

AUGUST 1987 95p

AQUARIST

AND PONDKEEPER

FISHKEEPING AT ITS VERY BEST. ESTABLISHED 1924

COMPREHENSIVE
BEGINNERS' GUIDE
TO KOI

Breeding European
Tortoises

EXCLUSIVE KOI
PRINT OFFER

Life at the bottom

THE SPOTTED
GOODEID

WIN 
**A SUNSHINE
HOLIDAY**
COURTESY OF
Atlantis



AQUARIST

AND PONDKEEPER
FISHKEEPING AT ITS VERY BEST. ESTABLISHED 1924

AUGUST 1987

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Photograph: Kent Koi Ko

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There appears to be virtually no end to the colour and scale combinations that can be found in Koi. Amazing versatility, coupled with painstaking and expert selection and breeding, can produce spectacularly beautiful end-results, as our cover photograph of a Kinginrin Kohaku demonstrates. The "Kin" portion of the name refers to the shimmering golden scales on the red part of the body, while "Gin" refers to the equivalent ones found on the white areas. A Kohaku is a fish which is predominantly white with red patches. Combine these factors and you get a magnificent fish which any Koi-keeper in his/her right mind would give an arm and a leg for.

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(Cover photograph reproduced by courtesy of Brit Koi).

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Coldwater jottings



Stephen J. Smith

Patch that!

The sample of butyl pond liner distributed with the April issue of *A&P* appears to have been extremely well-received among hobbyists.

WetPets of Romford has had some considerable response to the one-inch disc of butyl tacked to the front cover, but at least one grateful reader found the patch itself to be of quite some value.

"It was just what I needed," explained my correspondent, Colin Rose from Bromsgrove. "Only the previous weekend I had accidentally pierced my own pond liner and the 'free sample' provided the perfect patch for an instant repair!"

Sandown success

The 'Aquarian' Fishkeeping Exhibition provided one of the outstanding highlights of a far-from-outstanding summer.

The exhibition, organised by 'Aquarian' in conjunction with the Association of Aquarists, was held at Sandown Park, Surrey (20/21 June) and proved to be an overwhelming success.

My personal thanks are extended to 'Aquarian' and the A of A for providing me with the opportunity to present a display of Fancy Goldfish.

The purpose of the display was to demonstrate the wide variety and high quality of Fancy Goldfish available, and to advise and help fishkeepers gain more from their hobby.

The fish were kindly supplied for the exhibition by Goldfish importer and breeder Gary Lewis, and ranged from an immaculate pair of Common Goldfish to some young Hamamishiki in the process of colour-change.

Interest in the display was exceptional, with several hundred people visiting the stand to peer at some of the more unusual varieties or to seek advice on keeping Fancies.

One of the most common questions was: "Where can such quality fish be obtained?"

In answer to that question, there are three main sources: a) importers, b) commercial breeders, and c) specialist hobbyists.

There are a number of importers (such as Gary Lewis) of fine-quality Fancy Goldfish, who supply to retail outlets. The majority of reputable retailers will be only too pleased to help you obtain good-quality Goldfish of most popular varieties.

But you may have to be patient and you will pay a premium — both for quality

Right, many visitors were surprised at the range and quality of Fancy Goldfish available. "Where can such good specimens be obtained?" Was one of the most popular questions.

Below, among the visitors to the Fancy Goldfish display at the Aquarian Fishkeeping Exhibition was three year-old Damien Richards from Ipswich, Suffolk, who expressed a particular fascination for a splendid Redcap.



and to cover the cost of importation.

Alternatively, British-bred Goldfish can be obtained from any number of commercial breeders, such as Henry Tisbury, Tommy Sutton and Gary Lewis; but again, quality does not come cheap. A considerable amount of hard work and dedication is involved in breeding and rearing fine-quality Goldfish.

A further popular source of Fancy Goldfish for the enthusiast is the local society.

There are a number of societies throughout the country which specialise in the interests of coldwater fishkeepers. Many of their members are dedicated breeders and some societies hold Open Shows, during which unwanted fish are auctioned.

Although these particular fish may not be show-class specimens themselves, they are often the product of show fish which, given a few years' patience and determination, may well yield some fine quality offspring.

Even if you do not intend to show your Goldfish, the majority of fish obtained from a

society auction or from fellow members will be assured of being clean and healthy and should provide years of enjoyment.

Societies

Some of the leading coldwater societies which specialise in Goldfish keeping are:

Association of Midland Goldfish Keepers;

Bristol Aquarists' Society (original home of the Bristol Shubunkin, incidentally);

Goldfish Society of Great Britain;

Northern Goldfish and Pondkeepers Society;

South Park Aquatic (Study) Society.

In addition, many tropical societies have coldwater sections. Details of these, and the above list can be obtained by contacting your local library, while *A & P* regularly publishes details of forthcoming shows.

Secretaries take note

While on the subject of societies, one of the areas least represented in my postbag is that of coldwater societies.

Even our tropical societies outshine their coldwater counterparts in terms of correspondence and information. So please, secretaries — we would be only too happy to publish details of your society's events within the columns of *Coldwater Jottings*.

But if you don't send the information — we can't use it.

To cap it all

Finally, I must pass on just two humorous comments overheard on the Fancy Goldfish stand at the 'Aquarian' Fishkeeping Exhibition, both of which referred to a well-developed Oranda on display:

"Look Mummy," said one young chap, "there's a fish with a hat on!"

And the following day, from a bemused father: "What on earth is that one with its brains outside its head?"

Need I say more . . . !!

Letters

Not a Fairy

Firstly, I would like to congratulate your correspondent, Dr Robert Goldstein, on a most worthwhile article on live foods (*A & P*, March 1987).

I well remember showing a biology teacher an old *Aquarist & Pondkeeper* magazine which featured a line drawing of Fairy Shrimp, because there was an unidentified creature, like a small King Crab, found at a local clay pit which I thought might, indeed, be a Fairy Shrimp. I was told this species was not found in Scotland and that it must have been something else. I took his word for it. Certainly, I've never seen anything like it since. And I



Triops (Apus) cancriformis

still wonder what it really was.

Looking at the photograph in Dr Goldstein's article, it wasn't *Streptocephalus* *scoti* because it had a pea-sized shell covering its back. Any light you might be able to throw on the subject would greatly be appreciated.

Gordon Walker
Kilmarnock, Scotland

Editor's Note

Thank you, Gordon, for your kind comments concerning Dr Goldstein's article. We have received a great deal of correspondence concerning this feature — all extremely favourable, I am pleased to say.

I think that the 'King Crab' you refer to is *Triops (Apus) cancriformis*, a small freshwater crustacean found, mainly, in temporary bodies of water in the UK and, I believe, parts of Europe.

John Dawes

"Fanks" for the Pump

I just thought I'd write to say fanks for picking me winner of your March Siece Ekto Pump competition.

At the time I received your letter — I was in bed. Not that I'm a lazy... (!) but I just

happened to be on night shift at the time.

I had asked my wife to wake me up at 12... she did (UGH! — only 4 hours' kip...). Anyway, all sorts of thoughts went through my mind as I tackled the pile of letters. "Overdrafts — red electricity and rates demands, HP... and so on..." How wrong I was.

At first, it didn't sink in... I'd actually won something! And just what we wanted as well. We were thrilled to bits. So were the kids when they came home. Oh yes — when we told the pond fish that they were getting a fountain pump to freshen up their pond, they jumped about 40ft out of the water, going: "We got a fountain for the pond... whoopee!"

After that, I'd better sign off. Fanks again... Av an appy day!

Bob White
Bristol

P.S. The "other" letters weren't too bad either.

Editor's Note

What can I say? No wonder you won the pump!

John Dawes

Puzzling deaths at the Zoo Aquarium

The circumstances surrounding recent deaths of a Sargassum Fish (*Histrio*) and a Frog Fish (*Antennarius*) suggest the release of a short-lived, but very potent, toxin by one or both fish into the water of their thirty-gallon display tank at London Zoo.

While the release of toxins by some marine fish is well



LONDON ZOO AQUARIUM
Can Frog Fish poison themselves to death? (See "Puzzling deaths")

documented, there appear to be no similar records regarding the above-mentioned fish. Any observations which your readers might have concerning the sudden and unexplained losses of such fish will be gratefully received.

Dr C. R. Andrews
Assistant Curator,
Aquarium

Catching the Bug

I thought I'd drop you a line to tell how much I've enjoyed the past few issues of *A & P*.

Around the middle of March, my Dad and I began to set up a 3ft tank in our garage. At first, I was more interested in reading *A & P* and other aquatic books rather than in setting up the tank itself, but as I got more and more involved, I caught the "Aquarist's Bug".

Although there have been problems (such as dealing with leaks), I now have seven types of *Corydoras* catfish, four types of Tetras and many other fish. Soon, I am going to try culturing White Worms.

Do you know of any clubs in my area that I could join? Do you need to have "specimen"

fish to join? If so, I already have a Flying Fox measuring 10cm.

Anthony McDonough
(Age — 13 years)
Merseyside

Editor's Note

Welcome to the hobby, Anthony. Now you know what it feels like to catch "Aquarist's Bug"! Your nearest club is Merseyside Aquarist Society, c/o Mr J. Bailey, 11 Auburn Road, Liverpool, Merseyside. No — you don't need to have "specimen" fish to join a club... but it helps!

John Dawes

Congrats Gratefully Received

I would like to take this opportunity to congratulate your company on its magazine. I have been a reader for over ten years and have always considered *The Aquarist* to be the leading publication in the hobby.

While regretting the passing of WYO, I am very impressed by the Amanda Grimes' articles. The *Aquarist* manages a reasonable balance between all aspects of the hobby.

Bernard O'Neill
Warrington & District
Aquarist Society

Editor's Note:

Thank you, Bernard, for your kind comments. Time moves on and *A & P* evolves with it. We always hope that any changes we make meet with the approval of our readers. So far, it seems that we have done particularly well in the last year or so. Watch out for further developments.

John Dawes

FRED THE PIRANHA



News from the societies

Redcar Fishkeepers Society

The R.F.S. Open Show was held on 31 May and produced a very good crop of entries. The **Best Fish in Show** award went to **Denise Wilson** with a total of 89 points for her exhibit in the Loach Class.

Sincere thanks to all concerned and congratulations to all winners.

For details of R.F.S., contact **Brian Lacey** (Secretary), 32 Sycamore Crescent, Teesville, South Bank, Middlesbrough.

Cleveland TS6 0BW.

Forfar & District A.S.

Forfar & D.A.S. would like to thank all the exhibitors and judges who helped to make the Open Show such a great success. There were over 400 entries and visitors came from far and wide, including Greenock, Edinburgh, Inverness, Banff and Peterhead. The **Best in Show** award was, however, won by a local member, **Stuart Fordyce** of 8 Teuchacroft, Forfar.

Inverness and District Aquarist Society

At the A.G.M. of the Inverness and District Aquarist Society, the following members were elected to office:

President — Bobby Marshall, 41 Windsor Place, Conon Bridge

Vice-President — Bill Howieson, 47 Glengarry Road, Inverness

Secretary — Innes MacRitchie, 11 Wyvis Crescent, Conon Bridge

Treasurer — Andrew Call, 2

Sullivan Way, Inverness

The Society meets on the last Monday of each month in the Central School, Planefield Road, Inverness, at 7.30 p.m. All visitors welcome.

FBAS General Secretary Change of Address

Due to a change in employment, **Chris Cheswright**, the FBAS General Secretary, should now be contacted at the following address: 2 Cedar Avenue, Wickford, Essex.

Diary dates

Northern Goldfish & Pondkeepers' Society

The N.G.P.S. 1987 show, held in association with 'Aquarian', will be held at the Trinity United Reform Church, Delamer Road, Altrincham, Cheshire, on **Saturday 15 August**. Benching: 9.00 a.m. - 11.00 a.m. Judging (N.G.P.S. Standards): 11.00 a.m. - 1.00 p.m. Open to the public: 1.00 p.m. - 5.00 p.m. Further details from: **Peter Blomley**, 18 Roundhill View, Risingbridge, Nr. Accrington, Lancs BB5 2SS.

British Koi-Keepers Society

The 12th National Show of the B.K.K.S. will be held at Billing Aquadrome, Northampton, on **15-16 August**. Benching: 5.00 p.m. - 9.00 p.m. (Friday); 9.00 a.m. - 1.00 p.m. (Saturday). Oxygen will be available for re-bagging fish for the return journey. Opening times: 9.00 a.m. - 5.00 p.m. (Saturday) and 10.00 a.m. - 5.00 p.m. (Sunday).

Admission: £1.00 (adults); 50p (children and O.A.P's).

Judging will be in the Japanese style, with fish being exhibited in Azirinkai show vats supplied with adequate aeration. Refreshments, stands, video booth and many other

entertainments will also be available at this, the major B.K.K.S. event of the year.

For details of how to get to Billing Aquadrome, check the National Show advertisement in the July issue of *A & P* or ring (0604) 416316.

Last year's show was a tremendous success. This year's promises to be every bit as good, so don't miss out — put the date in your diary. See you there!

The Scottish Goldfish Group (Branch of the Goldfish Society of Great Britain)

The 9th Annual Open Show of the Scottish Goldfish Group, sponsored by Tetra Fish Care, will be held at Davidson Mains Parish Church Hall, Quality Street, Davidson Mains, Edinburgh, on **Saturday, 29 August**. Entries (at 20p each) close on **15 August**. Further information available from the Show Secretary, Mrs Pat Smith, 22 Cullin Court, Hallglen, Falkirk. Tel: (0324) 20954.

South London Catfish Group

The first Open Show of this newly-formed group will be held on **30 August** at Greenwich House, 141 Greenwich High Road, London SE10.

Benching: 8.00 a.m. - 1.00 p.m.; Judging: 1.15 p.m.; Open to the public: 5.00 p.m. onwards; Presentations: 5.30 p.m. For further details of both the Show and the society itself, contact **P. R. Thurbon** (Secretary), 204 Ladysmith Road,

Enfield, Middx EN1 3AE.

Asby Fishkeepers Society

The A.F.S. 1987 Open Show will take place on **Sunday 30 August** at the Grange Farm Hobbies Centre, Franklin Crescent, Scunthorpe, South Humberside. Booking in: 11.30 a.m. - 1.30 p.m. Show to start at 1.30 p.m. prompt. All enquiries to **Terry Nelson** (Show Secretary); Tel. Scunthorpe 850525 or **Eric Da-Costa** (Secretary); Tel. Scunthorpe 848485.

Preston & District Aquarist Society

The 5th annual Open Show of P. & D.A.S. will be held on **Sunday 30 August** at Preston Polytechnic, Students' Union Hall, Fylde Road, Preston. Benching: 12 noon - 2.00 p.m. Details from **A. McFarlane** (Secretary), 70 Princess Way, Euxton, Chorley, Lancs., PR7 6PJ. Tel: Chorley 79484, or H. Virgo, Tel: Preston 555530.

Bristol Aquarists' Society

The Bristol Aquarists' Society 1987 Open Show — one of the major events in the coldwater season's calendar — will take place on **12 September** at St. Ambrose Church Hall, Stretford Road, Whitehall, Bristol. Entries close on **1 September**. For details, contact the Show Secretary, **I. Mildon**, 87 St. John's Lane, Bedminster, Bristol, BS3 5AB. Tel: (0272) 712383.



German-English Labyrinth Exhibition

The Rhein-Main-Neckar group of the IGL, the European Labyrinthfish Association, in conjunction with the Yorkshire group of the Anabantoid Association of Great Britain, are staging an exhibition of gouramis and related fish. This will take place between **3 and 11 October 1987** at the Town Hall, Rüsselsheim, near Frankfurt, a short trip by train from the airport.

Fish from Germany and England will be displayed for the public in furnished tanks in the European style. The exhibition is timed to coincide with the IGL autumn meeting on the Saturday afternoon and the Sunday morning.

For information, contact **Stephen Clark** (Chairman — Yorkshire Group of A.A.G.B.), 10 Ashfield Road, Balby, Doncaster DN4 8QB.





This winning tableau from Tongham Aquarists was constructed around the theme of rain-forest conservation.



Lemon Tangs photographed in one of the marine tanks in Aquarian's Learning Maze.



The best coldwater fish award was won by this magnificent Golden Tench owned by Dave Caesar of Tongham Aquarists.

THE 1987 'AQUARIAN' FISHKEEPING EXHIBITION BIGGER AND BETTER THAN EVER

Adrian Blake reports on this year's spectacularly successful event

Dr David Foed, for the sponsors, got the exhibition off to an early start on I.T.V.'s *Wide Awake* show at 8.00 a.m. on Saturday morning before rushing back to be on hand to answer hobbyists' questions.

The entrance to Sandown, nicely furnished with tanks of marine and tropical fish, led the visitor on into the most attractive 'Aquarian' Fish-keeping Exhibition yet. Numerous trade stands for the hobbyists, goldfish and Koi, provided a strong selling feature with some very large specimens valued at over £150.00 each.

Airport Aquaria's range of new cabinets complete with tanks provided a nice display, while Stephen Smith's stand of ornamental Goldfish proved extremely popular with Stephen on hand to pass on his own knowledge to delighted Goldfish keepers. There were also many more marine displays this year with the public gasping at the beautiful colours of these fascinating fish. Yet another main attraction was the 'Aquarian' Learning Maze with ten large tanks of various species from Guppies to marines.

Personalities from the hobby "caught in the act" were: Dr Neville Carrington of Interpet seen buying a book on the *Aquarist* stand, David Sands sporting a Hawaiian shirt, selling his new *Corydoras* book, Dr Chris Andrews, curator of the London Zoo Aquarium presenting the awards, John Dawes, editor of this magazine, trying to answer all the questions from the hordes of people around him, author and contri-

WINNERS LIST

Class	Winner	Club
Burbs	T & D Cruickshank	NASTIES
Characins	A. Barnet	Hounslow
Cichlids	C. Walton	Bracknell
Labyrinths	J. Otley	Tongham
Egg-laying Toothcarp	H. Aylott	B.K.A.
A.O.S. Catfish	T & D Cruickshank	NASTIES
Corydoras Catfish	S. Attwood	Basingstoke
Rasboras	R. Cooke	Tongham
Danos	R. Barnes	Hounslow
Loaches	G. Ferris	Reading
A.O.V. Egg-layer	I. Legge	Tongham
Guppies	B. Lowe	S.E.A.S.
Platies	M. Strange	Basingstoke
Mollies	B. Barnes	Hounslow
Swordtails	D. Ford	Bracknell
A.O.S. Livebearer	D & P Lambert	S.L.A.G. (UK)
Pairs Egg-layers	K & D Robinson	Scorpion
Pairs Livebearers	D & P Lambert	S.L.A.G. (UK)
Breeders Egg-layers	K. Anderson	Denmark
Breeders Livebearers	D & P Lambert	S.L.A.G. (UK)
Single-tail Goldfish	D. Caesar	Tongham
Twin-tail Goldfish	R. Smith	Havant
A.O.S. Coldwater	D. Caesar	Tongham
A.O.V. Plant	A. Pearce	Tongham
Individual Furnished Aquarium	J. Ellis	Kingston
Club Furnished Aquarium	—	Scorpion A.S.
Best Livebearer	D & P Lambert	S.L.A.G. (UK)
Best Coldwater	D. Caesar	Tongham
Best Breeders	D & P Lambert	S.L.A.G. (UK)
Best Plant	A. Pearce	Tongham
Best Fish in Show	C. Walton	Bracknell

Tableaux:
 1st: Tongham A.S.
 2nd: Reading A.S.
 3rd: Scorpion A.S.
 4th: Bracknell A.S.
 Su Pollard Trophy: Tongham A.S.

butor Dick Mills on a busman's holiday and a very welcome visitor, Nick Lushchan, author of *A&P's* 'Helping Hand' for

disabled fishkeepers, looking a lot younger now he is minus his beard, but much better news was that he was minus his

wheelchair as well.

The club displays were again varied, with ecology being a feature ranging from the 'Save the Whale' tableau by Havant A.S. to the winning display 'The Dilemma of the Tropical Rain Forest of the Amazon,' complete with working models by Tongham A.S. Hendon A.S.'s Water Garden and the Bracknell Society's 'Bar Scene' were very attractive as was Reading A.S.'s 'Prehistoric Display,' complete with monsters.

The specialist societies were also in evidence providing useful and essential information for people interested in these particular species. Sincere thanks to them.

Best fish in show was 'Rambo' a superb cichlid, *Theraps (Cichlasoma) Raruegi*, owned by Mr C. Walton of Bracknell A.S.

The judges, provided by the Association of Aquarists, were impressed with the improved standard of the exhibits and senior judge Derek Lambourne in particular, stated that the Catfish Class 'is the best I have ever judged'. Tongham A.S. were also presented with the special 'Su Pollard' award for their display.

All the stands were doing very brisk business and the attendance was again very high on both days (surpassing last year's highest-ever figures). Thomas's, the manufacturers of 'Aquarian' foods and remedies, are to be congratulated on once again providing the platform for a great aquatic weekend.

PRODUCT ROUND-UP

by Dick Mills

EVERY KOI SHOULD HAVE ONE!

FILTRATION EQUIPMENT

The type of filtration system depends on the type of pond and whether it is custom-built for Koi or merely adapted for them. A custom-built Koi pond may well have its own built-in removable stand-pipe/bottom drain overflow system to siphon off dirt from the lower depths. Otherwise, there will be the need for a powerful submersible pump driving water through a biological/mechanical filter either in-pond or external to it.

The most popular form of filtration equipment is external to the pool, although an in-pool biological filter is feasible, provided that some precaution is taken to prevent the fish from digging up the sub-gravel pipes. External filters have become much more viable propositions thanks to modern plastics which offer the double facilities of simple design and construction.

Most designs are based upon the type of plastic water storage tanks now found in the house. In simple systems water fed in from the pool is sprinkled by a spraybar over a deep filter bed before being gravity-returned to the pool again. The filter medium is usually Canterbury Spa and/or Zeolite, often with an added foam layer, offering good biological and chemical removal of nitrogenous compounds. More sophisticated multi-chamber designs, with settlement chambers, sequential flow and provision for drainage to remove sludge, are quite feasible by the simple process of welding several single tanks together and arranging the pipework accordingly. Waterflow may also be arranged on the 'reverse-flow' principle, flowing upward through the filter medium. It is usual to arrange waterflow rate to turn over the volume of the pool every hour.

Typical prices for multichamber filters are:
2, 3 or 4 units (25 gallon modules) £165.00-£365.00

2, 3, 4, 5 or 6 units (50 gallon modules) £216.00-£735.00

Turbulence/oxygenation Chamber (including Venturi Jet) £55.00

To facilitate backwashing, a Ball Valve unit will be required, at £17.50

Filter Brushes (18 inches x 4 inches) £3.50 each or £300.00 for 100

Canterbury Spa filter medium £6.95 (55Kg)

SOME BRAND NAMES: Flowmaster, Amphill Aquatics' Aqua 83, Infiltration, Cyprio, Minireef.

FOODS

Assuming you have sufficient pool space, to get Koi up to size you need the right foods.

There are several well-known brand names of food especially formulated for Koi, and the food itself (generally in pellet form) can vary in size and composition according to the fishes' needs. Small pellets sink more readily than larger ones, and are very good for winter feeding when the fish are lower in the water. The ingredients may be specialised too, and include wheat germ, and colour enhancing additives, in addition to the standard diet. Floating sticks of food are especially suitable for active Koi in the summer months. For Koi, you are going to need bulk quantities, and most foods are packaged in 2Kg, 5Kg and 10Kg bags.

The following is a representative sample:

HIKARI Growth Food £16.50 (2Kg)

Excel (Pellet Food) £59.50 (5Kg)

Wheat germ (Winter sinking Food) £28.95 (5Kg)

Gold (Colour Enhancer) £39.75 (5Kg)

OMEGA Koi Pellets £15.00 (10Kg)

(three sizes — 4, 5, 6)

Size 4 (smallest sinks).

TETRA Floating Food Sticks

£6.95 (700gms)

£8.95 (1Kg)

Koi Colour Enhancer £7.95 (930gms)

CYPRIO Floating Koi Pellets:

(a) Staple food £7.50 (2Kg)

(mini, med or large) £14.50 (5Kg)

£27.00 (10Kg)

(b) Colour food £8.50 (2Kg)

(mini, med, or large) £16.50 (5Kg)

£25.00 (10Kg)

Mixer Packs:

(a) Staple (all sizes) £16.00 (5Kg)

£24.50 (10Kg)

(b) Staple & Colour £16.50 (5Kg)

(all sizes) £25.00 (10Kg)

NETS

Not only are the best Koi large, but they are also likely to be nearly out of physical reach,

so nets have to be big and strong enough to catch them. Short-reach nets and long-reach types are available; some may be telescopic, giving you the best of both worlds, but be prepared to pay realistic prices for quality products, £39.50 for short-reach, £59.50 for long reach.

POOL 'FURNITURE'

This section includes both practical and decorative items for use in and around the pool. For showing Koi, or separating specimens for other various reasons, a floating basket is ideal, allowing the fish top be seen easily (and within reach) without removing it from the pool.

FLOATING BASKETS including lids 750mm x 540mm x 250mm £110.00

QUARANTINE VATS 1.8m diameter, 0.5m deep £45.00

BUBBLEPAC (plastic blister-sheeting) is an ideal material with which to cover/insulate the pool against heat loss in winter; simply mount it on a suitably-sized frame. You can buy it off the roll, 1.5 metre wide in whatever lengths you need. £1.50 per metre length.

If you have gone for a Japanese-style garden pool, then the following will add a little authenticity to the surrounding terrain or nearby alpine rockery:

Decorative Japanese-design Lanterns

Pagoda design £59.50

On single curved arm £110.00 (large)

£45.00 (small)

Stone Koi (approx 1m long) £110.00

Also available are seated Buddha statues, imitation Cranes (the feathered kinds) etc.

PUMPS

To drive pool water through your tailor-made filtration unit you will need a good pump. This must be tailored to suit the pool's water turnover requirements and, of course, be capable of lifting the water well above the height of the external filter system. Siting of the pump can be important too, a long run to the filter may be ideal in summer when a flow of water through the pool will help keep temperatures even, but a short run may be more beneficial in winter where you should avoid bringing the deeper, relatively warmer water to the surface.

DAB NOVA 200 1-2,000gph £85.00

DAB NOVA 300 2,000gph £95.00

OASE 55watt 500gph £105.72

*60watt 396gph £147.48

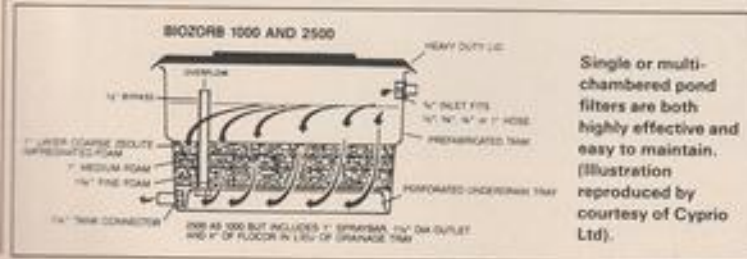
*80watt 726gph £186.50

*may be used in or out of pool

OTHER TYPICAL MAKES: Stuart-Turner, Walrus, Otter, Amphibious.

Some powerful pumps have been converted into 'vacuum cleaners', removing bottom water, blanket weed, gravel sand, soil, etc; they employ strainers to prevent damage to the impeller. For the larger, deeper pool, a telescopic handle and long reaches of hoses are required. Removed water can be returned to the pool or run to waste. 2m of hoses included.

POND-E-VAC (from Harrow Koi Co) includes many such features at £195.00



Single or multi-chambered pond filters are both highly effective and easy to maintain. (Illustration reproduced by courtesy of Cyprio Ltd).



Modern-day water treatments and remedies can tackle a wide range of pond problems at a reasonable price. (Photograph reproduced by courtesy of N. T. Laboratories Ltd.)

WATER TREATMENTS

Whatever the size of your filtration unit, you can get it off to a good start with a maturation compound. This supplies the filter bed with suitable material for the bacteria to feed, and multiply on.

POLYBAC — Maturation material (mix with water) for biological filters £30.00 for 5 x 80gm sachets (or £6.50 each)

Up to 100 gallons — 1 sachet/week for 3 weeks, then 1 sachet/month

100-600 gallons — 2 sachets/week for 3 weeks, then 1 sachet/fortnight

600-1200 gallons — 1 sachet/day for 5 days, then 1 sachet/week

1200-10,000 gallons — 1 sachet/day for 10 days, then 2 sachets/week

InterBio (UK) Ltd., Aldine House, 9-15 Aldine Street, London W12 8AW

Keep the water pure and up to condition with the following aids:

REFRESH — replaces minerals extracted by filtration — £17.95 (1.75Kg)

SALT — recharges Zeolite — £5.95 (25Kg)

ZEOLITE — removes ammonia — £35.00 (25Kg)

Then, of course, there is the whole, extensive, and over-expanding range of water treatments and remedies ranging from algal control to individual fish diseases and general tonics.

SOME BRAND NAMES: Waterlife Research Industries, King British, Interper, New Technology, Technical Aquatic Products.

1. BOOKS

There is a growing number of books on Koi, ranging in size and coverage to suit all pockets. Some offer more practical information than others, some have better photographs of the fish, but all will bring a better understanding of the culture of these magnificent pool fish.

Understanding Koi: by Mike George and David Hulse (Publisher: Staffordshire Waterlife) £4.95

A Fishkeeper's Guide to Koi by Barry James (Publisher: Salamander Books) £4.95

Koi of the World by Dr H. R. Axelrod et al (Publisher: TFH) £29.95

Manual to Nishikigoi by Takeo Kuroki (Publisher: Shuji Fujita) £17.95

2. VIDEOS (VHS/BETA)

£29.95

If reading is not your scene, then via a video-recorder, you can sample the delights

of Koi-keeping and see the fishes being cultured, exhibited and sold in their original country, Japan — all from the comfort of your own armchair:

Varieties of Nishikigoi

All Japan Show 1985, Koi Dealers and Buying Guide

All Japan Show 1986, Koi Dealers and Buying Guide

FOOT NOTES

Much of the above information was kindly made available by **Harrow Koi Company**,

NEWS

MARCOS OUT, SKILTON IN

No, don't worry, Chelmsford-based C. J. Skilton hasn't gone into politics but the recent political upheaval in the Philippines has benefitted his company and, now, the hobbyist too.

Two years ago tenders were offered for fishfarming equipment (holding tanks, aeration apparatus, nets, pumps, etc) for 14 fish farms to be set up throughout the Islands to keep marine fish and crustaceans. The deepening political crisis made any decision unlikely, but the change of Government under Mrs Aquino soon brought a request for a re-quote, and a swift acceptance was received.

The equipment was soon despatched, thanks to a local Company who made up the 92 fibreglass holding tanks at very short notice. Having "tooled-up" for this production, similar tanks can now be offered for domestic clients without incurring tooling costs. Following this order, a quotation was submitted for a similar scheme in Syria. We know that fishkeeping is supposed to have a

rear of 269 Watford Road, Harrow, Middlesex (Tel: 01-423 0208) and I would like to thank **Greg Jackson, Richard Broadway and Peter Hazell** for their courtesy and helpfulness.

This survey cannot hope to cover details of every Koi-applicable accessory, many products being very similar in design, performance and price. Readers are directed to the many reputable dealers whose advertising material appears elsewhere in this magazine: make these your first port of call and take guidance from the experts — your fish deserve the best, don't they?



C. J. Skilton's tanks being loaded for the historic shipment to the Philippines.

calming effect but C. J. Skilton seems to be taking it to its very limits!

Contact C. J. Skilton, Great Gibbercracks Chase, Butt's Green, Sandon, Chelmsford, Essex CM2 7TR for further details.

WIN A complete "Happy Goldfish" kit from Hagen

There is a chance for four lucky readers to win a prize in this month's competition.

Pet care accessory suppliers **Roll C. Hagen (UK) Ltd** have donated four "Happy Goldfish" kits, retailing at around £8.00 each.

Each Kit contains everything except water and gravel to keep your Goldfish happy, including:

Tail Goldfish-bowl with pedestal base.

Clip-on lid with easy-feeding window.

Air-pump and airline.

Undergravel filter plate with filter cartridge.

Food, and even a sprig of plastic plant.

All you have to do to enter is answer the four questions below. Write them on a postcard, together with your name and address in BLOCK CAPITALS, and send it to reach us not later than 31 August.

So:

Hagen Goldfish Competition

Aquarist and Pondkeeper (August)

58 Fleet Street

London EC4Y 1JU



The first four correct entries drawn by the editor will win the prizes.

QUESTIONS

1. What is the Latin name for the Goldfish?
2. Male Goldfish in breeding condition often have characteristic white pimples on their gill covers. What are they called?
3. Which part of the fish is referred to as the "Operculum"?
4. What term is correctly used for the tail fin of a fish?

NR: Stephen Smith will be reviewing Hagen's "Happy Goldfish Home" in next month's "Coldwater Jottings".

Employees of Roll C. Hagen, Aquarist and Pondkeeper and Hastings Printing Co. are ineligible.

BREEDING EUROPEAN TORTOISES

Captive breeding of tortoises is not only easy, but also constitutes a positive contribution to the conservation of these well-loved reptiles. Experienced herpetologist **Julian Sims** explains the main threats to the survival of European tortoises in the wild and provides a comprehensive guide to their successful breeding (Photographs by the author).

Following the implementation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) from 1 January, 1984, the massive trade in European tortoises ended. Legislation was necessary to prevent the thousands of deaths each winter of most of the tortoises imported the previous summer. Unfortunately, European tortoises are still endangered in the wild due to the destruction of their natural habitat by human activity, especially mechanised farming methods and building projects.

Mediterranean species

Tortoises native to Southern Europe and North Africa around the Mediterranean belong to the genus *Testudo*. Two species, *T. graeca* and *T. hermanni*, are widely distributed. The Spur-thighed Tortoise (*T. graeca*) is found in southern Spain, European Turkey and in North Africa and the Middle East. *T. graeca* can be easily identified by a spur on the thigh of each hind leg. Hermann's Tortoise (*T. hermanni*) is distributed in southern France, Sardinia, Sicily and west and southern Italy. Hermann's tortoises have a horny claw on the end of the tail.

A third species, the Marginated Tortoise (*T. marginata*) is only naturally distributed in southern Greece, although it is also found on Sardinia where it was introduced. Marginated tortoises have neither spurs on their hind legs nor a claw on the end of the tail.

Prior to 1984, Spur-thighed and Hermann's Tortoises were the two species most commonly offered for sale. However, due to the wide geographical distribution of both species, there was no certainty that a male and female purchased at different times would form a true "breeding pair". Tortoises from different geographical regions are classified as sub-species eg *T. graeca zarudnyi* from the east of the Spur-thigh range and *T. hermanni robertmertensi*, the south-western form of Hermann's tortoise.

Hybridisation should not, of course, be encouraged. An unfortunate example of hybridisation already exists as a result of captive breeding between the northern sub-species of the Diamondback Terrapin (*Malaclemys terrapin*) in the United States.

Due to the huge demands made on wild

populations by collectors for the pet trade, progressively younger tortoises were imported prior to the 1984 restrictions. Many of these reptiles were not sexually mature, thus, although much courtship and mating took place, eggs were not produced by the female. At the onset of maturity, it is common for only a single infertile egg to be laid in the first instance.

The importance of captive breeding

If adult male and female tortoises of the same species are maintained in the correct conditions, breeding these reptiles is very easy. In fact, captive breeding could provide enough young tortoises to satisfy the requirements of the pet trade.

In 1986, the Department of the Environment (Wildlife Conservation Section, Tollgate House, Bristol) relaxed the blanket restrictions on some forms of exchange and trading involving *Testudo* species. Licences were issued allowing captive bred individuals to be legally sold. Although the prices commanded by these young tortoises were significantly higher than pre-1984 figures, the values set insured that correct facilities would be provided for these reptiles. Never again would a tortoise be regarded as an expendable item, easily replaced at modest cost the following year.

Captive breeding is a practical way of increasing the population of these fascinating reptiles in Britain. Indeed, many school-children develop a longer lasting interest in Natural History from initially keeping tortoises as pets. The ease of captive breeding negates any argument of pressure to start once again the importation of tortoises — even on a quota system.

Captive breeding is also an important method of conserving tortoises should they continue to decline in number in the wild.

Courtship and mating

For successful captive breeding, suitable conditions for courtship, mating and nesting must be provided — preferably a large escape-proof garden with "free-range" grazing area and flower border for shelter from the direct rays of the mid-day sun.

Courtship is very noisy, with much shell butting and biting by the male. The male also squeaks during mating. Some males are very aggressive and draw blood by removing

scales from the legs of the female. Such wounds can be treated with Betadine antiseptic solution (Povidone — Iodine) manufactured by Napp Laboratories Ltd, Watford WD2 7RA. Similarly, any shell damage can also be painted with Betadine to prevent infection by fungi.

If a large garden is available, a female can often give a pursuing male "the slip" during a courtship chase. However, persistent males will interfere with the feeding patterns of females and may have to be segregated from time to time. This separation should never involve tethering — either by a hind leg or with a hole through the shell. Tethering causes stress and can lead to strangulation as the tortoise struggles to escape, while the latter method is downright cruel.

Nesting and laying

When a female tortoise is preparing to lay eggs, she becomes very restless, constantly on the move looking for a suitable nesting site. A flat, well-mown lawn is totally unsuitable. Gravid females also usually become aggressive to other females, biting and mounting them. It is particularly important that a suitable escape-proof environment is provided for these extra-active reptiles.

To promote nesting (and reduce the possible areas a female tortoise will choose in a large garden) the construction of a "TORTOISE HILL" is recommended. Such a well-drained mound of soil, with isolated patches of vegetation among which nests can easily be excavated, will prove very popular, particularly if there is a sunny, south facing slope.

Several trial holes may be excavated, especially if the tortoise is disturbed. Once egg-laying has started, the female uses her back legs to spread the eggs in the nest. Due to this action, eggs seldom touch each other in a tortoise nest. Spaces between reduce the risk of bacterial infection and decay passing from an infertile egg to the rest of the clutch. The eggs of *T. hermanni* tend to be elongated and number four or five in an average clutch. *T. graeca* eggs are spherical, slightly smaller but more numerous, nine, ten or more being laid at a time. The eggs of *T. marginata* are also spherical.

When all the eggs have been laid and infilling has started, an "all purpose" kitchen

will usually take from between 58 to 90 days using this temperature range. However, longer periods have been recorded, thus the eggs should not be disturbed until well after this time.

A fluctuating temperature range is necessary because tortoises do not have genetic selection of sex, as for example, mammals do. The sex of a mammal is an inherited characteristic, whereas environmental temperatures during incubation determine the sex of a tortoise. Mid-way in the 27° to 32°C range is the crucial point. Lower temperatures favour the development of males, higher temperatures dictate the development of females. In the wild, temperatures fluctuate naturally during egg incubation, resulting in the development of both the males and females which are necessary to maintain a viable population.

At the end of incubation, not all the eggs hatch at the same time — several days often elapse between the emergence of the first and last hatchlings. Sometimes pieces of egg-shell remain over the carapace — the upper part of the tortoise. These fragments can be carefully removed by hand.

Care of hatchlings

At first hatchling tortoises carry the remains of their yolk sac protruding from their plastron — the underpart of the body. This is almost totally absorbed within 24 to 48 hours of hatching, but there is the risk of fine particles of Vermiculite also being drawn into the body. Therefore, the baby

tortoise must be removed from the incubating medium and its yolk sac carefully cleaned with moist cotton wool. The hatchling can then be placed on a layer of moist kitchen towel until the sac has been completely absorbed.

Hatchling tortoises need to be maintained at between 26° to 31°C. Indoors and through their first winter, this temperature can be achieved by using a 60 watt silvered "spot lamp" which also provides light for basking. If young tortoises are not warm enough they will not feed.

The floor of their container can ideally be covered with sheets of cage bird sand paper. This allows the tortoise to get a grip during walking about and also reduces excessive development of their claws. Old sheets can easily be removed at cleaning time. Sand or gravel substrates are not recommended. These materials are not only difficult to clean but deaths in hatchling tortoises have actually been caused by the compaction of such particles in the gut.

The diet should be finely chopped and as varied as possible. Chopped lettuce and well-soaked pelleted dog food are particularly favoured, as are cucumber, tomato and fruit (both fresh and tinned). Added vitamins and minerals can be supplied by occasionally dusting the food with Vionate powder (manufactured by E.R. Squibb and Sons, Regal House, Twickenham, Middlesex).

A diet containing canned pet meat is not recommended. Although this animal protein promotes rapid growth, it also leads to shell

deformities (eg "pyramid" shaped shields on the upper carapace and the development of an unnaturally thick plastron).

During warm summer days, grazing on the lawn is enjoyed — clover and buttercup leaves proving very popular. Shelter from the sun must, however, be provided. If a greenhouse is available, this will provide warmer temperatures on cloudy days when the lawn is too cool for either feeding or basking.

Baby tortoises require regular baths in shallow luke-warm water, at least once a week. This not only gets fluid into the body (especially important after hatching) but also stimulates the release of uric acid and faeces.

Conclusion

European tortoises are reptiles which breed well in captivity. The adult females must be provided with an adequate amount and wide variety of food because the eggs they produce are MACROLECITHAL (ie) each egg has a large yolk. Their production therefore places quite a demand on the metabolism of the female tortoise.

One final word of caution: Careful consideration must be given before a solitary tortoise kept in isolation for many years is introduced to other tortoises for a captive breeding project. A solitary tortoise introduced to a group is particularly susceptible to Rhinitis — a mucus discharge from the nostrils. This condition can be relieved by regular baths in shallow luke-warm water.

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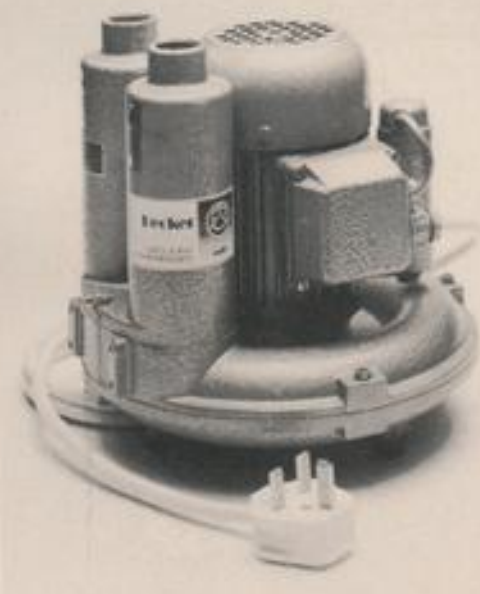
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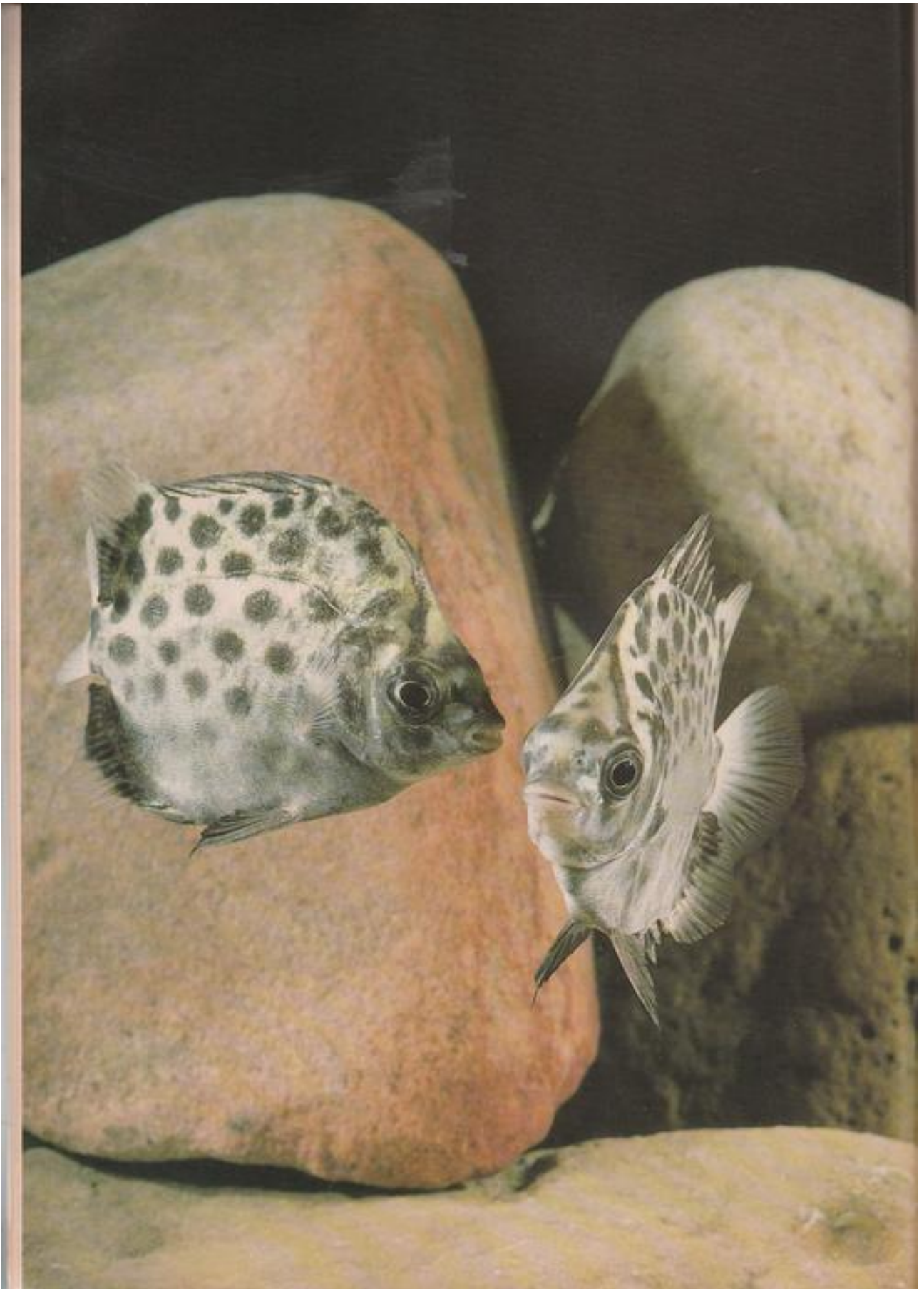
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Spotlight

THE COMMON SCAT

(*Scatophagus argus*)

(Photograph: Michael Gilroy)

Scats have been known in the hobby for many years. Yet, they hardly ever receive the attention they deserve. As experienced aquarist **Gordon Walker** explains, these fish are both versatile and interesting and, given the right conditions, will live for many years in captivity.

Species and varieties available

"Scats" are closely related to the marine Butterfly fish. Two species are included in the family Scatophagidae, which is most commonly represented in aquaria by *Scatophagus argus*. This scientific name actually means many eyed dung or offal eater, which is a pretty awful title for a popular fish!

The rarely imported *Scatophagus tetracornis*, the Four-spined Scat, is less disc-shaped, and merely silver and black striped, but by all accounts is a worthy aquarium fish to be snapped up when available. The Common Scat is very often seen with red markings and this variety is designated as var. *rubifrons*. Since this species has not been bred in aquaria, this form is not the product of selective breeding, or colour feeding, but of natural selection, due to environmental factors.

Origin and environmental conditions

All Scats are wild-caught, and the "five pence" youngsters swimming in your pet-shop's tanks have plate-sized parents swimming in the coastal regions of the Indo-Pacific ocean.

Very little is known about the life cycle. It's thought that they breed in coral reefs, with the fry then migrating from the ocean to fresh water. The fry have a larval form, or *Tbolichthys*, when the head is covered with bony plates and the body seems small by comparison. This changes as the fish mature. As the fry grow, they travel from fresh, to brackish water mangroves and lagoons, and journey toward the sea, finding abundant food supplies in these coastal areas.

These habits must be borne in mind. As captive fish mature, gradually increase specific gravity by additions of a good-quality marine salt towards full marine salinity. Of course, in nature, storms, the rainy season,

and mangrove tidal fluctuations, mean young Scats exist in a turbulent environment but it would be impractical to reproduce these conditions in home aquaria.

Introduction and care in home aquaria

It's a beginner's marine fish, it's hardy, it's a freshwater subject, it's a brackish water fish. Surely these opinions can't all be right! However, as explained with the complexities of its life cycle, they are all, in fact, correct, and occur at various times in the fishes' history.

I would be happy to add a two-inch tank-raised specimen to a marine set-up, (or a larger imported one). However, a tiny fry would not thrive in a marine tank since it is not yet fully adapted for a marine life. Therefore even hardened aquarists can fail miserably if they do the wrong thing with youngsters.

Rapid fluctuations in pH, such as may be experienced in shipping, also bring stress and hardship to young fish. White secretions on the body, eyes, and fins indicate this stress, as does deterioration in the tail edges. Given good conditions and use of water conditioning products, these symptoms can be readily overcome successfully. However, question the shop about the tank conditions, avoid "shimmying" specimens, and persuade the trader to treat these symptoms before purchase, if at all possible.

New fish require clean water free from suspended materials that may irritate the gills. They also need alkaline conditions. Dolomite gravels, or coral sand, may be added to the tank substrate to increase alkalinity gradually. A teaspoon or two of salts added each day over a week (per gallon) should provide good, safe conditions for newly-acquired Scats.

These young fish are particularly prone to disturbance and badgering if introduced to an established community tank. Bearing in mind that the salt requirement may upset your collection, a separate tank is best. If your community is not salt-sensitive, feed your collection well prior to introduction, and keep a small group of Scats, which helps both to induce a sense of belonging and security and avoid bullying of a lone fish.

In one case I've seen a Scat so badly nipped by a Puffer, that I have no hesitation in saying Puffers and young Scats are incompatible... Remember also that the

darting motion of one panicking Scat, invites attack, whereas the same behaviour in a small shoal confuses and distracts the potential bully or predator.

Feeding

Feeding should be no real problem as the scientific name might indicate. In fact, early studies actually found excrement in the digestive tract of collected specimens. This tendency is little evident when better quality food is available. Adult brine shrimp, blood worm, white worms, scraped prawn or crab meat, combined with marine flake will soon build up your little Scats into very robust, active individuals. These fish will also supplement their diet by constantly grazing algae off the rockwork. In the initial stages a slightly brackish aquarium will support many aquarium plants, but lettuce, cooked spinach and shelled peas can also be offered in an attempt to slow down interest in eating the shrubbery somewhat!

Transition to marine conditions

As long as the group are growing rapidly, little needs to be done to create a more salty tank. But, you will, at some stage, sense the slowing down of growth and see the colours change in your fish. Yes, even fish have black moods! If additional salt and aeration invoke a more reef-like environment and your fish respond well to it, then move over to marine conditions.

Because of their discus-like shape Scats are very imposing in marine aquaria, where, like Monos, their subdued adult tones provide an excellent foil for the brighter darting Damselfish and other beginners' fish.

I would make the transition after the two-inch stage.

The character and behaviour of Scats will ensure that they will long remain firm favourites. In addition, they are easy to care for compared to other reef fish, with which they share intelligence and an ability to recognise their owner and learn a feeding schedule, (heads will come right out of the water to greet you at this time).

Best in show

The adult size of aquarium-raised Scats is around 15 cm (6in) and a very impressive specimen measuring round about this maximum was Best Fish in Show at the spring Scottish Aquarist Festival in Motherwell this year.

Few fish are as appealing when young, or as rewarding for the caring beginner in fishkeeping. Its appeal to the beginning brackish water fishkeeper (or the marine enthusiast) in its larger sizes truly bridges a gap between the main interest groups in the hobby. The Scat is a fish that will grow with you, giving you years of interest and pleasure, no matter how far your hobby expands.



SCOTTISH AQUARIST FESTIVAL LIST OF WINNERS

As promised last month, here is the full list of major Scottish Aquarist Festival winners.

Best Fish in Show

(Bobby Wood Trophy):

Cichlasoma umbriferum owned by T. Grahame of Workington A.S.

Best Tableau

(Tetramin Trophy):

First — Scorpion A.S.

Second — Edinburgh Pondkeepers

Third — Muirhouse A.S.

Fourth — Larkhall A.S.

Fifth — Grangemouth A.S.

Society Gaining Highest Points

(Aquarist Trophy):

Dunfermline A.S.

Scottish Supreme Champion:

(LMB Trophy and Hospitality Trophy)

Botia sidthimunki owned by K. Fowler of Workington A.S.

F.S.A.S. Open Show League:

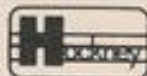
(D & G Trophies)

Single Fish: K. Liddle (Dundee A.S.)

Breeders (Egglayers): A. Weir (Dundee A.S.)

Breeders (Livebearers): J. Westwater (Dundee A.S.)

Trophy	Class
NEL Trophy	Furnished Aquarium (Society)
FNAS Trophy	Furnished Aquarium (Individual)
Bell Thompson Trophy	Best Schools Aquatic Art
Edinburgh Pond — Keepers Trophy	Best Coldwater
Earl of Motherwell Trophy	Best Guppy
George Henderson Trophy	Best Molly
Dunfermline Silver Jubilee Trophy	Best Platy
Basingstoke Friendship Trophy	Best Swordtail
Scotia Aquatics Trophy	Best AQV Livebearer
Aquarama Trophy	Best Livebearer (Pairs)
Hutchings Trophy	Best Pair of Guppies
Stan Taylor Trophy	Best Barb
Woodcock Trophy	Best Characin
Bob Ferguson Trophy	Best Rasboras
Friendship Trophy	Best Danio/Tropical Minnow
B.K.A. Trophy	Best Egg-laying Toothcarp



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Winner	Society
—	Lanarkshire
H. Hoey	Dunfermline
Lanark Primary	—
Mr & Mrs Silk	S.J.S.
Mr & Mrs Silk	S.J.S.
J. Reid	Edinburgh Pondkeepers
A. Pickup	Edinburgh Pondkeepers
R. Hunter	Workington
N. Hearty	Scorpion
J. Wells	Dunfermline
G. Anderson	Paisley
H. Hoey	Dunfermline
K. Fowler	Workington
J. Reid	Edinburgh Pondkeepers
G. Hogg	Dunfermline
A. R. Oldham	Stirling

Trophy	Class	Winner	Society
Belle Vue Trophy	Best Siamese Fighter	D. Leroy	Larkhall
Muirhouse Trophy	Best Anabantoid	Mr & Mrs Robinson	Scorpion
Rift Valley Trophy	Rift Valley Cichlid	K. Ranson	Stirling
Fotheringham Trophy	Best Dwarf Cichlid	A. Wilson	Scottish
Frisby Trophy	Best Large Cichlid	T. Grahame	Workington
Mark Aitken Trophy	Best Catfish 'A'	S. Wilkin Jnr.	Scottish
Ayrshire Trophy	Best Catfish 'B'	J. Norwood	Grangemouth
Aquarian Trophy	Best Shark	J. Wells	Dunfermline
Hartlepool Trophy	Best Loach	J. Wells	Dunfermline
Aberdeen Trophy	Best AOS Egglayer	C. Henry	Dunfermline
Duncan Fotheringham Trophy	Best Aquarium Plant	D. Anderson	Paisley
M & M Trophy	Best Pair of Egglayers	W. Remon	Dunfermline
Lanarkshire Trophy	Best Breeders (Livebearers)	K. Hunter	Workington
Aloa Trophy	Best Breeders (Egglayers)	W. O'Brien	Clyde



A corner of the unusual and interesting Muirhouse third-placed tableau depicting S.A.F. in miniature.

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THE SPOTTED GOODEID

Jørgen Wimo, President of the Danish Aquarium Union, shares some of his personal experiences with this hardy, lively and attractive livebearer.

Among the many true live-bearing toothcarps which have become available to aquarists over the last few years there are some, which are so exceptional in behaviour, that every aquarist who comes into contact with them will wish to have a go at keeping and breeding them. One of these fish is the Spotted Goodeid, *Chapalichthys pardalis* from Tocumbo (Michoacan) Mexico.

The genus *Chapalichthys* was described in 1920 by S. E. Meek and contains three species:

Family: Goodeidae

Subfamily: Goodeinae

Genus: *Chapalichthys*, Meek 1902

Species:

1) *Chapalichthys encasitas* (Jordan & Snyder 1900)

Synonym: *Characodon encasitas*, Jordan & Snyder 1900

2) *Chapalichthys pardalis*, Alvarez 1963

3) *Chapalichthys peralicius*, Alvarez 1963

Background Notes

At temperatures between 23-25°C both males and females of this species should reach 7.5 cm in size. Different sources give the information that *Chapalichthys pardalis* can give birth to approximately 15 fry but I feel that this number is too low.

I got my first fish in April 1985 from

Norway and the pair was put in a 50-litre aquarium. A month later the female was very fat and round and it was obvious that something was actually moving inside her. One could see how the skin of the belly suddenly moved outwards and thereafter fell back into its original position. Just in front of the anal fin was a dark spot, similar to the pregnancy (gravid) spot in Guppy females, but fainter in intensity, and smaller in size.

It is not possible for Goodeid females to keep sperm from the males for future fertilisations (as in Poeciliids) so, after each birth, the female has to be put together with a male.

Male *Chapalichthys pardalis* have spotted bodies, just like females. However, they also have larger dorsal fins and a yellow edge to the caudal fin (which females don't have). Finally, the anal fin of the males has six normal rays, followed by a notch — a characteristic of all Goodeid males.

Male Spotted Goodeids can be rather unfriendly towards each other. It is, therefore, advisable to have either only one male in the tank, or five or six, so that the aggression from a dominating male is not directed towards a single fish but towards a shoal, with much less damage.

In the eight months between May 1985 and January 1986, I enjoyed a reasonable degree of success with this species, as the

following excerpts from my notebook show:

19-5-85 : The female gave birth to 6 fry; their size was astonishing. They measured 20 mm in length and their bodies were speckled. They were exact copies of the female, but 3 times shorter.

3-7-85 : 45 days after her first birth, the female gave birth again and this time the six young fish from the previous brood — 4 females and 2 males — as well as the original male, were present in the tank. As far as I could see none of the fish present in the aquarium took any notice of the new-born fish.

4-7-85 : I counted 9 fry and, furthermore, the caudal fin of another one was sticking out of the female. After a while I thought that this situation had gone on long enough without the baby fish being born so I decided to help a little. I caught the female and with a pair of tweezers, took hold of the tail of the fry and carefully pulled it out. I then put both the female and the baby fish back with the other fish in the tank.

The female looked like she was fine but I took the baby for

Left, a Spotted Goodeid male. Note the large dorsal fin, the yellow edge on the caudal and the notch on the anal fin.
Right, birth is nearly complete, and the trophotaeniae are about to drop off.



dead. In any case, I decided to give it a chance. It moved a little and then sank to the bottom. Normally the sight of something swimming "abnormally" will provoke a hunting instinct in any watching fish. Not surprisingly, therefore, some of the fish from the first brood came rushing with the obvious purpose of eating the defenceless wriggling baby fish as fast as possible. However, when they were only a few centimetres from the poor "victim" they stopped — as if they had swam into a sheet of glass — and then swam away seeming not at all interested. It was quite clear that something about the stricken fish — maybe its spots — stopped the aggression of its fellow members. Altogether there were 15 fry in this brood.

After this lot of fry there was a long period during which no fish were born, even when the parents were fed variously with living food of different kinds, as well as dry food.

18-12-85 : 8 fry were produced by a 5 cm-long female from the batch that was born on 3-7-85 (ie) just 5½ months after the female was born. The fry measured 20 mm and were born in the parent aquarium where they (as I ex-

pected) were not eaten or hunted by the other fish.

29-12-85 : The original female gave birth again so (obviously) she had not been harmed by my "birth help". She now measured 7.5 cm and I placed her in a 50-litre tank so I could take some pictures. Birth lasted 24 hours and, now and then, baby fish were born with their tail first. In these cases it took from 1-5 hours before the baby fish were born. There were no baby fish swimming around with their "umbilical cord" (called trophotaeniae in Goodeids) right after the birth. I was, however, lucky to see one fish was being born with a 20 mm long stringy umbilical cord which fell off while the baby fish was sinking to the bottom of the tank. (Other baby fish had the umbilical cord attached for a few minutes before it fell off). At one time I counted up to seven trophotaeniae on the bottom of the breeding tank. There was a little red spot at the point where they had been attached to the fry. I tried to keep one set of trophotaeniae by putting it between two pieces of glass. I expected to make some pictures of it later — but when I had the time, a month later, the whole

lot had completely disappeared.

After birth the fry always lay for a few minutes on the bottom without moving before they tried to swim. Interestingly, the fry produced by the female measuring 7.5 cm were exactly the same size as those produced by a female measuring only 5 cm. The number was, however, considerably bigger (ie) 24 fry.

My record card for the period May 1985 to January 1986 is as follows:

Date	Fish	Length	No of fry*
19-5-85	Female I	6 cm	6
8-7-85	Female I	7 cm	15
18-12-85	Female II	5 cm	8
29-12-85	Female I	7.5 cm	24
4-1-86	Female III	6 cm	9
8-1-86	Female IV	5 cm	8

*All the fry measured around 20 mm in length.

Chapalichthys pardalis, the Spotted Goodeid is one of the really nice livebearing toothcarps which can be kept to advantage in a planted species aquarium or together with other fish of the same size. Either way, it is a highly desirable addition to the ever-expanding range of livebearers available to aquarists.

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Tomorrow's aquarist

Beginners' Corner

Aquascapes

This month, we start landscaping the community tank. A word of caution — it is always best to put the rocks and wood in *before* the plants. There is nothing more discouraging than arranging your plants, only to find they're just where you want to put a large rock.

When furnishing a tank, bear in mind the needs of the fish you want to keep. A smaller aquarium is usually good for displaying either two or three shoals of mid-water fish, or a pair of Dwarf Cichlids — such as Kribensis or Keyholes — with just one shoal of smaller fish. If you are thinking of shoaling fish, remember that these fish will need plenty of swimming space.

Dwarf Cichlids, however, are territorial and will be happier with caves and heavier planting. Shy, nervous fish like Glass Catfish, Silver Sharks and Siamese Fighters will not thank you for keeping the planting sparse; they need somewhere to feel secure. Bottom-feeders — a must for every community tank — will sometimes only feed at night and need retreats during the day. Angelfish will relish thin Vallis but won't get on with thick jungles of plant.

"Heavy" furnishings

Rocks and bogwood are the usual "heavy" furnishings. Bogwood can be pricey but well worth it; fish are relaxed with it and it provides a wealth of hiding and breeding places, as well as a dark and natural backdrop to plants. Soak it for **at least** a week to disburse any impurities and waterlog it. (If you ignore this necessary delay, your tank water will go amber and the wood will float!) When choosing bogwood, go for the more interesting shapes — spurs of root to lead the eye up into the water-holes and inlets for the fish to investigate.

When looking at rocks, personal preference rules — although you would be wise to avoid rocks with sharp edges. A spawning frenzy or playful chase could end in tragedy if sharp rocks are in the way. The choice of colour and shape is



Above, wood (appropriately treated of course) and plants can complement each other beautifully.

Right, many species, such as Rams, use rocks as spawning surfaces.



used to make "roads" from one part of the tank to another — Vallis planted up either side of a long, flat rock will form an

confusing. Flat rocks may look unexciting but you'd be surprised what you can do with them.

When surrounded by plant, they provide quiet islands in the gravel for bottom-feeders. They are often used by fish for egg-laying and can even be

The Self-Help Club

We have had a very interesting letter from **Raymond Matthews** of Devizes, Wiltshire, which we found thought-provoking. He says:

44 I am sixteen years old and keep many fish, my pride being breeding pairs of Angelfish and Ancistrus. I read through your magazine and find that young aquarists who write in occasionally get their questions published but are always answered by the advanced scientists who give short, quick and complicated answers. Really, it is essential for young aquarists to be dealt with by younger people. You could maybe call the section "Young Aquarist", in which they could write in and get their queries answered. P.S. Thank you for your time and I hope you spare a thought??

Thank you for your time, Raymond. We are always interested to hear from our

readers — for better or worse! We think, however, that you are confusing age with experience. We have lots of correspondence from aquarists who are ten years old and who would think you are positively over the hill — as you must think we are!

Fishkeeping is the kind of interest that people take up at any age. Many new aquarists began fishkeeping when they were thirty or more; which makes you, with eight years' experience, the more expert. Many of our older aquarists are more than happy to take advice from younger experts — fishkeeping is that sort of friendly club. Which is why we have featured your letter on this page. T.A. is read by all ages — and by the experienced aquarist — but, as you can see, we always have beginners in mind, whether they are seven or seventy.

With such a wide variety of

elegant avenue for fish and is pleasing to look at. If you want to stack rocks, either terrace them with gravel or glue them together with silicone sealant.

Rocks can also be used for "dividing" the tank — you could use large rocks to isolate a quiet corner, leaving the rest of the tank free for swimming space. The golden rule is experiment. **Take your time.**

Caves can be made out of rock formations but the quickest method is to introduce plant-pots and/or coconut shells. The former should be clay pots and you can either leave them whole, or cut the larger ones in half. Coconuts provide two extras — you can eat the contents! And the dark shell bleeds well with plants. These can be prepared by sawing a wedge out of the shell, leaving at least three-quarters intact. Empty out the milk, cut out the coconut and leave the shell to soak for a day or two. It might seem like hard work but they last for years... And then, of course, there are excellent, and relatively light, artificial rocks, logs and other types of aquarium decorations to choose from...

age and experience to cater for, we have put a great deal of thought and work into catering for everyone, not just on this page but throughout the magazine. We think we've got the balance right — and are surprised that you still find the "expert" answers complicated.

Our policy, of keeping fishkeeping topics within the range of most of us — ie those of us who are not scientists — is borne out by **The Self-Help Club**. Our aim is to encourage readers to share their experience with those who are newer to the hobby; an Open-line, if you like, to be used by all. So, **Raymond**, feel free. Let us know how you are getting on with your fish-breeding; pass on your experience to our readers.

Note. For his thought-provoking contribution, we are sending Raymond a copy of **David Sands'** excellent book: **Keeping Aquarium Fishes — Corydoras Catfish**; Published by: Dec Bee books; ISBN: 0-9511-959-0-5; Price: £5.95.

BEGINNERS' GUIDE

KOI

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- **Best Koi varieties**
- Filtration for beginners
- **Koi pool design**
- Choosing and handling Koi

BEGINNERS' GUIDE TO KOI

CHOOSING AND HANDLING KOI

For the best guide to choosing your Koi, getting them home safely and introducing them properly to their new home, follow Roger Cleaver's expert advice.

The biggest killer of Koi, and for that matter any fish, is MAN. This seems particularly true for novices to the hobby. The reasons are not usually because of neglect, but because the Koi-keeper lacks an understanding about his/her charges. More often than not the novice is unsure of what to look for when buying, how to get the fish home safely, what to do when they are at home, and how to look after them until they are settled in.

Choosing Koi

Choosing Koi often causes the novice

much concern. The first consideration in the choice of a Koi should be the question, "Do I like the fish?" If the answer is, "Yes" then the second consideration is, "Is it healthy?" If it is healthy and you like the Koi, then it is a good fish for you, regardless of its quality within its particular classification e.g. Kohaku, Sanke etc.

What then to look for in a healthy Koi? Firstly, it should be swimming with its fins erect in an active, searching manner, and it should have bright clear eyes. There should be no marks, blemishes, raised scales, sore spots or parasites visible. Small splits in the fins, although they constitute damage, are

no problem as they will usually heal very quickly once the Koi is settled in your pool.

Fish with either swollen or emaciated bodies should be avoided, as should Koi which are hanging at the surface or are lying on the bottom. Koi which are flicking or rubbing against the sides should also be treated as suspect. Another sign that all is not well is when the fish are breathing with either very rapid or very slow movements of the mouth and gills. Finally, fish which keep their fins down, or with cloudy or bulging eyes, should also be suspected of having some sort of problem.

But how do you spot these faults when a

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BEGINNERS' GUIDE TO KOI



ROGER CLEAVER

It is always a good idea to ask to see your chosen Koi at close quarters in a small bath or container.



ROGER CLEAVER

Close examination in a polythene bag allows you to see all parts of your selected fish.



ROGER CLEAVER

Oxygen is being pumped into the polythene bag which is placed in a polystyrene box for transportation.



ROGER CLEAVER

The polystyrene box is placed on the back seat of the car with its long axis parallel to the axle to minimise disruption.



ROGER CLEAVER

Keep the box wrapped up. This will prevent temperature fluctuations and, most importantly, will help keep the level of stress which the fish experiences, down.

Koi is mixed in with many others? The answer is to ask to see the Koi in which you are interested in at close quarters in a small bath or container. Inspected this way, signs of trouble will be seen more clearly. If everything looks alright, then ask to see it in a polythene bag so that you can inspect the fish from below. Most dealers are only too happy to oblige and, if you have any questions, ask them now. If in doubt after all this, then do not buy that particular Koi.

Safe Transportation

Once happy with your choice, the next problem arises: how to get them home safely.

Your dealer will have bagged your purchase and probably inflated the bag with oxygen. For larger Koi it is preferable to transport them by placing the bag into a cardboard or polystyrene box. These can sometimes be obtained from your dealer

and are worth retaining so that you can take them with you when you go to buy fish.

Carefully carry your purchase to your car, and, whenever possible, place it in the car so that the longest length is parallel to the axle. Cover the box or bag so that it is in darkness; this will help to prevent the temperature rising too much and the fish from suffering too much stress. Transported this way your Koi should arrive home safely and in the best possible condition.

Acclimatisation/Quarantine

Once home the question is: Do you put the fish straight into the pond or do you place it in quarantine?

Arguments for both ideas are many. Full quarantine requires at least six months and really needs doing in a special quarantine pond which is set up away from your main pool. Most people, however, cannot, for one reason or another, afford to

do this. Yet, I feel that a three-week period in a small quarantine set-up is beneficial for most novices.

It should be remembered that, apart from Man, the next big killer of fish is stress. No matter how carefully Koi are handled and transported, they will have suffered a certain degree of stress, if, for no other reason than the amount of upheaval they will have had since leaving Japan or their place of origin. Dealers do as much as they can to reduce the stress but new Koi will always have their resistance lowered to a certain degree. This leaves them vulnerable to attack and a period of quarantine should help the fish recover.

I would even do this when buying Koi from a dealer who offers 'Quarantined Koi For Sale' as the journey home could still lower the fishes' resistance sufficiently to bring on problems. Of course, buying quarantined Koi should prevent any serious

BEGINNERS' GUIDE TO KOI

A Play

Cast of Characters

HUMANS

Old dear

Young tyke

Mum

KOI

Katie Kujaku

Maggie Magoi

Old dear:

Oh! My word

look at them,

gawd aren't they

BIG!!!

Maggie Magoi:

She must be

talking about me

I'm the biggest

fish in this

pond.

Katie Kujaku:

Its only because

she hasn't spotted

how beautiful

I am yet.

I will go over

and say hello.

Maggie magoi:

She is much more

impressed by me

than you.

She can't

appreciate colour,

just look at

what she is wearing!

Tyke:

Mum can we go

and see the others,

now.

there are lots of

babies and things

to look at?

Mum:

In a minute dear —

watch the big ones.

Tyke:

But I want to

go and see the

others NOW

(Screams)

Katie & Maggie:

What an obnoxious

child!

THE END

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problems arising.

You first need something to quarantine the fish in. Smaller Koi can be quarantined in glass tanks while larger ones need a container big enough to allow the fish to swim. Round plastic header tanks can be obtained from builders' merchants and are very good. The rectangular plastic ones should be avoided as they have strengthening lugs in them which may damage your koi. Fibreglass water tanks can also be found and are ideal. It is worth investing in such containers as they can be used as treatment tanks should the need arise at a later date. Other containers used are children's paddling pools, or temporary pools can even be made out of timber and a cheap liner. The tank or container will need to be set up with some form of mechanical filtration, aeration and a good tight cover. Zeolite, obtainable from good Koi dealers, is also very useful in a quarantine set-up to help keep the water in good condition. The use of a heater can be advantageous.

To help your new Koi settle in, the introduction of another fish is beneficial. I often use a Goldfish kept for this purpose. The Goldfish is used, not because it is less expensive than a Koi, but because it generally is "happier" and settles in a tank or vat more readily than Koi. I do not automatically add any treatments but would observe the new fish to see if anything develops. Treatments should only be used if some form of disease develops.

Your quarantine tank should be set up and working for a couple of days before you go and buy your fish. The main reason for quarantining is to give your new Koi a chance to settle in. It also gives you a second chance to look for any problems.

Introducing fish into a pool

Whether you quarantine or not is your choice but, either way, you will still have to introduce your new acquisition to its new home. To do this you must float the bag with the new purchase on the water for thirty minutes before opening it. This will allow the temperature in the bag to adjust to that of the pond or quarantine tank. After opening the bag, add a little of the pond water to that in the bag and wait another ten minutes. Do this two or three times. The reason for this is that water from different supplies varies chemically. By mixing pond water to that in the bag, it allows the fish to adjust gradually to the new water conditions, thus helping to cut down on the stress.

If you are floating the bag outside on a sunny day make sure you provide some form of shade over the bag. If not, the bag will act as a greenhouse and the water, instead of adjusting to the pond temperature, will, in fact, heat up and may even kill the fish.

Once released, the Koi will usually swim to the bottom and then, after a short while, begin to explore its new home. Occasionally

a new fish will begin feeding the next or even the same day, but do not be worried if this does not happen. It often takes a day or two for a new fish to settle in. Some even spend a couple of days moping around the pool before they settle down. Do not worry if this happens and do not keep disturbing them to see if they are alright. Their behaviour is as a result of the stress of the move and they need time to adjust. Eventually, after two or three days, they will join the rest of your fish and become part of the crowd.

Feeding can be a problem for the novice Koi-keeper. The subject is one which warrants an article to itself but, to give one basic tip, a little and often is much wiser than a lot once or twice. The range of foods available is very good for Koi and your dealer should be able to give you good advice on what to feed.

Problems arise when too much food is given at any time. The amount you feed depends upon the size and quantity of fish, but a safe guide is to feed only as much as the Koi can eat in two to three minutes of feeding. After this time surplus food should be removed.

Ideally, food should be given several times during the day in the summer months in this way.

Should any signs of disease or unusual behaviour develop, either in the pond or quarantine tank, be sure to get help with the identification of what is wrong if you are not completely sure as to the cause. It is wrong to add any treatment or medication to your fish unless you are sure of what is the causative agent. Your dealer can be very helpful in this instance and should be able to give you good advice on how to treat your problem.

Koi societies

The various Koi societies around the country can also prove to be very useful, particularly to new people to the hobby. If asked to give one piece of advice to newcomers, it would be to join a Koi society. The experienced members of any society will be able to help with advice on any Koi-keeping problem that is likely to arise. Below are the details of the various Membership Secretaries of the major Koi societies.

Midland Koi Association

Mrs J. Hewitt, 1 Durham Crescent,
Allesley Village, Coventry CV5 9GA.

Yorkshire Koi Society

Mrs H. Bent, 58 Broom Crescent, Rotherham, Yorkshire.

British Koi-Keepers Society

Mr S. D. Ballan, 102 Norbiton Avenue,
Kingston-Upon-Thames, Surrey KT1 3QP.

The British Koi-Keepers Society has sections in various parts of the country and the Membership Secretary should be able to give details of your nearest section.

BEGINNERS' GUIDE TO KOI

BASIC KOI POOL CONSTRUCTION

Building your own Koi pool need not be the incredibly complex job some people make it out to be, as **Barry James**★ of Everglades Aquatic Nurseries demonstrates.

I have met many people over the years who are keen to construct a suitable home for Koi, but are terrified of the seeming complexity of the operation. Photographs of ponds under construction often published in the aquatic press show huge trenches filled with liquid mud at the bottom of which is a maze of pipe connections and the pond itself which resembles the Grand Canyon with Lilliputian figures labouring away in the abyss.

Of course, the professional and fanatical Koi-keeper with unlimited resources, do build such pools but for the person who wishes to build an adequate pool for a limited selection of fish, such an operation is unnecessary.

Let us say, for the sake of argument, that 20ft x 10ft would be a reasonably sized pool for the average garden. While 5ft would be the normal depth, 4ft would be quite adequate for the deepest portion, sloping up to 18in in the shallows. There is no need to build shelves unless you intend putting marginal plants around the periphery. One or two can always be accommodated in the 18in deep portion if desired.

The easiest material to work with is butyl rubber sheeting. It is tough and has a good life expectancy. Informal pools, either dumbbell or oval-shaped, will lead to fewer creases in the finished product. Bottom drains can be built in only in the initial stage of construction, but they are not essential.

Where possible, pools should always be situated at the lowest point in the garden; they look more natural in this setting. Koi love to bask in the sun, so make sure your pool will receive several hours of sunshine a day in summer.

Liner size & price

Having decided on the site and size of the pool, the first task is to work out the size of sheet you need. Assuming that you build the pool with slightly sloping sides, our sample pool 20ft x 10ft x 4ft would need a sheet calculated as follows: **Take the length plus twice the maximum depth and multiply it by the width plus twice the maximum depth.** This will give you the total square footage. Having obtained the price per square foot this will enable you to estimate the cost of the liner. In summer allow 3 weeks for delivery of your liner as the factories are working flat out to meet demand.

Excavation can be a backbreaking task but mini-diggers can be hired, complete with operator, for a very modest sum, and your hole dug for you in just a few hours. When the excavation is finished use a spirit level and a long straight-edge to check that the top is level. With liner pools it is always possible to shave a few inches off the top of the sides if you are slightly out, even when the pool is filled with water. It is important at this stage to remove any sharp stones and then to place either sand, underfelt or even several thicknesses of old newspapers to cushion the liner.

Installation & filling

You will need the help of at least one other person to install the liner. If it is a warm day stretch the liner out on the lawn and let it warm. This will help to iron out the creases caused by folding. Now place the liner in the excavation and adjust it by pressing it into place. One person in bare feet can get into the pool and push the liner into the angles. In this way you can make sure that the overlap is even all around the edge. Now the pool can be filled using the hosepipe. Station your helpers around the pool and give minute tugs at regular intervals to remove as many of the creases as possible. Start when there is about 3in of water in the bottom. Remember, once there is, say 2in, of water in the base it is impossible to do any more adjustments to the base. Continue this process until the pool is filled. At this point one can assess how accurate your levels are and adjustments made before installing your edging material. Any surplus liner can now be trimmed off.

Other types of pool

Of course there are many other methods of pool construction. Concrete, the traditional method, is still employed by many people especially for architectural designs such as rectangular, circular, 'L'-shaped pools and also when pools are being constructed at different levels. In general terms such pools should be constructed by experts as any mistake in materials or technique can lead to long-term problems such as cracking and leakage which are very difficult to rectify later. One company, in the UK specialises in extremely large fibreglass shells. These are a foolproof method but can be somewhat expensive and, because of their bulk, can be difficult to install if access is limited.

Bottom drains

Bottom drains while, as I stated earlier, are not essential, are a great advantage to any pool fitted with one. They are designed to empty the pool quickly and are made in such a way that small fish cannot be lost when the drain cock is opened. There are two basic types, one for use with liners and another version employed if concrete or fibreglass are the chosen materials. The drain is normally attached to a 4in diameter PVC pipe which leads to a brick-built discharge box situated beside the pool. The water is retained via a valve or standpipe to a soakaway or domestic drainage system.

After the pool is finished it is still possible to install a drainage system as there are models which can be fitted to the top of the pool side. These are connected to a pipe that siphons the debris from the bottom. These are known as 'top-bottom' drains.

Don't forget that while Koi are the major attraction, their beauty will be enhanced if the pool is in the right setting. An enormous amount of soil will have accumulated from the excavation. This can either be disposed of or used to create the basis for an attractive rock garden and, with a very little extra effort, a waterfall system, perhaps, linked to the filter system can be installed. Japanese gardens which incorporate Koi pools lean very heavily on evergreen trees and shrubs to create an all-year round garden. However, the beautiful autumn hues of the Acers and deciduous Azaleas are also used and no Japanese garden would be complete without flowering cherry trees to brighten up the early spring.

I always like to see a few water-lily plants of the more vigorous varieties in a Koi pool to provide shade. However, these are best planted in large tubs rather than planting baskets and large pebbles rather than gravel used to prevent the natural 'rooting' tendencies of carp.

*Footnote

Barry James' latest book 'A Fishkeeper's Guide to Koi', published by Salamander Books Ltd. (Price £8.95), not only provides comprehensive advice on maintaining and displaying Koi, but also on pond design and construction, as well as all other aspects of Koi-keeping.

BEGINNERS' GUIDE TO KOI

KOI VARIETIES FOR BEGINNERS

Gregory Peck, a prominent member of the British Koi-keeper's Society, sorts out some of the best "swimming jewels" for beginners. (Photographs supplied by John Beattie, Chairman of the B.K.K.S. National Show Committee).

There are more than one hundred different varieties of Koi, which fall into thirteen different groups. There are metallic Koi which make up three of these groups and non-metallic Koi which make up the other ten groups. There are also two types of scaling on Koi: the Japanese type which has scales covering the entire body, and the German, better-known as Doytz, which has a few scales on a leather type skin. (These Koi were introduced to Japan in the late 19th century.)

Metallic Koi appear to be the ones that stand out first to newcomers to the hobby of Koi-keeping, the Ogon being the most noticeable — an all-goldish-coloured Koi looking very much like a swimming jewel. (A nickname given to Koi by many people.)

METALLIC VARIETIES OGONS AND MATSUBAS (HIKARIMUJI GROUP)

Ogons are single-coloured Koi, normally available in three different metallic colours; orange, yellow or white. The other Koi varieties which fall into this group are Matsubas which are similar to Ogons but with a dark edging to each scale, a pine-cone effect giving these Koi a very elegant look. These varieties are a must in any new Koi-keepers pond, all being very hardy.

KIN KI UTSURI, KIN SHOWA, GIN SHIRO (HIKARI UTSURI GROUP)

These three varieties of Koi are all metallic with a black background or base colour. The Kin Ki Utsuri has a black base colour with a yellowish pattern. The Kin Showa has the same features with the addition of white to the yellowish pattern and the Gin Shiro has a white pattern instead of the yellowish pattern of the Kin Ki Utsuri. All three are, once again, very attractive fish.

HARIWAKE, KUJAKU (HIKARIMOYO)

The final group of metallic Koi contains all the other metallic varieties not already mentioned. The more distinct and favoured in this group are the Hariwake and Kujaku varieties.

The Hariwake is a similar kind of Koi to the Ogon but has two colours, normally gold on a silver background. These are very impressive-looking Koi and are very popular, especially those of Doytz scaling.

The Kujaku is a Koi having five different colours, dark and light blue, white, black

and gold; very attractive Koi, especially those which have white on the heads.

NON METALLIC KOI KOHAKU

The word Kohaku means red and white. These are therefore white Koi with a red pattern. There are many types of patterns of the Kohaku, from the straight pattern which is one large red marking spreading from head to tail, to stepped patterns of two or more patches of red on the back of the Koi, to a lightning type pattern which has a continuous zig zag of red along the back of the white background. The Kohaku is the number one variety of the Japanese and is the variety which normally wins at most of their shows. There is an old Japanese saying. "One starts with a Kohaku and one ends with a Kohaku." The meaning behind this saying is that many people start with the Kohaku as their favourite variety, and after going on to favour other varieties, tend to return to the Kohaku as their first choice.

TAISHO SANKE

The Taisho Sanke, more often known as just Sanke (meaning tri-colour), is a similar Koi to the Kohaku but with the addition of black markings. The Sanke is possibly the best-liked Koi in Britain among Koi hobbyists. An impressive Sanke will have a nice white background with large red markings and small black markings in a tortoise shell pattern on the back. The trend today with Sanke is that they have fewer black markings (perhaps five or six) than in the past.

SHOWA SANKE

Again, this is a Koi with red, white and black colour. The main difference between the Showa (as it is more commonly known) and the Sanke is that the Showa is a black Koi with red and white markings, unlike the Sanke which is a white Koi with red and black markings. It is very difficult for the beginner to be able to tell the difference between these two varieties. The Showa, Sanke and Kohaku are the most popular varieties of the non-metallic Koi and, undoubtedly, take the major awards at most of the Koi shows.

UTSURI

The Shiro Utsuri is a black Koi with a white pattern and is a very striking looking fish. Modern Shiro (meaning white) Utsuri tend to have more white than black, with a distinct marking, whether it be a large black 'Y' shape, or just a line from the nose to the top of the head. The Utsuri can also have a

red pattern, this variety being known as Hi Utsuri; or a yellowish pattern known as a Ki Utsuri.

SHIRO BEKKO

The Bekko is a similar Koi to the Utsuri, but instead of the black background of the Utsuri, the Bekko has a white background colour with a black tortoise shell pattern. Other varieties in the Bekko group are Aka Bekko, a red Koi with a black tortoise shell pattern and the Ki Bekko, a yellow Koi with a black tortoise shell pattern. Both the Aka Bekko and the Ki Bekko are rare varieties and seldom seen, but the Shiro Bekko is very popular and stands out well in any collection of Koi.

ASAGI/SHUSUI

The Asagi is one of the oldest breeds of Koi, having a bluish colour with red and pale blue markings. The Asagi is a scaled Koi, in which the head is normally pale blue in colour with the back being a darker blue. Below the lateral lines on the body and on the fins, there is normally some red. The Shusui is the Doytz version of the Asagi.

KOROMO

The Koromo is a cross-breed between the Kohaku and Asagi. It has a white background with a red pattern. Inset on each scale of the red is a bluish edge, giving the Koromo a very interesting pattern and coloration.

TANCHO

The name Tancho was derived from the crane bird, which has a large red spot on the head. The Tancho comes in three different varieties. Tancho Kohaku has a red head spot on a white body. The Tancho Sanke has a red head spot on a white body that has the black tortoise shell pattern. Finally, the Tancho Showa has a red headmark on a black body which has white markings. The Tancho Kohaku is perhaps the favourite among these three and one Tancho always looks good in any collection of Koi.

KAWARIMONO

Kawarimono is the name given to any non-metallic Koi that does not fall into any of the other listed groups. The most favoured in this group are the single-coloured Koi and the black and white Koi.

Single-coloured Koi include the Benigoi, a red Koi, the Midorigoi a green Koi, the Kigoi, a yellow Koi and the Chagoi a brown Koi.

The black Koi with white markings in this group are all members of the Karasugoi

BEGINNERS' GUIDE TO KOI



The Kohaku is widely regarded as the No. 1 Koi variety in Japan.

and include:

- Karasugoi — All-black Koi
- Hajiro — Black Koi with white tips to the fins
- Hagashiro — As Hajiro, but also with white head
- Yotsushiro — As Hagashiro, with all-white fins
- Kumonryu — Doytz version

KIN GIN RIN (KIN MEANING "GOLD" AND GIN MEANING "SILVER")

This class includes all the varieties of Koi, with the exception of Tancho. The Gin Rin are Koi with silver-coloured scales dotted, or in lines, on the back of the fish. This gives the effect that the Koi have diamonds glistening on their backs. They are very attractive and beautiful Koi which will grace any collection. The Kin Rin have gold-coloured scales in place of the silver 'diamond' scales but it is becoming quite rare to see Kin Rin Koi today. A definite must for any collection, especially the Gin Rin Kohaku or Sanke.

CONCLUSION

Beginners tend to go out and purchase one of every variety they can find. This is a mistake. Select Koi carefully, do not overstock your pond, and if there is going to be one colour which is going to be predominant, I suggest you try to keep it to red.



The beautifully scaled Asagi is one of the oldest breeds of Koi known.



The tri-colour Taisho Sanke is normally referred to, simply, as Sanke.



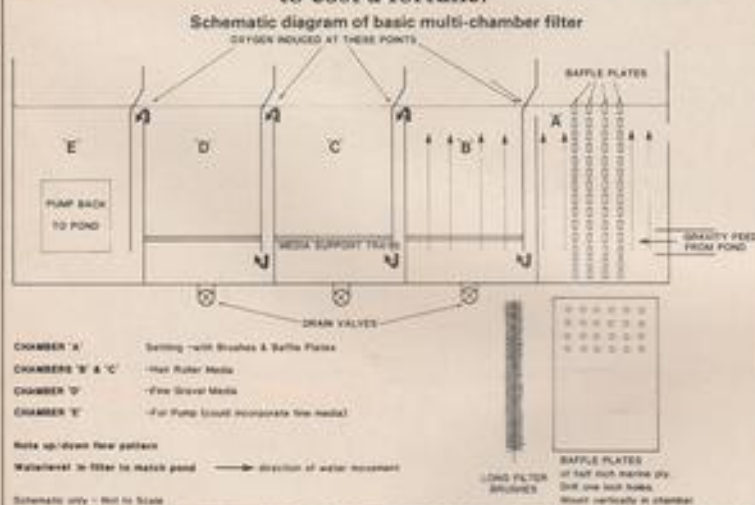
Shiro Bekkos stand out well in any Koi collection.



A Shusui is a Doytz-type Asagi and has relatively few scales on a leather-like skin.

BEGINNERS' GUIDE TO KOI FILTRATION FOR THE NOVICE KOI-KEEPER

Koi-pool filtration can be made to appear almost incomprehensible to anyone contemplating Koi-keeping for the first time. **John Cuvelier** cuts through the technicalities and presents a down-to-earth and sensible system which works perfectly well — and it doesn't have to cost a fortune.



Above, bacteria-laden "mud" on the surface of a gravel filter. A good idea of how much material can be collected can be seen by comparing the accumulation with the lightly scraped area on the right. Below, hair rollers provide excellent surfaces for bacterial growth.



Filtration for the garden pool is a subject which will, hopefully, one day fill a book! In the meantime, with the limited space available in this instance, I hope to provide at least a grounding in this vital subject.

Since Koi first hit the eye of the U.K. hobbyist way back in the fifties, both knowledge and ability in keeping Koi properly has expanded beyond belief, thanks to the efforts of many people and their experimentation covering many years.

The first question any newcomer invariably asks is, "Why do we need a filter?" The answer, strictly speaking, is that you don't! However, as Koi are intended to be admired for their shape, colour etc., they do need to be visible, and this is rarely possible in an unfiltered pool. Additionally, a fixed body of water will only support X number of fish and, should this limit be exceeded, all kinds of problems can result, from discomfort of the fish to actual mass fatalities from the poisons generated by the fishes' own digestive system. So filtration enables the Koi-keeper to increase the number of fish kept in a given body of water substantially, and to keep them in peak condition.

Running costs

What's it going to cost you? That, of course, depends upon the size of pool and the number of fish intended to stock it with, and there is no way that I can be persuaded to pluck costings from out of the sky!

The actual running cost of a pool and filter system is purely dependent upon the size and type of pump used, but an average system should be capable of giving satisfactory service for around £5.00 per week, although there again, this should not be taken as Gospel, as so much depends upon individual cases.

Filtration — principles and practice

Regarding types of filter systems, the arguments are endless, and this is not the time or place to become involved in that kind of thing, so the intention is to describe the most popular, and arguably efficient, system in use — the multi-chamber variety using gravity feed and up/down direction of flow. A glance at the simplified schematic diagram should convince the reader that there is nothing to it and, indeed, one does not need a degree in engineering to grasp the basic principle.

The aim of filtration is two-fold: Firstly, to remove any suspended solids in the pool water, thereby obtaining clarity; and secondly (and more importantly) to convert the

BEGINNERS' GUIDE TO KOI

clear water obtained into clean water, free from chemical contamination.

The first of these aims is achieved by the use of settling chambers fitted with either baffle plates, or the now fashionable long bushes, or both, which prevent any heavy solid waste from progressing into the later stages of filtration. This stage can be regarded as a **PREFILTER**, and is necessary because we do not want heavy waste to go forward, resulting in blockage in the biological stages.

The consequent, and most important, stages of the filtration process take place in the remaining stages and consists of merely passing the water through successive chambers filled with media which, when matured, will house a thriving colony of bacteria.

As the water passes through these stages, the bacteria convert the highly toxic **AMMONIA** from fish waste into other chemical compounds, **NITRITES**, which are still toxic to fish. Fortunately, a further conversion takes place within the cycle and the Nitrites are broken down into **NITRATES** which are relatively harmless. Any fine particles of solids which escaped the prefilter will also be trapped in these later stages.

As all 'friendly' bacteria we use are oxygen-dependent, the up/down flow system recommended lends itself perfectly to this demand, as at each chamber, a certain amount of turbulence is present at the point

of up/down transfer which carries over the required oxygen. Without sufficient oxygen, any biological filter is unable to function properly.

A further important point to remember is that, to be effective; the water being filtered needs to be in contact with the bacteria for sufficient time for 'nitrification' to take place. This 'contact time' will not be achieved if too high a pumping rate is used. So when buying your pump, big is not necessarily beautiful! **A model capable of pumping 50% of the pool volume per hour would be a reasonable "starter"**.

On the subject of pumps, you will see from the diagram that pumping takes place at the 'clean' end of the filter. It is both good practice and logical to position the pump at this point, as the life of a pump is considerably lengthened when used to move clean water as opposed to the dirty and gritty variety.

What to use as media in a filter is a continuous source of discussion, with the pros and cons of gravel, natural clays, ring media etc. etc. being kicked around with gay abandon. Based upon practical experience, I can unreservedly recommend ordinary hair rollers, now available in bulk. (For goodness sake don't buy them carded from the local shop — you'll need a second AND third mortgage!) Rollers have the benefit of a large, rough surface area for bacterial

cultivation, coupled with minimal resistance to flow and will not block up — the main drawback with gravel and related media.

The final chamber of a string of filters should use fine gravel as a media. This final 'screening' will impart the lustre to the water, (lovingly known by Koi-keepers as 'polish').

To move water through the filter stages, use the most inexpensive form of energy available — gravity. Thanks to 'Newton' and his apple, water always finds its own level, so that the faster you pump from one end, the faster water will come in at the other! (Don't forget the earlier comment re contact time though).

There are some truly excellent commercial filter modules now available but, they do tend to be expensive. I have always built my own but the choice is obviously yours. The D.I.Y. type will find the construction of a filter from concrete blocks etc. a doddle, but it does take somewhat longer.

A good rule-of-thumb concerning the size of a filter is that it should have an approximate surface area about one third that of the pool surface area.

Have a look at the accompanying photographs and take your pick. One thing I can guarantee. If you follow our advice and take your time with the design and building, you will end up with a pool which is the envy of all who see it.



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The large central pool at Lakeland Koi houses quarantined stock of all sizes.

**"Cumbrian"
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In early April, a new shop opened at Grange-over-Sands, Cumbria, not far from the M6. The Claris brothers, Jonathan and David, and David's wife, Kate, have set up Lakeland Koi in an area that has up to now not been adequately catered for.

They have converted a large barn and two shops into an interesting and comprehensive display catering for the needs of both beginners and established fishkeepers, with over 4000 fish in stock at all times.

A large central tank/pool houses Koi measuring up to 24in, while fifteen other stock tanks around the barn contain 60 different types of coldwater fish, from the ordinary to the exotic breeds. In another part of the premises is the tropical department which houses about 120 types of tropical fish from all around the world, including some of the larger varieties not often found elsewhere. All fish sold by Lakeland Koi are quarantined for two weeks before being put on sale.

Pond and aquarium plants are also in abundance as is a wide selection of liners, pumps, filtration units, ornamental fountains for indoors and out, garden ornaments and other pond/watergarden accessories.

For further details, contact Jonathan, David or Kate Claris, Lakeland Koi, Hampsfell Road, Grange-over-Sands, Cumbria. Tel. (04484) 2971.

**... and now, the
Waterworld
Aquatic AND
Garden Centre!**

In March 1983, David Quelch opened Waterworld at the Rochfords Garden Centre, Turnford, Herts.

But the closure of Rochfords in the autumn of 1986 meant that Waterworld had to find a new home.

David Quelch had, however, found an ideal site for the new Waterworld several months prior to the Rochfords closure — the Kingswood Garden Centre at Bullmoor Lane, Enfield, just three miles away.

The new Waterworld was going to be much more than an aquatic centre though. When Rochfords closed, the area lost an extremely popular garden centre. The obvious successor was the Waterworld Aquatic and Garden Centre.

Apart from the large and varied selection of fish and aquatic accessories, the Centre boasts a modern-style tropical and marine house, and a special Koi and coldwater fish house, offering both Japanese and "Waterworld-bred" English Koi. Managing the Aquatics is 21-year-old Martin Matthews, who has been with Waterworld for five years.

Glen Adams is Manager of the Garden Centre, having previously held the same position with Rochfords. As with the aquatics, the garden section is run by specialist sales staff, trained to give sound, professional advice and information.

The main aim of the Centre is to offer customers as wide a choice as possible of good quality products at prices to suit everyone's pocket.

The Waterworld Aquatic and Garden Centre is conveniently located just off Junction 25 of the M25 motorway, at the corner of Bullmoor Lane, Enfield.

For further details, please contact David Quelch on Waltham Cross (0992) 761587 during the day, or Royston (0763) 72070 (evenings).

CORRECTION SUSSEX KOI AND BIRD CENTRE
We had much pleasure in featuring this excellent establishment in the June issue of this magazine but regret that certain vital details were incorrectly printed. Please note that Sussex Koi and Bird Centre is located at Locksacre Aquatic Nursery, Wipham Lane, Bidham, Chichester, West Sussex and their telephone number is 0243 812472. We offer sincere apologies for any inconvenience caused.

PAINTING THE POND WITH COLOUR

Heathers are not only hardy, but colourful, and extremely useful as subjects for planting around ponds. As journalist and author **George Wallace-Clarke** explains, with careful planning, it is possible (indeed, easy) to "paint a pond" with colour all the year round.

(Photographs taken by **John Dawes** at **Stapeley Water Gardens**).

John Ruskin, who knew a thing or two about design, is quoted as having said in *The Stones of Venice*, "The purest and most thoughtful minds are those which love colour the most". Although he was writing about Venetian buildings, he may well have been caught by the effect of colours on nearby water, or he may have been philosophically observing that a little colour gives a lift to the drabest of surroundings.

Natural ponds in this country are usually shaded. They attract a fringe of overhanging trees and bushes, and in summer at least, attain an atmosphere of cool green sobriety. Let's face it, at least the monochrome is well suited to our landscape and, even if a little drabness intrudes in the winter, it still doesn't look out of place.

Ornamental and garden ponds, on the other hand, are another kettle of fish, as it were. Sobriety is usually unnecessary and colour draws attention to water and its life. Traditional flowering plants, unfortunately, seem to choose the same summer months to display their colours and often only last a short time. Cultivation often takes time and patience. In many cases, the height and bulkiness of flowering plants detract attention from pond life itself, rather than adding to it. There is one plant, however, which, if planted circumspectly around a pond, gives colour all the year round. I refer to heathers.

In praise of heathers

The beauty of heathers is that they can be tailored to any environment — although, admittedly, they don't like all soils. Rockeries introduced to relieve monotony or rising land behind ponds are suitable sites. Even a flat area around a pond makes an ideal site if interspersed with the odd dwarf conifer or two.

Strictly speaking, gardens are not the heather's natural habitat. They are mountain plants by origin. Even today, although heathers have served in UK gardens for many years, experts are scouring obscure mountain ranges for new species — with commendable success. But origins notwithstanding, given a not too dissimilar environment among stones and on rockeries, on gravel and in clusters, they thrive and paint their colours on the garden scene with variety

and with a richness that would gladden the heart of any John Ruskin and pondkeeper worth his/her salt. But they don't like shade; which makes them admirably suitable for pond surroundings.

Some winter-flowering varieties don't grow well on chalky or limestone soil. A soil test kit (obtainable from most garden centres) will soon establish the sort of soil around your pond and show how to adjust the balance by, for example, mixing in generous quantities of peat, or building peat beds, either alone, or on peat blocks between stones forming a pond background.

Planning is essential

Allocation needs careful planning. How to disperse the varieties chosen so that each month enjoys a fresh flowering (preferably at a distance from dying blossoms) is worth planning on paper beforehand. Choice of colours is not only a question of blending on dry land but also of avoiding clash of colour with lilies and other blossoming aquatic plants — particularly when the pond is at the bottom of a slope approached through heathered rockeries and forming a focal point for a vista from, say, a house or garden seat.

The heather collection itself is now pretty extensive and most garden centres and nurseries offer a wide enough range for a studied choice. The popularity of heathers is growing rapidly and some wholesalers are now specialising in their cultivation. So, even in ensuring a blanket cover of colour, the choice is wide.

Selected varieties for year-round colour

Erica carnea "King George", for example, with rosy-pink flowers to brighten the January gloom and contrast with the dead brown growth still remaining in the pond, covers the period from December to February. *Erica carnea* "Springwood White", with vigorous ground-cover qualities and light green foliage produce a mass of white flowers from January to March. If you want something of a contrasting background to these two, nothing could be better than *Erica carnea* "Myretoun Ruby" which not only has ruby-red flowers but dark green foliage to set them off, and lasts from February to April.

When it comes to May, we can try a purple flower, *Erica erigena* "Brightness"

actually flowers from March to May but has a strong colour to start the summer off. Both *Erica cinerea* "Velvet Knight" and *Erica cinerea* "Purple Beauty" flower in June. The former has a deep purple blossom which contrasts admirably with the lighter, glowing purple of the latter. They complement each other or can be distributed at points around the pond.

Both are also still flowering in July and August. The *Erica cinerea* "Atrosanguinea Smith's" variety is a July bloomer but is noted more for its rich green foliage than its bright scarlet flowers. It doesn't like lime and prefers free-draining acid soils.

Daboecia cantabrica "Atropurpurea" makes a change for August with bronzy-green foliage and rich purple flowers. *Daboecia cantabrica* "William Buchanan" is available for the same month but comes complete with crimson flower. *Calluna vulgaris* "Golden Haze" matches the autumn tints with a yellow foliage but its flowers in September are white. October also has a bronze foliage variety called *Calluna vulgaris* "Robert Chapman" which reaches a bright orange in October but its pinky mauve flowers only last from August to September. Once into November, the list grows shorter but both *Erica carnea* x *darleyensis* "Fursey" and *Erica carnea* x *darleyensis* "Arthur Johnson" blossom vigorously during these months with pink flowers lasting well into the spring in the bargain.

If the above catalogue does no more, it demonstrates heather flowers and colours are available all the year round. When it comes to making a choice, the list of alternatives for each month are prodigiously eye-opening (or, if you will, eye-catching), although, at the moment, summer has the largest list.

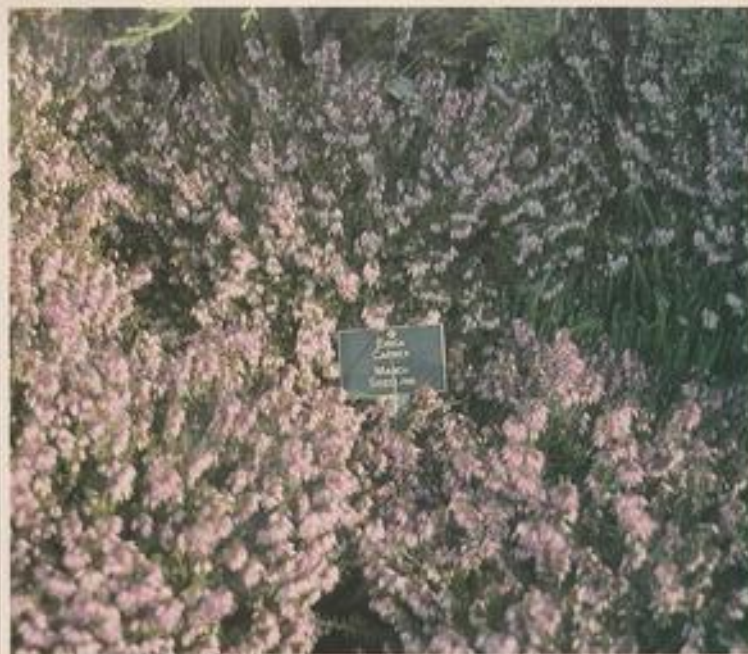
It is not even a matter of ripping up everything around a pond and replanting from scratch. Heather growing is eminently conducive to experiment. Further, by adding a few tree heaths that grow to about 6ft., like *Erica arborea* "Alpina", *Erica australis* and *Erica veitchii* "Exeter", you can add variety to the pond scene and at the same time paint in a few colours that may have been missed. You can even add colour to the banks of a stream, knowing that flooding won't wash it out.



This spring display gives a good indication of the colour combinations that can be obtained with careful planning. The main white clump is *Erica carnea* (Springwood White); the small pink patch growing into it is *E. carnea* (Springwood Pink); the white patch just to the left of the daffodils is *E. mediterranea* (W. T. Rackliff), coming into flower and merging into a pink clump of *E. carnea* x *darleyensis*. The yellow shoots of *Calluna vulgaris* (Beoley Gold) can be seen above *E. carnea* (Springwood Pink) at the extreme right of picture. Most of the other heathers visible (with the exception of Springwood Pink) have now completed flowering.



Even in winter, heathers (seen here in combination with conifers) bring a welcome touch of life to a pond.



Erica carnea (March Seedling) is a light-pink, spreading heather which forms very attractive clumps.

Books

Superb value at a modest price

Most aquarists have on their bookshelves books covering species identification, aquarium techniques and management, diseases and plants; all justifiably necessary, and maybe collected over a period of time. Now, with the release of T.F.H.'s latest publication, you can have the same information at your fingertips in just one book.

Dr Axelrod's MINI-ATLAS of Freshwater Aquarium Fishes (by Dr Herbert R. Axelrod, Dr Warren E. Burgess, Dr Cliff W. Emmens, Neal Pronck, Jerry G. Walls and Ray Hunziker — T.F.H. £19.95) is a gem of a

book embodying useful practical information on every aspect of fishkeeping (there's even a section on aquarium photography).

The major part of the book (over 670 pages) is, of course, the pictorial collection of fish species containing approximately 1500 pictures. This selection, while being smaller than the 4,000 featured in the larger ATLAS, actually provides more information per species: this apparent paradox being made possible by the use of idiograms beneath each picture. These cover pH, Hardness, Temperature, Length of fish, Recommended tank size, Food requirements, Livebearer or Egglayer, Lighting, Compatibility, Type of aquarium furnishing and Swimming habits. Fish families described are Cichlids (sub-divided into American species, Angelfish, Discus, Lake Malawi, Lake Tanganyika, and African non-lake species), Anabantoids, Killifishes, Characoids, Catfishes, Livebearers, Barbs and Minnows, Koi, Fancy Goldfish, and other families. Each pictorial group is introduced by a short family description.

Dr Cliff W. Emmens is the author of the remaining 300 pages or so, which cover Aquarium Maintenance, Plants and Fish-breeding.

Chapters are **The Tank and Other Equipment, Setting up the Aquarium, Fish Anatomy and Physiology, Water, Foods and Feeding, The Fishes, The Health of Fishes, The Plants and Fish Breeding.**

The quality of the text and photographs is excellent, information being clear and precise. Because of the book's bulky proportions, the publishers have thoughtfully arranged for the key to idiograms to be printed on the inside of each end-jacket flap so that, by leaving these extended while reading, you have an instant reference, until you get used to the symbols and their meanings.



There are three Indexes, two covering the pictorial species section (one scientific names, one common names, both including geographical sources of species); the other Index relates to the Aquarium Management section.

Whereas the original, much larger, ATLAS covered many more fish species, perhaps precluding fuller coverage of information, this mini-Atlas looks like being a runaway success — where else can you get a book that is three or four times more useful at less than half the price?

Dick Mills

“All the World’s Fishes, Reptiles and Amphibians”

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Edited by: Dr. Keith Banister and Dr. Andrew Campbell

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NEW CARTOON



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Both these substantial books represent remarkably good value for money. £9.50 (plus £1.50 postage) is an incredibly cheap price to pay for these authoritative, readable, spectacular works which are jammed packed solid with colour photographs and artwork from cover to cover (158 pages in the case of **Fishes** and 160 in **Reptiles and Amphibians**).

The text of each book is written by an international who's who of ichthyology and herpetology and, as such, is representative of the very best in both fields. I have no doubt that the same applies to other volumes in the series which include insects, songbirds, sea mammals, and other animal groups. Among these is a volume entitled **Carnivores** which can be obtained absolutely free by applying on a special "series" form available direct from **Torstar**.

One thing to watch out for if you are planning to buy these books (which I thoroughly recommend):

If you already possess a copy of **The Encyclopaedia of Underwater Life**, edited by Drs. Banister and Campbell, then you already own a copy of **Fishes**. The reason for this is that the **Encyclopaedia** deals with both fishes and invertebrates. **Fishes**, on the other hand, represents the ichthyological section of the **Encyclopaedia**, lifted out in toto and packaged as a separate volume. One great advantage of doing this is that you don't have to have a large section on invertebrates if your interest lies predominantly with fish. Another advantage is that the price of the "single-subject" volume is considerably cheaper (the **Encyclopaedia** costs £25.00).

I don't know whether there is an equivalent volume, just on invertebrates, planned for the series but, if there is, I can tell you in advance that it is also superb.

I am not absolutely certain, but the above may also apply to **Reptiles and Amphibians**, so it's worth checking.

In any case, you get each volume in the series on 10 days' approval and can return it if you are not, quote, "100% satisfied . . . and owe nothing". So, you can't lose either way. In fact, you are likely to gain a great deal even if, like me, you do not regard Lampreys and Hagfishes as true fishes at all. But . . . as Keith Banister so rightly says in his chapter "What is a Fish?" (and here I am in total agreement with him):

"There is no such thing as a fish. 'Fish' is simply a shorthand notation for an aquatic vertebrate that is not a mammal, a turtle or anything else".

Now, there's a thought!

John Dawes



JOHN DAVIES



MICHAEL BENJAMIN



MICHAEL BENJAMIN

Above, the oral sucker of *Parlowella* is both an adhesive device and an algal scraper. You can just see the delicate teeth inside the mouth. Above left, Angler Fish (this is a species of *Antennarius*) can use their pectoral fins to 'walk' along the seabed. Left, the Three-spined Stickleback, *Gasterosteus aculeatus*, is an expert nest builder. This male is in his full breeding colours and the nest he is making can be seen in the foreground.

LIFE AT THE BOTTOM

More kinds of fish live in, on or near the bottom of aquatic environments than anywhere else. Dr Michael Benjamin of University College, Cardiff explains why.

A Wealth of Habitats

Even though the buoyancy of water has liberated fish from the close dependence that other vertebrates have on their substrate, there are still more bottom-living fish than there are midwater ones. This is partly because there is a greater diversity of food available to them, but also because the various substrates provide a wealth of habitats to which the fish can adapt.

Substrates allow fish to cling, build nests,

burrow, form territories and move by methods other than swimming. These behaviour patterns have no equivalents among fishes strictly limited to midwater habitats.

The nature of the bottom can influence the colour of the fish and its distribution. It is not only adult fish that are concerned with substrates, but also their eggs and larvae. Fish that rarely leave the bottom have a body form that is modified accordingly: the ventral profile is often straight

and the mouth downturned and associated with barbels.

Bottom dwellers rely much more on taste and touch for finding their food than on sight, and their barbels are generally provided with taste buds and nerve endings. As bottom dwellers do not change their water level very much, buoyancy is not a problem and their swim bladder is small. All these features can be seen in many of our aquarium catfish and loaches.



The Sucking Leach, *Gyrinocheilus aymonieri*, has the straight ventral profile and arched dorsal profile that are typical of bottom-living fish.

Shelter — A Crucial Factor

Substrates provide shelter and this is a key factor in producing variety among bottom-living fish, for it also creates variety among their food organisms. Fish that live in open waters do not have a wide choice of diet. They either eat plankton or smaller fish — which in turn eat plankton. But the menu of bottom dwellers is far more exciting. Among the dishes on offer are: encrusting algae, rooted plants, numerous invertebrates, sunken plankton, the carcasses of dead animals, the organic matter in mud, and a wide variety of fish.

Many of our bottom feeders have highly modified mouths, jaws and snouts to cope with their choice of food. There is the extraordinary mud-probing "nose" of the Elephant-nosed Fish, *Gnathopetersonia petersoni*, the elongated "snout" of the Spiny Eel, *Macropodus opercularis*, and the famous lips of the Kissing Gourami, *Helostoma temminckii* (designed for algal scraping rather than courting!).

To take advantage of bottom cover, you have to be able to swim backwards. However, the price for manoeuvrability is loss of swimming speed. The familiar Angelfish, *Pterophyllum scalare*, have great finesse but little speed. Their laterally-compressed bodies and flowing fins are best suited for gliding between the stems of water plants.

Cover provides protection from predators, but produces the danger that a slow fish could get caught when emerging from its hideaway. Consequently, bottom dwellers can be armour-plated (e.g. as in the familiar *Corydoras*), camouflaged (e.g. the Angelfish, *Pterophyllum scalare*, where alternating vertical bands of light and shade conceal its fishy outline), disguised as some natural object (e.g. the catfish, *Ferlonella*, that resembles a twig), or have spines on their dorsal fins that can be locked in an erect position (e.g. *Synodontis* sp.). Crevice dwellers can also use their spines to jam themselves into their hideaways when any attempt is made to remove them. Some coral reef fish do this when they are asleep, so that they cannot be pulled out by predators.

Burrowing

Virtually all fish that feed on bottom deposits burrow to some extent while seeking their food, but some fish are excep-

tionally good at burrowing into a soft substrate. The various Coolie Loaches (*Acanthophtalmus* sp.) and Spiny Eels (*Macropodus* and *Mastacembelus* spp.) are perhaps the most familiar examples to aquarists. Their serpentine form of swimming serves them well in burrowing and the water content of soft substrates allows them to respire.

The Jawfish or Jack-in-the-box, *Opisthognathus aurifrons* (featured on the front cover of the December 1985 *Aquarist*) is a benthic marine fish that actually constructs a tube-like chamber into which it retreats at any hint of danger. It is also reputed to mate in a burrow, either its own, or a 'neutral' one.

Fish that walk

Some fish can 'walk' on the bottom, i.e. while they move, they maintain continual contact with the substrate. Marine enthusiasts may be familiar with the rather ugly, Frogfish, *Annomurina*, or the Angler Fish, *Lophius*. Although they are best known for their extraordinary fishing rod and lure, they also have specialised pectoral fins that serve as walking organs.

Some fish that can move along solid substrates can use this ability to move on dry land. The Mudskipper, *Periophthalmus*, is one of the most amphibious and spends much of its time half-buried in the mud of mangrove swamps with only its mouth and bulging eyes above the surface. It derives its common name from its ability to move across a mud surface in repeated skips by lashing its tail.

Nest building

Churning up the substrate is often associated with nest building or with the construction of nursery pits (e.g. the Jewel Cichlid, *Hemichromis bimaculatus*). There are, of course, many more elaborate types of nests including those in burrows (e.g. certain reef gobies) and those made of vegetation. The bubble-nests of fish that can live in poorly-oxygenated waters with a muddy bottom (e.g. anabantoids), and the nest that the Three-spined Stickleback, *Gasterosteus aculeatus*, builds from water weeds are well-known examples of nests made from vegetation.

Territoriality

Fish that live on or near the bottom are often territorial (or become so during the



Many bottom-dwellers such as this Coolie Loach (*Acanthophtalmus* sp.), have an underslung mouth (M) and circuncular barbels (B). The photo is a scanning electron micrograph.

breeding season) and keep intruders out of an area they have claimed as home.

Many attacks are aimed at conspecifics (members of the same species are most likely to compete for food and space) and it follows that a fish must be able to recognise another as belonging or not, to its own species. This is one of several reasons why fish that have some association with the bottom, in waters where light penetrates well, are more colourful than pelagic (open water) ones.

Territoriality may help to control fish populations by ensuring that the number of animals matches the food resources of an area. At the same time, territorial behaviour may reduce fighting among conspecifics — most border disputes are merely threats and the fish are rarely injured.

A Sticking Point

Special adhesive devices are typical of benthic (bottom living) fish that live in torrential mountain streams (e.g. the Sucking Loach, *Gyrinocheilus aymonieri*) and certain of the Loricariidae, or in the littoral zone of the seashore (e.g. some gobies). These devices prevent sea fish from being swept away in the surf and freshwater fish from being washed downstream by strong river currents.

We, in Britain, do not know what torrential mountain streams are. In Cherrapunji, a village on the southern face of the Khasi Hills, they certainly do! It is one of the wettest places on earth. In an average year, they have a rainfall of over 450in — the highest on record is a staggering 1042in (August 1860 - July 1861). Forty one inches of rain has fallen there in one day. It is incredible that fish can cope with the torrential currents that such conditions create, but they do.

The fact is that, whatever bottom conditions you can think of, there will almost certainly be a fish that can live in it!

Since the publication of my article relating to mimicry, or colour pattern sharing, in catfishes (*Aquarist & Pondkeeper*, Nov, 1986) I have received numerous comments on the subject.

Letter from Stafford

One letter represented a clear question and came from Dr. G. M. Evans, a Head of Science, in Stafford who is currently working on snake mimicry.

In the 1986 article I mentioned several forms of mimicry and, in particular, an obscure type known as Mertensian mimicry, which did not apply to catfishes but was referred to in an effort to cover the topic. Dr. Evans wrote:

"I write with reference to your recent article. While finding the article most interesting and informative I find myself confused over your discussion of Mertensian mimicry. I fail to see how or why a venomous snake should derive any benefit from seeking to appear harmless. The reverse case, an inoffensive feigning harmful, is indeed the classical explanation of Batesian mimicry, as you so rightly point out — and seems to make some sort of logical sense, even if there are some inherent practical difficulties.

I would be grateful for any explanation or further light you can throw on the matter — if you can spare the time — as I am currently working on the whole Coral Snake/False Coral Snake question."

My reply was:

"With regards to Mertensian mimicry, as I understand it, Wickler thought that the more poisonous Coral Snakes were not the models at all. He proposed, instead, that less poisonous Coral Snakes were the models. These are copied, on the one hand, by harmless snakes (simple Batesian mimics), and on the other, by the deadly species (the Mertensian mimics).

According to this complicated theory, the deadly Mertensian mimics stand to gain by not having to waste their venom on animals that disturb them but cannot serve as food.

One requirement of the theory is that forest animals, disturbing one of the less-venomous Coral Snakes (which are thought to be the most numerous) are, in fact, bitten. They must then recover so that they can retain the association between the coral pattern and the bad experience. Thereafter, harmless or semi-harmful mimics, and deadly species of Coral Snakes, are all avoided.

This is the theory, but the experiments needed to test it have not been carried out. According to Wickler, these tests must be carried out with those forest-mammal species that inhabit the same regions as Coral Snakes — not with the usual laboratory animals.

This is considered very difficult and, until the native habitat situation has been investigated, the Mertensian mimicry theory cannot be proved or disproved.

ZOOMIMESIS REVISITED

Another look at colour pattern sharing in Catfish

David Sands' thought-provoking article, published in *AGP* last November, stimulated a great deal of interest both in the UK and overseas.

Here is a selection of views (and replies) taken from David's mail bag (the largest he's ever received in response to an article). As you will see, the subject is far from closed!

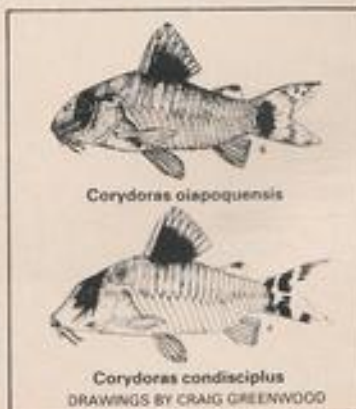


I feel that the whole subject could be debated on ad infinitum and the more study and comment, the better. Please keep in touch with me in regards to your own research; perhaps a common factor will involve our particular subjects and we can let the readers know."

Mimesis between *Corydoras* species (A reminder of part of the problem)

There are many fairly well known examples of colour pattern sharing between sympatric species of *Corydoras* as mentioned in my article. Some have remained hidden in specimen jars from the time of description because they shared the same colour pattern as the subject fish.

One example is a species described by



Corydoras oiapoquensis

Corydoras condiscipulus
DRAWINGS BY CRAIG GREENWOOD

Nijssen and Isbrucker, the leading researchers on the taxonomy of *Corydoras*. They described *Corydoras oiapoquensis* from the Oyapok River, French Guiana in 1972, and then discovered a mimetic species hidden among the preserved and subsequently collected material, and described a second species, *Corydoras condiscipulus* Nijssen and Isbrucker 1980.

A high incidence of mimesis, or colour pattern sharing, is found between long-headed (or snouted) and round-headed species. In most cases the two species are sympatric (ie) found in the same habitat. Is it that the same environment requires a similar camouflage — or cryptic colour pattern — to enable the catfish to blend into its background? While this is a possibility, many species have contrasting patterns despite sharing the same river system. Is it that in a large genus, patterns are bound to be duplicated? Or, does it hide the fact that certain species are not quite removed from each other?

Letter from an old friend

Another reader, and an old friend of mine, Barry Black, sent in the following detailed comments:

QUESTION 1:

"I understood that zoomimesis was when one species looks like another for no apparent reason other than blending in, and that true mimicry was for a reason i.e., protection from predation. You say that *Brechythamdia* look like *Corydoras* so that they can blend in for greater shoaling protection. If that's the case then it can't be zoomimesis as you say, because they benefit from looking the same."

REPLY: "Wanting to blend in, according to Wickler, is not reason enough to be described as mimicry. Perhaps I should have said "to be lost in the shoal" rather than for greater shoaling protection. I find it difficult to see where mimicry ends and zoomimesis starts or vice versa. I wondered if being lost in the majority lessened predation on a particular group.

I am beginning to think that, for a pattern to be plentiful, it must first be successful. If a pattern sharply contrasts against the animal's environmental background then, unless it has a suitable defence, it will be open to predation because it will not be able to conceal itself. If a pattern is cryptic and successfully blends the animal into the environment then predation may be reduced. That takes care of the 'first generation' model.

If a second 'mimic' species also finds the same pattern beneficial enough to mimic, then it might be described as a form of Wicklerian mimicry, (which is a name suggested by me for the zoomimesis form of mimicry).

I think zoomimesis probably represented a 'holding name' for Wickler for those incidents of mimicry (the ants and the mimic insects and spiders) which would not fit into accepted mimi-



DAVID SANDS

Above, in its juvenile phase, *Brachyrhamdia marthae* looks quite similar to *Corydoras pygmaeus*. Left, this is *Corydoras pygmaeus*, shoals of which can harbour *Brachyrhamdia* specimens.

cry types. There has not been a mimicry type described that represents the 'lost in the masses' mimicry and I hope that zoology accepts my suggestion to name this as Wicklerian mimicry (I proposed this in the November 1986 article in the *Aquarist and Pondkeeper*).

QUESTION 2: "*Corydoras hastatus*: one cannot say that it 'evolved from a substrate existence to inhabit a midwater corridor' as there is no proof. It is only speculative. The colour pattern is distinct and a common feature of many characins, as you say, and probably serves as a recognition signal. There is a possibility that the characin mimics the *Corydoras* which is an 'old' species with others deriving from it and becoming substrate species."

REPLY: "If *Corydoras hastatus* was primitive and other *Corydoras* species are derived from it I would not expect it to be one of the smallest species (it is beneficial to reduce size and bony plates to become a midwater swimmer — which *Corydoras hastatus* has when it is compared with its larger cousins).

If *Corydoras hastatus* was primitive or 'old', as you suggest, then I would not expect to find it to have such a widespread distribution, or the other midwater swimming species, *Corydoras pygmaeus*, to be found almost everywhere in central South America (*Corydoras hastatus* is found from the Paraguayan River to the tributaries of the Brazilian Negro River and *Corydoras pygmaeus* is widespread in the Peruvian/Brazilian Amazon suggesting a modern success of midwater species!).

In reality, I think it is more likely that the catfish is imitating the characin because the pattern is more common in the latter group and midwater shoaling species of *Corydoras* are in the clear minority in the genus.

It is interesting to theorise about which came first, the catfish or the characin; maybe they came together as the two groups have a great deal in common!"

QUESTION 3: "*Otocinclus affinis* is not parasitic. It does not depend on *Corydoras* body secretions for its survival. Only actual fieldwork could establish whether they share shoals in the same way as they do in aquaria. It may be that the 'mimics' do not shoal together with the other species naturally, but

possibly enter the other shoal during danger."

REPLY: "Perhaps I should have described *Otocinclus* as semi-parasitic. I appreciate what you say with regards to the need for field observations. When is the Government going to pay for us to go for a year?"

QUESTION 4: "Short and long nosed species of *Corydoras*: If the two similar species are both in relatively small numbers, then a joining of colour patterns would enlarge the overall group numbers i.e. safety in numbers, even though they are well protected.

Is it possible that both long and short forms are the same species but with different measurements ranging from blunt snout to long snout? It is difficult to imagine that many *Corydoras* have a sympatric long-nosed variant all due to the same outside influence.

Could it be that there were only two *Corydoras* at first — one long-nosed, one short-nosed, and that two phylogenetic lines emerged? If there was one long-nosed blue one and one short-nosed red one (only examples), then if they interbred wouldn't you end up with one short-nosed blue, one long-nosed blue, one short-nosed red and one long-nosed red? I don't know which is the most important trait but I would think that morphology (skeletal) was more stable than colour. Therefore, it is easier for a *Corydoras* to change colour than to change nose shape over thousands of years."

REPLY: "You say it may be that the mimics do not shoal together naturally but do so when threatened. Is mixing during danger a new kind of mimicry???"

I think it is very possible that some of the long- and short-nosed *Corydoras* are more closely related — even the same species. The entire article suggested that everything is open to debate. In fact, I thought it might have contained more questions than answers, to quote one ichthyologist.

Incidentally, I have had more reaction to this article than to any other in the history of my writing.

A lot of the points you raised such as the morphology and phylogenetic lines theories are common ground to anyone familiar with Nijssen and Isbruckers' study although I like the straightforward 'long-nosed/blunt-nosed' phylogenetic line theory.

I have just received a 68-page review

of the *Corydoras* from Peru and Ecuador from Dr's Nijssen and Isbruckers, at the beginning of which they go to great pains to explain that they will only discuss the overview of the genus once they have finished the final revision."

Letter from America

Another letter came from America: Dr. Richard Strauss, of the University of Arizona, is currently working on geographical variation in a widespread *Corydoras* species and has become interested in the morphological differences/size dependence between close forms such as *Corydoras adelfoi* and *Corydoras imitator* since my article.

There has always been a problem in what actually constitutes a species and, quite recently, specifically *Corydoras*. Dr. Richard Strauss has cast some doubt on the validation of some *Corydoras* descriptions (1985). He believes it has not been wise to base the description of new species when only a few, or even in some cases, only one specimen has been available. Several species have been described from a single specimen but usually because only one specimen was available.

Letter from Holland

Dr Gerlof Mees of Leiden's Rijksmuseum in Holland, a foremost authority on catfishes, wrote the following: "I enjoyed reading the paper on mimicry(?)."

Surely further study in life is necessary. At the moment, I would be inclined to think that your suggestion of resemblance 'in which both species blend into each other for greater shoaling protection' is at least one factor. It is well known that predators tend to concentrate on the odd one out, the individual that is aberrant in colour, shape and behaviour. If *Brachyrhamdia* resembles *Corydoras* ecologically, but is much rarer, it would be an advantage not to differ conspicuously from *Corydoras*. However, nature is rarely simple, and one factor does not exclude others."

Letters from UK aquarists

Several aquarists wrote to me about the habit of *Otocinclus* attacking other fishes and removing body mucus. Barry Black was correct though: only field study would reveal a more precise picture and certain species could only be described as semi-parasitic, at best, because the primary food source is known to be algae.

One point Ronald Hill of Mitcham made was that the *Otocinclus* could gain a little extra protein to make up for the basic roughage algae diet and possibly some protection that the mucus might give if it is anti-fungal etc. He thought out several reasons for tri-shoals of *Corydoras*, *Otocinclus* and *Brachyrhamdia*, including that they all feed slightly differently so would be more effective as a feeding group as well as the increased number being advantageous for detecting food, detecting predators and camouflage. All comments require habitat study and I would love to be given the opportunity to complete such research in the field, should a Zoological Society or University be willing to fund it.

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 expert 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, Buckley Press Ltd, 58 Fleet Street, London, EC4Y 1JU



TROPICAL
Dr David Ford



COLDWATER
Pauline Hodgkinson



PLANTS
Barry James



KOI
Roger Cleaver



MARINE
Graham Cox



DISCUS
Eberhard Schulte

Coldwater Setting up

I would very much like to set up a small aquarium of coldwater fish with real plants and would welcome any advice you can give me.

I would never recommend that a beginner in coldwater fishkeeping should start with a tank smaller than 36in x 12in because a smaller volume of water is not as easily kept in good condition. This, of course, is vital if fish are to remain in good health.

A good filter system, which could be undergravel or a powerhead (or a combination of both), or a power filter, will be suitable for your needs and advice on which type will be the most efficient for the size of tank you finally choose will be given by your aquatic dealer.

Choose plants which are suitable for a coldwater environment such as *Egeria densa*, *Elodea canadensis*, *Lagarosiphon madagascariense*, or *Vallisneria spiralis*.

Keep stocking levels on the low side so that the fish have room to grow, making outbreaks of disease less likely. Choose the fancy types of goldfish for both beauty and interest. Those most easily cared for are Fantails, Redcaps, Lionheads and Pearlscales.

Books which are particularly useful for coldwater fishkeepers are *You and Your Aquarium* by Dick Mills. *A Fishkeeper's Guide To Cold-*



Egeria densa is a suitable plant for a coldwater aquarium.

water Fishes. By Dick Mills. *Fancy Goldfish Culture* by Frank W. Orme; and *The Goldfish* by George F. Hervey and Jack Hems.

Pump and filter sizes

I am thinking of installing a fibreglass pond. What size biological filter would I need? Also, what sort of pump output would such a pond demand?

The type and size of filter which would prove efficient for your pond's needs will depend on many factors. The size of your pond will, of course, play one of the most important roles; stocking level and pond location are two of the other major ones.

Opinions vary; some pond owners believe that the filter must be of the same size as the actual pond it is to filter, but I would suggest that it should be at least one 1/3 of the pond's size to have any chance of being efficient.

There are many excellent pumps on the market and which will be the best for your needs will, of course, depend on the gallonage of water it has to cope with. Once you have decided on the size of your pond and calculated the number of gallons then your dealer will have a selection which can cope with that amount. The makers state the capacity of their pumps so you should have no problem there.

Discus Discus and tapwater

Is it possible to keep Discus in tapwater?

It greatly depends what one means by 'tapwater'. Tapwater in certain parts of the country, no doubt is ideal Discus water, whereas tapwater in other parts would not be suitable at all.

I have always found that Discus will do best in water with a hardness of not more than 10 degrees dH, a conductivity of about 250 to 300µS and a pH value of just below 7.

From reading the various published accounts of their natural biotopes, it is known that these fish are found in the wild in waters which have almost no traceable hardness, with a pH of around 6 or so.

It is quite obvious therefore that, if we want to keep these fish in good condition over any length of time, we will have to

offer the water which they have been used to, but because Discus Fish are really quite adaptable, we don't have to go to such extremes.

Breeding water for Discus will have to be softer than just for keeping them and should not be much harder than 3 to 4 degrees dH with a conductivity of about 150µS.

Koi Koi flashes

At present I have a 6in American Koi housed in an 18in tank with no filtration, but regular water changes. Recently it has been "flashing" against the aquarium sides, although not very often. However, there are no external signs of disease other than loss of colour. I would greatly appreciate your help.

It is the normal reaction of most people to consider any change in behaviour of their fish to be caused by some form of parasite or disease. While flashing is associated with several parasites, fish will usually flash repeatedly, pausing only to recover, if the cause is parasitic.

You say in your letter that the flashing happens "not often". That being the case, I feel that the problem may well be associated with water quality, especially taking into consideration the size of tank your fish is kept in.

An 18in tank is not ideal even for one 6in Koi for any period of time; this is made

even more so when there is no filtration. Koi are considered "dirty" fish in that they produce a great deal of waste products. With no filtration, and in a small tank, this can cause the water to change very rapidly. The pH levels can fluctuate, as can the ammonia and nitrite levels. All of these cause the fish stress and can lead to loss of colour. The occasional flashing could therefore be due to irritation caused to the fish by this changing environment.

Test kits are available to check pH, ammonia and nitrite levels and are not too expensive. I would suggest that the first thing to do would be to check what your water conditions are. Even though you do regular water changes these fluctuations in levels will occur. If you find this the case then the remedy is to do partial water changes until the levels return to normal and then take measures to prevent them recurring. This would mean providing some form of adequate filtration.

If you find your water to be alright, but the flashing continues, then the most probable cause would be one of the fluke infections, if no other visible signs exist. Flukes can be cleared up by several commercial products and your local fish shop should be able to recommend one for your use.

Tropical Breeding Botias

As far as I can find out, Botias have never been bred in aquaria. Is this true? I would also be grateful for information on their aquarium needs as well as the conditions under which they breed in the wild.

Botias are found in India, Pakistan, Thailand, Malaysia, Borneo, Java, Sumatra and Vietnam. All species are nocturnal and most prefer soft, slightly acid waters that are clear and well-oxygenated. Their diet is omnivorous but the preferred food are worms dug out of the gravel.

It is not true to say the Botias have never been bred in the aquarium but reported spawnings involve exact reproduction of their natural habitat. This means deep mud (complete with Tubifex worms) and overlying clean water of correct pH and



Some species of Botia (but not this one — *B. lohachata*) are currently being bred in fish farms in the Far East.

GH and oxygen — not an easy habitat to maintain in the aquarium! The Far Eastern fish farms use mud ponds and harvest the fry.

Holland's (but not Dutch) Piranha

I have just acquired four piranhas under the name of Holland's Piranhas. Although I have been keeping tropical fish for the past twelve years, which includes keeping both young and adult *Serrasalminus nattereri* (Red Piranha) I am afraid to say that I have never heard of the species I mention above. Can you help?

Your name for the Piranha is close... it is Holland's Piranha, *Serrasalminus hollandi*, (sometimes *Serrasalminus hollandi*). This species is not usually found in the aquarium trade because it can be a vicious killer that will even attack its own kind. The fish originates from Brazil and prefers soft, acid waters and a diet of small fishes (although it should take strips of meat). The size is about 5 inches maximum.

This fish can be really dangerous... it can take a child's finger off, so do be careful. As you have four specimens, I think you will get fights and be down to two, or even one, eventually.

Bogged down

At a recent aquarist show, I purchased two large pieces of bogwood approx. 21in x 12in x 7in. I understood from the stallholder that, after soaking them for a period of a few weeks, any residues present would have dispersed sufficiently for safe siting in my 80-gallon aquarium.

I found, however, that even with constant filtration, the water very quickly became brownish and remained so until the wood was removed and the water

changed.

Continuous boiling for a further two weeks with regular water changes still proved to be unsatisfactory.

My letter is to ask your advice on the next course of action.

Bogwood will release its colour on soaking but this process can take months or even years. Boiling speeds up the colour loss, so too does boiling in milk (if you can afford it!). German aquarists actually prefer the brown colour it imparts to an aquarium and every German freshwater tropical tank has a piece of bogwood — which is renewed when the colour starts to fade.

A quicker solution is to remove the wood and dry it out thoroughly (in a cool oven if necessary). Paint it all over with a polyurethane (no other) varnish obtainable from any

DIY store. Allow to dry and repaint. Do this three times to make sure even a pinhole is not available for the water to enter (otherwise the water lifts the varnish from the wood giving an unsightly blister).

After the varnish has hardened, rinse well before returning it to the aquarium.

Marine First species

What fish would you recommend for a beginner's tank measuring 39in x 15in x 12in? Are fish such as Chaetodonts for experienced aquarists only?

With such a small tank it is vitally important that you stick to juvenile specimens of very hardy species only. First you must pre-mature the filter bed until no nitrites persist and then keep just one Damsel fish for a 3-month "apprenticeship" period before buying juvenile showfish.

Few Chaetodonts are suitable for your circumstances, (eg *Chaetodon kleinii* (or, alternatively *Hemiochus acuminatus*) — but juveniles only.

Interpet Wordgrid Competition Winner

The first correct entry drawn from yet another huge mailbag belonged to: **Mr C. Slateford, 24 Tor View, Tregadillet, Launceston, Cornwall, PL15 7HB.** Mr Slateford, along with several hundred other entrants picked out the following correct answers from the Wordgrid: **Fin Rot, Dropsy, White Spot, Parasite, Fungus, Anchor Worm, Gill Fluke, Shimmying and Gasping.**

Congratulations to Mr Slateford and sincere thanks to Interpet for sponsoring another excellent competition.

NEXT MONTH

This month, "K" stands for Koi. Next month it stands for Killies. Don't miss the following in our Focus on Killies issue:

- The Killifish of Oman by Ray Hocking of West Cornwall Fishkeepers
 - Jaroslav Kadlec from Czechoslovakia on the threatened and captivating *Cynolebias boltoni*
 - A special Spotlight article. Rod Roberts of the British Killifish Association on a rather splendid and spectacular *Nothobranchius*
- Not all the issue will be given over to Killies, of course, as always, there will be something for everyone... And there are some exciting competitions too, including a great

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