

JUNE 1985 85p

# AQUARIST

AND PONDKEEPER

The Magazine for Fishkeepers



A Beginners Guide to  
**KOI** (Colour feature)

Introduction to **KOI**

SPOTLIGHT: *Ulrey's Tetra*

*New Series* Language of Fishes



## COVER STORY

**Water Lily: 'Formosa'.** Suitable for ponds having a depth of up to four feet and a surface area in excess of 16 square feet.

Water lilies comprise the epitome of floral colour in the pond and the crowning glory of an attractive fishpool. Their suitability for various sizes of ponds is very wide-ranging and their colours exemplify all shades of red, pink and yellow in addition to white. As well as providing a colourful adjunct to the pool's mirrored surface, their discoid pads afford shade and cover for the fish.

No pond need be deprived of a water lily: even a small tub water garden can support one of the pygmy lilies which have miniature blooms and leaves of no more than a couple of inches in diameter.

Water lilies should be grown in containers supplied for this purpose and this permits easy siting and ease of maintenance when seasonal trimming or dividing becomes necessary.

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## AQUARIST



Founded 1924  
as "The Amateur Aquarist"

Editor: Laurence E. Perkins

Consultant Editor: John A. Dawes

Advertisement Manager:  
J. E. Young

Vol. L No. 3, 1985

**Subscriptions:**  
Renewable 31st December  
annually. (Surface mail)  
July to December £7.00.  
Airmail quoted on request

MSS, or prints unaccompanied  
by a stamped addressed  
envelope cannot be returned  
and no responsibility is accepted  
for contributions submitted

The Editor accepts no  
responsibility for views expressed  
by contributors

Printed by Buckley Press,  
The Butts, Half Acre,  
Brentford, Middlesex.  
Telephone: 01-688 8441



## Some plants for the...

by Jack Hems

# garden pond



Rose Arey

SUBMERGED plants for the garden pond should be chosen with great care; for not a few species spread at an alarming rate during the lengthening days of spring to about midsummer, with the result that lilies or *Nymphaeas*, and other aquatics that bear showy flowers run the risk of being overgrown unless the pondkeeper keeps their rapid spread under close and regular observation.

Such a plant is hornwort (*Ceratophyllum demersum*)—unquestionably one of the best oxygenators and egg- and fry-savers known to the fishbreeder, but given a few months in an open position, it quickly forms a deep coverlet of myriad-branching stems thickly clothed with miniature bottle-brush bristles.

Be this as it may, if you introduce

hornwort into your pond make certain that a tidy amount is removed periodically (especially the umbeliform growth that has been blackened by exclusion from light) and shake this choked tangle of vegetation over the pond or into an old bath in order to release any young fish or newts which have become caught up in the soggy mass.

*Ceratophyllum* is a rootless plant. The stems keep growing and branching until the sheer weight of vegetation send it to the bottom where it becomes weighted down under the constant rain of detritus from above. When autumn comes round, tight terminal buds are formed on some of the topmost growth, which break away from the parent stems and sink to the bottom. There they remain until the following spring when, stimulated by the extra light and rising temperature, they rise and start the growth-cycle all

over again.

Not nearly so rampageous in growth is a plant originally from Australia and known by more than one technical name including *Tillaea recurva* and *Crasula intricata*. The latter name is probably the right one (at the present time). It is a most adaptable plant for plunged, in a bunch of tied stems, into water no deeper than about a foot, its stems will ascend vertically until they contact the atmosphere, when they will grow horizontally along the surface until they reach the sides, whereupon they crawl out, so to speak, and colonise the cracks in paving stones or damp soil around the pond. *C. intricata* is a pretty plant. The narrowly elongated leaves grow in pairs every quarter-inch or so along the slender stems which branch, not so frequently low in the water, but near or at the surface. At the surface they create a dense 'lawn' of lilliputian leaves.

*C. intricata* keeps its green leaves (below frost level) all the year round, but its aerial foliage gets cut down by the first bad frosts. *C. intricata* is a good producer of oxygen, a good fry hider, and a first class spawning plant. As its invasive growth is easier to control than that of *C. demersum* it is, indeed, the better buy of the two.

The water starworts (*Callitriche*) are decorative plants for growing underwater but it is recommended to buy a good clump or bunched tangle of stems at the start. If this advice is not followed, the plant will soon become broken up and pushed about by active fish. The way to establish it is to anchor a clump under a small heap of pebbles or broken clay pot. Then the slender and brittle stems will rise quickly to the surface

THE AQUARIST



Water crowfoot (*Ranunculus aquatilis*)

They are rather sparingly clothed with delicate linear leaves borne in pairs. When, however, a stem reaches water level, the terminal leaves form a small rosette that stays buoyant at the surface. *Callitriche* is so delicate in growth and appearance (at the surface) that it can be mistaken for a cluster of duckweed and swept up in a tidying-up fish net or fine-tined garden fork or lawn rake. So bear this in mind. *C. palustris* is the species most commonly offered for sale by well-stocked dealers. It is worth having in a pond if only to provide spawning duvets for fish, and supplementary greenfood for green-stuff eaters. Female newts favour its narrow leaves for folding into egg-protecting sachets.

Members of the genus *Elodea* are found all over the world (or so it seems), and *E. canadensis* tells us its original home through its trivial epithet. It was introduced into the river Cam in 1847 by Professor Babington, Curator at the time, of the Botanic Gardens, Cambridge. Professor Babington never imagined what his action would result in; for in a few years *E. canadensis* was blocking the waterways over a large area of England. Pleasure boating had to stop, swimming became too dangerous to contemplate, and the conveyance of coal and other goods by barge came to a halt. By 1852, the position was serious. Then, in



Marsh Marigold (*Caltha palustris*)

the strange way that Nature has with some of its children, the plant started to go into a decline—and never regained its former vegetative powers: it now grows in localized areas in tidier clumps. It makes a valuable oxygenator for the garden pond. The tiny dark-green leaves grow in whorls up branching stems.

Years ago, a plant that bore a faint resemblance to *E. canadensis* but with larger and conspicuously recurved leaves went under the popular name of curled pondweed or (erroneously) *Elodea crispus*. Botanists soon corrected this to *Lagarosiphon muscoides* var. *major*. It is said to be native to South Africa and is naturalized in New Zealand and certain parts of Europe (southern, I imagine). It is a powerful producer of oxygen and does not grow so rampantly as to pose any problems. (It is easy enough to chop lengthy stems down to size with edging shears.) There are quite a few species of the

genus *Lagarosiphon* from sub- and tropical parts of the world. There is no doubt that some of them would make admirable plants for heated aquaria. But to get back to *L. muscoides* var. *major*. A bunch of this plant tied to a stone will soon throw down roots and anchor itself at the bottom of a pond. It also makes a good spawning plant.

Some of our indigenous water plants are worth trying after a good swishing about in water tingled claret-red by the addition of some crystals of permanganate of potash. This should render leeches, water snails, and so on *kaput*. One of the prettiest is *Potamogeton crispus*. This species, which can be dredged up from lakes and the less fished-over or busy canals, has a stoutish but brittle stem clothed with wavy-edged almost transparent leaves about 3 in. long and less than half that measurement across. They grow close together on the branching stems and both stems and foliage are of a olive-green hue shading to brownish red. *P. crispus* is, indeed, a most decorative plant when it is seen lying along the surface under a setting sun. Its leaves then appear to glow with an inner fire. It is a good oxygenator and spawning plant. Water crowfoot or *Ranunculus aquatilis* has two types of leaves and bears a profusion (if conditions suit it) of small white flowers, yellow in the centre. The leaves that grow well down in the water are divided into hair-like segments; those that float at the surface are shiny green and three-lobed. It is easy to root if a bunch of stems is weighted to the bottom.

No pond is complete or, indeed, really worth looking at, without some decorative marginal plants and a water lily or two. A marginal plant which will give an exotic touch from late spring until early autumn, or rather until the first frosts draw nigh, is *Cyperus alternifolius*. Better known, perhaps, as the umbrella grass, this plant from Madagascar should be grown in a well-crooked plastic pot filled with a 50/50 mixture of pre-moistened peat and fine grit. The stems are crowned with about a dozen spreading leaves about five or six inches long and some quarter of



an inch wide, tapering to a fine point. The stems may attain up to 3 ft. in height. The pot must be placed with its rim well below the surface of the water in order that the roots are never deprived of water. In one season it will outgrow a smallish pot, but it is easy to divide up the rootstock and plant up in other containers for giving to friends or the ladies conducting jumble sales. Overwintering can be in any well-illuminated place in which the temperature does not fall below 50°F. *Glyceria aquatica* var. *variegata* is a superb ornamental grass for habitually moist positions or for growing direct in up to about 18 in. of water. It is invasive but is easily thinned out by ripping out spreading stolons. The grass-like leaves attain about 2 ft. in height and are vertically banded wine-red, green and ivory-white. Very early in the year, when the plant is just stirring into growth, the whole of its stems and foliage are richly suffused with wine-red. This extremely decorative plant is best planted in a well-crooked plant pot of fairly large size and sunk in the shallows. Zebra rush is a Japanese rush of distinctive coloration or markings. Stout quill-like in growth, each 'quill' is alternately banded in green and white. *Scirpus tabernaemontani* var. *zebrinus*—to give the plant its botanical name—must be planted in a position protected from gussy winds for winds soon blow the brittle quill-like foliage down. This rush can reach a height of some 4 to 5 ft. Plant direct into mud troughs or in a large pot sunk in the pond.

The common Arrowhead (*Sagittaria sagittifolia*, and its forms), is planted in about 5 in. of water. During the summer it sends up some leaves which are broadly sagittate in shape, and white flowers, roughly an inch in diameter. *Bistorta umbellata* is a native aquatic that does well in some 2 to 6 in. of water. The leaves are sword-shaped, green suffused with bronzy copper, though as they age they become uniformly green in colour. About the middle of summer the plant is crowned with umbels of rose-pink flowers. The plant can be spread by division, and is popularly known as flowering rush. Less common-



ly as the water gladiolus. For late spring and early summer flowering few of our native plants can rival the Kingcup or Marsh Marigold. The leaves are entire and almost rounded; the flowers borne on branched stems resemble jumbo-sized buttercups. There are several forms of this plant (forms or cultivars or distinct species). *C. palustris* is the name of the type; *C. palustris* var. *alba* is from the Himalayas, and has snow-white flowers. There is a double form of the buttercup-type. Marsh marigolds are quite at home in shallow water or in soil that does not dry out. They are well-suited to a bog garden planted with primulas, forget-me-nots and species of *Lysichiton*.

For colour on the water itself no plant can give such an enchanting display as the water lilies (*Nymphaea*). Water lilies can be planted direct into a soft loamy or clay bottom, or in cage-like containers sold by dealers in pond plants. The interior of the cages must be lined with old sacking

***Lysichiton camtschatcense* or skunk cabbage**

or the close-meshed bags (opened out) used for packing greenstuff such as Brussels sprouts. After lining, fill the containers to near the top with a mixture of yellow clay, coarse grit, and a pinch of bonemeal or dried hoof and horn meal. The 'mixture' should be well and truly mixed.

Perhaps the best red lily is *Eschboucle*. It blooms away from May to October and the intense vermilion flowers reach the size of a soup plate. *Eschboucle* is, however, only suited to a large pond or small lake. For a small pond there is *Rose Arey*, with large star-shaped flowers of a rich rose-pink colour and slightly incurved petals. Even more delightful is *Conqueror*. The flowers are vibrant red flecked or shading in places to white. It continues to bloom for months on end. The flowers of morning glory (*Morhacea carnea*) stand proud of the water. They are of a gentle pink; the inner parts tending to



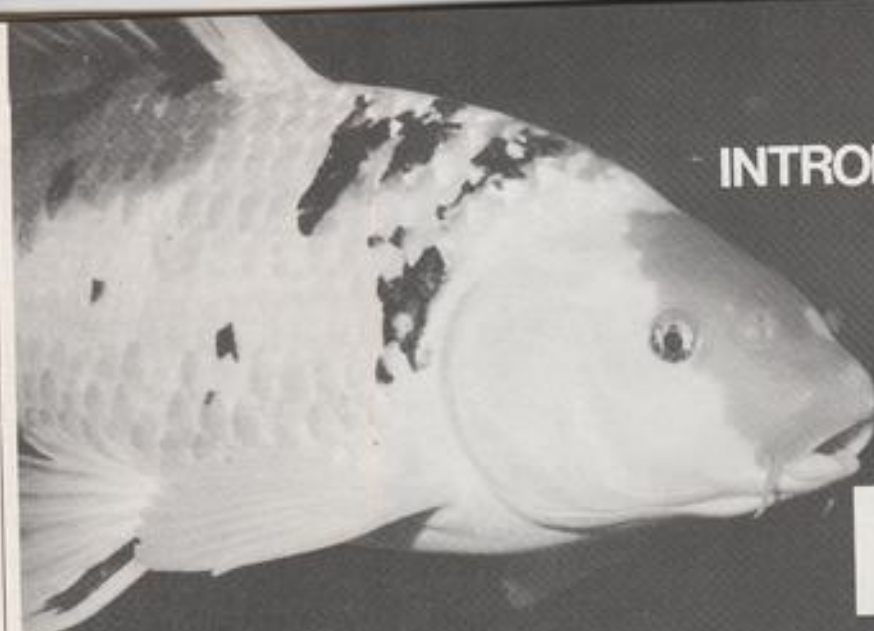
**Umbrella Grass**  
(*Cyperus alternifolius*)  
overhanging a pool  
with lilies and water  
hyacinth in bloom

pinkish white. Mrs. Richmond bears very large, almost globular flowers deep pink shading to palest pink streaked with white. Chromatella (*Marliacea chromatella*) is very suited to a smallish pond or the shallows of a largish pond. The flowers are canary-bird yellow with deeper yellow stamens. The pads are distinguished by bronze mottlings over a light olive-green ground. The white lily from America is listed as *N. odorata*. It has white flowers about 5 in. or less across, and is a prolific bloomer after it has established itself.

*N. Marliacea carnea*







## AN INTRODUCTION TO

# KOI

Large and colourful koi in close-up

It is strange that a common noun should assume a specialised meaning as the result of popular interest. Koi is Japanese for carp but is now accepted worldwide in piscicultural circles as referring to the large multi-coloured carp which grace the garden ponds of those lucky enough to afford the space which these gaudy monsters require. Koi alone is sufficient to describe the fish under discussion, Koi carp being tautological but while Koi means no more than carp intrinsically, the name now refers to what are better described as Brocaded Carp and, more correctly, Nishikigoi.

The history of this man-made development of a *Cyprinus carpio* variety stretches back in time and is best described as a process of diligent crossings of carp species and varieties involving such old favourites as the Mirror Carp, the Higo or Golden Carp, and others. This product of man's careful selection, however, remains a carp with a pair of barbels to distinguish it from those closely allied members of the Cyprinidae family, goldfish, which have no barbels.

Carp are notorious for their robust physique, large omnivorous appetites and toughness but it can be a mistake to treat koi as though they share all the physical characteristics of the wild carp forms and, just as man-made mutations of the common goldfish require more care and, sometimes,

### by L. E. Perkins

cossetting, so Koi must be cultured and maintained with more concern than that accorded to nature's original product.

Colour patterns of Koi are legion and carry Japanese names which are of most importance to Koi specialists who show their fish in competition. To the pondkeeper these specific tags may be superfluous, the main requisite being colourful fish which will show up in a garden pond and for doing just this Koi varieties have been developed so that their full beauty is better appreciated when they are seen from above in a pool rather than when viewed from the side in an aquarium. That they also look most attractive when seen in aquaria is not to be denied but however large the aquarium may be, Koi are for the pond and with sufficient space will achieve large sizes and look their most impressive.

Initially, the first Koi to appear in Britain were, of course, imported from Japan and a multitude of teething troubles was manifested in keeping them alive with no success at breeding them for some time. However, they quickly caught the fancy of coldwater enthusiasts and the British Koi Keeping Society was formed which has gone from strength to strength and contributed much to the care and breeding

of Koi and now it is possible to obtain British bred Koi which exhibit a better disposition to survive and thrive in British ponds with the result that small specimens can be acquired to grow on and adapt to the pond for which they are purchased. In the early days of Koi keeping only large specimens were imported and losses were sustained at some considerable expense but now young fish are widely available for pond stocking with greater certainty of them adapting to their surroundings and the available water volume.

Retaining all the basic attributes and proclivities of common carp, Koi will forage, browse on underwater vegetation, uproot plants and generally create a muddy environment and especially will they do these things when they reach large sizes. To combat such behaviour Koi fanciers often design and build their ponds with incorporated filter systems and feed their Koi so well that their 'rooting' propensities are discouraged and their rainbow colours more easily appreciated in crystal clear water.

Anyone seeing a shoal of large Koi in an ornamental pool for the first time can be forgiven for being filled with a desire to possess some of their own for the sight of these friendly creatures vying with one another in a

dazzling kaleidoscope of colour cannot fail to impress anyone with eyes to see them and the temptation to obtain some and to hurry them home for the garden pond is understandably irresistible. However, some thought should be given to the matter before rushing into things and purchasing specimens which may be unsuited to the conditions available. Better to adapt your garage before buying a Rolls Royce and as Koi represent the Rolls Royce of the pond fish world, an existing pond should be prepared or a new pond planned and constructed with Koi in mind. If an existing pond is envisaged for one's first Koi, ensure first that it has the requirement of minimum permissible size and, more importantly, depth. A winter like the one recently 'enjoyed' in Britain emphasises the need for a depth of five feet. It is really not practicable to introduce Koi to a small pond as a plethora of troubles will arise from cramped quarters and such troubles will increase along with the growth of the fish.

Feeding Koi is not a difficult matter as they are likely to relish anything on offer but live food is best restricted to garden worms, and aquatic live food (*daphnia* and *tubifex*) banned from the menu altogether for fear of introducing parasites and disease. In the warmer months Koi appetites will be at their greatest and should be fulfilled up to and including autumn when good feeding for winter resistance should be ensured. In milder winter weather when Koi show a willingness to feed, more vegetable and carbohydrate foodstuff should be offered than that containing protein.

When quarters have been made ready for the reception of Koi it remains only to visit a reputable stockist and to select one's specimens, paying most attention to the visible signs of healthy alertness and lack of surface damage. Once back at home with the precious cargo it is preferable to house the fish in quarantine quarters where they can be closely inspected and, where possible, watched over a period of days at least, longer if practicable, so that signs of stress or debility may be spotted, for once released in the pond infection can



spread unchecked.

Fortunately, Koi compel attention. While other pond fish may claim attention only when weather conditions are at their best, Koi owners find themselves drawn to the pond whenever time permits and frequent association with these fish not only builds an ongoing relationship but ensures that untoward happenings are noticed that more quickly for not only are there possible ailments to cure but there are predators to ward off in the form, mainly, of other people's cats and, in many areas, herons and mink. Yes, there are problems involved in keeping and maintaining valuable creatures but if a project is worthwhile, means will be devised to make it viable.

The range of colours and their mixtures among Koi varieties is very wide and to the non-specialist choice will be a personal matter presenting no little difficulty stemming from a desire to have more differing specimens than perhaps one's space or pocket can accommodate. Reference to a good book on Koi keeping will provide a list of the variety names and colours such as: Ohgon (golden yellow), Bekko (tortoiseshell), Ao (turquoise), Doitsu (mirror-scaled), Gin (silver metallic), Aka (red), Hisoku (yellow-green) and Kohaku (red and white). For those who have never experienced the excitement of viewing large Koi in numbers, a visit to a water garden centre is to be recommended where their full potential can be appreciated and where the practicalities of ownership can be

#### Koi shoal

assessed and discussed after which some thought should be applied to the matter because Koi keeping can start as a pond adjunct, grow into a hobby and develop, quite easily, into an obsession.

#### Coming events in the Koi Keeper's World

The Lower Thames-side Section of the British Koi-Keepers' Society stage their Show on 23rd June at The Grange Recreation Centre, Rayleigh, Essex.

The Nottingham and District Section's Show will be held on Sunday 14th July at Gregory's Rose Gardens, Stapleford, Nottingham.

The Northern Section will again stage a Japanese-style Koi Show on 4th August at Tatton Park, Knutsford, Cheshire.

The premier Open Koi Show, Koi 85 will be hosted this year by the Essex Section on Sunday 18th August at Langton's Gardens, Billet Lane, Hornchurch, Essex.

The Midland Koi Association's Open Show will be held on 28th/29th July at Baginton, Nr. Coventry.

Harewood House, Nr. Leeds, will be the venue for the Yorkshire Koi Society's Annual Show on Bank Holiday Monday, 26th August.

Britain's first ever dealer sponsored Koi Show, organised on Japanese lines, will be held on 13/14th September at Gregory's Rose Gardens, Stapleford, Nottingham.



## 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 which department you wish your query to go to. All letters must be accompanied by a S.A.E. and addressed to:  
**Your Questions Answered, The Aquarist & Pondkeeper,  
The Butts, Brentford, Middlesex TW8 8BN.**

### TROPICAL



Dr. David Ford

### Tropical



#### **a.o.v. and a.o.s. . . .**

This may seem a stupid question to ask but I am fairly new to fish-keeping and have never come across an explanation of the abbreviations A.O.V. and A.O.S. What do they stand for?

A.O.V. stands for any other variety and A.O.S. stands for any other species. At club and national shows the showing and judging of fish is carried out under the rules laid down by the federated group of aquarium societies (such as Federation of British Aquarist Societies or Association of Aquarists). They list most species, or varieties of a given species, with sizes and shape, etc. for the judges. However, there are 20,000 species of fish, so to list them all is impossible. Hence most groups of fish have an A.O.V. or A.O.S. section to cover the "specials".

#### **oscar . . .**

I am thinking of setting up an aquarium 48 in. x 12 in. x 15 in. and stocking it with Red Oscars. Please could you advise me on the following:

1. Would it be better to have a sexed pair or a shoal?
2. If you have a shoal how many, how big?
3. What plants, if any?
4. What's the best filtration system?
5. What temperature should the water be?
6. What rockwork should I use if I want to breed?

You say you want to breed the Oscar—so to be sure, a true breeding pair is required. You could isolate a pair from a 'shoal' but don't make the mistake of buying one brood, i.e., brother and sister.



*Astronotus ocellatus*, the oscar—but is it a male or a female?

The male has slightly larger fins and perhaps more red colour, but the only sure way to sex the fish is to observe the breeding tubes when they spawn. The female has a wide, blunt tube, and the male has a narrow pointed tube.

Several large rocks should be placed such that there is a cave for the female to hide from the male if necessary. Moderately hard water at neutral pH or just alkaline (pH 7.5) at 78°F is ideal.

No, do not add real plants (plastic OK), because the fish will only destroy them.

Feed the pair copiously on chunky food (beef, liver, shrimp, crab, snails, small fish and the excellent red earthworm). This will cause a lot of mess so do lots of partial water changes to keep the water clean.

Hundreds of eggs are laid, usually on a smooth side of a rock or on the tank base after digging away the gravel. During spawning and egg fanning stay clear of the tank (use a

screen to view the fish) because the fish become very tense at this stage. When the fry are free swimming it is best to remove the parents. Feed the young brine shrimp, then daphnia and finally chopped chunky food and flakes.

You will need at least two tanks—not less than 36 in. x 15 in. and power filtration is needed, not undergravel—the fish are too messy.

#### **molly and callis problems . . .**

I have been keeping tropical fish in a 36 in. x 15 in. x 12 in. tank for about a year. This Christmas I decided to purchase an 18 in. x 15 in. x 12 in. breeding tank. A few weeks before Christmas I put a pregnant female black molly into it; about three weeks later she gave birth to 15 healthy babies.

For the first few days I fed the babies on Interpet liquify 2, then I crushed up some dried food and fed them on that. Now I am down to four mollies the rest have died, one after the other and there is no explanation for this. My Vallisneria in the aquarium isn't very healthy either and is going brown. I keep the tank at a constant temperature of 74°F. The water seems perfectly clear and there is no problem with the tank.

Please could you tell me the problem with the tank, or if I have not given enough information could you send me the details of where I could have a sample of water tested to see if anything is wrong?

**COLDWATER**

Arthur Boarder

**PLANTS**

Vivian De Thabrew

**KOI**

Hilda Allen

**MARINE**

Graham Cox

**DISCUS**

Eberhard Schulze

The Black Molly *Poecilia sphenops* or *Poecilia mexicana* is a domesticated fish—this means it is a man-made variety and so it is not a hardy fish. In my experience it is not even a good community fish, unless the temperature is elevated (80°F) and salt present in the water (a level teaspoon per 50 litres) they are very prone to fungus and white spot.

You do not know the history of your female—she may be pregnant from a brother-sister cross, or even from a long line of in-breeding. She may be too young. The fish does not give good broods until a year old. Your diet was wrong—they must have some green food and be given a flying start with live food (brine shrimp is best). They also need clear, clean water, preferably in a mature tank with lots of algae.

Next time try to find a breeding pair, with a virgin female, from different stock. Put them in a matured tank with algae present and little salt. At 78°F to 80°F the young should be produced at 50 or 70 days. Hatch brine shrimps and then feed vegetable diet. You should then get 50 to 80% survival rates. Analysing your water won't help! A leaflet on your plant problem is enclosed. **D.F.**

**Coldwater****water crowfoot . . .**

Can you please recommend a water plant for a small garden pool which is useful and attractive? I think a water lily would be too large?

The ideal plant for your pond is Water Crowfoot (*Ranunculus aquatilis*).

This plant has two types of leaves, the submerged ones are very fine and branching, whilst those which float on the surface are very shiny and attractive. It flowers prolifically with small white flowers shaped like those of the buttercup. The advantage of this plant over a small water lily is that the submerged leaves are oxygenators and are also very useful to hold fish eggs in the spawning season. Some fishes will eat the leaves of this plant which are not poisonous as are the other members of the same Family.



*Ranunculus aquatilis*, note the fine submerged leaves

**mixing species . . .**

I have a tank, 6 × 1½ × 1½ feet, which I intend stocking with cold-water fishes. I intend to stock it with Bitterling; Golden Medakas; Black Banded Sunfish, Golden Orfe; and Stone Loach. Which coldwater Catfish can I add?

Make sure that your tank has a firm stand or base as the water alone can weigh over a quarter of a ton. As for your choice of fishes, the Orfe will soon grow too large to be mixed with very small fishes. Small ones might be all right for a start but they grow very quickly given the right food and conditions and would soon dwarf the smaller fish and look out of place. The Sunfish is a small species and only

grows to about four inches long, but you must realise that this fish is carnivorous and could attack small fishes. It would be as dangerous in the tank as a small Perch or Pike. The North American catfish you suggest, *Ameiurus nebulosus*, will grow too large for keeping with the smaller fishes as it could swallow them whole. I knew a boy who had a small one and he fed it on Sticklebacks, which were half its size.

In setting up a mixed collection, it is important to try to have fishes of a similar size, as large fishes rarely look well when with very small ones, and bullying can take place. **A.B.**

**Koi****on stony ground . . .**

Since moving to a new house I have attempted to dig a Koi pond. Things did not seem too bad until at about 2 ft. depth I came across a mass of large flint stones in a clay mixture. From then on life became very difficult even with the use of a pick-axe, but at long last I have a hole from 3 to 5 ft. deep with rough surfaces that cannot possibly be smoothed to accept a direct fitting liner even of butyl rubber. Is there any answer to this particular problem?

It is usual to spread a smooth layer of sand over the pond floor after taking care to tape over the joint face and screw holes of any bottom drain to be fitted at the time, but I agree it would be physically impossible to tamp sand into the side walls.

In some circumstances I know that thick layers of newspaper, cardboard,



roofing felt, tarpaulin and even old carpets have been used as an inner liner to prevent damage to the final pond liner.

However, it is vital that the worst of the holes and sharp edges of broken stones be covered in some way. If this cannot be achieved with clay or earth you may have to use a 3 to 1 sand-cement filler mixed with a quick-setting additive to give what need be only a moderate finish to the worst parts of the side walls.

You have been digging-out at a very wet time of year and although there is little danger of the sides collapsing, as can happen with soft earth, you should proceed with all speed during one or two days of dry weather.

In your case you would be well-advised to fit an underlay to guard against any remaining imperfections and to present a safe, smooth surface to the butyl.

The best recommended underlay material is a non-woven polyester fibre matting that is both permanent and rotproof.

It is available from Butyl Products Limited, 11 Radford Crescent, Billericay, Essex CM12 0DW, at about £1 per sq. metre ex-works for the medium thickness V34 BIDIM matting and in roll widths of 2.1, 4.2 and 5.3 metres.

H.A.

## Marine

### holiday feeding and lighting for anemones . . .

After having two tropical freshwater fish tanks for three years with success, I purchased a further tank 12 months ago and set it up as a marine tank. I have had great success with the fish. The size of the tank due to shortage of space is only 24 in. x 18 in. x 18 in. but I have kept 1 Banana Wrasse, 1 Red Blood Shrimp, 2 Damsels and 2 Clown Fish to the present time quite successfully. However, in July last year I purchased a small anemone and fed it by hand with small quantities of frozen shell

fish. Unfortunately, by September it had just shrunk away to nothing and died. I then purchased a further one, which although lasting a little longer has gradually been shrinking in size and has now died. I have got a tube worm in this marine tank which has gone from strength to strength.

I check the nitrite level regularly and the test shows perfectly clear, not a sign of pink at all. The salt content is correct, and I have also done water changes from time to time. Before purchasing another anemone I wonder if you could advise me on this matter?

Also, whilst writing, during our holidays last year we asked a friend to feed the fish for us, and wonder if there is any length of time for which they can be left safely. We use the solid blocks for the tropical freshwater tanks which slowly release food, and wonder if there is anything similar which can be purchased to feed the marine fish?



Good lighting is essential for healthy growth of corals plus anemone

I regret to inform you that you will not succeed with invertebrates of the family *Coelenterata*, i.e. anemones, living corals, hydroid polyps, etc., unless you have a very high level of illumination over the tank. What this statement means in practical terms is that an 18 in. deep tank having a 3 sq. ft. surface area such as yours needs, as a minimum, four fluorescent tubes each 24 in. long. Three of these tubes should be 24 in. 'Northlights' and the remaining tube should be a 24 in. 'Gro-Lux'. These tubes should all be run for a minimum of 12 hours each day and will only have a useful life of 6 months, i.e. all four tubes will have to be replaced at 6 monthly intervals.

Please remember the all-important

once weekly addition to the seawater of replacement trace-elements and the 2-3 times weekly addition of a vitamin supplement. The beneficial effects of adding these two supplements to an invertebrate marine aquarium must be seen to be believed.

Your feather-duster worm would, of course, survive quite well under poorly-lit conditions since these annelids do not have a high light requirement.

In a well-lit invertebrate aquarium, fat and healthy coral fishes may quite safely be left without the addition of any foods at all for at least 14 days. This is much safer than giving a non-aquarist neighbour a whole pot of food to experiment with whilst you're away. If I am going to be away for more than 14 days I make up little packs of flake food in paper screws—one for each day and ask the neighbour to empty one pack each day into the tank.

G.C.

## Discus



### have a go . . .

For a number of years I have been keeping common types of tropical freshwater fish and now I would like to keep Discus.

I propose to set up a 30 x 16 x 12 inch tank lit by a 20 watt Aquaglow tube and filtered by an external clip-on power filter (possibly a Hagen Aquaclear); with a pH 6.6-6.8, a temperature of 80-84 degrees. I plan to keep a pair of Royal Blue or Turquoise Discus.

Will this set-up be O.K.? A friend of mine who keeps Discus has told me that gravel should not be used but peat is the best substrate. Also, he said that adult Discus will not eat Flake and should be fed only live and FD foods. Are these things true?

Can you also tell me if Zeolite (Aqua-Zorb) removes medication like activated carbon?

Although there must be an IDEAL set-up for keeping Discus Fish it seems that a great number of hobbyists are successful with most sizes of aquaria. It often doesn't really matter too much

if the aquarium is an odd size as long as a certain amount of water is available. Again, one could now argue about the CERTAIN amount of water; this could then be extended to filtration; or this or that or basically to any of the technical aids, etc. I have come to the conclusion that there are a great number of people able to show great success in really adverse or alien conditions.

The main thing is: Have a go!

As far as your aquarium is concerned the size is O.K. (I am sure you mean to say that your tank is 16 inches high and not deep and it is an accepted way of always mentioning the height as the last measurement). If the Aquaclear power filter is suitable for this size of aquarium then it is also suitable for keeping Discus Fish. A pH of 6.6 to 6.8 is fine but a temperature of only 80 degrees would be too low. Discus Fish need a higher temperature and the 'maintenance' temperature should never really fall below 84 degrees.

When you say that you plan to keep a pair of either Royal Blue or Turquoise Discus Fish I very much hope that you actually mean a 'PAIR' and not just TWO fish. Discus Fish are shoaling fish and at least five or six should be kept together. Otherwise you will find that you have a very dominant specimen and one being dominated: The result being that the dominated fish will soon give in and if not rescued will eventually die.

I would find it very helpful in future to be given the reasons why something should or shouldn't be done: Gravel as a substrate may be wrong, often I advise the use of a gravel because a little calcium will in soft water have a buffering effect and prevent a large pH drop; but I would certainly never recommend the use of peat as a substrate. My views on LIVE foods for Discus Fish are well known and the only type of live food I will ever use or recommend is Whiteworms, all other live foods are usually troublesome and their use must be discouraged. A Discus Fish getting sick because of polluted Tubifex is a sorry sight and as there is no cure available is always a dead fish. To maintain a Discus Fish in superb

health no live foods are needed, live foods are nothing but a lazy man's food. Today, with the superb range of frozen foods available and the fishes' willingness to eat basically everything including Flake foods I can see no reason at all why there is still this phobia on live foods.



Freeze-dried Tubifex represents a safe alternative to its live equivalent

Zeolite will, just like activated carbon, remove medication from the water. It will also have to be tested with certain types of water since I once found that the fish became very stressed when Aqua-Zorb was used in a water with only 100 microSiemens. If you are not sure about these types of resins I suggest that you get in contact with the manufacturers/distributors and ask them for advice for your special application.

### deionisers . . .

My Discus seem unwilling to breed. My water is usually 8-12 GH which I thought was soft enough.

I contemplated buying a deioniser, but I am nervous of spending around £200 for something I don't understand. What does one consist of? What extra features does a two column unit have over a single column unit? Why do some resins go into the filter while others condition tap water?

Some people say that Discus are stressed below pH 6.5, therefore peat should not be used if the water is not hard or has a pH above 7.2?

I bought some 'Red Discus' imported from Singapore. They cost the same as Blue Discus, there are small lines and patches of red on the body and fins. What species do you think they are?

Although Discus Fish have bred in a 'hard' type of water it is usually much easier and often more prolific to spawn them in a water under 4° DH. If you are really serious and want to breed Discus Fish—more than just the once—then you will need a suitable water supply and for hobbyists who live in areas where the tapwater can not be used, the simplest way to produce a good water would be with a deioniser.

A deioniser is a unit containing a cation and anion resin. In a single column unit the resins used are 'mixed-bed' resins and once exhausted can only be regenerated with complicated machinery and are usually regenerated by the supplier. In a two-column deioniser the cation resins and anion resins are in fact kept in individual columns and can therefore easily be regenerated in situ. Cation resins are generally available in the free acid or hydrogen form and the salt form. In the salt form calcium and magnesium are exchanged for sodium and this type of water is very useful for laundries, hairdressers or dishwashers, in fact for all applications where a great deal of detergent is used, but not for fish-keeping. The free acid form will exchange all hardness for the equivalent acids and the anion column will exchange the acids for hydrogen, oxygen and a bit of CO<sub>2</sub>; in other words a deionised or demineralised water which is slightly acidic. Of course, there are many different types of resin available, some even have a colour indicator for you to see the state of exhaustion, some are more stable than others, some have a higher yield but most important the resins must be suitable for tropical fish; and not every deioniser, demineraliser or softener or even loose resin can be used for tropical fish keeping.

I have never heard that a pH 6.5 or below will stress Discus Fish; in fact their ideal pH is around 6, they will even stand a low pH of 4 for a short time without too much stress. Discus Fish are very adaptable and I wouldn't worry too much about such things.

As for your Singapore 'Reds' I am sure they are nothing but hormone-fed Brown Discus Fish. **E.S.**



'Form' in fish, like those abominable Miss World contests, is in the eye of the judge. Both are displayed on the competitive show-bench (remember the girl with teeth like Red Rum, or was it a piranha?). The exhibitor naturally wishes to make the best presentation. Geographic variations occur frequently, especially those with extensive north to south distributions. The fish-breeder, however, exerts his influence through feeding, temperature in the earliest stages of rearing and the growth-rate of his fish.

By controlling diet during early growth, differences in body form are produced with many species. Relatively large eyes and heads result from malnutrition. Early development is more important than subsequent growth rates in determining the relative size of body parts. Differences in body form can be produced by controlling temperature during early development. Raising this increases the growth-rate and fish with relatively large heads and fins result. This was demonstrated with rainbow trout reared at 46°F to 20 cm when the temperature was raised to 60°, giving them a higher growth-rate, larger size, heads and fins than fish reared at 46° and 53° throughout. In the wild, however, slower growing Pacific herring have larger eyes and longer heads and fins than faster-growing members of the same year class.

Differences in body proportions of adult fish depend also upon the size at which they reach maturity. Fast growing individuals have relatively small heads and fins, etc., though there is some variation among members of a group of fishes. The effects of temperature are seen in North-South ranging fish like cod, hake, etc., with more vertebrae and body scales in their cold arctic haunts than the same species in the Mediterranean. But these northern forms also have smaller heads, eyes, jaws and fins.

Very slow-growing fish have a deep, narrow body-form, fast growing a



by Eric Hardy

thicker, more elongated, cylindrically-conical body, tapering to a point. Thus rate of development of body-parts and rate of growth have opposing relationships to body-form. However, while relatively small body-parts are found in some fish after rapid growth, they have characterised other fish with slow growth. These are differences established early in life, for early development is an important factor in controlling body form.

This does not intend to ignore the genetic background to body-form, the careful selection of mating pairs. But many fish like the common goldfish do not always breed true to type, depending upon the purity of their ancestry. Poor fish from first class stock can produce good young, but these will not be pure and may produce poor offspring. Colour is a matter of heredity, though some believe that it is influenced in goldfish by the composition of the water at spawning time. Fish in an overcrowded tank or pond will be smaller than normal and some, especially African *Pachypanchax playfarii*, look anything but normal, because

this has its scales standing out at right angles almost to the body, as if it had dropsy.

Fish almost always act as if they are hungry. Many tropicals are overfed, making them listless at shows whereas 'starving' fish before exhibition keeps them alert and moving for the judges. Full fish can foul their transport water by becoming 'seasick' on a rough journey. Roomy cans should be used for transit to avoid rapid changes in water temperature and any injury from hitting the hard sides. Filter the water first through sand and charcoal and give it half-an-hour's aeration before departure. Air-surface is more important than depth of water.

A large thermos flask is ideal for transporting small fish, providing the water is well aerated and the container warmed to its temperature to avoid cooling. Most male fish, of course, look their best in spawning condition, with a pearly, opalescent, slimy, mucus protection to their skin which some rub off after spawning. Handling fish may remove scales. They are born without them and acquire them soon after hatching, and again a healthy early development makes the best growth. Fish are usually deeper in colour when kept in a dark container, and paler in a light one. Kept in an aquarium illuminated from below a shubunkin becomes deeper-coloured on the belly and paler on the back. Intensity of colour is caused by the ductless glands rather than light, hence the stronger colour of most fish when excited in their breeding display, by reason of the expansion of pigment cells. The iridocytes or plates which reflect light with a bright metallic sheen are generally most abundant where the pigment cells are fewer.

The colour of fish cannot be materially changed by a change of food. This iridescence is from guanin, a by-product of the fish's digestion. However, some black pigment foods can be stored in black cells to give the black patches marking some goldfish.

THE AQUARIST

## Company Profile

# THOMAS'S, Manufacturers of 'Aquarian' and 'Atlantis'



The daily Product Panel is an important part of Thomas's strict quality control programme

READERS of the *Aquarist & Pondkeeper* are, of course, familiar with the 'Aquarian' range of fish foods and remedies. As from last month, they will undoubtedly have also become aware of the 'Atlantis' range of aquatic products (see, for example, our 'Tomorrow's Aquarist' Photo-Fit Competition sponsored by 'Atlantis' in the May issue of *A & P*).

The common link between 'Aquarian' and 'Atlantis' is Thomas's (a division of Mars G.B. Ltd.). Thomas's is based in Halifax and is well-known among cat and dog owners for its Petcraft range of products such as Biscrok, Marrobone, Rewards, Smacko and Kit-Bits.

The company was founded in 1877 and can, therefore, boast of a long history during which it has developed into one of the leading pet accessories companies in U.K.

Of its wide variety of products, the one most familiar to aquarists is, without doubt, the 'Aquarian' range of flaked foods and remedies, launched in

1976 after years of research and development carried out by Dr. David Ford (currently responsible for our Tropical Queries). The present range of foods consists of Tropical Fish Food, Goldfish Food, Marine Fish Food,

Carnivore Food, Vegetable Diet, Colour Food, Growth Food, Guppy Food, Tablet Food, Fry Food for Egglayers and Fry Food for Livebearers. The remedies and water treatments are numbered from 1 to 10 and are, in order, Tanksafe, Tapwater Conditioner, Dechlorinator, Algae Control, Plant Food, Aquarium Conditioner, Fungus Remedy, White Spot Remedy, Copper-safe and Disinfectant.

The success of 'Aquarian' has been such that, since its early days, a free Advisory Service was set up, again, under Dr. David Ford's supervision, to handle the flood of enquiries that came pouring in. In November 1981, responsibility for the 'Aquarian' Advisory Service was taken over by John Dawes, the Senior Consultant to 'Aquarian'. The number of enquiries now stands at around the 1,500 mark each year, coming from aquarists of all ages and expertise, as well as from schools, traders, Societies and academic and research institutions from all over the world.



Dr David Ford at work in the Aqualab

THE AQUARIST



In addition to handling queries, the 'Aquarian' Advisory Service also publishes Bulletins and Guides which are available free on request. The complete range of publications are:

**Bulletins**

- Aquarium Calculations
- Plants
- Rooting Medium and Plant Growth
- Correct Lighting and Plant Growth
- Fish Nutrition and the Aquarist
- Control of Algae in Freshwater Aquaria
- Metrication and the Aquarist
- Water Quality
- Fish Diseases
- Filtration in Freshwater Aquaria
- Tablet Food
- Ponds
- New Tank Syndrome
- Stocking the Aquarium
- Control of Snails in Freshwater Aquaria
- Heating Systems and Calculations
- Swim Bladder Problems
- Transporting Fish

**Guides**

- A Guide to the Care of Freshwater Tropical Fish
- A Guide to the Care of Coldwater Fish
- A Guide to the Care of Tropical Marine Fish

The brand's reputation is something that Ron Hillcoat, the Marketing Manager, is particularly proud of. He sees this reflected in many ways, especially in the high degree of brand loyalty shown by aquarists over the years: "Many of these hobbyists have achieved the very highest honours in



One of Thomas's Associates supervising the automated 'Aquarian' production line in the Company's Halifax factory where this and other well-known products are manufactured

the Showing arena and have been happy to feature in the 'Aquarian' advertisements for little more than the prestige of doing so."

Vital to the success of the brand is the Aqualab, based at the Thomas's factory in Halifax. The Aqualab is headed by Dr. David Ford who not only runs a carefully controlled monitoring programme on 'Aquarian' products, but also organises and implements an ever-expanding programme of research and development into new products.

The Aqualab has played a prominent role in the development and re-designing of the new 'Atlantis' range of aquatic products launched at the British Pet Industry Exhibition which took place during the last few days of April.

There are over 80 'Atlantis' products available, many of which have been specially commissioned for the range. Others include improved and modified products previously manufactured or distributed by Thomas's under the Petcraft and Sicce labels.

During the A & P visit to Halifax, plans were already well advanced to extend the 'Atlantis' range even further with a selection of products which are likely to be completely 'new' to the hobby in many ways. Details of these will, of course, be made public in due course. Suffice it to say here that new products are on the way.

In June 1984, Thomas's became deeply involved for the first time in a major Show by running the 'Aquarian' Fishkeeping Exhibition at Kempton Park. This first venture was so successful that it has already become an annual event, filling the gap left by the demise of the 'Alexandra Palace' Show and providing a badly-needed event for the south of the country.

For fuller details of 'Aquarian' and 'Atlantis' products, the 'Aquarian' Advisory Service and the 'Aquarian' Fishkeeping Exhibition, write to the relevant department at Thomas's, Pellon Lane, Halifax, West Yorkshire HX1 5QP.



**OSCAR**

G. Robinson



# COMMENTARY

by  
Roy Pinks

We scribes often seem to give conflicting advice to beginners, mainly because we forget that at one time we, too, were trying to pick a way through the initial wilderness. During a lifetime with fishes we have experimented with many aspects of the hobby, some successful and rewarding, others much less so, and have eventually settled for a comparatively modest level of effort which reflects the sum of our experience and contains our own favourite species. Some of us have discarded breeding, for example, as being not worthwhile or convenient any longer. Others, because the growth of their own families has put pressure on available space, have reduced their holdings to a single tank or even a single species. Elsewhere, the real enthusiast has had to give up the fish house and confine his activity to the small spare room or even a corner in the lounge. In every single case it is natural that we would want to get every possible ounce of entertainment from what we are left with. But we still give, in parallel, advice to buy the largest tank you can afford, on the one hand, but to give your tank over to single species on the other. Understandably, this is just not on, especially for the tyro, who is keen as mustard to try everything in as quick order as possible.

Hence, I am beginning to wonder about that golden rule of buying the largest tank as starters. It is interesting to note that the standard unit for beginners in the early days of fish-keeping was the 18 in. or 24 in. tank, whereas today the figures are more like 36 in. or even 48 in. I have no doubt that the improved standard of living, prestige value and trade pressure have contributed to this trend, which seems to have been reflected in the dimensions of the purpose-built tank cabinets, a few of which are available in the smaller sizes. On reflection, whilst big tanks are economically and aesthetically attractive to the experienced fishkeeper, it is highly questionable whether they are right for the beginner. He will usually make mistake after mistake and learn the hard way (despite all our advice), and the bigger the tank, the bigger and more expensive will be his disasters. Perhaps the main difficulty with these jumbo tanks is the matter of lighting; as the size increases, so does the depth, and this reduces the effectiveness of most lighting "fits", which fail to support the necessary plant life. It is also something of an acquired art to judge how best to stock a large aquarium, not only from the point of view of compatibility of species, but also from that of visual appeal. Only the old hand will have the discipline to stock with a full complement of fish at the outset, and not to add new ones from time to time. The latter practice often leads to trouble because the newcomers cannot cope with semi-polluted water, or because they introduce some form of disease, even after proper quarantine.

The beginner is bound to want to try his hand with all sorts of species, not simply keeping them, but breeding them, too. He will want to raise the fry and he may want to experiment with growing plants, sometimes with controlled temperature variations. So, if he is pressed for space and short of cash—and who isn't?—we are hardly doing him a service by enjoining him to begin his apprenticeship with a large tank.

I am sure that one of the reasons for the movement towards the bigger units is the appalling untidiness which used to exist when folk began with a 24 in. tank and then acquired others as their interests grew. The jungle of wires, airtubes, switches and pumps came not to be acceptable in the modern home, since they readily attracted dirt and became positive dangers to small children who love getting their fingers into everything. So, the decorative type of tank tended to oust the others, and if the aquarist was an enthusiast he was removed to the spare room or the fish house, where he could indulge his bits and pieces to the full. The arrival of prefabricated cabinets has confirmed this by making the tank perform a function of beauty rather than enterprise.

This is something of a pity, especially if the lack of elbow room for trying things out causes the tank to fail, as it so often does. Yet nobody seems to have thought of marketing these cabinets made in such a way that, say four small tanks can be accommodated instead of two larger ones. The degree of modification required would be minimal, and the additional flexibility achieved would enable many of our managerial recommendations to be carried out, such as always having a quarantine tank immediately available. With this sort of choice on tap it would not be difficult to confine individual species to certain tanks as we so often recommend. It would also make it possible for us to suggest keeping species which we would normally steer away from. Penguins, for example, are notoriously snappish with other fish (and often amongst themselves), but given a tank on their own, properly planted, they are an unforgettable sight. An attendant advantage, provided that the electricians are soundly planned, is that tanks not in use can be switched off, thus reducing your power bill, though if I know my beginners, this is not a situation which they are likely to allow to arise.



# A BEGINNERS GUIDE TO

by Stephen J. Smith

# KOI

AS the most colourful, and possibly the largest of domesticated fish, Koi have enjoyed a tremendous amount of popularity over the past couple of decades. And deservedly so—the sight of a mature Kohaku feeding from its owner's palm is one to behold; and a source of great pride for the owner.

Called Nishikigoi (Nishi is Japanese for brocaded, while Goi means Carp) the popular types available today were developed from the wild Asiatic carp, the Magoi, which was introduced into Japan for food. Even today black carp are considered a delicacy in Japan.

Two main developments of Koi are seen today: those which stem from the Magoi, and a second type which was produced as a result of the introduction of German carp with the Asiatic variety.

This second type are called Doitsu, which means German Koi. The main differences are the scale type and the shape of the body. In the Doitsu the body is slightly broader and has larger mirror-type scales dotted about the body. The most popular type of Doitsu has a row of these larger scales running along the dorsal region and along the lateral line.

## Types of Koi

Given the right conditions, Koi have the potential to reach up to 24 inches in length. It is not surprising that there are several strains of these popular and colourful species. In fact, the Japanese divide these into 13 different classes or groups.

One should bear in mind when selecting Koi that the main features are: correct body shape—the nose should not be 'snub' and fins and body contours should be symmetrical; richness of colour; and patches of colour should be clearly defined with no blurred edges, speckles or stains.

## Kohaku

By far the most popular variety of Koi is the Kohaku, and the Japanese regard these as the main pedigree line of the species. 'Kohaku' means 'red and white', and the fish displays clearly-defined patches of red on a white body. No serious Koi enthusiast does not have several of these in his pond, and it has been said by the Japanese that "Koi-keeping begins and ends with Kohaku."

## Taisho Sanke

The Taisho Sanke is named after the Japanese Emperor Taisho. The Japanese word 'Sanke' means 'three-coloured', and the feature of this type of Koi is that it shows distinct patches of red and black on a white background. Ideally, the red and black patches should not overlap and there should also be no black at all on the head of the fish. An additional feature of the Taisho Sanke which I find most fascinating is that the pectoral fins sometimes carry black stripes—but it must be remembered that these should feature on both fins.

## Showa Sanke

This is another three-coloured fish, this one named after another Japanese Emperor, Showa, and although it has the same three colours as the preceding type, the differences will become immediately apparent. On the Showa Sanke red and white patches are defined on a black background; and there is no black on the head.

## Tancho

This is a variety of Koi developed from the Kohaku, the Taisho Sanke or the Showa Sanke. It derives its name from the Japanese national bird—a white-bodied crane which has a red head. Thus, the Tancho is similarly marked, having an all-over white body and a clearly-defined deep-red patch on the top of the head. There should be no other markings.

## Asagi and Shusui

'Asagi' means 'blue' in Japanese, and these types of Koi have the similarity in that both fish are predominantly blue with a red underside or ventral region. The main noticeable difference is in the types of scaling of the fish. Asagi have the usual scaling with the edges rimmed with a paler hue, while Shusui has the mirror-type scaling of the Doitsu, referred earlier in this article.

## Bekko

The Bekko can sometimes be confused with the following type of Koi, Utsuri Mono. Bekkos have black markings on a background of any other colour, and the word 'Bekko' means 'tortoiseshell'. There are three most popular forms of Bekko. Shiro Bekko has its markings on a white body, while Aka Bekko has a background of red. A yellow-bodied Koi with well defined black markings is a Ki Bekko. It is preferable for Bekkos not to carry any markings on the head.

#### Utsuri Mono

While the Bekko has black markings on any background, the Utsuri Mono has a black body with markings of any other colour. 'Utsuri' means 'reflection', while 'mono' means 'group.' Again, there are three main types: Shiro Utsuri has white markings, and the Hi Utsuri's markings are red. The third type, Ki Utsuri, has a yellow pattern.

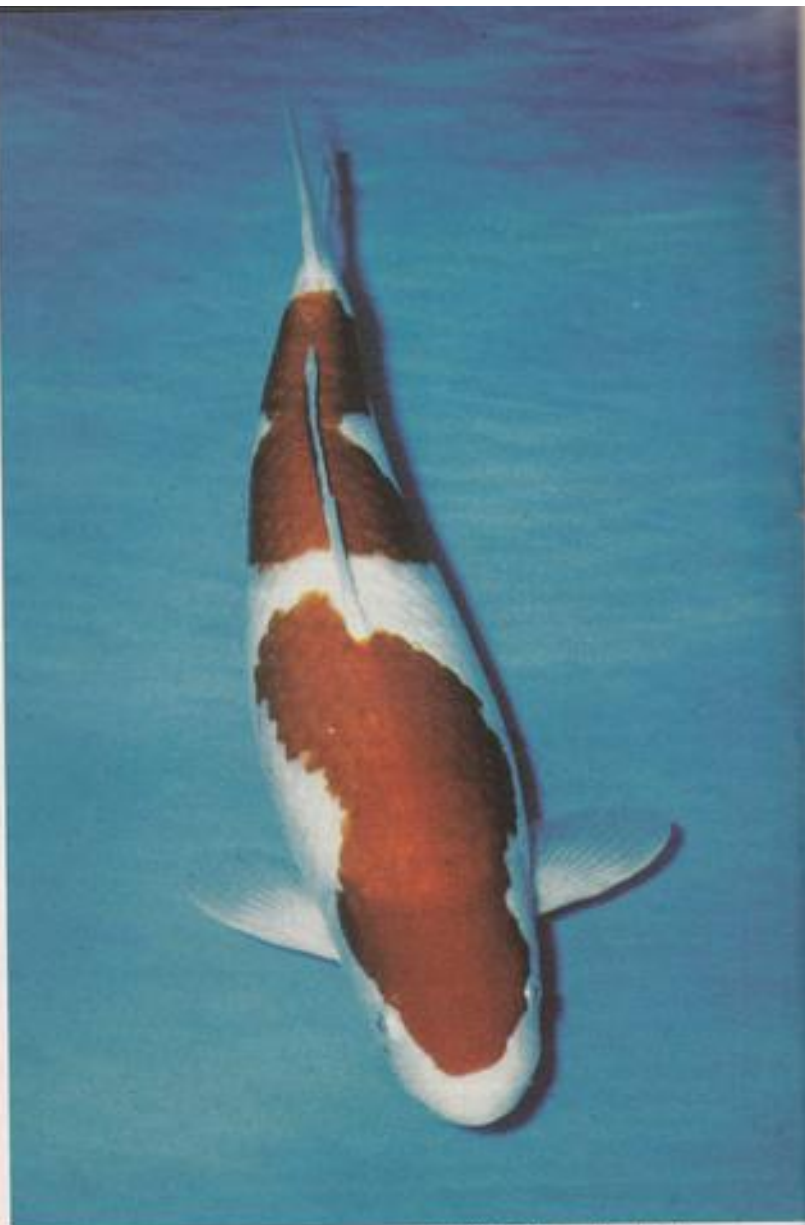
#### Ohgon

This is commonly a golden-yellow fish, although they may be silver, lemon, or any other pale all-over colour. Many people begin their Koi-keeping with this type of fish and they are an extremely popular variety. Ohgon are usually single-coloured, but another popular type of Ohgon has black shading towards the centre of each scale creating a fabulous 'pine-cone' effect. This type is called Matsuba Ohgon, after this highly attractive and fascinating feature.

It is not possible to describe all the many and varied types of Koi in this article, but it is hoped that the descriptions of some of the main types will stimulate the reader into looking closer at Koi for himself. Words and pictures can never do justice to the living form, and this is particularly true in the case of the 'kings of coldwater fish.'



**TANCHO KOHAKU**—named after the red-crested crane, the Tancho should have a single red spot as large and round as possible on its head.



**KOHAKU**—white and red. The bright red pattern, on a pure white body, can appear in many forms and two very clear-cut areas are shown on this Koi. The Kohaku is believed to be the first truly patterned Koi produced almost 200 years ago from which many varieties have been developed by cross-breeding and selection. It remains the most popular Koi in Japan where they say everyone starts with Kohaku and ends with Kohaku.



**TAISHO SANKE**—having three colours, a white body with red and black patterns and this example is a large adult Koi. Developed in the Taisho era 1912-1926, the Sanke (or Sanshoku) should appear as a good Kohaku with the addition of a black pattern. The amount of red and black varies greatly with different spawnings and parentage giving rise to many sub-names for the Sanke.



**DOITSU HARIWAKE OHGON**—a mirror scaled variety of the metallic silver and gold Hariwake Ohgon. The body may appear as white or platinum, and the pattern colour may be either shades of gold or orange, all differently named.



**ASAGI**—the body is dark blue or light blue with white shading between the scales giving a reticulated pattern. The head should be a clean light blue, and the Asagi is enhanced by red or orange on its sides and extending into the pectoral fins. When crossed with the German (Doitsu) carp and appearing with a smooth skin and mirror scales along its back, this variety is known as SHUSUI.

**KUJAKU**—this name translates into "Peacock", and the Koi is a highly metallic version of the Goshiki.



# Coldwater Jottings

by Stephen J. Smith



## A brief introduction to spawning Goldfish

ONE of the most enjoyable and rewarding aspects of the hobby of coldwater fishkeeping is breeding and rearing one's own fish. This is an aspect regarded by many with awe, but with common-sense and patience perfectly satisfactory results can be achieved. And for those who also enjoy exhibiting at shows, there is a great sense of achievement in seeing one's home-bred specimens awarded a place-card.

Goldfish will be ready to spawn from around mid-May to September, provided that they are maintained under good conditions and are fed regularly with a balanced diet, which ideally should include a fair proportion of live foods.

I am often asked how one can tell the difference between male and female goldfish. In broad terms the answer is that healthy goldfish in spawning condition will display the respective characteristics of their sex. The female will appear rotund showing a swollen underbelly where eggs are developing. Viewed from above, the female fish with a healthy development of roe will display a lop-sided appearance.

The male, however, has rather different characteristics. His behaviour is usually the first give-away that spring

is in the air (or should I say water!). At the onset of the breeding season when water temperatures are increasing, he will be seen to chase his peers—whether male or female—vigorously around the pond or aquarium.

The predominant characteristics of the male goldfish in spawning condition is the development of white pimples, termed 'tubercles' on the gill plates; and often on the forward edge of the pectoral fins.

## Preparation of the spawning tank

It is imperative that the spawning tank is thoroughly cleaned and sterilised before use. I use three-foot tanks scrubbed out and then filled with a strong solution of Sterazin and aquatic salt. Having allowed this to stand for about a week the solution is then flushed out completely and the tank refilled with clean fresh water.

A correct dose of Sterazin is then administered according to the instructions on the bottle before leaving the set-up to stand for a further week before introducing the breeding pair.

You will have noticed that no plants or gravel are used in the spawning tank—it is kept completely bare. A 'curtain' of colourless nylon wool which has been sterilised by boiling can be hung across the tank as a spawning mop. This should not be so thick that the fish have difficulty in passing through it and should reach the floor of the tank. I have successfully spawned fish without the aid of a spawning mop, though it is felt that its use does help to stimulate the female.

In the meantime, the selected breeding pair have been placed in individual 'conditioning tanks', where they are fed plentifully with earthworms, *daphnia*, and flake food for two or three weeks before spawning.

## Spawning procedure

If the fish are in spawning condition spawning will usually take place within two or three days of introducing the pair into the spawning tank. Their prior conditioning in separate tanks seems to assist this occurrence, though it is also brought on by the change in water. The fish may also be more

likely to spawn during early morning, and many aquarists place the spawning tank where it can catch the rays of the sun during the early hours.

The procedure begins with the male chasing the female vigorously around the tank, using his nose to push against the female's ventral region. The female may be quite near to exhaustion when she finally releases her eggs as she passes through the spawning mop. Appearing oval in shape and about the size of a pin-head, the eggs become spherical when they come into contact with water. At the same time the male releases his milt, and by osmotic action water and milt are drawn into the egg to bring about fertilisation.

Within about an hour at maximum the pair will have completed spawning. At this stage, aquarists who are attempting to spawn their fish for the first time may well be alarmed when they see the fish turn round and begin to eat the newly-laid eggs.

At this point the parent fish are returned to their respective conditioning tanks for a day or two to recover, before placing them back into the pond to regain their condition for possible future spawning.

Up to 5,000 eggs can be laid in a spawning, though I have found the number of eggs to hatch to be around the 1,000 mark with a successful spawning. Do not be too disappointed if only very few or none of the eggs turn out to be fertilised. This is a common occurrence and termed an 'infertile spawning.' If this happens return the pair to their individual tanks for further conditioning for about a month before attempting to spawn these fish again.

In the meantime, try spawning with a different pair.

## Hatching and rearing fry

Once the parent fish have been removed from the spawning tank gentle heat should be applied (approx 75°F.) to incubate the eggs. It will be noticed that the eggs will have adhered to the sides and base of the tank, and care should be taken not to disturb them. Some of the eggs will be seen to develop white fur over them, and this

THE AQUARIST



is a form of fungus which attacks infertile eggs. Many aquarists prefer to remove them from the tank, but this is rather a tricky procedure and I choose to leave them alone rather than risking damage to healthy eggs.

Within 4-5 days fry from fertile eggs will begin to hatch; and appear as tiny slivers, rather like glass, clinging to the sides of the tank. For the first few days they will remain there motionless while feeding from the yolk sac. Do not attempt to knock them off the glass as they are at their most vulnerable at this stage and will not have the strength to swim to the surface and will most likely drown.

During this time I administer one of the commercially-prepared liquid fry foods to the water to stimulate the production of *infusoria*—microscopic organisms on which the fry will feed as soon as they are free-swimming.

When the contents of the yolk-sac have been consumed the fry will have developed the strength to leave their 'perch' on the aquarium glass and make for the surface, where they take their first gasp of air to inflate the swim-bladder.

At this stage the fry will feed continuously on *infusoria* and liquid fry food. Also of benefit is an eggcupful of pond water which has a full bloom of algae, as algae is a beneficial and much-ignored source of nutrient for fry.

I discussed rearing brine-shrimp in last month's *Coldwater Jottings*, and brine-shrimp nauplii should be administered a week or so after the fry become free-swimming. This should be supplied plentifully as many aquarist who try breeding for the first time fall at this first hurdle through under-feeding. As I stated earlier, fry will feed continuously, and as long as only live food such as *infusoria* or brine-shrimp nauplii are administered the water should not become polluted as would be the case with dried foods, for instance.

Next month I shall discuss the process of selecting and rearing fry to young adults. In the meantime I hope I have encouraged fishkeepers who may not have considered breeding their own fish to give it a try. I can assure you that it will provide a most pleasurable and satisfying aspect to the hobby.

#### COLDWATER SHOWS

I deservedly had my back-side kicked by the Midland Koi Association recently for mis-informing readers about their show this year. To put the record straight their open show and exhibition takes place on Sunday 28th July at Baginton Village Hall, near Coventry. My apologies to M.K.A. for the error, and to everyone else who thought we had an extra bank holiday this year!

However, I have been informed that on Bank Holiday Monday 26th August, the Yorkshire Koi Society will be holding their annual event at Harewood House, between Leeds and Harrogate. This promises to be a most interesting day out as I understand there will also be a display of steam traction engines.

Bristol Aquarists' Society have written to inform me that their next show is on Saturday 21st September at St. Ambrose Church Hall, Bristol, and will be open to the public from 3.00-5.30 p.m.

## Press Release

### Cataloguing the joys of water gardening

The recent issue of the annual Highlands Water Gardens Nurseries catalogue for 1985 is in full colour and this 36-page manual covers Highlands' comprehensive range of products for the beginner and for the enthusiast. The catalogue is entitled *Everything for the Water Garden* and Highlands' range is the largest from a single source in the UK. New products for '85 include reproduction water-wheels in three sizes, a wrought iron ornamental bridge, the Puffin glass fibre pool, a decorative indoor pool and garden ornaments with stone and lead finishes.

Highlands is Britain's number one specialist water garden centre and the



largest aquatic plants specialist in Europe, with 17 acres of propagation beds for deep-water and marginal

aquatic plants. In addition, they stock up to a million coldwater fancy fish in all sizes, shapes and colours at any one time.

Display pools at Highlands' attractive water garden centre in Chorleywood, Hertfordshire, are laid out to enable potential newcomers to the hobby to see exactly what the finished pool will look like and choose the right products and accessories accordingly. From June onwards the aquatic plant beds are ablaze with colour and the fish-rearing houses are always a favourite with children.

There are ample car parking facilities and Highlands is open seven days a week, 9 a.m. to 5 p.m. from Monday to Saturday and 10 a.m. to 5 p.m. on Sunday. Products from the catalogue are also available by mail order.

# ON THE TEST BENCH

by Ian Sellick

## Unifita

REPLACEMENT sponges for power and air-operated filters of all makes tend to be quite expensive and sometimes hard to come by, although most good shops stock a very good selection. Now, Windsor Water Gardens have provided a solution by manufacturing a range of foam filters for every filter available in the UK, and at a price somewhat cheaper than the filter makers' own. These seem to be good copies and fit well. Sample prices: Fluval 302 foam £2.99; Eheim 2008 £2.25; Tetra Billi 99p.

Also manufactured is Fitafill Foam. This is simple foam pieces, small blocks that can be used in box filters, canister filters or even in small pond filters, so long as they are retained in some way. Priced from £3.03 to £13.99, it seems somewhat expensive, but I suspect this largely reflects distribution costs and mark-ups. It is, of course, reusable with careful washing, and will make any box-type filter into a biologically active one.

Perhaps the most useful product in the range is a series of gravel tides; thin foam mats that can be placed over the first inch of gravel, then more gravel added on top when using under-gravel filters. The mat will not only prevent digging through to the filter plates, but will actually increase the biologically active area. The foam does, however, compress completely under the gravel's weight which reduces the usefulness of the latter aspect.

Made in a plethora of different sizes from 24 in. x 12 in. to 72 in. x 24 in., there is a mat for every tank as they are, of course, easily trimmed. Prices range from £2.95 to £13.99.

Windsor Water Gardens are at Leagrave Road, Luton, Bedfordshire.

## Interpet mini-powerstream and powerstream

ALMOST small enough to be wrapped in the two bank notes that will buy it, this little filter is a real marvel. Under 20cm tall, and about 6cm from front to back (excluding mounting suckers), this filter will find application in any tank of 18 in. and above, so long as it is completely immersed. Turning over a healthy 24 gallons an hour, its electricity consumption is minimal, 4 watts producing over ten days running per Unit. The motor is sealed in a grey plastic case that is easily removed from the filter body by pushing two tabs on the side. The impellor cover pulls off for quick cleaning of the impellor chamber—a necessity every time the filter is cleaned.



The impellor magnet has the usual two nylon running washers that are very readily lost, and a plastic impellor that seems quite robust. The filter body is of green plastic. Water enters through the whole of one side through



very flimsy looking plastic slats, but which are actually quite flexible and have stood up to quite heavy handling. The water then passes through the 3½cm width of a block of blue (!) foam enclosed in a flexible plastic housing that enables it to be rapidly removed from the filter for cleaning. The water is collected from the far side of the foam passing upwards into the impellor and back out to the tank.

Well thought out, cheap and well built, this little filter deserves to be extremely popular.

Larger stablemate of the Mini is the Powerstream, some 28cm tall and just over 7cm square, turning over some 50 gallons an hour for a 6 watt power consumption. This is a more conventional filter; the impellor drawing water through a cylindrical sponge held on a perforated plastic tube. Water enters the filter through 4 small slots at the bottom of the filter sides, and through the gap round the filter base. The filter should not therefore be buried, or be allowed to become buried.



as its efficiency in removing particulate matter will be impaired. At nearly the height of the internal dimension of a standard 12 in. aquarium, this may be a problem to some users. I would have liked to have seen water entry through a grille in the side of the unit.

The filter base is removed for access to the media, and although it is possible to get finger nails in the water intake gap, the base is not that easy to remove.

The filter works very well, however. The impeller cover I found very stiff initially and difficult to remove, although this improved with use due, to my mind, to the unnecessary

O-ring. The impeller is easily cleaned, although the blades are a little thin, so care should be exercised. Flow may be altered by swivelling the outlet tube, although in reality this does not seem to alter the pump output, but merely directs the flow partly into the tank directly, and partly round the top of the filter body.

By attaching a piece of flexible tube to the filter output, it can be connected to a spray bar, or simply allowed to flow out at the opposite end of the tank from the filter; a very useful feature that ensures good water circulation.

A venturi effect may be created by

attaching an air line to the spigot on top of the filter. The filter is secured by attaching suckers to the pump head using the slide-in holders provided. This means the filter body itself is not secured. After some use, the filter body can become loose (it is only held by being a tight fit with the pump intake), and with robust fish such as big catfish or cichlids, the filter body is too easily detached.

This is a good value filter for the medium tank, especially useful with the spraybar facility.



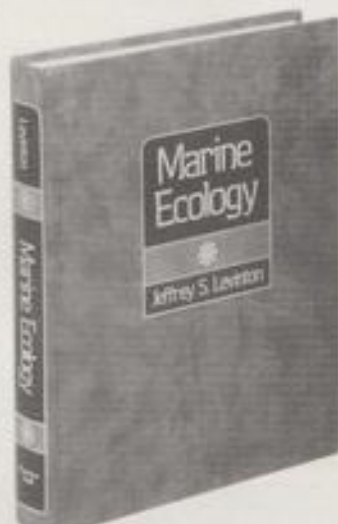
## BOOK REVIEW

by John A. Dawes

"Marine Ecology" by Jeffrey S. Levinton; published by Prentice-Hall (1982). ISBN: 0-13-356852-8. Price: £34.15.

For a variety of reasons, it seems that marine enthusiasts almost invariably enter the hobby with, at least, a basic level of preparation. This is usually achieved through discussions with experienced aquarists and/or through the consultation of relevant literature. Therefore, from the start, marine hobbyists become involved, to a greater or lesser extent, with the science of the marine aquarium.

This involvement can take many forms ranging from a consideration of the compatibility of particular species (viewed as aquarium inhabitants) to as full or all-embracing a knowledge as possible of seawater, the marine environment and the biology and



ecology of "aquarium" and "non-aquarium" marine organisms.

"Marine Ecology", by Jeffrey S. Levinton, is a book written primarily for students of this subject or the closely-related one of Biological Oceanography. The text is, therefore, concerned with factors affecting the distribution of organisms in the wild, including the physical and chemical characteristics of the environment in which they are found.

Yet, I could not help feeling that many of the subjects tackled, as well as the treatment they have been given, make substantial sections of the text very relevant to those marine hobbyists

who fall in the second of the categories mentioned above.

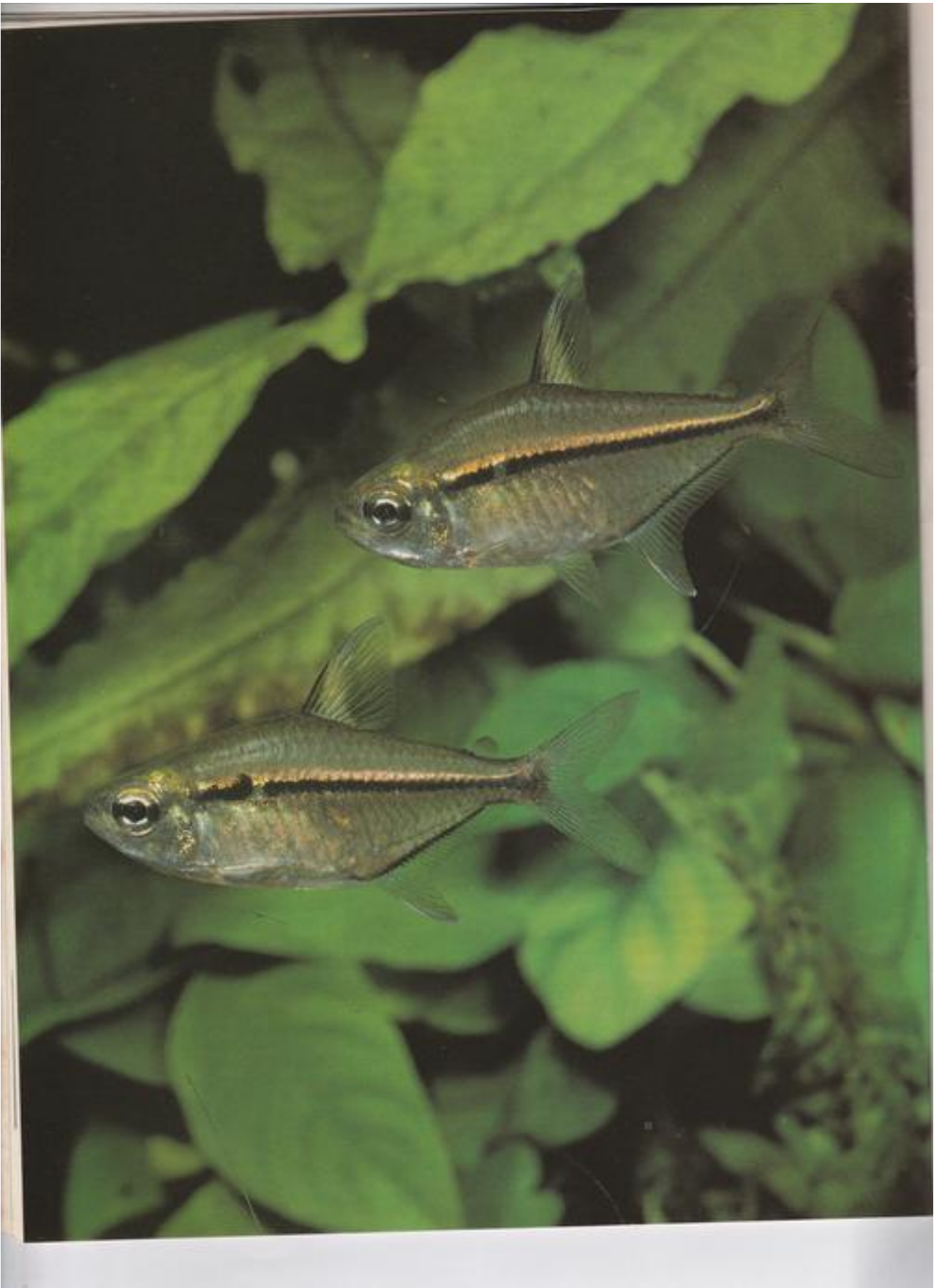
Of particular interest to such aquarists would be the chapters dealing with the ecology of the intertidal zone, benthic (bottom-dwelling) communities and coral reefs.

Other subjects covered include estuaries, the sub-tidal environment, deep-sea communities, feeding adaptations, plankton dynamics, food webs, productivity, reproductive and migration strategies, interspecific interactions, diversity and evolution (including the formation of species), and factors limiting the distribution and nature of populations.

The chapters (21 in total) are grouped into six parts, each of which carries a short, but useful synopsis on the first page. The chapters themselves are suitably subdivided and well illustrated with diagrams and half-tone photographs. In addition, each chapter carries a very welcome summary at the end. Each major point is numbered and discussed briefly.

Many technical terms are defined in the text but, to help matters further, there is a fifteen-page Glossary at the end of the book. There is also a list of those journals most likely to be of use to those interested in marine ecology, a very extensive and up-to-date list of references and a comprehensive index.

At £34.15, "Marine Ecology" may be too expensive for many hobbyists but should be within the reach of local libraries.





# SPOTLIGHT

## *Hemigrammus ulreyi*

Boulenger, 1895

by John A. Dawes

Photo: A. van den Nieuwenhuizen

THERE are four generic names that crop up more regularly than any others when one is dealing with Tetras. In alphabetical order, they are *Hemigrammus*, *Hyphessobrycon*, *Moenkhausia* and *Paracheirodon*. If we attempt to separate these genera according to gross morphological characters, we find that, no sooner have we begun to feel that some progress is being made than we come up against what feels like a solid brick wall.

If we take the long, torpedo-shaped body of the Neon (*Paracheirodon innesi*) and the Cardinal (*P. axelrodi*) as the deciding criterion, we then find that the 'other' Neon, the Black Neon, is not even considered to be in the same genus. It is, in fact, known as *Hyphessobrycon herbertaxelrodi*.

If we choose the black line that stretches along the lowermost edge of the ventral region of the body (along the base of the anal fin) that is so common in *Moenkhausia* species, we again come unstuck. A quick glance at the accompanying photograph of *Hemigrammus ulreyi* is all that is needed to put paid to this line of attack.

So it is with any single, easily observable characteristic that we care to choose. We, therefore, need to turn to smaller, distinguishable parameters to complete the job. Almost certainly, the best source of reference for this type of work is 'Characoids of the World' by Jacques Géry. However, even this substantial tome cannot be regarded as the last word on the subject, particularly since the recent incorporation of the Cardinal Tetra

into the genus *Paracheirodon* by Stanley Weitzman and William Fink in their 1983 paper.

Leaving the small genus *Paracheirodon* on one side, *Hemigrammus* may be distinguished from *Hyphessobrycon* and *Moenkhausia* in a number of ways.

It can be distinguished from *Hyphessobrycon* in that fish belonging to this genus have no scales in the caudal fin while both *Hemigrammus* and *Moenkhausia* species have, at least, partially scaled caudals. The 'easiest' diagnostic feature separating *Hemigrammus* from *Moenkhausia* is that the lateral line is incomplete in the former. In *Moenkhausia*, this line is almost straight and runs from its origin just behind the gill covers to the caudal peduncle. In *Hemigrammus*, the line often extends only as far as the origins of the pelvic fins.

Using these criteria, the Tetra Ulreyi (to give this species its rather uncommon common name) falls neatly within the genus *Hemigrammus*.

However, how long it will remain there is anybody's guess. Among the Characins, Tetras are probably the most difficult to classify, having (as they do) numerous 'intermediate forms', exceptions to rules and presumed neotenus types. (Neoteny is the term used to refer to the retention of immature or larval characteristics beyond the period normally expected).

*Hemigrammus ulreyi* and all the other species currently classified in

the genus, are thought by some (including Géry) to belong to the last of these groups. The belief that these species are neotenus is based on the fact that the lateral line is known to develop (usually) from the region behind the gills and grow backwards towards the caudal peduncle. Since *Hemigrammus* species only exhibit the anterior portion of the lateral line, this has been interpreted as an 'incomplete' and, therefore, neotenus characteristic.

Yet, even Géry admits that some of the species currently placed within *Hemigrammus* may have been artificially placed there.

*Hemigrammus ulreyi*, of course, is blissfully ignorant of all this and continues to delight those relatively few aquarists who are fortunate enough to secure supplies of the species. Many aquarists may, in fact, believe that they have *H. ulreyi* in their tanks. However, close examination of their specimens and their comparison with the accompanying photograph will probably convince them that what they have is the False Ulreyi or Flag Tetra, *Hyphessobrycon heterorhabdus*, which, incidentally, was first described by Ulrey in 1864!

*Hemigrammus ulreyi* comes from the upper reaches of the Rio Paraguay in South America. It is quite hardy and peaceful but requires a relatively high temperature: around 25-27°C (77-80.5°F). Males grow to about 3.8 cm. (1.5 in.) and females slightly larger, i.e. 4.4 cm. (1.75 in.). Although any foods will be accepted, *H. ulreyi* shows a distinct preference for live or frozen foods. There are no

# SPOTLIGHT

detailed reports of this species having been successfully bred in aquaria.

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'Relationships of the Neon Tetras, a group of Southern American freshwater fishes (Teleostei, Characidae) with comments on the phylogeny of New World Characiforms. *Bulletin of the Museum of Comparative Zoology*, Vol. 150, No. 6, Dec. 1983.

## Press Release



### Modern Pumps Improve Garden Pond appearance

GARDEN ponds are becoming more and more popular and enthusiasts are increasingly using modern electrically operated submersible pumps to recirculate water and create attractive fountains and waterfalls.

The development of safe, small but powerful electric pumps in recent years has made it easier for pond enthusiasts to keep water aerated and clear. This improves the appearance of ponds and creates ideal conditions for fish and plant life.

In addition the pumps enable the pond "gardener" to easily create waterfalls and fountains to provide

added effects.

To meet the growing demand, Guinard Leisure Pumps of Loughborough is launching a new range of three Waterboy pump models.

The range simplifies the choice according to the pond enthusiast's needs. It is now much easier to identify exactly the most suitable pump according to the size of pond, the volume of water to be recirculated or the height of waterfalls and fountains.

The Waterboy 3, is aimed at the smaller pond owner who wants a basic reliable recirculation or fountain pump. It has a suggested retail price of £69 inclusive of accessories.

The Waterboy 5, is a versatile

1,000 gal/hour pump for those water gardeners with larger ponds, impressive waterfalls and high decorative fountains. At a suggested retail price of £80.

The Waterboy 10, is a 1,500 gal/hour pump with a suggested retail price of £95 (inc. VAT) aimed at the fishkeeper enthusiasts operating a large pool, or in conjunction with a filtration system. The Waterboy 10, offers the facility for large volume water circulation, while retaining its inherent facilities for waterfalls and fountains. It features thermal overload protection against misuse with a auto restart.

The pumps have been developed as the result of many years of experience with pumps of all sizes supplied worldwide and are fully tested Guinard Leisure Pumps offer a full service advice and back-up through their retailers.

The pump range is supported by two basic accessories for use as required. The Dual Control Flow Valve and the Universal Strainer. The Control Valve can be fitted anywhere between the pump and the outlet applications. The individual controls for each outlet hose allows for easy fine tuning of the flow, making the most of pond size and circumstance.

The Universal Strainer slips neatly over the Waterboy 5 and 10, allowing ease of cleaning and maintenance.

Further details on the Waterboy range can be obtained from British Guinard Pumps Limited, at 29-30 Kernan Drive, Swingbridge Industrial Estate, Loughborough, Leicestershire LE11 0JF. Tel: (0509) 231872.

THE AQUARIST



# THE BASIS OF FISH HEALTH

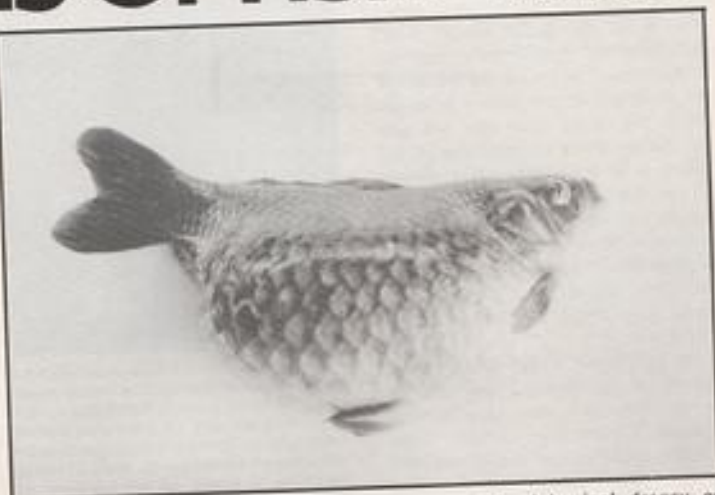
The Grass Carp tapeworm

## Bacterial Diseases of Fish

by Dr. A. Powell and Dr. R. A. Sweeting

There are bacteria living in marine, freshwater and brackish waters from the tropics to the poles, and many of these can cause diseases of fish. Outbreaks of disease caused by bacteria are rare in completely natural fish populations, as far as we know, but where fish are kept on farms or in tanks, or where the environment has been changed drastically by man, they are all too common. The commonest bacterial diseases of fish are linked with changes in water quality or temperature, or with changes in the fish, for example the onset of sexual reproduction when the body resources are put to the job of producing eggs and sperm and physiological stress results. Frequently physical damage to the skin, scales and mucus layer is also implicated, as after grading of fish on farms.

Compared with air, water is a very rich medium for bacteria and very many types abound in the normal aquatic environment. Many of these are important in decomposition, i.e. they break down wastes including fish faeces and are very important in the biological filters used in tanks and ponds. These include *Nitrobacter*, *Nitrosomonas* and others which convert ammonia to nitrate, nitrate and nitrogen gas. Some of the free living bacteria may attack fish when the fish are under stress—and are



known as facultative pathogens—for example *Aeromonas hydrophila* and *Pseudomonas fluorescens*—both of which are very common in freshwaters and in soils of all types. The intestines of fish—like the intestines of man—have their own bacterial flora. Normally they also contain some organisms for example, *Vibrio* species, which can, under certain circumstances, become dangerous to fish and cause the disease vibriosis. *Vibrio*, like *Aeromonas hydrophila* is another facultative pathogen.

In addition to the facultative bacteria there are a few species which are true parasites. These are referred to as obligate pathogens and although they may survive off a fish they cannot reproduce outside the fish. A well known example of one such disease organism is *Aeromonas salmonicida*—the causative organism of furunculosis which used to be considered a disease of trout and salmon but is now known to be widespread in coldwater fish.

Many bacterial diseases produce ulcers. An ulcer may be the result of the infection of a wound by the bacteria from the surrounding water. If this is the case there is normally just one ulcer on the fish. If this

A carp with abdominal dropsy or oedema caused by a systemic infection of *Aeromonas hydrophila*—a facultative or opportunist pathogen.

can be treated straight away healing usually follows without complications. Alternatively ulcers may result from bacteria within the fish (rather than from the outside as in the previous case), i.e. in the system or systemic. In this case it will be possible to isolate bacteria from the blood, kidney and other areas of the fish, and probably the internal organs will not be functioning as they should. The external ulcers in this case are probably only one of many symptoms. Other frequent symptoms of systemic bacterial disease include haemorrhaging. These may be major, which result in anaemia, or minor. Minor haemorrhages can be seen as pin spots (petechial) haemorrhages in gills, skin or internal organs. A haemorrhage is the result of destruction of a blood vessel wall which allows the blood to escape. In addition to the direct damage of cells by bacteria some produce toxins, for example haemolytic toxins which destroy red blood cells. This in turn will also cause anaemia and reduced

oxygen transfer leading to inefficiency of circulation of materials around the body. One of the major internal organs influenced by bacteria, either directly by destruction within it, or indirectly by toxins paralysing it, is the kidney. In freshwater fish one of the functions of the kidney is to get rid of the excess water that fish take in. In sea water one function of the kidney is to retain water and prevent its loss from the body. Failure of the kidney can lead to water-logging and dropsy in fresh water fish and water deprivation in marine fish. Swollen abdomen, pop-eye and raised scales occur as a result of fluid retention (oedema).

As with many types of fish disease prevention of bacterial problems is easier than cure and avoidance of sudden temperature change, water quality deterioration and stress will reduce the chances of bacterial problems. If a bacterial disease is suspected it is necessary to discover



An agar plate which 5 days before had been inoculated with a swab from the kidney of a carp. Each blob represents a colony of bacteria which have grown from a single bacterium introduced on the swab. Each of these colonies is made up of millions of individual bacteria. It is only by growing these large numbers that the presence of the bacteria are revealed.

which type of bacteria is responsible and its sensitivity to various antibiotics. The sensitivity is usually assessed by an antibiogram investigation. The bacterium isolated from a sick fish is grown on agar plates and tested for sensitivity against several different antibiotics. This is done because although some antibiotics have a wide action against most types of bacteria some bacteria are resistant to some drugs and some may become resistant if wrong times, quantities, etc. are used during treatment. Antibiotics can be administered by injection or in the food or water or applied topically to any wound or ulcer. The details of these treatments will be described in a future article.

## YORKSHIRE AQUARIST FESTIVAL

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# Tomorrow's AQUARIST



## Reaction to Jonathan Moss' article on his visit to Nancy Aquarium . . .

SHORTLY after Jonathan Moss' article in the March edition of T.A. on his visit to the Aquarium at Nancy in France, we received the following letter from Professor Bruno Condé, the Director. We feel proud to discover that Tomorrow's Aquarist is read abroad as well as in this country and, therefore, have great pleasure in reproducing Professor Condé's helpful letter. It answers Jonathan's query concerning the 'blue flashing light like that of a police siren' which, as we suspected, was partly the work of Flashlight Fishes (Anomalopidae).

Professor Condé's positive reaction clearly illustrates the best possible attitude towards young fishkeepers who, we hope, will respond in like vein by visiting the Nancy Aquarium should the opportunity present itself.



### More funnies from Maurice Ballard

Last March, we featured Maurice Ballard's highly original version of the rule: "Buy as large a tank as possible" with the promise that we would also publish some of Maurice's other 'funnies'. Here they are:

#### QUESTIONS

1. What fish must you not drop?
2. Which fish is designed to be thrown?
3. What tropical fish is edible?
4. Which fish is made of wood?
5. Name two very valuable fish.

#### ANSWERS

1. Glass Catfish.
2. Discus.

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Votre Ref. : Aquarist March 1985  
Nancy Ref. : S.C.T.T.E.  
Origine : B.I.E.

The Aquarist and Pondkeeper  
The Holly, Westford, Middlesex  
T9B 1BB  
U.K.

Nancy, W. 6 mars 1985

Dear Sirs,

Many thanks for publication of the paper about our Aquarium by Jonathan Moss. The work has mentioned several very different species of *Diabotus* with especially photophorescence: *Diabotus guineensis* (Omnivores) from Australia, and *Diabotus* *trilineatus* (Omnivores) from Senegal.

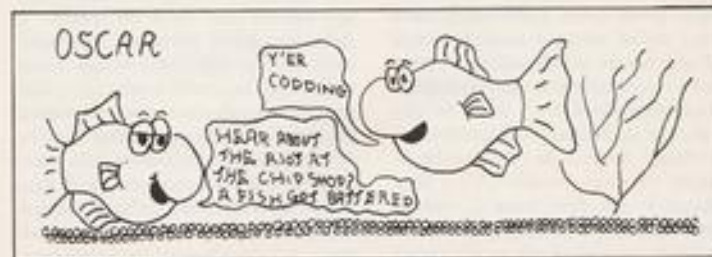
With best regards,

Bruno CONDÉ, Professeur  
Directeur du Musée de Zoologie  
et de l'Aquarium Tropical.

3. Chocolate Gourami.
4. Pencil Fish.
5. Jewel Cichlid and Diamond Tetra.

**Gareth Shore**  
takes up the challenge  
Gareth Shore is twelve and lives at

1 Honister Grove, Beechwood,  
Runcorn, Cheshire WA7 2TY. He  
is a Tomorrow's Aquarist reader who  
responded to the invitation we extended  
with Maurice Ballard's 'tank' cartoon  
mentioned above. Thanks a lot,  
Gareth.



## WHAT IS YOUR OPINION?



by B. Whiteside,  
B.A., A.C.P.

"In August 1984 I purchased two small *Plecotomus* type fish; I do not know the exact genus and species. They were about 2.5 cm. long and were fawn coloured with dark brown stripes. Apart from my liking of these fish as fish, I also hoped that they would clear my tank of algae. This didn't happen and I still had to scrape away algae every so often. However, while sitting quietly in front of my tank the other evening, I realised that the clay flowerpots, in which I keep Amazon sword plants, were spotlessly clean. Since this observation I have noticed that the *Plecotomus* are almost constantly cleaning the pots. I have seldom seen them on the tank glass or plants. Why these fish should be so attracted to the pots I do not know. I am shortly going to set up a tank specifically for these fish and obviously clay flowerpots will figure in the set up. . . ."

Mr. R. G. Farrow, of 9 Wyndham Close, Birch Glen, Colchester, Essex, wrote the above letter some time ago. I hope that he will let us know what evolved in his newly, set-up tank, if he can remember!

Mr. P. D. Nance, whose address is 23 High Trees, 90 Epsom Road, Sutton, Surrey, wrote: ". . . Your column is the first thing I read in *The Aquarist*. I find it a positive stimulus to my interest in fish—

especially when I'm at a 'low' with the hobby. I must just tell you how I've made a good friend through your column. He is Marjan Vidic, from Yugoslavia. During the summer I had the good fortune to have Marjan stay with me for a few days. When he left for his homeward journey, loaded down with fish equipment he had bought, my family were sad to see him go. I admire Marjan's dedication to his hobby as a lot of what is needed for fishkeeping is not easy to obtain in Yugoslavia. He has to cross many borders in order to buy what he needs; he's a real international aquarist."

I published a letter from Marjan in *The Aquarist* a couple of years ago. I still have the beautiful postcard, showing Bled-Stovenija, that he sent to me on 16th October 1983, thanking me for publishing his original letter and saying: "I hope I'll receive some letters from aquarists from England because I'd really like to contact other aquarists—I feel so lonely. . . ." I'm delighted to learn that Marjan found a penpal and managed a visit to England. If I recall correctly, he wrote about the possibility of making a video film of his visit to England. Perhaps Mr. Vidic or Mr. Nance will let us know if any photography or filming was done—and what items of equipment were taken home to Yugoslavia.

Mr. Nance continues his letter: "I must at this stage echo Mr. Mark Gill's remarks about live foods. I keep discus and I never now feed my fish live food. My deaths from disease have virtually dropped to zero. I find, with patience, all fish can be coaxed to eat anything, within reason. Some foods, like boiled egg and banana, can be a bit messy. I think the secret is variety and very clean water. I find the frozen foods very useful but quite expensive. The problem with discus is that the dealers tend to feed them only on live *Tubifex* and they have to be weaned onto dead food." (Photograph 2 shows discus expert Mr. Eberhard Schulze, in his Highgate shop, on a hot day last summer when I had the pleasure of visiting

his shop and photographing him and some of his breeding discus with babies—Photograph 1).

On 17th November 1984 Mr. Nance had the good fortune to be invited to visit West Thurrock Power Station, near Dartford, on the Thames estuary, to study fish which are sucked up into the cooling water filter system. Mr. Nance wrote: "It was a miserable, cold and foggy morning when we arrived. The trouble was that because of the miners' strike the station was temporarily shut down; but the chief chemist, Mr. Bill Seer, kindly started the pumps for us and we were able to see quite a few live fish at close quarters, the most interesting being a 10 in. red gurnard. Mr. Seer I found a knowledgeable man. He informed us that nearby was a colony of mitten crabs which come from much warmer waters than ours. They are presumably kept alive by the warm outlets of the power stations. The Thames is getting so clean now that they regularly get salmon caught on the filters; also, barnacles are becoming more of a nuisance because the water is cleaner. I would like to thank the station manager for allowing the visit.

"Just a few words about lighting. I've been using the Thorn 2D lamp for about six months now. I don't

One of Mr Schulze's discus with its babies



THE AQUARIST



think it has made much difference to my plant growth—although, on the condensation lid immediately below the lamp, the algae growth seems very prolific. It suggests to me that the light has not got much penetration of the water. The main advantages of the lamp are very low running costs, nice yellow light, low temperature of the lamp, very handy in an enclosed lid, and long lamp life. The main disadvantages are that it is expensive to buy, around £10, it's not very easy to fit in the lid of the fish tank, and you need somewhere for the small choke that is needed. The latter can get quite hot. I would think, if you didn't have a condensation cover, that there could be a chance of water getting into the electrical connections. That's all for now."

The Thorn 2D lamp has interested me, Mr. Nance, but I have not yet tried one. Your findings suggest that it may not be much of an improvement over other light sources for an aquarium. Your point about algae growing on your condensation cover, below the lamp, is not really valid in that this is not specific to the 2D lamp. Only last night I removed the cover glasses from all six of my tanks and gave them a good scrubbing with a nailbrush. They were covered in green algae, encouraged by condensation, heat and light—and, as you may know, all my light sources are Woolworth's tungsten bulbs (they were still 99p for four last time I needed to buy some). The damp, well-lighted conditions above an aquarium, on a cover glass or condensation cover, are ideal for the growth of various algae. Other dirt I had to remove with the nail brush was dried flake food and lime deposits left by evaporated water. I place my cover glasses, *one at a time*, in the bath, on a shower mat, and use a shower hose to wash them while scrubbing them with the nail brush. Please take great care with the glass. As I know only too well, it can cut—deeply and seriously!

It's an exercise that should be carried out fairly regularly because dirt, dust, algae—and talcum powder if tanks are housed in bedrooms and



**Eberhard Schulze, of The Highgate Aquarist, beside one of his discus tanks**

you have careless powder dusters about—gather on glasses and cut down on the amount of light that gets from the lamp in the hood down to the plants and fishes in the water. After I'd washed and scrubbed all my cover glasses last night I was amazed to see that my tanks looked very much brighter—as if I had increased the strength of the light

bulbs above the tanks. Much more light was getting to the parts where I wanted it to get. Incidentally, I'm occasionally asked about the wattages of the ordinary tungsten bulbs I use over planted aquaria. I use only 40 watt bulbs. I use one such bulb over an 18 in. x 10 in. deep tank, one for a 20 in. x 12 in. deep tank; two for a 24 in. x 12 in. deep tank, and three for a 30 in. x 15 in. x 15 in. tank.

Do change the filter wool in your filters on a regular basis. It's pointless

to have filters running if the wool is clogged up with dirt and there is little water flow. The occasional new diaphragm and set of valves on an air pump will work wonders; and on rare occasions it might be a good idea to renew the clear plastic airlines running from the pump to filters, etc. Some tubing becomes hard and rigid; most gradually build up a layer of dirt on the inside—like clogged water pipes or arteries—and restricts air flow. A new airstone for a tank or for a filter can be a good, cheap investment. As I said once before, also check outlet points from air pumps and check air filters in pumps. Use a hat pin, if necessary, to remove deposits of dust and soot—even if you have neither in your home or fish house. It can do no harm also to check the sets of air-control valves one tends to collect as more items are operated from one air pump. A tarry, viscous fluid can gather in these after prolonged use and can reduce air through-put. Power filters tend to slow down and clog up more quickly because of their efficiency—if that's not a paradox—so they need regular attention. Lift the outlet spray from the tank when the filter is working and you'll be able to judge whether or not the filter box needs opening and cleaning. A long-stemmed brush—Interpet sell one—for cleaning the water-carrying tubes on power filters, is a most useful and cheap investment. You can play the part of the sweep and keep your water tubes clear. A short, smaller brush is useful for air-operated filter tubes.

Mr. Phil Taylor writes from 181 Malpas Road, Brockley, London SE4 1BQ: "I have read your column for many years—I have been reading *The Aquarist* for 24 years, having bought my first copy at the age of 12—but have never written to you before now. As you asked for letters on the subject of coldwater catfishes, I decided to reply. I kept my first coldwater catfishes in a 14 in. x 8 in. tank, which now seems ridiculously small. I was eight years old at the time and my fascination with catfishes has lasted

until the present day. The only coldwater catfish sold by dealers in the fifties and sixties was the type known as the black bullhead—now given the scientific name *Ictalurus melas* I believe, but then called *Ameiurus nebulosa*. To my mind this is an excellent beginner's fish. It eats almost anything and is tolerant of dirty water and changes in temperature. Although the literature depicts it as a savage predator, I found it to be harmless to fish of its own size—although, undoubtedly it would eat fish small enough to be swallowed whole. In home aquaria it could be expected to reach 8-10 in. in length. Why I am writing is because there has been a change in the catfish commonly offered for sale—at least, in the south of England.

"Most of the catfish I see in dealers' tanks now are the channel catfish, *Ictalurus punctatus*, sold under the name of blue cats, and a kind of semi-albino variant of the same species sold as gold cats. The channel catfish is a food fish commonly found in the southern U.S.A., and requires different care from the bullhead. First, it is a river fish, needing clean water with high oxygen levels; and second, it grows to a much larger size. I saw one that won a well-deserved prize in the A.O.S. coldwater section of a local fish show last year. This magnificent specimen was of the albino type and must have been 18 in. long,

excluding the barbels. For this reason, I think that beginners seeking an amusing novelty for their first coldwater aquarium should avoid this fish. The common tench is a more suitable scavenger and requires conditions identical to those required by goldfish.

"Lastly, may I be impertinent enough to ask if the Manchester United and Northern Ireland footballer, Norman Whiteside, is a relative of yours?"

No, Mr. Taylor, star footballer Norman Whiteside is not a relative of mine—although your question is one I'm asked almost daily, by pupils, and almost as often by strangers who see my surname on cheques or credit cards. Interestingly, it's most often asked in Chinese restaurants: "You Norman Whiteside's brother; cousin; uncle, etc?" A new telephone directory was published in N. Ireland this week and a quick count has just disclosed 156 Whitesides—and I don't think I know a single one of the others listed.

For a future feature please send me your opinion on: (a) aquatic plants for ponds; (b) aquarium plants grown from bulbs; (c) silicon-chip controlled thermostats; (d) breeding small cichlids; and (e) koi—together with anything else you'd like to discuss. I look forward to receiving a letter from you—especially if you are a teenager or elderly reader. Good-bye until next time.



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# The Confederation of Aquarists

The membership of the Confederation of Aquarists (C of A) met once again during the British Aquarist Festival at Belle Vue, Manchester, for their sixth meeting since formation in November 1982.

The meetings have now become a regular occurrence at major festivals to further the fishkeeping and breeding hobby through friendly Nationwide communications, drawing on the expertise from within the A of A, FNAS, NEFAS, YAAS, SAA & FSAS and valued specialist support from SLAG, AAGB & CAGB. Future extensions to such meetings could take place at similar events like the one at Kempton Park organised by the Association of Aquarists (A of A).

Delegates from the various member Aquatic Organisations and Specialist Groups have actively been working on the basic aims of the C of A, namely the establishment of a Nationwide listing of Aquarium Norm Sizes for fishes.

The respective listing from each member Federation/Association, including valued information from Specialist Groups, are being co-ordinated, with the aid of a computer, into a comprehensive list of sizes. A list which on completion will reflect associated regional differences experienced.

As and when sections are finalised, 1985 seeing at least three sections, they will be passed to the member organisations as a guidance document of standardised fish sizes on a Nationwide scale. It is intended that the information be used as a guide, it is not the Confederation's policy to

dictate its adoption by members, only to provide a basic form of information of interest to Aquarists and Judges alike. Later may see similar lists for judges, societies, lecturers, programme aids, show classes, etc. to further 'free' exchange between members.

In January 1984 the Confederation became members of Aqua Terra International (ATI), a Federation of European National Federations of Aquaristic and Terraristic Societies set up to represent the interests of and promote said interests on an International scale. To further the 'free' exchange of information on this scale a delegate from the C of A attended the annual meeting of ATI in Austria between 7th to 13th June 1984.

The meeting has resulted in various requests for information, and to maintain the continuity the members are undertaking to supply relevant data on the hobby and its activities within Great Britain for future communication to ATI.

The Confederation of Aquarists will meet during the Scottish Aquarist Festival being held in Motherwell Civic Centre on the 18th/19th May 1985, when hopefully the meeting will see more Aquatic Organisations and Specialist Groups taking part in the activities.

Should any Organisation or Specialist Group wish to become members, or wish further information about the Confederation, please do not hesitate to contact the Joint Administrators:

Mr. and Mrs. W. Bennett  
15 Coulter Avenue  
Wilshaw, Lanarkshire  
ML2 8SZ

## THE LAW

### and WILD BOG PLANTS

In our April issue we published an article by Dr. Robert Goldstein entitled 'Wild Bog Plants' in which the author described his methods of collecting aquatic plants from the wild in the U.S.A.

We should emphasise the point that in the U.K. there are laws protecting certain wild aquatic plants and that indiscriminate culling of protected plants not only puts scarce species at risk but is a punishable offence.

## NEXT MONTH

### To Florida and back PART 2

#### SPOTLIGHT: The Clown Loach THE TECHNOLOGICAL AQUARIUM

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# Koi

saved from  
oil pollution

by John Heath

EVERY book on fishkeeping has a section on how to keep your pond free from disease, plague and every other sort of pestilence. I wonder how many of them, however, give any guidance on getting rid of oil from the surface of the water? "Not exactly a common occurrence!" you will say and, thankfully, you will be quite right. However, as I will now narrate, my wife and I were recently faced with that very problem.

It all started just before the last spell of cold weather. Rather unusually for me, I had taken the precaution of asking our oil supplier to top-up the central heating tank. The oil was delivered early one morning via the inlet situated at the front of the house and we thought no more about it. However, my wife had occasion to go out of the backdoor around midday and suddenly realised that all was not well. A strong smell of oil pervaded the patio and, as she sniffed, her eyes alighted on the fishpond. To her horror, she saw that the surface was covered with a thick film of oil!

Having quickly responded to my wife's SOS to the office, we both stared at the pond wondering how on earth the oil could have got there. The oil tank is buried underneath the patio, which has the fishpond on one side of it. There seemed no possible connection between the tank and the pond. Then it dawned on us that the oil must have come up the 10 ft. tall vertical overflow pipe in the

corner of the patio and then splashed across the paving stones into the pond (see summer photograph with pipe to author's left).

The same fear had struck both our minds as soon as we saw the oil—the safety of our fish. The pond is stocked with eight of those kings among pet fish—the exotically coloured Japanese carp called 'koi'. The biggest of ours is well over a foot long and worth at least £50. These delightful fish have given us immense pleasure over the past two years and are so tame that in the summer

they literally eat out of our hands. I had visions of our gorgeous koi gulping some deadly oil and floating lifeless on the surface of the pond, as often happens in the open sea after an oil tanker disaster.

Having discovered how the oil got there, the next problem was how to get rid of it. Our first inclination was to remove the koi from the pond with the net, but this seemed likely to ensure that they became thoroughly impregnated with oil. Of one fact we were certain, being a very light oil (specific gravity less than one) it would float on the surface of the water. So, if we could remove the oil from there, we stood a good chance of saving the fish. It crossed my mind that being highly inflammable, we could perhaps burn it off? That thought seemed to be fraught with even more danger to the fish. Pouring in hair shampoo or washing-up liquid appeared to be equally out of the question.





Surely, I thought to myself, we ought to be able to utilise the pump which drives the fountain and waterfall? By reversing the flow, as we do when we drain the pond for cleaning in the summer, it should be possible to pump off the surface layer alone. Sadly, however, it proved to be physically impossible to hold the pump in a position to achieve this. The only answer left seemed to be to do it the hard way—by skimming the oil off the surface by hand. We therefore armed ourselves with large, flat meat dishes and buckets, and started to skim. What a job it turned out to be! As fast as we skimmed an area clear, the film of oil simply drifted back to cover it. Draining the sea with a thimble probably evokes similar murderous feelings of frustration!

On discovering the spillage, we had telephoned the oil company for help. Two men duly arrived at this point—a salesman and a cleaner. The former suggested that all we

needed to do was to pump more water into the pond, so that it overflowed at the lowest point carrying the oil away with it. We tried this, but, unfortunately, as soon as the level reached the top of the rubber membrane, the water disappeared but the oil didn't! The second oilman produced some large absorbent pillows, which he floated around on the surface of the pond. These appeared to pick up some of the oil, but then quickly became saturated.

By this stage, the light was beginning to fade and we were all agreed that, although skimming by hand was by far the hardest work, it was also the most effective method. So, we all set to with a will and skimmed on into the gathering gloom. Gradually, the temperature dropped and it crossed our minds that nature might after all intervene with an easy way out. If the surface froze, we could perhaps remove both ice and oil together the following morning. With this ray of hope in mind, we thankfully downed

tools and rested our aching backs for the night.

Daybreak the next morning found us peering anxiously into the pond. To our delight, we could just see, through a  $\frac{1}{2}$  in. layer of ice, our beloved koi moving about at the bottom of the pond. We immediately set to with shovels to break the ice gently and then to remove it piece by piece. By dint of further skimming and another de-icing job the following morning, we finally got to the point where there was barely a vestige of oil left. We had won at last!

I am very happy to report that all our koi appear to be none the worse for their oily experience. It had taken us the best part of 36 hours to avert the possible catastrophe, but it had all been worth it to save our family pets. Who would have thought such a hazard could occur? When you think about it, I suppose it could happen to anyone with oil on the premises, whether from an oil tank or even a petrol driven lawnmower!



#### Big Piranha

We have a Red Piranha which is approx. 11 inches in length, six inches in height and three to four inches in width. It is six years old and is quite healthy.

If anyone has a larger Red Piranha I would be very interested to know.

J. HOLTON (Mrs.)

26 Palmer Place,  
Abingdon,  
Oxon OX14 5LZ.

#### Sri Lankan Aquarium Society

For the first time in this country we have formed a Society called the Amateur Aquarium Society of Sri Lanka. The president is a well known authority on fish and allied subjects viz. Mr. Rodney Jonklaas. I have been elected its Hon. Secretary and the official address is my own home address.

We welcome members from any part of the world and our annual subscription is Rs 300/- in our currency or its equivalent. Meetings are held on the last Sunday of each month and overseas members are encouraged to correspond with Sri Lankans for the exchange of ideas and aquarists material. Pen friends are welcome and if I am contacted I shall be pleased to help.

M. G. M. PERERA.

No. 78/1 Pagoda Road,  
Nugegoda,  
Sri Lanka.

#### Discover the Fish!

By PISCES

The First is in FILTER but not in SIEVE

The Second is in DELIVER also in GIVE

The Third is in WATER but not in POOL

The Fourth is in MEASURE also in RULE

The Fifth is in MENU but not in FARE

The Sixth is in HORSE but not in MARE

The Seventh is in MOLLUSC but not in SNAIL

The Eighth is in PARTRIDGE but not in QUAIL

The Ninth is in LIGHT but not in PALE

ANSWER: FIREWORM

# LANGUAGE OF FISHES

By John A. Dawes

## SETTING THE SCENE

There are over 20,000 extant (living) species of fish in the world. This makes fish the most numerous major group of vertebrates in existence at the present time.

The range of habitats occupied by this huge number of species is equally impressive. For example, fish may be found in the deep, cold, dark and virtually featureless expanses of the ocean abysses and trenches, in the equally featureless but warmer and partly lit midwater reaches, in hot, shallow thermal pools, among icefloes, in fluctuating habitats (such as tidal pools and seasonal puddles and ditches), in mountain torrents, in subterranean streams and lakes and every other conceivable but habitable aquatic ecological niche in between.

Logic dictates that this amazing flexibility will be reflected in a range of biological adaptations. For a start, the nature of the water itself will have a direct bearing on one or more features, be they anatomical or physiological, of a fish's biology.

Take, for instance, saltwater with its high specific gravity, i.e. mostly around 1.021, but approximately 1.025 in the Caribbean and as high as 1.035 in the Red Sea. This property (caused by the relative amounts of dissolved salts) poses a series of problems which, unless solved in one way or another, will result in death. Although it may sound improbable, fish can actually dehydrate in seawater. The reason is, simply, that seawater represents a more concentrated solution than that which exists in the internal body tissues. A direct result of this is that water will move, by a process known as osmosis, from the more 'dilute' tissues into the more concentrated external environment.

Fortunately, marine fish can balance this movement in a number of ways, particularly by drinking incessantly, thus replacing the water lost. Freshwater fish cannot do this,

while a few species, such as eels and salmon, can adapt both to sea and freshwater conditions.

If time and space allow, I will return to this topic at a later stage in the series. The point I want to make here is that the diversity of environments in which fish are found exerts certain pressures on the potential occupiers of these environments. Those individuals (and species) which are best suited to the existing conditions, obviously, stand a much better chance of surviving than poorly suited or adaptable ones. The collective term for these 'pressures' is Natural Selection.

When Natural Selection acts on succeeding generations of organisms, detectable, heritable changes become apparent and the species is said to evolve. If these changes continue for long enough and become sufficiently great, the resulting organisms may end up being so different to their original ancestors as to constitute a new species.

Much has been written on this subject over the years, particularly since the publication of Charles Darwin's classic book, *The Origin of Species by Means of Natural Selection or the Preservation of Favoured Races in the Struggle for Life* in 1859.

It is not my intention to add to the massive body of evolutionary material that exists. I raise the issue merely to emphasise that if we consider the diversity of aquatic environments that exist (along with the environmental pressures they exert) it is only to be expected that this will be mirrored in an equally wide range of forms, sizes, colours and behaviours among the 20,000 or so species of fish that live and reproduce in these environments.

It is this, perhaps more than anything else, that makes the study of fish (ichthyology) such a fascinating subject. In fact, it is far more than just a subject—it is a way of life.



Fish come in a bewildering array of forms, colours and sizes, as illustrated by this Sea Horse, *Hippocampus*



histris, and Blacktipped Reef Shark, *Carcharinus melanopterus*



If a fish is to survive and reproduce, it has to be fully equipped to carry out the complete range of activities which characterise all living things. These activities or processes are all inter-related, often in complex ways, and represent differing solutions to the same basic biological problem of ensuring the continuation of the species through succeeding generations.

In order to do this, fish have to breathe, eat (and avoid being eaten), be aware of their surroundings, move, and be able to eliminate their toxic waste products. It is only if these 'problems' are overcome successfully that an individual can grow to maturity and acquire the potential to reproduce.

All along the way, there are clues or signs that reveal significant details about the manner in which a particular species solves its problems. These clues are there to be read by the inquisitive aquarist. It is amazing how much can be learned through simple, diligent observation and how quickly one can begin to master the skill of reading the signs.

Colour, shape, behaviour and a host of other factors all reveal fundamental information which, if interpreted correctly, will not only increase one's level of enjoyment but will also enhance one's chances of success in keeping fish.

The fact is that fish communicate with members of their own sex, with those of the opposite sex, with members of other species and, sometimes, with organisms other than fish. They do this in numerous ways, including (as stated above) colour, shape and behaviour. Sounds, chemicals, light, electricity and other forms of communication are also regularly used.

The whole assemblage of methods employed can be regarded as constituting a real language—the *Language of Fishes*—which this series will be exploring in the coming months.

In our own species, the organised sounds by which we communicate with each other constitute verbal language, while our movements, postures, spontaneous sounds and subtle changes in pigmentation constitute non-verbal languages, often collectively referred to as body language. It would be inconceivable for a human being to survive successfully without understanding human language in its various forms. Similarly, fish can only survive by understanding fish language.

Taking the argument one stage further, we can only survive successfully as aquarists on a long-term basis by learning to interpret the language of fishes.

Some 'bits' of language are so easy as to be almost self-evident. For example, there is no mistaking the message emitted by the sharp, cutting/tearing teeth of fish such as sharks, barracuda, piranha and other predators. Other aspects of fish language are a little more subtle. For example, what do the intense breeding colours of Gouramis, such as the Dwarf (*Cofia lalia*) or the Thick-lipped Gourami (*C. labiosa*) mean? Are they supposed to attract females or to repel rival males?

In some mouthbrooding cichlids, e.g. *Aulonocara nyassae*, the Peacock Cichlid, males are very colourful and carry egg-spots on the anal fin while the females are drab and do not have egg-spots. How can this bit of fish language be interpreted?



There is no mistaking the message carried by the Black Scabbard Fish in its teeth

In other mouthbrooders, e.g. *Melanochromis auratus*, the Golden Nyasa Cichlid, the females are quite colourful. Is there any significance in this?

Some fish are loners while others are shoalers. What signs do shoalers use to communicate this information to members of their own species? In certain species, the shoaling instinct is very well developed during the first few days/weeks of life but is lost as the fish mature. Can this be 'read' from the body language of fry and adults respectively?

Some fry are born weighing as much as, or less than, the fertilized egg from which they developed while others show significant weight increases during the embryonic stages. What does this say about the reproductive strategies of such species?

The males of certain species have a highly modified anal fin (known by a variety of names, such as the gonopodium or andropodium) while the females have 'normal' fins. What is the language of reproduction carried by these structures?

Internally, various parts may be modified extensively. These too speak their own language—an 'internal' language of fishes. Suitable examples of this internal language are the sophisticated labyrinth organs found in Anabantoids, the trophotaeniae developed by Goodeid embryos and the trophonemata produced by gravid *Jenynsia lineata* females through which they nourish their embryos.

Wherever we look, there are examples of fish language, each with its own, sometimes unique, messages. Many have been investigated extensively through the years while others still await either convincing interpretation or, even, comprehensive investigation.

In the *Language of Fishes*, I will be investigating selected examples from these categories in the belief that it is only through asking questions and attempting to answer them that real progress can be made.

Many of the questions (the majority?) are posed by the fish themselves. As long as we are aware of this and are constantly on the lookout for these questions and their possible explanations, we stand a good chance of successfully coming to terms with the complex but fascinating language of fishes. I sincerely hope that these articles contribute in some way towards achieving this target.

# Meet the Societies



## DUDLEY & DISTRICT AQUARIST SOCIETY



The D.+D.A.S. logo



*Pterophyllum scalare*

Dudley & District Aquarist Society claims to be, "... one of the oldest Societies in the Midlands ... formed in 1937, exactly one year and one month before the formation of the F.B.A.S."

A second "oldest" claim concerns the Society's early meeting place, part of the cellar in the 400-year-old Dudley Castle. Further, how many Societies can claim having to vacate their meeting venue because of an outbreak of Foot and Mouth disease? Dudley can! (The Castle grounds have, for years, housed Dudley Zoo).

Dudley D.A.S. was formed to promote all aspects of the aquatic hobby. Like every other Society in the country, it has had its ups and downs. Happily, it is in a healthy state these days with activities to please all its members.

For example, there is a Junior Section (given every encouragement by the older established members) with its own competitions and trophies.

Meetings are organised twice a month. The first Friday of every month is dedicated to Table Shows while lectures and other activities are reserved for the third Friday. Many of the lectures are presented by the members themselves who have free choice concerning the subject. Proceedings get underway at 8.00 p.m. at the Allied Centre, Tower Street, Dudley, West Midlands.

Members are encouraged to travel to Open Shows elsewhere, something they regularly do with some success. Other attempts at maintaining links with Societies in the area involve plans to organise some form of inter-club discussion group.

The Society finds that one of its major difficulties is a lack of Judges for its Shows. In order to rectify this, the committee arranged a Judging Course in the latter part of 1984 with the full co-operation of the F.B.A.S. The course was open to any interested party and attracted candidates from Leicester, Corby, Wolverhampton and, of course, Dudley itself.

D.D.A.S. also runs its own Open Show. For details of this and other activities, contact Mr. J. Cloud (see below).

Subscription Rates: Single, £2.00; Joint, £3.00; Junior, 75p. Special rates for O.A.P.'s and Unemployed.

Apply to: Mr. J. Cloud, 9 Linley Grove, Himley View Estate, Dudley, West Midlands. Tel: (0384) 59334.

## BEXLEYHEATH & DISTRICT AQUARIST SOCIETY



The B.+D.A.S. logo



*Corydoras arcuatus*. Photo by Derek Lambourne

December 1985 will mark the tenth anniversary of Bexleyheath & District Aquarist Society, originally formed by ten founder members, one of whom is now the President.

At first, meetings were held in members' homes, but this soon became an impossibility as numbers grew. After several moves over the years, B.D.A.S. is now based at The Scout Hall, Warwick Road, Welling, Kent.

The present membership embraces an extremely wide range of hobbyists, from juniors just starting up to those who have enjoyed a great deal of success for many years. This diversity, of course, is one of the great strengths of any Society, preventing it from "going stale" and providing a never-ending series of opportunities.

In the case of B.D.A.S., a sufficiently high level of interest exists to warrant fortnightly meetings at The Scout Hall (every other Tuesday). These get-togethers start at 8.00 p.m. and, almost invariably, include a Table Show with three levels of award: Novice, Junior and Open.

An attractive Newsletter, bearing the Society's impressive *Corydoras arcuatus* logo, is produced every month by the Secretary. The contents often include articles from abroad which arise through contacts set up with Societies in Canada, Kenya, New Zealand, South Africa and U.S.A. One of the spin-offs of this international exchange is that B.D.A.S. is now affiliated to the Federation of American Aquarist Societies as well as our own U.K.-based F.B.A.S. and K.(Kent)A.A.S. International links were strengthened further in 1984 with a visit to Holland and, this year, to West Germany.

For the last six years, B.D.A.S. has held an Open Show, each of which has attracted entries from far and wide. As one external observer put it in the B.D.A.S. Newsletter: "... you got the magic recipe right again and produced the most successful Open Show this season".

Besides lectures, slide shows and discussions, trips are also organised for members and their families. If you are interested in finding out more about B.D.A.S., there is an open invitation to The Scout Hall on any meeting night.

Subscription Rates: Single, £10.00; Couples, £15.00; Juniors, £3.00.

Apply to: Mr. R. Blake (P.R.O.), 33 Ripon Road, Plumstead, London, SE18.





## From Aquarists' Societies

Monthly reports from Secretaries of aquarists societies for inclusion on this page should reach the Editor by 3rd of the month preceding the month of publication.

### Dates for the diary

A monthly information column to keep you up to date on forthcoming events.

**Associated Goldfish Societies U.K.**  
The above society in default. All enquiries concerning coldwater societies should be directed to the appropriate area society or to the Goldfish Society of Great Britain.

**CANCELLATION**  
Due to unforeseen circumstances the Long Eaton A.S. open show has been cancelled. Back in 1986! Any enquiries to: Mrs. E. E. Dunn. Tel: 0332 668844.

#### JUNE

**1st June: SWINDON A.S.** 3rd open show at Park South Community Centre, Swindon. Schedule from show secretary, Mr. K. Curtis, 12 The Civic, Fishers, Swindon. Tel: 32920.

**1st, 2nd June: MID-SUSSEX A.S.** Exhibition and open show (Sunday only). Sponsored by Interpet Ltd. To be held at "The Marlets", Civic Way, Burgess Hill, Sussex. Further details from J. Smith, 51 Bancroft Road, Brighton BN1 4DL. Tel: 0942 47912.

**2nd June: REDCAR FISHKEEPERS SOCIETY** open show at Redcar Racecourse. Details and schedules from S. J. Ives, 21 Hunt Park, Redcar, Cleveland TS10 1PQ. Tel: 0942 47912.

**6th June: LLANTWIT MAJOR A.S.** open show (to FBA's rules) at the School Hall, Han Lane, Llantwit Major. Details and schedules from Show Secretary, Mr. C. Turner, 146 Arrian Street, Ruzah, Cardiff. FBA's Championship Trophy Class K.

**8th June: EAST DULWICH A.S.** open show at Pansley Hall, Stoford Road, Walsworth S.E.17. Further details from the Show Secretary, 8 York Close, Fitzalan Road, Camberwell, London SE5 9BZ.

**8th June: CANNOCK & DISTRICT A.S.** open show at Avon Road Community Centre, Cannock, Staffs. Details and schedules from Mr. A. Pettis, 25 Oaks Drive, Cannock, Staffs. WS11 1EU.

**8th June: NEWTON AYLIFFE AND D.A.S.** second open show at Elmfield Community Centre, Rowan Place, Newton Aycliffe, County Durham. Further details from: E. Hargrave, 41 Shafto Way, Newton Aycliffe, Co. Durham DL5 3QN. Tel: 0325 316753.

**8th June: BRITISH KILLFISH ASSOCIATION** open show at Collingham Memorial Hall, Collingham Village, Nr. Leeds. Details from Mr. M. Tomkinson, 4 Simons Row, Middleton, Leeds LS10 4JZ. Tel: Leeds 779551.

**8th June: I.C.B. AQUARISTS** will be holding a bring and buy auction of fish and aquatic equipment at the I.C.B. Social Club, Roccar near Uttoxeter. Everyone will be welcome. Fish will be booked in from 10 a.m. Auction to begin at 11.30 a.m. approx. For further information phone Alan Rothwell on 0782-31741.

**11th June: YORK & D.A.S.** are holding a bring and buy at New York Club, Blossom Street, York. Auction to commence 8.0 pm. Any enquiries phone either 0904-411137 or 0754-62 3177.

**15th June: NORTH AVON A.S.** 6th open show at Hanham Folk Centre, High Street, Hanham, Bristol. Bunching from 9.30 till 11.45 a.m. Specialist judges engaged. All enquiries to the Secretary, E. Commons, 1 St. Anne's Close, Cadbury Heath, Wernley, Bristol BS15 5EJL. Tel: 0272 677994.

**15 June: S.P.A.S.S.** open show. Schedules and further information from Mr. E. Franklin. Tel: 01-879 2680.

**18th June: ACCRINGTON & DISTRICT A.S.** open show, Harvey Street Community Centre, Oswaldtwistle. Enquiries to S. Welch, 133 Lammack Road, Blackburn or C. Wallbank, 130 Burnley Road, Blackburn. Tel: 61765.

**18th June: LINGCOLN & DISTRICT A.S.** open show at Ancaster Day Centre, Boundary Street, off Newark Road, Lincoln.

**16th June: WORKINGTON & D.A.S.** open show at Carnegie Arts Centre, Finkle Street, Workington. Details from R. Hadfield 25 Queen Street, Workington, Cumbria CA14 2PX. Tel: Workington 61326.

**22nd June: THE BASKINGTOKE AND DISTRICT A.S.** open show will be held at the Carnival Hall, Basingstoke. For further details please contact the show secretary, Chris Ralph, 325 Abbey Road, Popley 4, Basingstoke, Hants RG24 9EJL, or telephone Basingstoke 02562 437733.

**23rd June: PORT TALBOT & DISTRICT A.S.** 15th annual open show at the "Four Winds Hotel", Aberystwyth, Porth Talbot, West Glam. Schedules from J. Egan, 53 Princes Arms, Baglan Moor, Port Talbot, West Glam., S. Wales SA12 7RN. (s.a.s. please).

**23rd June: SKELMERSDALE & D.A.S.** open show at West Skelmersdale Community Centre (range of venues). Schedules end of April. Further information from C. Martin, 10 The Winners, New Church Farm, Skelmersdale, Lancs WN9 8NG.

**23rd June: ARBROATH A.S.** annual open show at the Community Centre, Marketgate, Arbroath. Details from John E. Stevens, 95 Berchin Road, Arbroath. Tel: 0241 76695.

**29th June: NAHSEA & DISTRICT A.S.** 12th open show to be held at Scotch Horn Centre, Nahsea, Near Bristol. Details available from Mrs. S. J. Kenwood, 11 Queen's Road, Clevedon, Avon BS21 7TH.

**30th June: ROMFORD & BECONTREE A.S.** open show to be held at the Parkside Community Centre, Goodwiners Lane, Goodwiners, Essex. Schedules from Mr. B. Brown, 12 Tiptree Crescent, Clayhall Avenue, Ilford, Essex IG5 0SZ.

**30th June: ST. HELENS A.S.** open show at Rainhill Village Hall, Rainhill (off M62 - Merseyside). Further details from Mrs. H. Stradman, 10 Ribble Avenue, Rainhill, Merseyside L35 8NT. Tel: 051 426 4213.

#### JULY

**6th July: SELECTIVE A.S.** open show at Cefn Coed Community Centre, Cefn Coed, Merthyr Tydfil, South Wales. Further information from G. V. Blackburn, 3 Palm Road, Gurnos Estate, Merthyr Tydfil, Mid-Glamorgan, South Wales CF47 9HT.

**7th July: SCARBOROUGH & DISTRICT A.S.** open show at Fearage School, Longwategate, Scarborough. Further details from Mrs. J. Jones, 79 Pasture Lane, Seamer, Scarborough.

**14th July: DUDLEY & D.A.S.** open show at George Saltor High School, Claypit Lane, West Bromwich. Further details from R. Hampton, 61 Wood Road, Lower Gornal, Dudley, West Midlands.

**14th July: READING & DISTRICT A.S.** open show at Southcott TCC, Cranston Square, Southcott, Reading. Further details from Mr. M. W. Lamb, 12 Fern Drive Tisbury, Reading RG3 5EU.

**21st July: SANDGROUNDERS A.S.** open show at Meads Cop School, Meads Cop Road, Southport. Schedules from Mr. B. Baldwin, 10 Olive Grove, Southport, Merseyside. Please send s.a.s. or telephone 0704 43384.

**28th July: ASHBY FISHKEEPING SOCIETY** open show at George Farm Hobsons Centre, Scunthorpe. Booking in time 12.30 p.m.

#### AUGUST

**4th August: DORCHESTER A.S.** 5th open show at the Roy's Brigade Hall, Weymouth Avenue, Dorchester, Dorset. Annual trophies for each of the thirty-three classes. Highest Pointed Visiting Society and many more. Schedules available from Mr. B. Symes, Show Secretary, 3 Arnhem Green, Dorchester, Dorset DT1 2PS, or phone Dorchester 62815.

**4th August: BLACKPOOL AND FYLDE A.S.** open show at St John Vianney School, Glastonbury Avenue, Blackpool. Sponsored by Amnidge Nimrod Products. Also an auction. Further information from Mr. C. MacDonald, 109 Kensington Road, Southport, Merseyside. Tel: Southport 41792.

**4th August: GRIMSBY & CLEETHORPES** 18th annual open show to be held at T.A. Centre, Westward Ho, off Bargaat, Grimsby.

**5th & 11th August: YORKSHIRE AQUARIST FESTIVAL** Doncaster Racecourse. Details and Schedules from Mr. N. Ballin, 11 Shearwater Drive, Pocklington, Yorkshire YO4 2ED. Tel: 07562 3177.

**18th August: BRITISH KOI KEEPERS SOCIETY** (Essex section) present their 10th national show at Langtons Gardens, Biller Lane, Horechurch, Essex. Further details from Mrs. M. J. Bishop, 5 Green Lane, Eastwood, Leigh-on-Sea, Essex SS9 3AP. Tel: 0702 522388.

#### SEPTEMBER

**8th September: DARLINGTON A.S.** 3rd open show, Eastbourne Comprehensive School, Darlington. Further details K. Rodway, Darlington 487541.

**15th September: NORTHAMPTON AND DISTRICT A.S.** open show at the Gladstone Road Centre, Gladstone Road, Northampton. Further details from Chris Swan, 13 Weymouth Court, Northampton NN3 4LN. Tel: Northampton 0604 603058.

**21st September: BRISTOL A.S.** Coldwater fish show, St. Andrew Church Hall, Storrord Road, Wintchill, Bristol. Open 1.00-5.30 pm. Schedules and further details from Show Sec. Ian Milden, 87 St. John's Lane, Bristol BS3 5AB. (0272-712393).

**21st September: PLYMOUTH & D.A.S.** open show at Trinity United Reform Church, Ter Lane, Harty, Plymouth. Show Sec. Mr. W. Ruddle, 47 Farringdon Road, St. Ives, Plymouth.

**21st September: HOUNSLOW AND DISTRICT A.S.** open show at Hounslow Youth Centre, Kingsley Road, Hounslow, Middlesex. Further information, Pete Furse, 11, Upon Road, Hounslow, Middx. Tel: 01-870 0934.

**26th September: EAST LONDON AQUARISTS AND PONDKEEPERS ASSOCIATION** open show at Catterall Hill, Cecil Road, Chadwell Heath, Romford, Essex. For further information on the Club and this show, please ring Hazel and Martin Howells on 01-590 1824.

**29th September: WOLVERHAMPTON A.S.** open show to be held at Pendeford High School, Marsh Lane, Fordhouses, Wolverhampton. Our Show Sec. is Barry Jones, Highworth Close, Preens, Wolverhampton. Tel: 0902 730144.

**29th September: DARWEN A.S.** open show at the Darwen Library Theatre. Details from D. T. Mieser, 22 Green Street East, Darwen, Lancs. BB3 3HY.