association, Catfish Association of Great Britain, Southern Livebearer Aquarist Group, British Cichlid Association, Anabantoid Association of Great Britain, Viviparous and the YAAS information stand.

The tableaux were as ingenious as ever — the worthy winner being **Jenny** and **Bob Lack** and **HCAG's** attractive Gingerbread House. In second place were two tableaux with equal points, a Paddle Steamer by **South Leeds AS** and **Scorpion's** Frog Song. **Glanford AS** had a book tableaux with a list of endangered species and the clever title of "Indangered Species".

HCAG also had the Best Fish in Show, an AOV Female Livebearer (*Poecilia chica*) and Best Exhibit was the Pairs Egglayer by **G & H Baron** of **Bridgewater** (*Channa gachua*). Fish of the Year was the same fish that won at last year's show, the perfect *Brycinus imberi* owned by **Mr and Mrs DaCosta** of **Ashby**. Second was **K Smith** of **Boston** with a *Cichlasoma harmsgi* and third **Mr and Mrs Carey** with a *Labeo bicolor*, **York AS.**

Well done, the new YAF Committee — let's return next year, same time, same place!

Photographs next month

great teachers — and Mish and his present staff were very willing students.

Now, five years after its first venture into the difficult waters of the aquatic trade, Escot have over 100 tropical aquariums and about 40,000 gallons of coldwater display tanks. In addition, they now sell mammals, birds and reptiles, plus all a pet would ever dream of in the way of luxuries.

There is already a small tea room open and Mish now employs six full-time staff in the centre. He has built up about 40 acres of growing ponds around Devon and lays great importance on the farming side of the business.

He also appreciates the, as yet, untapped tourist potential. Set in beautifully landscaped parkland, Escot have 20 acres of Rhododendron walks and this year are opening, for the first time, a two-acre Victorian walled rose garden (being featured on BBC2 this summer). There is also planning permission for five acres of waterfowl park which will, hopefully, be started by the end of this year.

Opening times: 10.00 am - 6.00 pm — seven days a week. For further details contact **Mish or Lucy Kennaway, Escot Aquaculture, Parklands Farm, Escot, Ottery St Mary, Devon, EX11 1LU. Tel. 0404 822188.**

News from the societies

Greenock and District Aquarist Society

The Greenock and District Aquarist Society held a very successful 4th Open Show in March this year, and although the entries were down on last year, the adverse weather must take the blame for this downward trend. There were 525 exhibits from all over Scotland to be judged. From these entries the Greenock club collected 16 First place, 17 Second place, 18 Third place, and 6 Special merit tickets, making the grand total of 57 tickets won by the club.

The Best Fish in Show award was won by Mr A. Weir, of Dundee. The Society with Highest Points was Greenock and District Aquarist Society. Individual with Highest Aggregate: Mr D. Smith and Mr K. Liddel (equal). Greenock and District member with Highest Aggregate: Mr D. Smith.

For further details of G.A.D.A.S. contact Hugh Gray (Secretary), 170 Cumberland Road, Greenock, Scotland.

International Characin Association

A new specialist society, the International Characin Association, is being launched with the aims of:

a) promoting the collection, study and breeding of characins;
b) assisting in the correct identification of species;
c) gathering information, organising conventions and producing papers and/or a magazine on characins;
d) encouraging members to enjoy and develop their interests in characins;
e) promoting interest in fishkeeping as a whole;
f) remaining non-sectarian and non-political at all times;
g) remaining financially independent — based on contributions from members and other sources organised by the organisation.

Full details from: David Sidebottom, ICA President/Secretary, 18 Harry Street, Werneth, Oldham, Lancs, OL9 7TA. Tel. 061 626 9128.

Diary dates

Llantwit Major Aquarist Society
The L.M.A.S. will be holding their Open Show on **Sunday 11 June** at Llanilltud Fawr Comprehensive School, Ham Lane, Llantwit Major. For further details, contact Colin Turner, 46 Arran Street, Roath, Cardiff. Tel. Cardiff 498982.

Workington & District Aquarist Society
W.D.A.S. are holding their 1989 Open Show on **Sunday 11 June** at the Carnegie Art Centre. Full details from G. Chestney (Secretary). "San Juan", Jacktrees Road, Cleator Moor, Cumbria, CA25 5AY. Tel. 0946 810116.

Fair City Aquarist Society
The F.C.A.S. will be holding its first Open Show on **Sunday 11 June** at the Rodney Pavilion, Dundee Road, Perth. Entries & Benching: 10.00 am to 1.00 pm; Judging: 1.00 pm to 5.00 pm. For further details, contact Eric Jones (Show Manager), 28 Rona Court, Perth. PH1 3DB. Tel: Perth 25952.

The Marple Aquarist Group
The M.A.G. Open Show will be held on **Sunday 18 June** at Marple Liberal Club, Stockport Road, Marple. Benching: from 11.00 am to 1 pm. Judging: 1.30 pm. For further details contact Bob Jones (Chairman), UK Aquacare, Goyt Mill, Upper Hibbert Lane, Marple, Cheshire. Tel. 061 426 0074. Alternatively, ring Tom Hibbert on 061 483 5796, or Mrs L. Gunn on 061 427 3618.

St. Helens Aquarist Society
The St.H.A.S. Open Show will take place at Rainhill Village Hall, Rainhill Merseyside, on **Sunday 25 June.** Benching: 11.00 am-1.15 pm (15p per entry). Judging: from 1.20 pm prompt. Further details from Mrs H. Steadman (Secretary), 10 Ribble Avenue, Rainhill, Merseyside, L35 0NJ. Tel. 051 426 4213.

British Koi-Keepers' Society (Lower Thames-Side Section)
The B.K.K.S. (Lower Thames-Side Section) Open Koi Show will be held on **Sunday 25 June** at Grange Community Centre, Little Wheatleys, Rayleigh, Essex. Details from Les Holmes (Show Secretary), 19 Rubicon Avenue, Wickford, Essex, SS11 8LL. Tel. 0268 733681.

Wear Valley & District Aquarist Society
The first Open Show of the above society will take place on **Sunday 25 June** at Henkowle Community Centre in Bishop Auckland. For further information, contact John Corrigan (Secretary), 8 Clifton Green, Sunnybrow, Crook, Co. Durham, DL15 0NP. Tel. 0388 745674.

Port Talbot & District Aquarist Society
The 1989 Port Talbot & D.A.S. Open Show is scheduled for **Sunday 16 July.** Venue: Taibach Youth Centre, Port Talbot, West Glamorgan. Further information from John Egan, 53 Pentre Afan, Baglan Moors, Port Talbot, West Glamorgan, S. Wales, SA12 7RN. Tel. Briton Ferry 821126.