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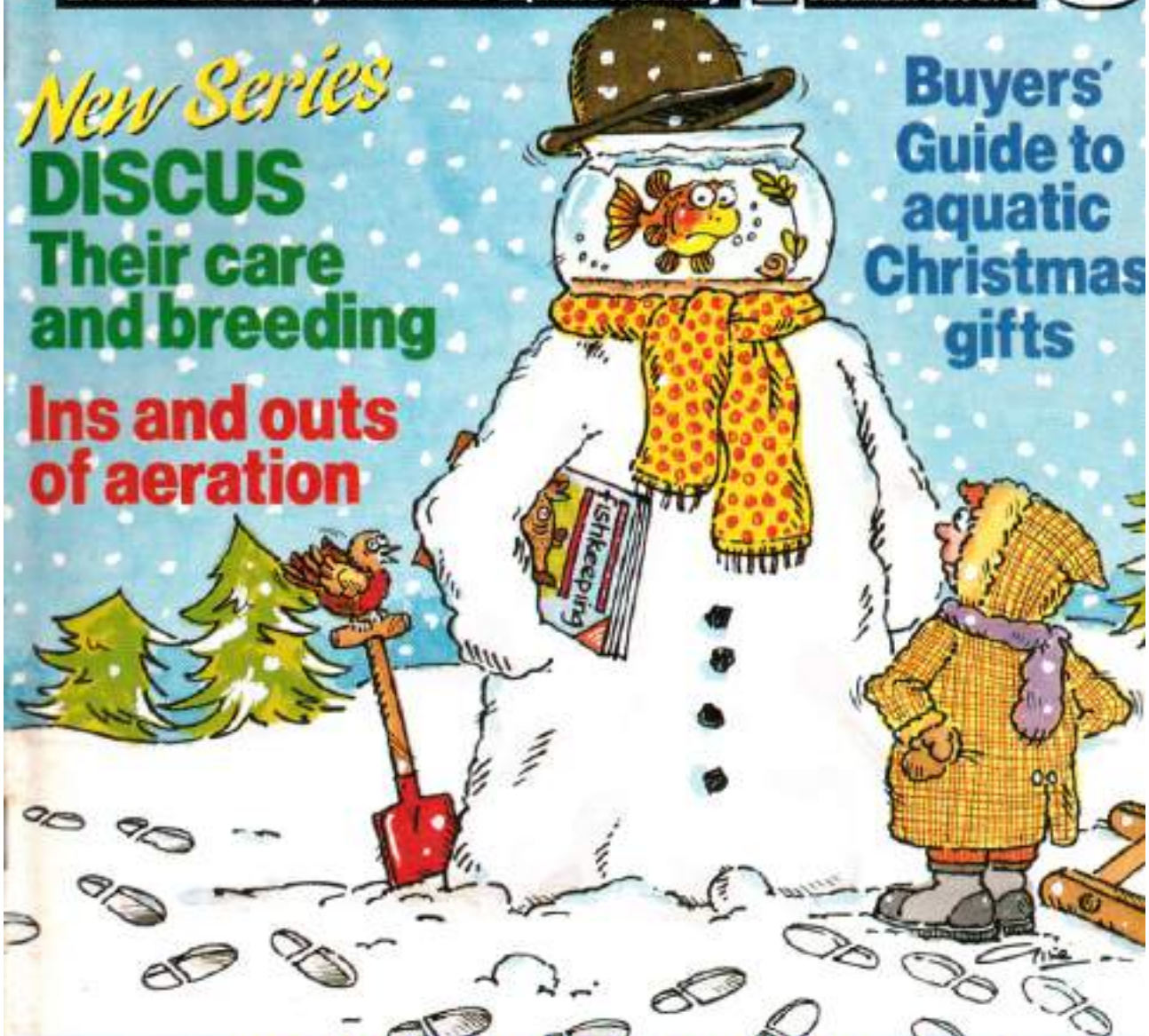
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THE ED SAYS...

Eight years ago, when I first began to keep fish, I remember keenly the excitement of going into aquatic shops and asking "What's new?"

And inevitably there would be something to delight the eye, defy all efforts at identification or strain the wallet.

Mind you, I was spoilt for choice. One shop specialised in cichlids and catfish. Another, miles out in Finland, was run by two fanatical hobbyists who somehow managed to combine aquatics with an upholstery business. Still another was a semi-professional outfit, but the way that guy could persuade *Ancistrus* to spawn was unbelievable.

Now, I feel, the pioneering spirit is being lost. Aquatic shops are becoming larger, more spacious. The 'Open All Hours' type of business is being pushed aside by the supermarket mentality that says the sale of one external power filter makes better economic sense than chasing Neons round a stock tank.

The money is not in fish any longer (unless they're Koi) so why bother to give much choice? A standard Singapore shipment will satisfy ninety per cent of the punters, and the other ten per cent? They're the loony club members, all mouth and little money to spend.

Of course, there are exceptions, but they are getting harder to find. 'Bread and Butter' (to use a phrase beloved of slick aquatic entrepreneurs) is the diet of the day.

We have been conditioned into believing that only the bigger aquatic shops are any good. They may be more viable, but to expect all the staff to know much about the fish they sell is perhaps like expecting a burger bar chef to know what goes into the bun.

Next time your request for any species a little out of the ordinary is met with a blank look, go and find another shop that knows its stuff. More important, don't just buy your fish there. Buy the tank and the power filter too. That way, he will stay in business and you will keep the fish you want... Merry Christmas! — Nick Fletcher, editor.

PRACTICAL FISHKEEPING

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INFORMATION

- 12** You ask, experts answer — our Aquatic Queries service is second to none.
- 30** Marine diseases, prevention and cure — with Jerzy Gawor.
- 38** Ever-resourceful, our readers win more FREE subscriptions with their own ideas to improve the hobby.
- 56** 'On File' includes a spotlight on a top retailer and a focus on a range of portable pools.
- 70** What to get the fishkeeper for Christmas... our Buyers' Guide gives some topical suggestions.
- 76** Results of the British Aquarist Festival head up our Newsround pages.

TROPICALS

- 6** Why aerate? Dr. David Ford, of Aquarian Laboratories, tells you.
- 26** NEW series by Max Pickering takes the mystery out of keeping and breeding Discus.
- 40** Part two of Clive Goodwin's controversial plant series will help YOU gain aquatic green fingers.
- 46** Dave Sands' Christmas 'Side by Side' includes the ultimate in status symbols for cichlid freaks.
- 60** Meet a couple of real fishkeeping fanatics, whose flat is crammed with surprises.
- 62** Supergrass — Barry James looks at Vallis, an aquarium plant with many uses.

MARINES

- 20** Ever-controversial Dave Keeley unveils plans for his 'Manne Wally of the Month' and talks about the import time-bomb.
- 34** Leo Holliday's colour spotlight is on Tangas and Surgeonfish.
- 66** Meet a Scottish aquarist with a head full of ideas and a garage full of native marine tanks.

GOLDWATER

- 22** Why won't Grandad be with us for Christmas? Greg Jackson's 'Just Koi' column reveals the awful truth.
- 44** Fish of the Rising Sun. Our colour centres go to a show with a difference.

PLUS ...

- 28** Talkback — the liveliest letters page for thinking fishkeepers.
- 50** Dealer Spotlight goes to the Land of Song.
- 52** Editor Nick Fletcher writes a Christmas ghost story for Young Fishkeepers (and possibly their parents, too).

Make a resolution to join the growing list of PRACTICAL FISHKEEPING subscribers. January's issue is special, so don't risk disappointment — fill in the coupon on page 77, now!

Printed by Worcestershire Web Offset Ltd, Droitwich, Worcestershire.

COVER PICTURE: Resident cartoonist Clive Francis (Fran) and his creation Floyd wish all readers a Merry Christmas and a Peaceful New Year. See you all in 1987!

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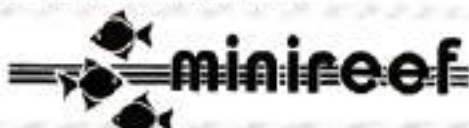
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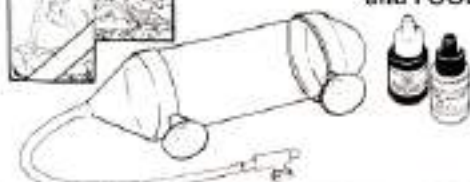
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An old fishkeeper like me can recall when aeration was considered essential in the home aquarium. With no power or undergravel filters, the aquariums of old were static blocks of water and a stream of bubbles was necessary to stir things up.

Airpumps were big, noisy and expensive, so enterprising aquarists made their own. We would use an old lorry tyre pumped full of air. A length of fine rubber tubing was glued into the tyre with rubber solution and the outlet allowed to bubble away in the aquarium. It lasted a week before the tyre needed pumping up again.

It was assumed that oxygen was being dissolved from the stream of bubbles and this was being used by the fish to breathe in such a small body of water. Eventually someone decided to measure how much oxygen actually dissolved, and so design the best aerator. Samples of water were taken at the bottom of the tank by the aerator stone, halfway up the stream of bubbles and at the surface, for fine mists and even larger bubble sizes. To everyone's surprise, the oxygen levels were exactly the same, except for a higher value at the surface — but anywhere along the surface. This meant that the bubbles were not dissolving! The long cherished belief that aeration was supplying the fishes' essential need for oxygen was just not true.

What was actually happening was that the bubbling flow was setting up water movement, dragging oxygenated surface water down to the bottom of the tank and, even more important, bringing water containing carbon dioxide to the surface, allowing that gas to escape. It is the water movement that is the important factor in aeration, rather than the bubbles themselves. Hence the modern power filter with its water jets is even more efficient than a simple aerator. So the poor old airpump is not really needed any more... except as decoration.

A stream of bubbles somehow brings an aquarium to life. Therefore, only a small pump is required, less noisy and easier on the pocket.

What about air-powered undergravel filtration, you may ask. Again, power filtration has taken over. There are many models of mains-operated pumps that fit on the top of the uplift and make undergravel filters far more efficient than any air uplift could do. What of bubble-up box filters? Now there are internal power filters

Why

Dr. David Ford, of Aquarian Laboratories, explodes a widely-held notion that aeration is necessary for fish well-being.

ae



• DR DAVID FORD

that take up no more room in the tank, but are ten times more effective.

Air for Decoration

So, let us relegate the air pump to the role of decoration, rather than maintenance. Most pumps work by vibrating a rubber diaphragm at the 50 cycles of the U.K. mains electricity supply. This means every bubble is also vibrating at 50 cycles per second, and when each bubble bursts at the surface it releases sound into the room at that level, one we hear as an annoying hum.

Hence choosing a tiny pump, or hanging it by a thread, or mounting it in another room — in fact all the ingenious methods that hobbyists use to suppress the airpump noise — don't really work. The bubbles are more noisy than the modern pump!

The solution to this problem is to use a good aerator stone or wooden diffuser to give a fine mist of bubbles. Each oscillating bubble will then lose its energy before reaching the water surface. A large bubble rises more rapidly, and the air within is still full of sound energy when it hits the

atmosphere.

How can we make the air flow more attractive, as well as silent? Use a longer aerator stone to give a curtain of bubbles at the rear of the tank. In fact, there is porous plastic tubing available that can give sheets or circles of air. One tip — never submerge this porous tubing without the air flowing first, or water gets into the pores and it won't come out again.

Another attractive idea is to fit coloured spotlights with a beam shining on to the airstream. Each bubble picks up a flash of coloured light. One side of the tank could be red and the other green, with two aerator stones. You will not get problems with algae growing, because it cannot photosynthesise under coloured light. Obviously you have to use plastic plants too — but in large aquaria it is possible to fix a central white beam to shine on a clamp of real plants or a coral head.

Toxicity

In those far-off days of putty tanks and tyre aerators, every household had a coal fire, a chimney, and therefore a

draught. Draughts mean fresh air. Nowadays it is central heating, and draughts mean loss of expensive warmth. Therefore we seal every nook and cranny and the average living room becomes a pool of warm, still air.

Smokers leave layers of carbon monoxide, carbon dioxide, sulphur dioxide, nicotine and assorted tars hanging in that air. In the old days that pollution went up the chimney — now it heads for the inlet of the air pump. Overnight, the chemicals we leave behind are bubbled through the aquarium where all the water-solubles are dissolved out. Only a few parts per million, of course, but it happens every night and slowly the toxins build in the water until the fish mysteriously die.

Pipe smokers are the worst offenders, cigarettes next, especially after a party. But even if no one smokes in the household, there are still aerosol sprays, air fresheners, painting and decorating, or even just stale air from humans gathered around the TV all evening. (Note that the carbon dioxide we exhale is 25 times more soluble than the oxygen the fish need. All these toxins are bubbled through the fishes' water to concentrate and poison.

Not using an airpump is not the answer to this problem. The power filter still aerates by dragging the water surface layers down, and the pollution will be over that water surface. The answer is to site the pump in another room, halfway, loft or even outdoors. With a specific inlet port, a length of tubing can be run to the outside air or poke under the floor boards —



Whether piston driven, diaphragm-operated, single, twin or multi-outlet, airpumps will be with us for a long time — even though their original primary function, that of aeration, is open to question.

rate?

A pair of internal filters, sited to give maximum surface turbulence as the streams of water meet. This aerates far more effectively than a traditional airpump.

whatever system suits your particular home.

This flushing with fresh air is particularly important with marines.

The Marine Aquarium

The maximum oxygen that water at 24°C(75°F) can dissolve is about eight milligrams per litre for a freshwater tank, but this falls to seven in a brackish tank and six in a seawater tank. Marinists recognise this problem by stocking fewer coral fish than they would tropical fish. However, those few fish may well be large, above Angels or big Puffers, whose total biomass equals a shoal of freshwater community fish! Therefore it is essential to maximise the aeration of seawater aquaria. Certainly use power filtration, but include an airpump too and really blow those bubbles. A good airstone will give a fine mist in seawater, much finer, and so quieter, than in freshwater.

When preparing a salt solution for setting-up or partial water changing, the result can be dissolved by vigorous aeration of the container.

Other Uses for Aeration

An airpump is a useful tool for any hobbyist. Coupled to a proprietary vacuum device, it can make an effective gravel cleaner. The bubble-up box filter can be operated by the airpump and these cheap filters are useful standbys for the quarantine or treatment tank.

If the main tank has been



dosed with chemicals for White Spot or Gill Fluke, the residual compounds can be removed by adding the bubble-up filter filled with activated carbon. A small airflow is effective in cleansing eggs laid by Angelfish and similar spawners.

The fry, too, will benefit by fitting an air-operated foam filter: the surface of the foam will soon be covered with infusoria for the babies to eat, without the danger of drawing the fry into a box or power filter's container.

There is just one problem with the use of an airpump: the fine tubing is ideal for siphoning. It takes a minute amount of water in that tubing

to start a siphon. It can happen when switching the pump off — in which case the water pours into the pump and ruins it — or if you disconnect the airpump and leave the airline dangling. It takes just three hours to completely empty a 20 gallon tank on to the living room floor (I know it). So always fit an anti-siphon device, they cost only pennies.

Always have a spare diaphragm to hand (some models include a spare as standard) because it is always the diaphragm that fails with time. It prolongs the life of these vibratory pumps to run them flat out, i.e. no back pressure to distort the

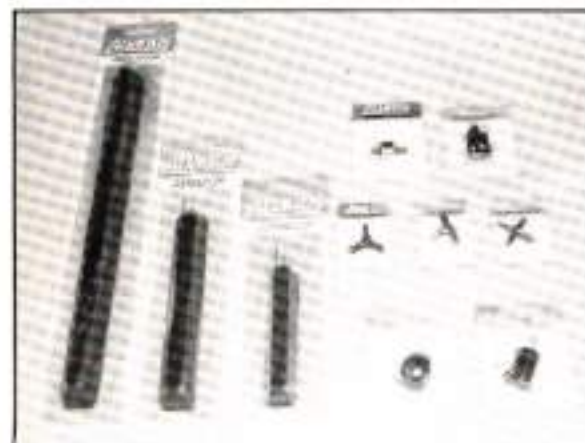


An airpump delivering identical volumes of air will give a much finer stream of bubbles in the dense water of a marine aquarium (top) than in fresh water. It's quieter, too!

diaphragm.

You do this by adding a T or Y piece and a clamp on a short section of airline. This can be opened or closed to give just the right level of bubbles in the tank with the 'bleed' releasing sufficient air to prevent back pressure.

Why aerate? Because it's pretty... it can be useful, but it isn't essential. ■



Long airstones (left) give attractive streams of mist-like bubbles. Atlantis make a full range of back-up gadgets such as gang-valves, T-pieces, one-way valves and three-way connectors.



The humble bubble-up box filter teamed with a modest airpump has many applications, especially in breeding and quarantine tanks.



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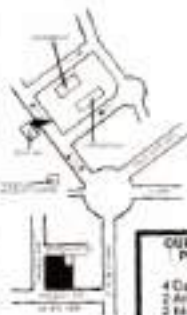
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CATFISH CATFISH CATFISH CAT

Fly the flag

Do you know of any aquarium spawnings of *Corydoras robiniae*, and if so, under what conditions the spawnings occurred?

Can you suggest any ideas of your own which might induce spawnings? — Norman L. Waks, New South Wales, Australia.

I have heard nothing about anyone spawning *Corydoras robiniae* but since the first imports into Europe about 18 months ago I suppose a few Catfish enthusiasts may have cracked the secret of breeding the Flagtail *Corydoras*.

I do not know all the habitat details, but I was led to believe that this species came from a white-water tributary of the Rio



The Flagtail *Corydoras* (*C. robiniae*) has a tail region reminiscent of that other Catfishid, *Danonea uracantha*.

Negro.

I have kept this species and noticed that it was unusually quick in the water — perhaps something to do with its torpedo-shaped body. It prefers a subdued-lit aquarium and seems to thrive on a fine shrimp-based diet.

Just keep a few together and grow them up to size (about 75mm) in a quiet aquarium. D.S.

Syno sense

I have recently set up a tank 22" x 22" x 22" which houses two *Synodontis nigricans* and one *S. schoutedeni* and would like to add another *nigricans* and one Black Ghost, *Steindachneria bifasciata*.

Lighting is via a Grolux and the tank is filtered through a deep terraced gravel bed by two powerheads serving an undergravel filter. Decor includes plants, bogwood and cork which forms caves. They are being fed on live Tubifex, TabMin and lettuce. How do we sex them? Are there any plants particularly suited to rather dull lighting? — Mr. & Mrs. Worby, Wallington, Surrey.

The only obvious items missing from the diet you are offering the *Synodontis* is frozen gamma and brine shrimp. I believe that crustaceans are an important part of the diet for all catfishes.

You would not breed *Synodontis* with the Ghost Knife Fish in the aquarium, because this South American fish would disturb other occupants with its 'electrical activity' at the dead of night.

Plants in a dimly lit aquarium are a problem. I recognise this and discussed it in my new book 'African and Asian Catfishes'. One way would be to take an easy to grow plant like *Elodea*, grow it in a window tank and keep placing it into the tank. When it gets weary, put it back in the window! Perhaps you could alternate a couple of bunches. D.S.

Whisker clues

I have acquired a catfish which I believe to be a member of the family Pimelodidae. The fish has identical shape and features to *Pimelodus clavatus*.

Regarding colour, the fish is bronze with three pale stripes which are not very noticeable. It is 11 inches long. Any way you can identify this with the limited information I have given? — P. Angus, Glasgow.

The first thing you must do is check on the number of barbels your catfish sends out when it's looking for food! If it has three pairs, then it is undoubtedly from the South American catfish family Pimelodidae ... If it has four pairs then it will be from the Asian catfish family Bagridae, most likely a member of the genus *Mystus*. The extra set of barbels in the latter are distinctively placed on the upper tip of the snout and are given the name 'nasal barbels'.

Not so swell, this disorder

Three months ago I was given a complete aquarium containing various community fish. My problem concerns what appears to be a *Synodontis*.

It is dark olive brown with a mid grey underside and at the moment is about six inches long. Can you identify it, and how big will it grow?

Part of its belly seems to have swelled up — do you know why? — L. A. Mason, Hayes, Middlesex.

It is difficult to identify your *Synodontis* but at a guess I would say it could be *Synodontis nigrita*, a Nigerian catfish adult at about seven inches.

The swelling you describe is usually caused by an internal blockage or a bacterial infection caused by poor water quality. Now the aquarium is settling down and you are offering a better diet, the catfish should improve. D.S.

I suspect your catfish is *Mystus tengara* but barbel count is necessary for a correct identification. D.S.

Six barbels, and you're likely to be dealing with a *Pimelodid* — eight, and it's a *Mystus* species.



CICHLIDS CICHLIDS CICHLIDS CICHLIDS CIC

In praise of older fish . . .

I recently bought an eight inch Jack Dempsey cichlid. Even though it is a common, aggressive, plant-wrecking fish, I was intrigued by its beauty. Are there any other cichlids or catfish I could keep with it? How do I sex it? — C. Bingley, Nottingham.

Jack Dempseys have a very bad reputation, but compared with some more recent imports they are quite meek and mild. I think they are a beautiful fish and it is a great shame that people are put off by their reputation. They can be kept with other South/Central American Cichlids of similar size — my male is currently sharing quite happily with *Urolophorus*. They are likely to eat smaller tankmates!

You could keep it by itself in a 2 ft tank, or as part of a community in a larger tank, minimum size 48" x 15" x 15". It is likely to be excessively aggressive only when breeding, and that is true of many species. You can keep it in any

water that isn't too extreme in pH. Temperature about 77-80°F, lighting not critical. UG filtration is adequate.

If yours is eight inches long then I imagine it is male. Males are larger, have a slight hump to the forehead; females are rather more colourful as a rule, having the greenish scale highlights (if you look at the fish closely you will see there is a greenish dot on each scale) rather more distinct, and showing dark vertical bars on the flanks. Unfortunately many males are rather washed out; a good male looks iridescent green, but these days many look pallid with greenish areas.

The only requirements for breeding, in my experience, are to have a him and a her! But you must be extremely careful about introducing adult male and female — the best way is to put them in a tank with a clear divider between them and leave them for several weeks to get used to each other. If you buy a female and put her together with the male there is

likely to be mayhem. Care must always be taken introducing adult cichlids to each other. It is naturally carnivorous and so a suitable diet will include raw fish, beef heart, liver, prawns, and lots of earthworms



which are taken greedily. The tank should have a choice of flat stones for spawning sites, with hiding places as well — either caves made of rocks, or five inch flowerpots on their sides. M.B.

How to move without tears

Within the next couple of months I intend moving house. How do I move my fish without creating too much trauma? — Dick Cooks, London E8.

I think the important thing is for you to take as much as possible of your old water with you so that you can set up a temporary residence while the new tank matures for a day. Although your new tap water is

untreated, it still needs a degree of ageing, as it will be too highly oxygenated as it comes from the tap.

You may have noticed that when you completely re-fill a tank with fresh water, lots of little bubbles appear on the glass; if you put fish in such fresh water, similar bubbles will adhere to them, and this can cause permanent damage to the gills. So it would be best if you could leave your tank to stand for 24 hours before adding the fish.

You will need a container for the fish in the meantime — a small tank would do, or if you don't have a spare tank, buy yourself one of those small

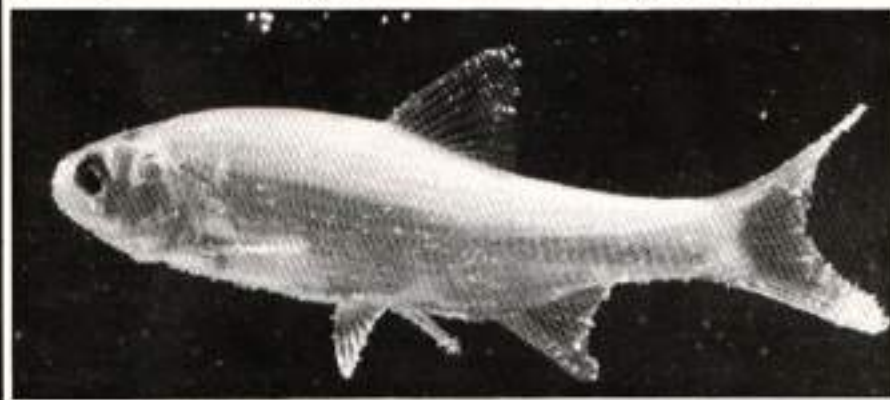
plastic dustbins used for home-brewing (and therefore made of non-toxic plastic). Such a bin is always useful for water changing or as a fish container during major tank clean-ups. You will need to transport about five gallons of your existing water, and you can top this up with a couple of gallons of fresh in your new home. You will need to heat the container and to provide aeration.

I suggest you deal with any danger of waste products by purchasing a packet of "Aqua-zorb" and tipping this into the holding container. Keep the container dark to reduce trauma, and don't feed the fish. If you can keep them in

darkness (eg cover container with a blanket) then they will simply experience a rather long night and be little bothered by it.

When your new tank is ready for its occupants, remember that it will not be biologically mature, and unless you are very careful you may end up with "New Tank Syndrome", or nitrite poisoning. To avoid this, use your Aqua-zorb from the holding container, put it in a small internal box filter and use this in the tank for the first 2-3 weeks. Keep feeding to a bare minimum and be meticulous about removing any uneaten foods. I would just give a single small feed every other day for the first week. I would also buy a nitrite test kit and monitor the nitrites twice a day initially — at the first sign of any problem change one third of the water and stop feeding for two days.

Console yourself that I managed to move 15 tanks of varying size 150 miles; admittedly I was able to do it over a period of several weeks, but I still bear the mental scars! Best of luck with the move. M.B.



The result of putting fish (in this case a Golden Orfe) into fresh tapwater. The bubbles can permanently damage their gills.

Glass, but not so fragile

I would like to know a little about the Glass Catfish and Sucking Loach. I have already added two each of these to my three-foot community tank. — Richard Holman, Tolpuddle, Dorset.

Sucking Loach are a hardy, easy-to-care-for fish, although you should have only one loach per tank as they can sometimes be aggressive to each other. They may also show signs of aggression to

similarly shaped fish such as the freshwater sharks. However, in a largish, well-planted tank this aggression does not usually amount to a great deal. Sucking Loach grow quite large and you may eventually have to rehouse yours.

The Glass Catfish is a shy, shoaling midwater species and is quite hardy. Both these fish should live quite well in a community tank and feed on the usual proprietary brands of dried food. C.A.



Glass Catfish look more delicate than they are, and can hold their own in community tanks with similarly-sized fish.

Early scraps

My wife and I have successfully bred Siamese Fighting Fish.

Can you tell us at what age the young ones will begin having a go at each other and need to be separated? The young are housed in a 24" x 8" x 8" aquarium without decor. The temperature is a steady 80°F, aeration is very gentle, lighting very subdued and the fry are thriving. Would a local aquatic shop be interested in buying any, do you think?

Am I right in assuming that the male fighter sucks eggs from the bubble nest, and renews the airbubbles which surround them, at regular intervals? — Mr. & Mrs. D. Robjohns, Immingham, South Humberside.

You are doing all the right things to spawn and raise the *Getta splendens* and yes, the male was renewing

the bubble nest.

The males may not fight when brought up together. What happens is that just one fish will outgrow the others and become a sexually mature male. He will fight any other male that begins to develop signs of maturity. So that's the one you remove and give away, or save for future breeding.

This will happen again as the number two in the pecking order takes over — hence you will not have a sudden crisis, but a steady supply of mature males over many months.

If you decide to breed again, obtain a new male or female for the best of your brood. Do not allow brother and sister spawning. This may have occurred in the past and you will get poor stock.

The petshop may well take the Fighters off your hands when large enough for sale, but will probably not want to actually buy them. You will find they prefer to swap the fish for food or accessories. D.F.

Tiddler tank

I would like to set up a freshwater fish, such as minnows, stone loach, bullheads, gudgeon and sticklebacks. Any advice? — J. McCulloch, Lanark, Scotland.

Fish such as minnows, stone loach, bullheads and the like are actually quite easy to keep in the aquarium, so long as the tank is well filtered and well aerated, although you will have to pay some attention to their diet. Minnows and gudgeon will readily adapt to dried foods, but bullheads, stone loach and sticklebacks require a staple diet of tubifex and chopped earthworms. C.A.



Three-spined Sticklebacks are most interesting if captured in early spring, when they will readily breed in the aquarium. Parental care by the male is reminiscent of cichlids.

Keep them dark

I have bred without any difficulty some Disc Tetras (*Epiplatichthys orbicellaris*). Can you give me some information on these fish, as they seem to be quite rare? — J. Oldham, Colwyn Bay, Clwyd.

These fish often spend a fair amount of time near the bottom of the aquarium, and seem to do best if the tank has a dark substrate with relatively subdued lighting.

Although there are no external sex differences it is known that these fish may

produce several hundred eggs at spawning and the resultant eggs and fry should be protected from the attentions of the parent fish.

The young fish grow quite rapidly and should be given plenty of suitably sized live food. The fish originates from North Eastern South America and may reach a length of ten or perhaps twelve cm. The Disc Tetra should accept a range of dried live and fresh foods and acclimatizes well to a temperature in the range of 20-25°C. Water should be soft and slightly acid. A shoal of these fish looks particularly attractive in a 60 to 100 cm long community aquarium. C.A.

Search for sighted tetras

I recently acquired some Blind Cave Fish (*Asityanus mexicanus*). I have started a project on the fish for 'A' level biology and would be most interested in acquiring the sighted version, the Mexican Tetra, for cross breeding. So far, no fish shop in the Cambridge area has been able to get any for me. If you know the whereabouts of any Mexican Tetras I would be interested to know. — Theo Anderson, Cambridge.

You have chosen a difficult subject for your studies. The Mexican Tetras are

an endangered species and so can be classed as unobtainable unless you go to that country and search for a few survivors yourself. The Blind Cave Fish is freely available, but that is the tank-bred ASTIn farmed variety, of course, and the farmers do not breed the sighted variety.

The same fish (*Asityanus fasciatus mexicanus*) ranges as far North as Texas, where it is a small silver Tetra sold as bait, not an ornamental fish. Ask your local petfish shop if his nearest importer has USA connections who could obtain specimens for addition to a routine import batch. D.F.

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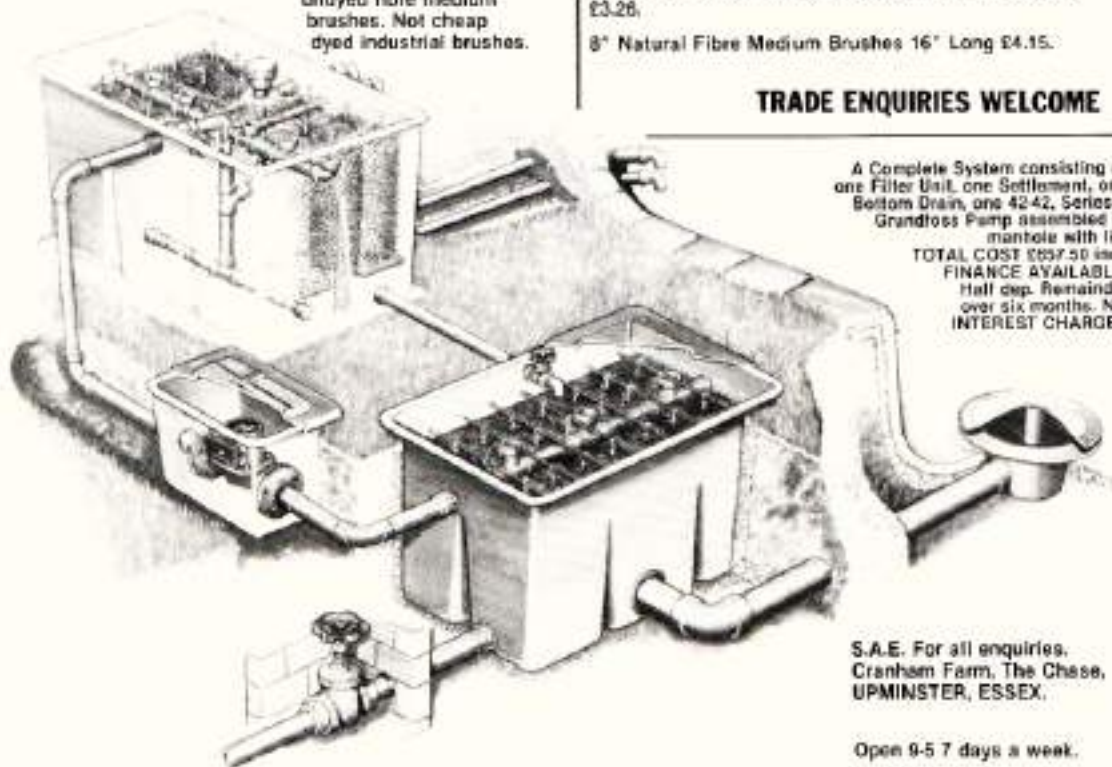
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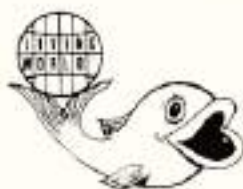
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JUST KOI

Greg Jackson, of Harrow Koi Company, goes indoors for his Christmas feature

In the run-up to winter, I receive many inquiries as to whether it is possible to keep small Koi in aquariums. The answer is 'yes' but it must be remembered that, given optimum conditions, these fish can grow at an alarming rate.

Equipment is quite simple — a tank or vat (the bigger the better) serviced by belt and braces undergraves, powerheads and power filters for that final polish.

Why all the hardware? Koi, as you know, are natural bottom feeders, continually rooting through the gravel. So as fast as your UFG filter is pulling down the debris, the fish are stirring it back up. This is where the power filter comes into its own.

In this sort of application I use them purely for mechanical filtration, filling the canister with filter wool alone. This, incidentally, needs frequent changing.

The gravel should be medium grade, 2-7 mm diameter. Finer, and it packs down too rapidly,

Dear Santa,
Please find enclosed my list of gifts that I would be grateful to receive this Christmas. I really did appreciate the lovely,

healthy Anchor Worms you sent last year, but the Fish Lice were the wrong size — much too big.

Was it you or the Mother in Law who gave me those GAV Flukes? Whoever it was, I still have some left, so please could you send me some Malachite Green and Formalin?

Not that I am ungrateful, you understand, I thought it was a nice touch to find my Koi seasonally decorated on Christmas morn with snowflakes. Uncle Fred said it looked like White Spot, but I never did find out for sure, as it had all melted by the time I buried them on Boxing Day.

After Christmas lunch last year, Grandad called all the men into the front room and locked the door, saying he had a Swedish fish video called 'Varieties of Nishikigoi'. Please could you send me my own copy — Grandad won't be with



us this time, his doctor said he had watched one Swedish video too many.

Uncle Fritz is coming over from Bavaria again this Christmas. Could we have a 40lb turkey, because last time the bird wasn't big enough. Uncle Fritz ran out and returned with my 28-inch Aka Sanke 'Bertha'. You may remember

that Koi, it won the 1985 National. Anyway, Fritz announced that we could now have a traditional Bavarian Yuletide meal — poached carp. Please send him a copy of 'Understanding Koi' so that he can grasp the difference between filtering and filtering. Hope this letter meets with your approval.

coarser, and it looks unattractive.

An aquarium of 36 x 15 x 12" is about the minimum to contemplate, but larger tanks promote growth rates. I personally like to see planted aquariums, but with Koi it's a futile waste of time, money and effort. Small Koi derive great pleasure from uprooting and stripping plants.

All is not lost, however, because over the past few years many excellent imitations have appeared. These will appeal to the non-purist school of aquarists, which you have now automatically joined!

Lighting the Koi aquarium is a personal choice, although I have found Grolox the most natural affect.

If the aquarium is sited inside the house, no additional heaters are needed. Only install them if the fish are in a garage

or outhouse.

We are now ready for the Koi... how many? What size? What variety? If you are just keeping the fish indoors for the experience, the choice is yours. But bear in mind that the Doitsu or Leather type of Koi look best when viewed side-on.

If choosing promising, high-potential fish with a view to introducing them into your main pond come spring, then stock very sparingly to allow them the best possible rate of growth and vigour. In the three-foot tank I would keep no more than half a dozen three to four-inch Koi over the winter, cutting numbers down to four by spring if the intention is to retain some fish indoors. Do remember that Koi are not solitary fish. They are happier in numbers, and improve immensely if both their psychological and physical needs are met.

Do you have a problem with Koi-keeping? Write to Greg Jackson at Harrow Koi Company, 205 Walford Road, Harrow, Middlesex. Greg cannot give personal replies, but the best points raised will be carried in future issues.

Letters

LAST winter I lost several Koi during the paralytic spell, and quite a few more in early spring. Is it possible to heat a pond of 1500 gallons, and what are the advantages and drawbacks? — T. Simkins, Esher, Surrey.

UNFORTUNATELY there is no source of cheap heat readily available. But if you were to add four 300-watt aquarium heaters and some sort of insulating cover (not floating) you could probably maintain a temperature around 55°F all winter.

There are, of course, swimming pool heaters available, both gas and electric. But the running costs are prohibitive.

The obvious advantage of winter heat is that the fish continue to feed and the bacterial action of filters is maintained.

The only problem is the conditioning of the Koi. I feel that, regardless of how cold the weather is, heating should be turned off at the end of March so that the fish have a brief, dormant spell. They really do require this, being coldwater fish from Eastern Europe.



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It is the aim of every Discus keeper to breed his or her fish. Follow this series and you'll be on the road to success!



Turquoise Discus, created by selective breeding in the United States, are highly prized but not recommended for the beginner.

Discus — perhaps one of the most intriguing and revered species available in the hobby. Even though the Discus is now bred successfully by quite a few hobbyists in this country, anyone who can keep them alive and growing is generally regarded by fellow aquarists as someone a bit special. The aquarist who not only keeps them thriving, but breeds Discus as well, assumes the mantle of a "super being"!

Why should this be so? Discus, like marines, require optimum water conditions. If correct aquarium husbandry is applied, there is no reason why anyone should not be successful with either Discus or marines. In this article I hope to pass on to you some relevant information regarding the former, which will enable you to join the elite!

However, more about water conditions later. First of all, let us have a look at the fish themselves.

Discus fish are so called because of their shape, like an athlete's discus positioned vertically. They belong to the family Cichlidae and are thus cichlids. Cichlids are extremely diverse with many genera. The genus we are interested in is *Symphysodon*, which actually means "having teeth in the middle of the jaw".

The first Discus was *Symphysodon discus heckelii*, which was described by Dr. Heckel in 1940. It is also known as the "True Discus", not for any reason other than it was the first of the genus to be discovered. This fish is different from other Discus in that three of its nine vertical bars are more prominent — the one through the head, the fifth or middle bar and the caudal or tail bar. The fish is also covered with wavy blue markings on its flanks. *S. discus* emanate from the Rio Negro and its tributaries, itself one of the tributaries of the Amazon.

Symphysodon aequifasciata aequifasciata, better known as the Green Discus, and described by Pellegrini in 1904, was the next member of the genus to appear. They are found in Lake Tefe and Peruvian Amazonia. These fish were then really almost forgotten until the mid 1930's, when they were introduced to the hobby. Once their exacting requirements were realised, spawnings began to be observed.

Quite rightly, Discus were known to be closely related to the Angel Fish (*P. scalare*). It was therefore assumed that their breeding requirements



A suitable water conditioner will help reproduce the natural element in which Discus swim, without harmful side-effects.

THE

would be the same, i.e. remove the eggs, hatch them in a separate tank and grow the fry on. This, as we now know, is not possible with Discus. Discus fry, as a first food, consume the mucus excreted from the flanks of the parents. Discus were not therefore successfully spawned in captivity until the late fifties, with Jack Wainley in America and Dr. Eduard Schmidt-Focke in Germany doing the pioneering work.

In 1960, Schultz described two further sub-species of *Symphysodon aequifasciata* — *S. aequifasciata axelrodi*, the Brown Discus from Belem, near the mouth of the Amazon, and *S. aequifasciata haraldi*, the Blue Discus, which is found near Manaus in Brazil. Controversy still surrounds these classifications, with some taxonomists claiming only one species exists, the non valid sub-species being merely regional colour variations. I must admit to sympathising with this point of view, but then I'm not an ichthyologist!

In the last thirty years, many superb hybrids have been created by selective breeding in Germany, the United States and Japan. These fish are extremely expensive and highly prized. A breeding pair can be valued at thousands of pounds, and most enthusiasts hope one day to own and breed "Brilliant Turquoise", "Powder Blue" or "Cobalt" Discus.

For the newcomer to Discus keeping, I would recommend the Brown Discus (*S. a. axelrodi*) which is now available

CICHLIDS



Discus are show-stoppers — these Green or Teft Discus have been featured on the King British stand at several recent aquatic events.



These are Heckel Discus, the first to be described by science. Note the prominent bars through eye and tail.

NOBLE ART

relatively cheaply due to mass breeding in South-east Asia. However, beware small Discus with very bright red or blue faces, as this colouration is achieved by breeders in Singapore adding a hormone to the food which is fed to the Discus.

Should you be able to raise these fish to adulthood, they would probably turn out to be sterile. Not only that, but a much more rapid effect would be to see this "highly coloured" Discus revert back to being an ordinary Brown (*S. a. azeleod*). The problem is that once the hormone supplements are withdrawn, the fish just returns to its normal colouration.

If finance is not too much a consideration, then the Blue Discus (*S. a. heraldi*) is a more colourful fish, with blue lines extending from the head into the flanks — the more lines, the higher the price! Do not be tempted by the Heckel (*S. discus*) as this fish is more difficult to keep, requiring higher temperatures (30°F plus). It is better tackled when some experience has been acquired.

Now to business! Discus, being from the Amazonian river system, require soft, acid water. Unlike many other characids or cichlids from the same area, they will not readily adapt to hard, alkaline conditions. Consequently hobbyists with these conditions will be lucky if they can keep Discus alive longer than six months.

I too have heard the stories about aquarists who have kept and bred Discus in water conditions more suitable for

Discus have the undeserved reputation of being 'impossibly difficult'. But Max Pickering, of Bristol-based Technical Aquatic Products, has successfully kept and bred them for years. In the first of this series he discusses the varieties available, and their optimum water conditions.



• MAX PICKERING

Rift Valley cichlids. If they are true I assure you that it would be the exception, rather than the rule.

Get yourself a total hardness test kit of a reputable make and see what your tapwater provides:— 0°-4°dGH, ecstasy, draught Amazon, breeding a distinct possibility, 4°-10°dGH, not too bad, Discus will thrive and may even breed, but adjustment will more than likely be necessary, 10°dGH plus, and you have got a problem! If it is any consolation, it is also my problem — water in the Bristol area, where I live, is 22°dGH, which is more like draught Malawi!

If you have hard water, how can you get around this situation? The cheapest way is to collect rainwater in a plastic butt. Avoid metal gutting and do keep a close fitting cover on the butt to eliminate unwanted insects and algae. It is also probably a good idea to fit some sort of strainer over the down-pipe to eliminate larger debris, like leaves. Do not forget to clear this strainer regularly, however, or obviously not much water will reach your butt!

Prior to using this rainwater, I

would recommend that it be filtered through a good quality activated carbon. This medium will absorb most chemical pollutants which the rain may have picked up on the way down. Pay particular attention to this if you live near an industrial complex.

If rainwater collection is impractical, the only other real alternative is to use deionising resins which, put simply, remove magnesium and calcium carbonates and sulphates from the water.

DO NOT use a domestic water softener. Although these contain a resin which removes magnesium and calcium cations, they are in fact exchanged for sodium ions. Sodium is an element present in salt (NaCl Sodium Chloride), so obviously a sodium imbalance must be avoided. Two resins must be used, hence the two column deioniser commercially available for the purpose.

It is possible to construct your own deioniser, but the choice of resins is critical. And regeneration of resins can prove to be inconvenient domestically.

Having now obtained water

of the correct dH (hardness), let us now turn to pH (acidity/alkalinity). As an aside, it never ceases to amaze me, when giving a talk on water chemistry to clubs and societies, how many "aquarists" confuse these two terms! Do not forget — dH = hardness; pH = acidity/alkalinity. Discus in the wild tolerate a quite wide range of pH readings, from as low as pH 4.5 up to pH 6.8, but always an acid reading. pH 7 is neutral and any reading obtained above this is naturally alkaline.

Use a reliable accurate test kit to determine the pH of your tapwater, then add a proprietary pH adjuster such as that produced by ourselves or another reputable manufacturer. Do not overdose — read the instructions carefully and re-test the pH until the desired acidity is reached — ideally, pH 6 to pH 6.5.

Now that we have discussed the fish themselves and the water conditions required, join me next month for a look at the "set-up" itself, and the do's and don'ts of persuading your Discus to spawn. ■

TALK BACK



Write to: Talkback
Practical Fishkeeping
Bretton Court
Bretton
Peterborough PE3 8DZ

Pond nets a threat to life?

FOR ten years I have owned a garden pond. Nothing can equal the enormous pleasure I derive from it, not only from the fish (which are tame and take worms from my fingers) but also from the wildlife attracted to the water.

I have two resident frogs which live almost permanently in the pond, and I am visited regularly by a toad. Thanks to an outside light, I can often have a look at what's going on at night.

Earlier this year, my husband made a filler which proved a great success, and to further the cause of clean water, he fixed a net over the pond. This I was not happy about—would the frogs be able to get through the gaps purposely left for them? I was afraid they would jump and get tangled in the mesh, and sure enough, one night I inspected the pond and found the toad spreadeagled across the net, apparently lifeless.

Luckily we detected a small movement and returned him to the water, where he eventually recovered. I removed the net there and then.

So despite the advice always given, to net pools in the autumn, I would ask hobbyists to have second thoughts. Far better to spend a few moments each day, removing leaves with a net, than to risk killing amphibians. — Mrs J. N. Murray, Hull, Humberside.

THERE'S an open invitation to food manufacturers this month, in the light of the letter from Tetra about Anita Peacock's October feature.

Just to prove we cater for minority interests, the Star Letter Award of a FREE annual subscription to PFK goes to a champion of Mormyrids. If there's anyone out there specialising in these quaint fish, who would like to write about them, now's your chance. For you and anyone else with an itch to put pen to paper, the address is: Talkback, Practical Fishkeeping, Bretton Court, Bretton, Peterborough PE3 8DZ.

Food flurry

YOUR feature by Anita Peacock on coldwater fish foods (October issue) was a disappointment to us at Tetra and, I'm sure, to all other reputable manufacturers.

The article takes a very authoritative stance, yet by its content shows your contributor is hardly qualified to make such outright judgements. The article contains significant errors of fact, and in particular, the value of declared pack statements of contents as a basis of appraising the quality of foods is greatly over-rated.

It is impossible to counter Miss Peacock's article in letter form, and sad that readers are being misled as to what really constitutes an ideal fish food.

Perhaps you will let the balance be redressed by an article based on research results and scientific evidence from the world's largest and longest programme of feeding tests, rather than qualitative opinion. — Cliff Nash, on behalf of Tetra.

• The right of reply is an accepted principle of a free press, and Tetra are more than entitled to submit and have published the article suggested. Equally, all manufacturers of coldwater fish foods should be afforded the opportunity of equal editorial space. So if they

IN PRAISE OF ELEPHANTS

FOR about a year now, I have been keeping fish from the Family Mormyridae. I started off with two *Gnathotemus petersi* (Elephant Noses) and now have six of various species, housed in a 48 x 15 x 18" tank along with a Butterfly Fish and a few catfish.

I have tried to obtain information on the Mormyrids but found it hard to come by, as they do not seem to be covered in many aquatic books. And apart from *Practical Aquarist*, Subscription Editor, only the commonest fish *G. petersi* was stocked.

I do not think there is any Mormyrid Association in Britain, yet I fail to see why these fish are not being kept in the same esteem as the wonderful Discus.

Okay, they are fussy eaters (mine eat only small live foods or chopped earthworms) and they don't like bright light.

Should this condemn them to anonymity?

In contrast to the many 'phony' mass-produced fancy fish, Mormyrids stand out as untouched, highly intelligent oddities which have adapted themselves to their environment in a highly proficient and unusual way.

I would very much like to hear from other aquarists who have probably kept Mormyrids far longer than I, and I am sure an article in *Practical Fishkeeping* would be well received. — Neil Arden, 56 Heol Maclor, Coadpoeth, Wrexham, Clwyd LL11 3NA.

• Can anyone out there respond to this plea? For my part, I shall try and prepare a suitable article as soon as possible. This letters page would like to hear from any other Mormyrid keepers in the same situation as Neil.

would care to submit copy on their products to me, here's what I will do: compile a composite feature, based on the information I receive, edited without bias by myself. Closing date for receipt of such material, manufacturers take note, is Tuesday, December 30th, 1988.

Tanks for the memories . . .

I THOUGHT readers might like to know how I became a fishkeeper. Some twenty years ago, I ran a tyre shop and a man came in to have a puncture repaired on his motorcycle sidecar. He produced a metal aquarium frame and used it to prop up the sidecar wheel. When I commented on this rather unusual 'jack' he said it had been hanging around for ages — in fact, he was on his way to dump it. Did I want it?

An enthusiast in the next workshop heard about my windfall, considered it a very well-made frame, and told me how to glaze it. A month earlier, we had had a plate glass

window broken and I had saved two large pieces of glass. A quick trip to the local glazier, and I was in business.

This tank was in use until about a year ago, when one of the long sides cracked without warning; I had to make an emergency dash to the petshop to replace it. I opted for an all-glass tank (cheaper and no rust problems) but I am still a bit apprehensive about such a weight of water in an aquarium stuck together with glue! I do wonder, though I have been assured it is safe, whether this one will still be going strong twenty years' hence! — M. Fry, Harrow, Middlesex.

British fish still the best

After reading Barry James' article in the October issue, I have to question his assertion that the British haven't got their act together in the breeding of fancy coldwater fish.

I have been doing this since 1960, when I joined the Bristol Aquarist Society. It would only be a 45-minute drive for Barry to see some of the finest coldwater fish in the world at the Bristol A.S. show. I say 'in the world' because foreign imports are not a patch on British-bred fish.

Apart from the Bristol show, there is the annual Northern Goldfish and Pondkeepers show in Altrincham, and the Goldfish Society of Great Britain show in London.

Any week Barry would like to come to Bristol, I will take him to visit fellow coldwater fishkeepers in the area, proving that standards, far from having slipped, are improving all the time if you know where to look. — Vic Capaldi, Filton, Bristol.

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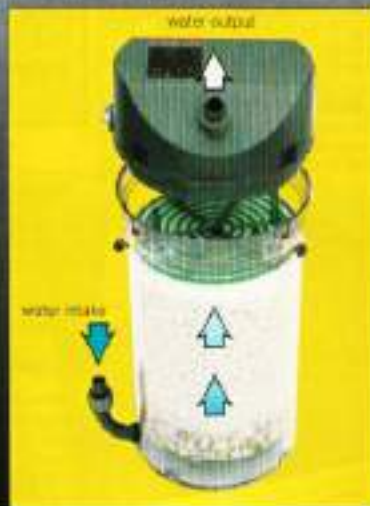
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2013	∅ 160 x 345	390	1,15	8 W	250
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The AQUALITY "Helpline" service, run from our retail premises in South East London, rarely rests from nationwide telephone calls concerning problems experienced by fishkeepers.

Some of these are basic enough to explain and advise on via a telephone conversation. Others, however, require the fishkeeper to bring a sample of aquarium/pond water for chemical analysis and/or a fish specimen to check over for disease-causing organisms.

In a number of instances the problems relate to marine aquaria and their inhabitants. In this article I would like to highlight the most common situations we come across, and offer some advice on prevention and treatment.

Water Quality

The fish is in constant, intimate contact with its environment — the water. The only barrier between fish and water is its skin. Should this become damaged in any way, either by physical or chemical attack, then the fish becomes vulnerable to a number of ill.

An imbalance of metabolites, as well as a loss of body fluids, is the first reaction, resulting in shock, decrease in body defences against disease, infection and death. Sometimes, if the skin damage is severe enough or is on a particularly delicate part of the fish (the gills for example), then the initial shock can be severe enough to cause death.

The first point, therefore, is to ensure that water quality is just right, allowing for healthy development of marine fish. Prepare your aquarium water from a good brand of sea salt (e.g. Instant Ocean, Tropic Marin).



On the reef, conditions are constant, in the aquarium they may not be so, leading to stress and possibly disease. (Pic: Les Holliday).

MARINE DOCTOR

Jerzy Gawor, of the AQUALITY Fish Diseases Laboratory, shows how to diagnose and treat the simpler disorders affecting inhabitants of the home aquarium



Ideal parameters (for average community aquarium)	
pH	8.30
Buffer (AK)	600.00 meq
Ammonia	0.00 mg/L
Nitrite	0.00 mg/L
Nitrate	25.00 mg/L (and below)
Temperature	76 °F
SG	1.023

Whatever advice you receive, a regular 25 per cent partial water change once every month is part of the key to successful marine fishkeeping. Regular dilution of accumulating waste

and by-products of fish metabolism, and replenishment of lost minerals and trace-elements, are essential.

The partial water change is the single, most important water-management aid available to the fishkeeper. Monitoring the quality of the aquarium water is also important, as the tests will show the chemical parameters (which deteriorate with time) vital to your fishes' health.

Testing the aquarium water regularly allows you to pre-empt and alter water conditions before too much damage is incurred by your livestock collection.

The second point under this heading is that, if you buy fish which already have damaged skin or fins, you are potentially going to lose those fish, or introduce a problem to an already established system. It is worthwhile taking time over any fish purchase. View it from all angles. See that the skin and fins are intact. Look for bright eyes and clear fins, watch the fish feeding if possible. Stay clear of fish that are nervous, damaged in any way, thin and off their food.

As an added precaution, set up a small quarantine aquarium, and keep all newly purchased fish isolated for up to six weeks. Treat them, if required, against parasites before introducing them to your main aquarium.

These simple points will vastly reduce the complications you as a marine fish enthusiast will find in your chosen hobby. Above all, beware of the "Wanna buy a cheap fish?" merchants. Cheap, low quality, unquarantined fish, offered to the hobbyist within hours of being landed at Heathrow Airport, are sure to cost you dearly in the long run.

However, there may be occasions when, having taken all these precautions, you still find a fish behaving oddly and showing classic symptoms of infection.

The most common, in my experience working at the laboratory, are those caused by the opportunist parasites *Codinium coelestium*, *Cryptocaryon irritans* and Monogeneic Trematodes (gill and skin flukes).

An increased level of activity, rapid gill beats, fast darting movements, and violently scraping against rocks are all typical initial symptoms of *Codinium*. Do not wait for the disease to develop any further — you must treat the fish at this stage. To delay will allow the parasites to cause extensive gill and skin damage and result in the fish's death.

Once the tiny, white, dust-like spots appear on the skin and fins, the disease becomes potentially terminal. But it is still worth trying to save the fish.

Codinium treatment — method

Prepare a large plastic bag of fresh tap water to house the fish comfortably for a short while. Aerate and dechlorinate the water and adjust the pH so that it matches that of your marine aquarium.

Immerse the bag of fresh water into your tank so that the bag gradually warms up to the same temperature as the aquarium. Switch off the aquarium lights. Once this has been achieved, catch the infected fish and place in the bag for two minutes. Many parasites are immediately destroyed on contact with fresh water, with no ill effects to the fish. Repeat on alternate days,

MARINES



GIW and skin flukes are easily eradicated by immersing fish in a dilute formalin bath, followed by copper-based medication.

if necessary — no more than four treatments.

Once treated in this way, it is advisable for all the fish in the aquarium to undergo a copper-based medication, e.g. **Paracide, Marine Cure** and **Cuprazin**. Ideally, treat in a hospital tank, but if this is not available add the copper-treatment to the aquarium itself.

Aerate the system well and add copper until a level of 0.15-0.20 ppm is reached (this level will be higher if using complex-copper treatments — read all instructions thoroughly before use). The level is then brought up to 0.30 ppm on the second day, and maintained for 8-10 days. Remember, copper is lethal to invertebrates, so either remove them from your aquarium or treat the fish in a separate system.

Cryptocaryon irritans (marine white-spot) is a much larger

parasite. Infected fish will have several large (pin-head size) spots in their skin and fin surfaces. Treatment must begin as soon as possible if the delicate gill tissue (primary site of infestation) is not to be irreparably damaged.

Respiration and scratching activity is elevated in fish infested with *Cryptocaryon*, but not as much as with *Godinium*.

Should you find that your fish are scraping and scratching, but there is a lack of dots or spots of any sort (and there is little deterioration of the general well-being of the fish over a period of days), then skin and gill flukes should be suspected.

Cryptocaryon — Monogenic Trematode treatments

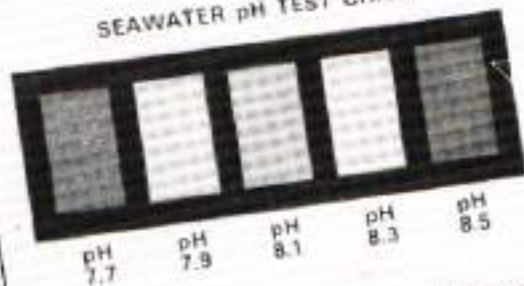
Prepare a clean bucket of salt water from your aquarium, and add to this 1.0 ml of formalin per gallon. Aerate well. Place the infected fish in this bath for 20-30 minutes and return to the aquarium. Treat, as in *Godinashy*, with copper-based medication.

These treatments are simple, but effective, and have a good track record for eradicating these parasites from your marine collection. ■

Summary

1. Maintain good water quality, by doing regular partial water changes and checking water quality.
2. Be critical when purchasing your fish. Do not buy 'cheap' fish on the spur of the moment — you may get more than you bargained for.
3. Watch your fish and how they behave. Often a change in behaviour is your first sign that something is wrong.
4. If water quality is checked and found to be optimal, suspect parasites and act immediately as per instructions in this article.
5. Feed fish sparingly during treatment. Do not feed on shrimps, as these absorb copper from the water, causing the fish internal damage if eaten.
6. Give your fish time to recover. Don't immediately buy more replacement fish. Allow the system two or three weeks to return to normal.
7. Enjoy your marine fish!

SEAWATER pH TEST CHART



Always view your pH test horizontally, i.e. through 1.5 cm of water, in natural daylight or using a daylight type fluorescent tube.

SPECIAL NOTES

- (i) A yellow reading indicates less than pH 7.7.
- (ii) A bright purple reading indicates more than pH 8.5.
- (iii) The normal diurnal pH shift on a coral reef — into both pH 7.9 to pH 8.5. Thus, any 24 hour range of readings between these upper and lower limits accretes to all forms of marine life. However, once the pH reading 'bottoms' at pH 7.9 — or lower — the reading to a higher level for a few hours (that the seawater's alkaline reserve is exhausted). A slowly effected 25% - 33% daily change is now necessary.

The pH of a marine aquarium is easily tested using a sample of water plus reagent, compared against a colour chart.

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Fig. 1



Fig. 2

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Model 400 A Little More. For up to 30" aquariums using 1 or 2 bottom filters, under gravel filter or an outside filter and airstone.

A Guide to Air Usage

Airflow - Aquarists needs (litres/min/hr)

Equipment	Low	Normal	High
Airstones	0.25	1.8	2.0
Mistline Filter	0.5	0.75	1.2
Cascade Filter	1.4	1.75	3.0
Super Two Filter	1.2	1.75	3.5
Airstream Bottom Filter	0.25	1.0	2.0
Junior Bottom Filter	0.25	0.5	1.0
CF Sub-gravel Filters	0.25	0.5	5.0

Your Pump Selection Guide

Pump	Air Flow (GPM/min)	Max Pressure (Depth of Tank in inches)
W200	1.0	40
W200	1.5	50
W300	2.0	61
W400	3.0	70
W500	3.0 Adj	58
W600	6.5*	64
W700	8.0*	68
W800	8.0*Adj	68
W900	0.0*	50
W1000	10.5 adj	68

Adj. = These pumps are adjustable.

* Twin Pump - This is the combined output of all diaphragms.

† = Diaphragm Pump

Airflow Spares are included on a zip money under free flow ideal credit note. A full range of spares kits, Filter Beds and Diaphragms is normally available from stock.

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Model 600 A Powerful One. For up to 18" aquariums using wide tube under-gravel filters, high capacity outside filters or to aerate and filter several smaller aquariums. "Tee" provided to convert one nozzle.

Model 700A The Powerhouse. For aquariums of 3/6" and above and for aerating and filtering an assortment of tanks. "Tee" provided to convert to one nozzle.

Model 800 The Powerhouse Plus. For 10 gallon up to 135 gallon aquariums. Turn the electronic flow control for more or less air. "Tee" provided to convert to one nozzle. You may never need another air pump.

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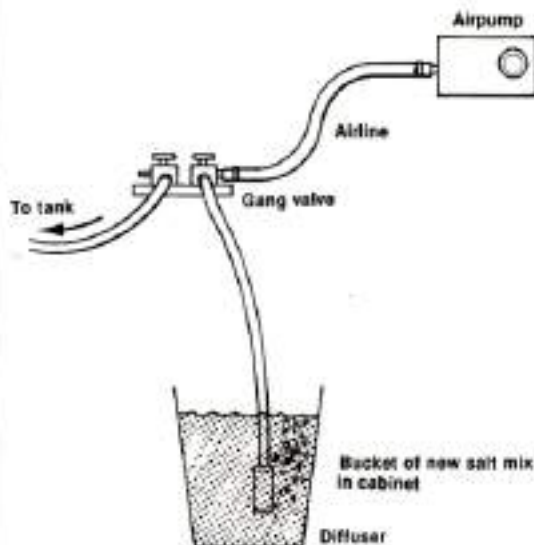
READERS' Tips

Do YOU have a tip worth sharing with fellow readers? If so, send it in and be in with the chance of a FREE year's subscription to PRACTICAL FISHKEEPING

Working behind the scenes

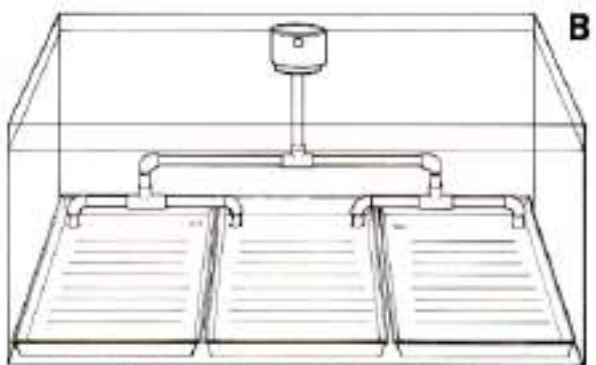
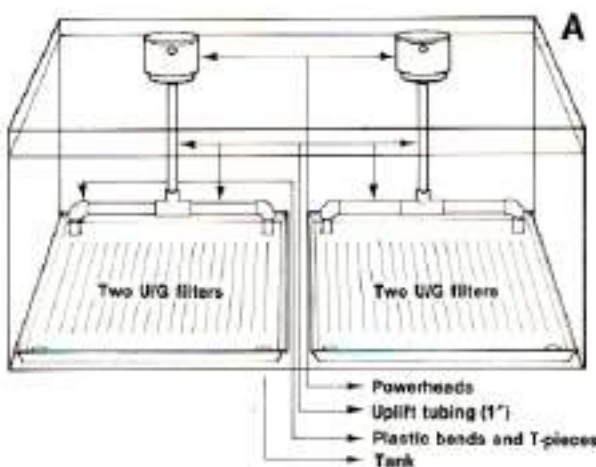
AERATION of water prior to performing a partial water change in marine tanks is always advised — with this system, it can be accomplished 'behind the scenes'. All you need is a spare diffuser, a gang valve and a bucket (which can be hidden in your tank cabinet). The diagram explains all.

The best tips are often the simplest. Boris, Lancs reader F. Moore has just earned twelve more months' worth, compliments of Practical Fishkeeping.



Saltwater can prepare itself behind the scenes with this gang valve arrangement.

Value from your powerhead



Uplift tubes, bends and T-pieces as tank A
More powerhead for your money thanks to these two ideas for powered undergravel filtration.

HERE'S a tip that might help fishkeepers wishing to use powerheads with undergravel filtration in large tanks, but who find the cost of the motor units beyond their means.

I have two tanks, set up as follows: one (tank A) is 54 x 24 x 21", the other (tank B) is 53 x 18 x 18". In the larger tank, I placed four undergravel filter plates as shown, in the smaller three.

Both tanks could have been serviced by a larger plate at each end, individually served by a powerhead. But bearing in mind the large base area of the tanks, I felt that better filtration would be achieved by using the centre uplift provisions from separate plates. This is especially so in tank 'A', where 24 x 12" plates are laid at right angles to the tank length, covering most of the base area.

By using cheap plumbing fittings, I serviced four uplifts with just two powerheads in tank 'A' and the same number in tank 'B' using just a single powerhead.

Try and obtain the bends and T-pieces unpacked from a trade counter; this reduces costs considerably.

If you wish to prove that water is being drawn up the uplifts, simply push a dropper filled with potassium permanganate solution into the gravel, close to each, and watch the injected dye rising up the tubes.

SINCE most powerheads are patently too powerful for the job they are asked to do, this is a really worthwhile tip. Gorleston, Suffolk reader E. Long gets a free annual subscription with our compliments.

No sucker, this device

THIS home-made pond vacuuming device may be powered either by a garden tap or the outlet of a submersible pump.

The idea came while I was watching the salvage of the 'Nanking' treasure, when sand was being sucked away from submerged cargo. Basically, water is forced between the walls of the inner and outer tubes, and the water-borne debris is drawn through the inner tube into the net for disposal.

Materials:

A length of rigid pipe (e.g. copper) is used as a handle and delivery pipe. One end is turned through 90°. A compression band is useful for this, so that a locking nut can be easily sealed to a one-inch length of 1½-inch plastic tube with fibreglass resin.

Half-inch garden hose feeds the 'handle' from either a garden tap or an adaptor from the outlet of a standard

submersible pump. Handlebar grips or tape are an optional 'comfort' extra!

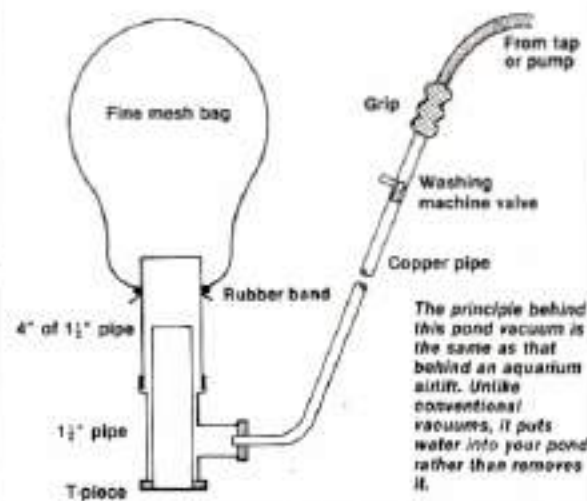
The 1½-inch pipe at the end of the handle is glued into the T-piece as shown, and set at an angle that ensures the mouth is parallel with the pond bottom when in use.

Four inches of 1½-inch plastic pipe are glued into the uppermost outlet of the 'T'.

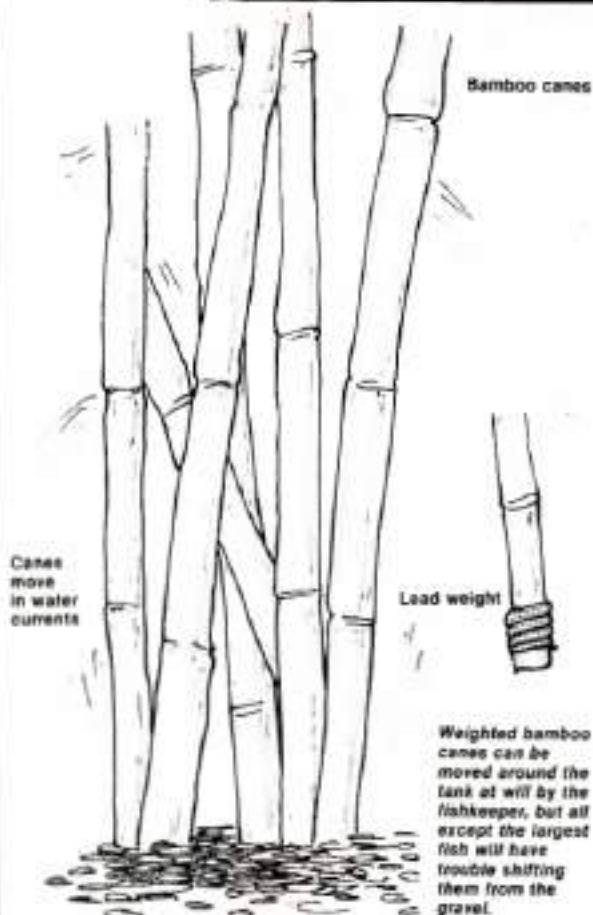
Next, four inches of 1½-inch plastic pipe are set in the centre of a one-inch length of 1½-inch pipe (or a concentric reduced) and glued into the lower outlet of the T-piece. A fine net bag is secured over the outlet with a rubber band.

A useful sophistication is to add a 'washing machine' type valve to the copper tube near the handle, for total control.

CLEANING up on a free subscription for a treasure of a tip is Loughton, Essex reader D. Gordon.



The principle behind this pond vacuum is the same as that behind an aquarium siphon. Unlike conventional vacuums, it puts water into your pond rather than removes it.



A touch of the Amazon

HERE'S how to give your tank that natural, 'Amazon River' look. All you need are some bamboo rods about the same length as the depth of water, and some lead wire to secure them.

Wrap several turns around the base of each and bury the bamboo in clumps in the gravel. Each piece will sway gently in

the current. This is a particularly good way to disguise heaters and airlifts. To preserve the wood, each piece may first be coated in clear polyurethane varnish.

ONE way to 'sway' the editor into parting with a free annual subscription... well done, David Bethell, of Bow, London E3.

Subscribe to a good offer

READERS' Tips is one of the brightest features in this magazine, because the material is supplied by you, the hobbyists. To encourage you to send in your ideas, we are offering a FREE annual subscription to PRACTICAL FISHKEEPING for every tip published. Think what that means — your copy will drop through your letterbox every month for the next year and, with the current cost of a UK subscription, you will save yourself £16. So you can see that the offer is well worth pursuing.

Send your tips, preferably with a rough line drawing by way of further explanation, to: Readers' Tips, Practical Fishkeeping, Bretton Court, Bretton Peterborough PE3 8DZ.



One major aim of this article is to show how a mass of healthy plants in the aquarium can, in effect, be used as a 'filtration mechanism' for removal of nitrate. This final breakdown product of fish nitrogen metabolism can be converted to new plant tissue.

But it should be remembered that this is only one part of the whole chain of interdependent metabolic reactions in the plant, and that many factors influence these, with a resultant effect on plant growth.

In both natural habitats and the aquarium, essential requirements for plant growth are: **adequate oxygen, carbon dioxide, light, nutrients and a correct temperature and pH range.**

In natural habitats these are found in varying proportions — consequently the environment can often be less than ideal for a given group of plants, while another indigenous group may find it perfect.

This means that the aquarist, in trying to grow plants coming from a wide range of habitats all over the world, is faced with a vast range of variables which he considers the factors that dictate the degree of success.

As different plant species have different requirements and compete for particular elements, the net result in a given habitat is that some plants will dominate and others will hardly survive at all.

If this happens in the aquarium, it is usually classed as 'failure' — but of course, failure to achieve satisfactory plant growth may be due more to a lack of basic requirements than to competition between species. So what are the essentials?

growing

In the second part of his innovative series, Dr. Clive Goodwin spells out what aquarium plants need to thrive.

1. Adequate oxygen and carbon dioxide

Concentrations of these two gases in the water are closely linked to the aquarium — both fish and plants take in oxygen for cell respiration and release carbon dioxide. Plants, alone, take in carbon dioxide for photosynthesis (the use of light as a source of energy for a build-up of carbohydrates in the chloroplasts of leaves).

Important lessons that can be learnt as far as the aquarium is concerned are (first) that during the day, the amount of oxygen released by the plants from photosynthesis is much higher than that taken in for respiration. Therefore the net concentration is high.

But at night the photosynthesis process ceases, the carbon dioxide concentrations build up (due to both fish and plants) and the oxygen concentration drops. This is obviously not to the benefit of the fish and constitutes another reason why

the powerhead or pump supplying the undergravel filter should be left on permanently.

A further asset is that oxygen is provided both for bacterial filtration and for root cell respiration, resulting in better root growth.

Unfortunately, the myth has arisen over the past ten years that plants cannot be successfully grown with *algae filtration*. This has excluded many aquarists and deterred many newcomers from attempting to plant their tanks.

The asset of using the gravel bed as a biofilter and functioning plant root medium seems to have been forgotten. Yet the science of 'hydroponics' (growing land plants with their roots immersed in an aqueous medium) has long been accepted. This gives even better growth than in soil, and there is no concrete reason why it should be unacceptable as a principle for aquatic plants, too.

An essential feature in hydroponic systems is oxygen

for the plant roots, and logically this must apply also to aquatics.

In my experience, if sufficient light and nutrients are available to the aquatic plant, excellent growth may be achieved.

Failure to grow plants with *algae filtration* can be prevented by a 'fixed' ten to twelve hours' light per day. The photoperiod must be regular, hence the use of a time switch is strongly recommended. Light intensity must be at least 10 watts per foot of aquarium if you use white light, or 20 watts for ultra-violet.

Inadequate light and nutrients are the two main reasons why plant growth fails.

2. Essential nutrients

The essential mineral salts for plant growth are — **Nitrogen** (as nitrate); **Phosphorus** (as phosphate); **Calcium**; **Magnesium**; **Sulphur** (as sulphate); **Potassium** and **Iron** — these are known as the 'major elements'. Minor (or trace) elements are: — **Zinc**, **Boron**, **Copper**, **Molybdenum** and **Manganese**.

In hydroponics, the major salts are usually supplied to the plant in the range 200 milligrammes per litre of water surrounding the plant roots. Iron, at a concentration of a few parts per million, is usually sufficient for optimal plant growth, and the other trace elements are required at even lower concentrations than that.

Amounts of salts for aquatic plants in a different system (the aquarium) where nitrate is supplied as a product of 'bacterial biofiltration' will obviously be different. The blend of materials in 'Thrive' has been developed to meet this need.

Deficiencies in any of the elements will give rise to corresponding types of plant



At Dr. Clive Goodwin's home are several tanks under test with Thrive, and one thing he hopes to establish is which common plant species are the dominant ones — i.e. first to the nutrients.

POINTS

PLANTS

'Thrive' is still very much a cottage industry, with Dr. Goodwin mixing all the ingredients by hand.

disorders that are seen in land plants. But when this occurs, it usually means that one plant in the community is excessively 'greedy', in that it takes up one particular element more easily than its competitors, to their detriment.

Most nutrients are taken up by the roots, although a variable amount (depending on species) is also absorbed through the leaves. These are transported up the stem to the growing points. Each is dealt with by the plant in its own, characteristic way. Nitrate taken up by the roots, for example, must be reduced to ammonia before becoming available to the overall economy of the plant roots and leaves.

Essential elements can be found in excess in certain natural habitats. In hard water, for example, calcium and magnesium salts predominate, and so only plants which have adapted to this environment can exist. The aquarist with a mains water supply that falls into this category has the choice of keeping plants that are adapted to hard water (which are few and far between in this country) or taking the easier path of 'filtering' off the salts by using ion-exchange resins.

3 Light

Light influences plant growth either directly, via the plant hormone system, or indirectly, via photosynthesis.

The relationship of light, via the latter, to the use of protein to build tissues is complex. But it is evident from studies that show accumulation of nitrate in the leaves at low light intensities.

The conclusion must be that increasing light intensity boosts the nitrate 'uptake and incorporation' in plant growth. But in general, the effect of photosynthesis can be stated to be totally 'indirect' in that it 'boosts' the 'base of nutrition' of the plant and gives energy for the formation of new tissue.

The wavelength of light that is absorbed by the leaves (i.e. the effective light that can be used by the plant) falls into two distinct bands, one at the red and one at the blue end of the spectrum. Absorbed light in the wavelengths red, blue, indigo

and violet are utilised by the pigment chlorophyll in photosynthesis. The plant pigment 'phytochrome' utilises light at the far end of the red spectrum to influence the plant hormone system, directly stimulating growth. It is beyond the scope of this article to go into details, but the relevant information to be gained for the aquarist is that if the aquarium is illuminated by a light source which excels in providing just part of the spectrum — ultra-violet and infra-red — then better plant growth should result.

In practice, this is not the case. I conducted a long series of experiments to compare white light (fluorescent strip) with U.V. (known commercial type) which proved conclusively that under identical conditions, twice the amount of U.V. light was required to give the same degree of plant growth.

The 'direct' effect of light on plant growth is due to light stimulating the release of certain plant hormones. The interesting point here is that it



Plants recommended for Tropical Aquaria

Fast growth rate	Indian Fern — <i>Hygrophila</i>	<i>Ceratopteris thalictroides</i> <i>difformis</i> <i>polysperma</i> <i>corymbosa</i> <i>angustifolia</i>
Medium/fast growth rate	Amazon Sword — <i>Echinodorus</i> sp. Cabomba <i>caroliniana</i> Ludwigia <i>mullerti</i> Myriophyllum <i>aquaticum</i> Java Moss — <i>Vesicularia dubyana</i> Fountain Plant — <i>Ophloporon japonicus</i> Aponogeton sp. <i>Semodax valerandi</i>	
Slow growth rate	<i>Cryptocoryne</i> sp.	

appears these hormones are still to be found in 'dead' plant tissue. This may explain why bogwood and the like are beneficial in the aquarium, and is the basis for including selected ground wood in the organic base of Thrive.

In conclusion

The aquarist, having established his aquarium to satisfy the various premises already mentioned, will want to stock with plants that will succeed.

The table above shows a

range of recommended species that grow at various rates and which can be used with Thrive.

One or two species with fast growth rates must be included to facilitate rapid nitrate uptake! Unfortunately, these tend to be more competitive between themselves than plants with slower growth rates.

Slow-growing *Hygrophila* species do well on their own, but fare badly when faced with competition from Indian Fern (*Ceratopteris thalictroides*). The latter is recommended for beginners, as it grows very



Hygrophila difformis is one of the competitive, faster-growing plants recommended.

rapidly, either on the surface of the water or loosely attached to the gravel. Don't bury the roots — best results are obtained by tucking them between two strips of household slate.

There are many other factors that influence the successful growth of individual species and I am willing to personally answer any of your queries on the topic: write to Clive Goodwin, Alderside, Low Burnham, Epworth, Doncaster DN17 1DA.

When merchant adventurer William Adams was washed ashore at Kyushu in the spring of 1600, he forged the first link of a cultural chain with Japan that has stretched almost unbroken for centuries.

The 'Blue-eyed Samurai', as he came to be known, was the first Englishman to experience the rigid social and military traditions that had preserved Japanese society for so long from the curious eyes of the Western world.

You might think modern Japan had severed with its past — but behind every thought, deed and action in the Land of the Rising Sun there is still an acute awareness of history. This applies through all walks of life — including ornamental fish culture.

Ask the British aquatic hobbyist which fish is most closely identifiable with Japan, and the answer is likely to be 'Koi'. But beautiful as these brocaded carp may be, they are still a cash crop to the people who breed them.

A lesser-known fish, however, is held in real reverence — the Rancho. Literally translated, the word means 'Ultimate' or 'Dream' and at the highest level of appreciation these fish transcend all commercial considerations.



FISH of th

Editor Nick Fletcher visits, not just another fish show, but an event of considerable cultural significance.



Young visitors were understandably perplexed by the reverence afforded to the fish on show . . .



The Rancho history is closely linked with the Samurai traditions of honour, dedication, loyalty and strength. In modern times, the fish have become more aligned to the ideals of Sumo wrestling, and all known awards at the annual All Japan Competition are of Sumo grading. This event is of such national importance that the Prime Minister of Japan donates the supreme trophy for the best fish, while others are awarded by the Ministries of Agriculture, Fisheries and various other high-ranking dignitaries.

Rancho culture in Japan is under the strict control of the All Japan Rancho Association. This ruling body has approximately 30 Kai (or chapters) which between them have 20,000 members. All these Kai owe strict, though unwritten, allegiance to the parent body. The

atmosphere among members is as closely knit as between Freemasons. For example, any Kai member selling fish to outsiders would instantly be dishonoured.

But despite the rigidly formal structure of these Kai, English devotees of the Rancho now have direct links with the foremost Japanese breeders. Man behind this is Frank Hilton, who first became interested in these fish 20 years ago and tried to develop a strain from commercially available specimens. He soon found this to be impossible. And after studying Japanese literature, he soon understood why.

Rancho, he discovered, represent 400 years of

development within a closed circle. They were bred almost exclusively by the old Samurai families, who regarded Rancho as having spiritual links with the past.

After persistent efforts, Frank made contact with Sakyo Koshiishi, vice-president of the Yokohama Jinchu Kai. A friendship grew over two years of phone calls and correspondence, and Frank was eventually granted membership of the Kai and appointed his own Japanese teacher.

Eighteen months later, he was presented with a group of Tozai (year-old fish), told to grow them on and learn from their development. Before accepting these fish, he was requested to dispose of any so-called 'Rancho' he already owned, and never to sell a fish to anyone other than a fellow Kai member.

Frank obeyed these instructions to the letter and was finally given permission to form an English Chapter of the Yokohama Jinchu Kai.

A further breakthrough was achieved in September, when members had their own fish benched in an inaugural competition, run as part of the Anglo-Japanese Will Adams Festival in Gillingham. Judging the Rancho — all descendants of those original ten Kozai — were Mr Koshiishi and his President, Kazuo Nogi.



As judging proceeded, the English Rancho enthusiasts learned much from the Japanese experts.

RISING SUN



The Oya Rancho of Frank Hilton, judged to be the best overall fish on the day.

The two Japanese officials were invited over to England a week before the festival, and made welcome at members' homes. Came the day, excitement was running high as the dozen members of the English Chapter, attired in their official regalia, awaited the judging.

The fish were shown in white, rectangular plastic bowls and

judged in three categories . . . Totali (year-old), Nisi (two-year-old) and Oya (three-year-old). An impressive array of trophies awaited the winners, including a hand-carved Rancho mounted within a bowl of Italian walnut.

Before the official results were announced, I talked through an interpreter to Negi San and Koshishi San; both were impressed by the intensity and seriousness with which the English Chapter conducted themselves, and delighted by the standards already achieved.

"In three or four years' time, these fish would be ranked well in Japanese shows," they said.

"The British climate, which we thought might prove a setback, has been no obstacle to progress. We envy the space our friends have available!"

Were there still techniques to be revealed to the English Chapter of the Kai?

"They will receive further instruction as their standards improve."

Culture of Rancho among Kai members is specialised and intensive. Ponds follow the dimensions of Japanese Tatami mats (5 ft. x 3 ft) and only odd numbers of fish are reared in these, for aesthetic reasons. No filtration is employed — instead, the ponds are geared to easy and regular maintenance through partial water changes.

Water clarity is not paramount, as long as the fish are properly cared for, and it varies according to the time of year and feeding regime. Diet depends on the age of the fish, and whether they are intended

for showing or for breeding. In early life, live foods play a dominant role.

It was perhaps fitting that Frank Hilton's Oya Rancho was ultimately judged top fish in the Gillingham show, best fulfilling the judges' criteria of colour richness, grace of movement and overall symmetry.

Unlike fish shown outside the Kai, size of Rancho is considered of secondary importance to quality. As with Sumo wrestling, it is felt that a good little 'un can always beat an indifferent big 'un.

Frank was honoured, but equally pleased that the Japanese judges had made the English Chapter a gift of several more top quality Rancho to further improve their breeding stock.

And as a gesture of appreciation, a Highland pipe band awaited the cars and cameras of the judges when official business was concluded — a facet of our own island culture that even the Japanese would be hard-pushed to emulate . . .

One of the splendid metal trophies awarded at the first show to be held by members of the English Chapter, Yokohama Jiechu Kai.



SIDE BY SIDE

Another Christmas, another 'Side by Side', and for the festive season

I have chosen three catfish from South America — including a very special one for the aquarist who has everything — and two from Africa.

Aside from the mandatory *Corydoras*, I am featuring a Bristlenose species from the Family Loricariidae. Representatives of this, one of the largest groups, are deservedly popular. They are bought to rid tanks of algae, and more often than not prove very adaptable and spawn. They protect their fry, and this noble attribute takes all the hard work out of raising them.

I have many letters from readers claiming to have spawned *Plecostomus*, but all the books say it hasn't happened. The confusion arises

because just about every Suckermouth is sold as a 'Plec', whether it belongs to one of the 120 species of *Hypostomus* or the equally well-represented Bristlenose Cats known as *Anicistrus*.

Bristlenoses are adult at between four and five inches in aquaria, and breed readily. Besides algae, they require shrimp and flakes for a balanced diet, giving them the reserves to spawn energetically while we fishkeepers linger over the Christmas pud!

I have chosen a small representative of the 100-or-more strong African *Synodontis* genus. This is a group overdue for more popularity. About five years ago, fishkeepers couldn't get enough of them, but just recently the demand has fallen away — ironically, just as their availability increased. It all goes to prove that we most

want what we cannot have!

The Aluminium Catfish is a cheap yet impressive-looking present, frequently imported from Zaire and Nigeria. It looks well in an African theme tank and, if kept in groups, can be a lively sort. Look out for its big eyes — if Red Riding Hood had done the same with the wolf, she might have averted the death of an endangered species...

The last fish in this selection is something of a mystery. It was discovered in 1979 and described by Brazilian scientist Dr. Haroldo Britski a couple of years later. It has not been captured alive for the aquarium trade, despite repeated attempts by teams led by Dr Herbert Axelrod and Heiko Bleher. So the Zebra Shovelnose is the last word in aquatic staise-symbols.



DAVE SANDS

What big eyes you've got!

SCIENTIFIC NAME:

Gephyroglanis longipinnis

FAMILY NAME: Bagridae

COMMON NAME: Aluminium,

or 'Big-Eye' Cat

CONFUSED WITH: *Arius* (but has more metallic appearance and larger eyes)

The large eyes of the Aluminium Catfish are a redeeming feature of what is known to be a mild predator on smaller fish. Widespread in Africa, it may have darker colour forms, or there may be more than one species. As they become adult, they change from shiny livery to a dull blackish-grey. In twos and threes they are active, especially if the water is kept bright and partially changed on a regular basis.

They grow upwards of eight inches (200mm) but are usually encountered at half that length. In the wild I do not think they are predators so much as opportunist feeders, filtering through the silt for whatever turns up. They do well on standard flake, shrimps and tablet food.

The eyes have it, so far as the Aluminium Catfish are concerned.

SCIENTIFIC NAME:

Anicistrus delichopterus

FAMILY NAME: Loricariidae

COMMON NAME: None —

suggest 'Starlight Catfish'

CONFUSED WITH: Every other

species. All are difficult to

separate without habitat

information.

The Starlight Bristlenose Catfish comes from certain Brazilian rivers and may be quite widespread. It grows to around 150mm (six inches) and keeps its attractive tail stripe far longer than other, similar species. Feed on lettuce, spinach, tablet food and soaked flakes. If a pair is kept in a species tank with plenty of bogwood they may spawn — the eggs resemble caviare and they and the fry are guarded by the male.

A breeding challenge



Like most *Anicistrus* species, the Starlight Cat will spawn in aquaria under the right conditions.



Catfish expert Dave Sands includes a tantalisingly unattainable fish in his festive selection for December.

CATFISH

Skunk in pattern only

SCIENTIFIC NAME: *Corydoras zircovatus*
COMMON NAME: Skunk Catfish
FAMILY NAME: Callichthyidae
CONFUSED WITH: Little else, because of distinctive pattern

Once imported in great numbers from Peru and sometimes Brazil, the Skunk Catfish has not been around much recently. Adult at 50mm, or two inches, this one is a natural choice for the

fishkeeper who would like to keep a species other than the Bronze or Peppered Catfish.

It has been spawned, but by all accounts not easily. The eggs are few and quite large in comparison to those of other species.

The fish come from white, bright waters and do not enjoy low temperatures or a low pH, so beware. A neutral pH and temperature around 80°F are suggested. Feed with fine shrimp and tablet foods.



The common name of this catfish refers to nothing more sinister than its body pattern.

Stocking-sized Synodontis



The Ko River Cat is one of the smaller *Synodontis* species, advantageous if you have limited space.

SCIENTIFIC NAME: *Synodontis koensis*
FAMILY NAME: Mochokidae
COMMON NAME: Ko River Cat
CONFUSED WITH: Several other *Synodontis*, but its small size and origins help identification.

The Ko River Catfish has many colour patterns, which makes it difficult to identify from single colour-form pictures. No two specimens are identical.

Generally, this catfish has a 'marmalade' pattern like the best sort of tabby cat, with large spots around the cheeks.

A plus point about this species, originally described from the River Ko on the Ivory Coast, is that it is adult at between four and five inches (100-125mm).

A number of West African *Synodontis* look very similar — especially *S. toanei*. Obviously this requires investigation by scientists well versed in the field.

Feed this catfish on prawns, flake and chopped earthworms and it will love you forever...

more than can be said for the wife, when she meets you coming home from a Christmas boozing trip.

SCIENTIFIC NAME: *Meredontotus nigrinus*
FAMILY NAME: Pimelodidae
COMMON NAME: Zebra Shoelnose
CONFUSED WITH: Nothing under \$5,000...

The Zebra is a beauty and I want one (why not a pair?).

I was the first person to photograph the holotype in the Sao Paulo Museum in 1879, and have made a fuss about it ever since. Heiko Bleher describes it as a fish with such a turn of speed as to make it well nigh impossible to catch. This might explain why it took so long to be discovered, although doubtless native fishermen have always netted and beheaded the odd specimen without a second thought as to its potential value.

This beauty graces the Amazon rivers (and has since been discovered in Colombian waters), holding its own in foaming cataracts.

Such an aristocrat would require a 200-foot aquarium at the very least, with waterfalls, rapids and a diet of caviare.



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of tropical fish which normally include 20 species of Synodontis, 30 species of Corydoras, 25 species of killies, Blue - Brown - Green - Heckel Tefe - Turquoise Discus, Clown - Blue-eye Plecostomus - Apistogramma, Haplochromis, and many others.

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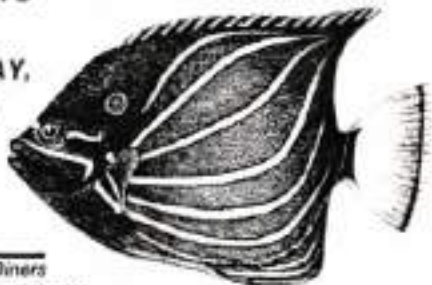
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Dave Keeley (left, and yes, without the beard) chats with KAHRA boss Melvyn John.



The fish in the marine section are on a completely different system to the livestock — a practice the home hobbyist would do well to observe.

WELSH WIZARDRY



Ask general manager Melvyn John why his shop is called KAHRA and he'll tell you it stands for 'Kerrison Animal Health / Riverside Aquatics'. That usually leaves the customer open-mouthed, but in fact the rather cumbersome name of Cardiff's most go-ahead retailers is a potted clue to its development.

The 'Kerrison' tag harks back to the days when Melvyn was a trainer of showjumpers and eventers. It's a stud name deriving from 'Keer', a mare he successfully co-opted on for six years. The link between horses and aquatics is not as tenuous as it may appear, for as a young man, Melvyn studied animal nutrition. This gave him a knowledge of the feeding requirements of all pet animals — cats, dogs, birds, reptiles, rodents and (of course) fish.

His first business in Cardiff was as a combined distributor and manufacturer of animal feedstuffs and a pet retailer. So successful was it, he soon looked round for larger premises and found them on Leckwith Road, in the quaintly-named district of Canton. He then embarked on a five-year development programme.

In 1985 he took over a small, but reputable, shop on the banks of the Taff, Riverside Aquatics (which accounts for the third element of KAHRA's present name). The premises were closed down, but the staff and equipment were taken on to coincide with a £20,000 refurbishment that took until the spring of this year to complete.

At the end of October, KAHRA threw wide its doors to stage an 'open day' for regular

This month's Dealer Spotlight focusses on the Land of Song, where we find a shop that successfully combines aquatics with other pet interests

customers and guests from the pet trade. Our own writer Dave Keeley was on hand to talk about marines, and PFK went along too; Melvyn had promised we would not be disappointed.

KAHRA certainly falls into the category of 'general pet store' but with a strong bias to fish and related products, which make up 50 per cent of the trade. The shop is spacious (4,700 square feet) and strikes a nice balance between the 'spit and sawdust' establishment and the kind of place where you feel awkward without a tie.

The layout and choice of shop fittings have been carefully thought out — Melvyn took advice both from a professional firm and an old hand in the trade, Armitage's rep John Lewis.

As you walk in, the small mammals are on sale to your left, well away from the rest of

the livestock. Then come reptiles, including a large female Burmese Python in a totally regulated and spacious vivarium designed to resemble a bygone shopfront.

Moving along, a wide selection of birds, including budgies, quails and parakeets occupy an aviary which Melvyn ruefully describes as costing more than his first house.

The aquatic section is at the far end of the shop, dominated by a wide selection of marine fish and invertebrates. These are on separate TMC filtration systems, mercury vapour lit. The electrician, who helped install them, built in safety factors like three independent circuits to prevent overload, safety valves with trip switches and splash-proof power points.

The freshwater tropicals are in individually filtered aquaria, and undergo a quarantine

period in the shop itself. The next phase will be to build a separate quarantine facility, which will effectively double the stocking capacity.

Many aquatic shops fall down on the quality of staffing, but all nine who work at KAHRA have been through an education programme run by the Pet Trade Association. One young lady, Geri Rogers, is currently taking a degree in Marine Biology at Swansea University. New staff take part in an apprenticeship to train them in merchandising and retail sales management — so whatever your query at KAHRA, it will be answered knowledgeably and courteously.

A big strength of the shop is that it sells not only the livestock but all the back-up goods necessary for their well-being. If it's reptiles that interest you, there's a selection of live foods and ceramic vivarium heaters.

If marines are your hobby, KAHRA carries all the remedies, water treatments and foods, including the frozen Gamma and Waterlite ranges. And the same holds true, whether you keep a parrot or a pony.

When a shop spreads its net so wide, the accusation is usually: "How can they possibly know much about fish, if they do all the other pets too?" But KAHRA defeats this argument by having at least one member of staff specialising in every area.

Dave Keeley, a man not known for dispensing praise lightly, was full of it. "Without a doubt, the best in South Wales," he said. "They really try, and they really care." ■



Most of KAHRA's freshwater tropicals are of the commoner species, but they do carry the more exotic, too — like these Sorebim lime cats.



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Xmas cheer

A hundred pounds' worth of voucher prizes, to be spent how you like at one of Britain's biggest aquatic stores — that's the lure of this special Christmas competition.

J.P. Pet Centre of Great Yarmouth are offering vouchers to the value of £50, £30 and £20 to the senders of the first three correct solutions to our word grid.

And you don't need to live in the Norfolk area to redeem them — as one of the most comprehensively-stocked mail order companies, J.P. will dispatch the goods by post. A glance at one of their regular advertisements will give you some idea of what they offer.

So what do you do to be in with a chance?

Answer the eleven clues, each of eight letters, and fill them into the numbered grid. Then read down the shaded

squares to find the hidden word.

Write this on a postcard or the back of an envelope and send to: J.P. Pet Centre Contest, Practical Fishkeeping, Denton Court, Berton, Peterborough PE3 8DZ, to arrive not later than Monday, December 22nd.

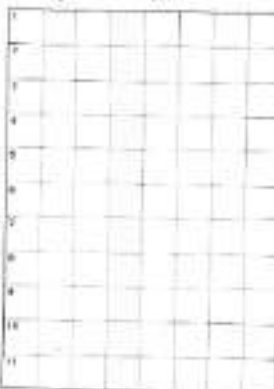
Don't forget to include your full name, age (under 16) and address on your entry.



Here are your clues:

- 1 The Elephant Nose fish is one of these.
- 2 You ought to gain this from your hobby, as fishkeeping is fun.
- 3 This shows up bacteria on microscope slides.
- 4 Prominent food has this structure.
- 5 Water should be clear and clean if this.
- 6 A trap is an aid to this with some livebearers.
- 7 Water (and babies) benefit from this, regularly!
- 8 Sound like pyjamas, these fearsome characins.
- 9 Electric eels are good at this — sounds attractive, but isn't!
- 10 The world's longest snake, sounds like a girl fooled another.
- 11 Embarrassed? No, just a popular type of terrapin.

Once your clues are correctly filled in, read down the shaded column for the word that could make you a winner.



A FISHKEEPERS ALPHABET

WATER CHANGES

Join the RPWC brigade, and watch your fish flourish. The letters stand for 'regular, partial water changes' — arguably the most vital element in aquarium husbandry.

In the days before sophisticated filtration, everyone could tell when their tank needed freshening up. Now, it's not always so easy. Undergravels, and more especially power filters, are excellent at taking out suspended solids so that water — to all intents and purposes — looks clear and clean, week in, week out.

But an aquarium is a closed environment, in which fish feed and excrete. Even with the intervention of nitrifying bacteria, waste products build up. It's only by regularly replacing part of the tank volume that these are diluted to safe levels. The watchword is 'little and often', although experts disagree as to exactly how much water should be changed, and at what interval.

For an ordinary freshwater aquarium, 25% every fortnight is about right. Take the opportunity to use a gravel-cleaning device to remove solids drawn into the filter bed. Avoid vacuuming gadgets that

merely pull water into a fine-mesh bag and return it to the tank.

Instead, opt for a model that actually allows water to be drawn off to waste.

Twenty minutes before a water change, turn off the electric so that heaters are not cracked as the level falls. Replacement water should be left to stand in a closed container for at least 24 hours, and brought to approximately the same temperature as that remaining in the tank with boiled water from the cold tap. Never draw water from the hot tap — it is likely to be contaminated with traces of copper from the pipes.

If you have a fish house, it is worth thinking carefully about ways of speeding water changes and disposing of the waste water. The less you have to run around with buckets and lengths of siphon tube, the less of a chore water changing becomes...and human nature being what it is, simple tasks are more likely to be performed on schedule.

One last tip — don't trust to memory your water changing schedule, but keep a chart and pin it on the wall. The same chart can also detail other routine maintenance that might otherwise be neglected.

It was one of those shops you don't see so many of nowadays — tucked in a sidestreet away from the main tide of shoppers, relying for trade on word of mouth.

A peeling sign over the dusty plate-glass window announced to a largely disinterested world that this was Grimadons' Aquatic Supplies, and anyone venturing over the threshold would find that the owner — old Jack Grimadon — was perfectly in keeping with his surroundings. Shop and proprietor both seemed to belong to a bygone age. Not for Jack the bright lighting, the displays of up-to-date filtration equipment or even the all-glass aquaria of his competitors.

But the fish — as Ernie Cartwright was to discover — were a revelation. He hadn't intended to be in this part of town, but it was the week before Christmas and he was anxious to buy his nephews Darren and Andrew something for the community tank they shared. Something out of the ordinary. So far he had met with no success. Then a young assistant in the other shop he'd tried had (rather disloyally, Ernie thought) suggested in a whisper that Grimadons' might be the answer.

And so it proved. As Ernie's eyes accustomed themselves to the gloom within the little shop, and the old man nodded silent assent to a request to look round, the visitor gave an involuntary gasp of surprise and delight. The old angle-iron tanks were a sparkling panoply of the rare, the unusual and the bizarre.

Ernie had not believed there could be such a treasure house of fish in such an unpromising

Winners

THERE was a colossal response to our October competition sponsored by John Allan Aquariums Ltd. Hundreds of you solved the secret of the snail and arrived at the slogan 'TOMORROW'S HOOD TODAY'.

A four-foot Multilux hood is on its way to 13-year-old Rex Cartney, of Meopham, Kent; a three-foot version to nine-year-old Paula Gammon, of Rochdale, Lancs; and a two-footer to Miss V. Bilverstone (13) of Thetford, Norfolk.

Now try your skill at this month's word grid and set yourself up in style!

THE COLLECTOR



• NICK FLETCHER

setting. But there they were, all beautifully cared for. And all for sale.

The inevitable question was met with a non-committal reply. "Contacts in South America," was all the old man would say. "Good contacts."

It was the head of the fish that riveted Ernie to the spot. Not a fish-like head at all, but uncannily human. Gradually he took in the body as well... curiously flattened, delicately fringed with long fine that vibrated hypnotically. And the tail — incongruously tapering.

"Oh, that," said Grimsdon, moving out from behind the counter slowly, deliberately, like some night-stalking primate. "That's a Black Ghost Knife Fish. Not a species I'd recommend for beginners."

But Ernie barely heard the old man. It seemed as though time and space had suddenly lost their meaning. In his mind's eye, he was no longer standing in a run-down shop, but running the rapids of an Amazon tributary in the company of strange, wild-featured Indians. For seconds that seemed like hours, he was transported to another Continent, summoned by untold gods to a world in which he had no place, which was actively hostile to him. Ernie shuddered, blinked, returned with an effort to reality, if indeed this shop were real.

"How much for the fish?" he asked, sharply.

"It's a well-grown specimen," replied Grimsdon, the eyes behind the bottle-glass spectacles strangely bright. "I can't let it go for under £30. And there's something you should know."

Ernie raised his eyebrows quizzically.

For the Festive Season, editor Nick Fletcher presents a fishy tale to chill the blood . . .

"The Indian collectors have a horror of these fish," continued the old man slowly. "They believe that the souls of their drowned comrades are reincarnated as the Black Ghost. And who is to say they are wrong? Just look at that face..."

Once more the eyes of the fish and its prospective buyer met, once more it seemed as though Ernie was slipping away from reality. But his mind was made up. All thoughts of buying his nephews something for their tank were selfishly pushed aside. He, Ernie Cartwright, must own the Black Ghost — whatever the old man said.

"The senile fool probably got attached to it and is trying to scare me off for fear of losing a pet," said a voice inside his

head that seemed curiously unlike his own.

Grimsdon murmured to the fish, which came as if bidden to the sweep of the net. He bagged it and stood for a moment as though reluctant to exchange it for the handful of notes that an increasingly impatient Cartwright was proffering...

A more bizarre case Detective Chief Inspector Naylor had never encountered. And the CID were at once baffled by the circumstances and infuriated that their Christmas leave (such as it was) had been summarily cancelled.

Naylor looked up from his notes and once more surveyed the bedsit where Cartwright had met his end. The body lay amidst the shattered remnants of a fish tank. The water it had

"That dart, wherever it came from, was tipped with curare . . ."



once held, all forty gallons of it, had cascaded through the ceiling of the flat below, alerting the tenant who had called the police when her rush up the stairs and frenzied knocking at Cartwright's door were met with silence.

"I don't get this at all," said pathologist Leslie Davies, who had been called in after the fingerprint boys had gone over the flat with their brushes and powder.

"It was obviously the dart that killed him..." and here he pointed to the slim, feathered object that protruded between the shoulder blades of the dead man.

"Not the dart itself, you understand..."

Naylor did not understand, and told his colleague so. "I can't say for sure until the lab has run some tests. But from the look of it, that dart — wherever it came from, and the lord knows where — was tipped with curare," said Davies.

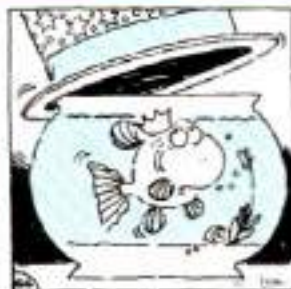
"A poison not unknown to modern medical science. But originally it was used by the Amazonian Indians to bring down game..."

In the little shop, safe behind the 'Closed' sign, old Grimsdon crouched beside one of his tanks. He crooned to the occupant, rocking backwards and forwards rhythmically on his arthritic heels. "You're home, Consuela. You're home!"

And in a way, the man who had in his youth travelled the world in search of rare fish... married an Indian girl three weeks into the jungle from Manaus... and lost her to the rapids when their shared canoe capsized... in a way he was entirely right.

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ON FILE

Product reviews by technical editor Cliff Harrison



• CLIFF HARRISON

BOOKS

THERE are few books devoted exclusively to fish breeding, and even fewer that combine the necessary range of detail with a clear and organised approach that will maintain the interest of the relative novice.

An Interpet Guide to Fish Breeding by Dr Chris Andrews is the latest in the **Salamander Books** series, and maintains the excellent standard of earlier volumes.

Dr Andrews is a well-known fishkeeper and author, and is currently Assistant Curator (in charge of the Aquarium) at London's Regents Park Zoo. He

starts the book with general sections on water quality, feeding and the various problems that can affect success. He then covers the breeding patterns common to particular families — cichlids, gouramis, characins, barbs, danios, rasboras, catfishes, livebearers and bodwater species — but detailing the differences that are inevitably to be found between individual species.

In addition to making the whole topic of breeding look achievable by the average hobbyist, the book gains by making the subject as interesting as it really is: the photographs of broods of tiny, pectilymarked cichlids being protected by their parents convey that interest far more effectively than any number of words, and I am sure that every reader will soon be itching to get started on a fish breeding programme. The title retails at \$4.95.



Latest in a popular range of books from Interpet — with a well-known author.

WITH so many companies in the aquatic trade shouting their claims as "biggest" or "best" it is refreshing to find a retailer quietly offering the sort of service that, I'm sure, would help make the hobby even more popular if it were copied by some others.

Kingfisheries of Bockenheim, Kent, is one of the longest-established aquatic retailers in the region, founded in 1853, and has been located in its current premises since 1958. Stan Kemp, the manager and director, originally started with Kingfisheries at the age of 13 as "Saturday boy", moving to full-time employment at 21, and overseeing the company's development since then. It has a normal staff of six, five of them full-time, plus two further part-timers in the spring and summer, when the coldwater section becomes especially hectic.

Kingfisheries occupies an interesting position in the retail trade, in that it offers a larger range of stock than most aquatic specialists. Yet it retains the personal touch that often seems to be missing with some of the larger operators.

The reality is that Kingfisheries is anything but small: with over 200 tanks (plus more than a dozen ponds in their outdoor section), I calculate that they must have available more than 300 separate species and varieties in the freshwater tropical field

POOLS

MANY people, both traders and hobbyists, find that their space requirements for coldwater fish can vary greatly from season to season: at a peak in the spring and summer, as the newly-hatched fish are growing on, and dropping in the autumn and winter as the unwanted specimens are culled or disposed of.

There is a new range of above-ground dismantlable pools, constructed of galvanised steel and aluminium tube with a high-tensacity fabric liner, for durability and a minimum of maintenance.

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ground.

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They are 50 cm deep and 166 cm wide, and can be provided in any length in multiples of three metres. The smallest tank, holding 3000 litres, costs £298 plus VAT and delivery, and optional extras include roof covers, ground mats and foot plates for soft ground. The six metre size, holding 6000 litres, costs £425 plus VAT and delivery.

For more details contact **Fast Engineering, Old Mill Industrial Estate, Muckamore, Co. Antrim, No. Ireland, BT41 4QE. (Tel: 08454 63686).**

The Fastank Raceway may not be the most visually pleasing of pools, but is fully portable and practical.



SPOTLIGHT ON KINGFISHERIES

alone, plus an interesting range of marines and coldwater fish. Moreover, the quality was good, with the fish well settled in established aquaria: I lost count of the number of unusual species I found there, and that extends even to the very rare, such as their albino Lung Fish at £750.

Stan's policy on equipment is to offer those brands he is personally happy to recommend, and for that reason names like **Eheim**, **Hoffman**, **Tunze**, **Oase**, **Stuart Turner** and **Evee-Flo** are to the fore. Careful recording of all equipment sales and subsequent monitoring of returned and faulty goods enables suspect brands and models to be identified and action taken.

He also stocks **Seabray** aquaria and cabinets — sharing my view that the high standard of workmanship, plus the special textured laminate they use in a wide range of wood finishes, combine to create the most striking of all display units.

It's not just the big, expensive items you'll find: Kingfisheries have many spares for 20-year-old **Eheim** models in stock, for example, together with pool, fountain and filtration accessories. The company's most innovative

Kingfisheries manager Stan Kemp — he'll only sell equipment which he would be happy to use himself.



Kingfisheries' impressive frontage features a full display of pumps and fountains by UK Oase distributors, Water Techniques.

scheme launched in conjunction with a leading manufacturer is the "**Tunze Gold Card**": this offers special discounts on marine fish to purchasers of tanks with complete Tunze filtration installations, the first such arrangement ever made available in Britain.

You'll find Kingfisheries at **308 Croydon Road, Beckenham, Kent (01-650 3716)**, and street parking is available nearby (but mind the yellow lines immediately in front of the shop). It's open six days a week, Monday to Saturday.

Forthcoming attractions include a visit by **David Sands** to sign copies of his book, "**Catfishes of the World**" (that's on December 13th, and a week later on December 20th. **Chris Rawlings** will be on hand to answer questions on the Tunze filter systems.

Chris is director of **Aquamagic**, the sole UK concessionaires for Tunze, so it should be an invaluable opportunity to learn more about this high-tech range that includes pumps, mechanical and biological filters, protein skimmers, automatic CO₂ dosing equipment — in fact, just about everything needed to ensure problem-free marine fishkeeping.



Unusual fish are commonplace at Kingfisheries — like this characin with the impossible name of *Bryconethiops microstoma*.



Corydoras fans find a treat at Kingfisheries, in the shape of species like *C. barbatus*.

Space

Ever heard of an aquaholic? No, it's not somebody who feels compelled to drink gallons of water. It's an exponent of an outing known as a 'fish crawl'.

This takes the form of a whistle-stop tour of as many aquatic retailers as possible in a single day. And the true aquaholic is likely to return with something unusual, bizarre or downright colossal by fish standards.

Cambridge couple Tony and Stephanie Barton are self-confessed sufferers from this happy malady, to the extent where they will have to move house if their prized Red-Tailed Catfish gets any bigger. His present 100-gallon tank was custom-built to just squeeze through the front door.

It all began modestly some six years ago, with a 40-gallon aquarium stocked with barbs. Within months, they had progressed to small cichlids... then larger ones... then catfish. Soon their first-floor living room was crammed with eight tanks, and even the cat was finding it difficult to move around. At that stage, the Bartons cried 'enough' and today there are just five aquariums. But what aquariums they are!

The largest holds the Red-Tail, Marmaduke. He's the second of his species they have kept, the first sadly dying after two years from an infection. At first, Tony and Stephanie were too upset to buy another, but eventually ordered his replacement from Cambridge Aquaria.

Marmaduke was flown over from Brazil, arriving at their door in a sturdy plastic dustbin bag. He has grown from one foot long to two, and with the

Just how many aquariums can be packed into a modest first-floor flat? Editor Nick Fletcher meets a couple of hobbyists who have more fish than the average shop...

care and attention he receives, that's not surprising. Monday to Thursday he gets through a daily tub of worms. Friday is fast day, Saturday and Sunday he gets chicken livers.

The tank is serviced by a large external Eheim power filter with an inside foamback up, and every Saturday Marmaduke is freshened up with a ten per cent water change. Algae is removed from the glass with a toothbrush mounted on a long handle.

The other real 'character' fish is Cornelius, a large and rather ill-tempered *Tilapia buttikoferi*. He was bought after a classic 'fish crawl' that took in Birmingham, Stratford-upon-Avon, Oxford and eventually Airport Aquaria at Heathrow.

The Bartons' Tilapia buttikoferi attempts to bite the hand that feeds it.



Left: Tony and Stephanie Barton, at home with fish... and plants... and animals.



Over the years, fish have come and gone — but several 'originals' remain in two mixed tropical communities. A 60-gallon tank is home to two Uarus, a Severum, two *Sarbania*, a large *Hypostomus*, a very photogenic Giraffe-nose Cat *Acheilichthys occidentalis*, two Upside-down cats, a Silver Shark, six Tinfoils, two Angels and a Firemouth. An unlikely mix, but they get on fine.

The smaller community gives pride of place to a couple of Clown Loaches that at their present size of seven inches would break the bank of most fishkeepers.

The coldwater aquarium is a fairly recent addition. It is stocked with fancy goldfish from the local Monkfield Aquatics and Needingworth Fish Farm. Tony Barton was

Pride of the Bartons' family of fish is their Red-Tail Catfish, Marmaduke. He's doubled in size in just eighteen months.



Invaders

having trouble with the usual power filter when I visited, and like all good practical hobbyists was making do with a number of makeshift devices until the filter could be repaired.

He has always kept meticulous records of routine maintenance, feeding regimes and water changes, and the details in his log record every fish that he has owned over the years — including price, size when bought, diet and (in the case of some of the cichlids) breeding successes.

"We don't go out a lot, apart from visiting aquatic shops, and when we first began getting keen we felt fishkeeping was taking over our lives.

"Now, however, we feel it is a part of our lives that neither of us would be without," says Stephanie.

"I used to be a landscape gardener, but our present flat doesn't have a garden" adds

Tony. "So our tanks, and the houseplants that surround them, are an attempt to create that missing element indoors."

On a final, practical note, Tony has an £11,500 flood damage clause in his house contents insurance policy. "It covers the tanks, not the fish, but is very necessary for someone with so much water around."

"How much?"
"We calculated it once. It came to a ton and threequarters."

• Do any of you readers feel you qualify as a "fishkeeping fanatic"? Do you have wall-to-wall aquariums or ponds — or perhaps specialise in the unusual?

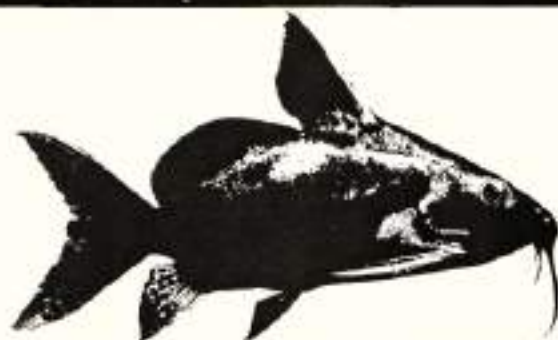
Write in and tell the editor about it. The address: Fishkeeping Fanatics, Practical Fishkeeping, Bretton Court, Bretton, Peterborough PE3 8DZ.



Studies have shown that of all the catfish, *Auchenoglanis occidentalis* comes closest to having real intelligence.

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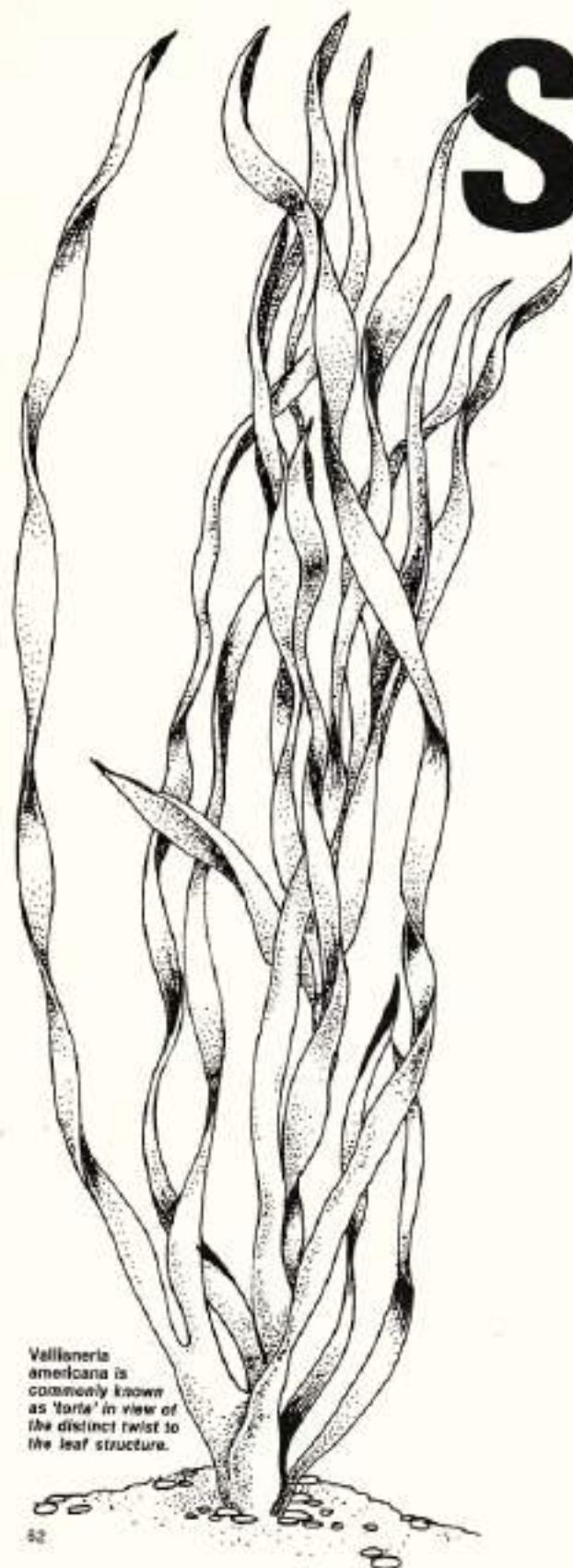


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Vallisneria americana is commonly known as 'tortie' in view of the distinct twist to the leaf structure.

52

Vallisneria — everyone is familiar with them, and they are probably the commonest group of plants to be found in aquaria. Popular names include Tapegrass, Eel Grass and Wild Celery — although where in the world the last name was coined is a mystery to me. If it were placed in a salad I don't think that I would have much trouble in distinguishing it from the real thing, which is presumably 'Tame' Celery.

Vallisneria obey all the criteria necessary to make good aquarium plants. They will flourish in hard or soft water; are not too critical about the temperature range they will tolerate; do not need pruning; propagate easily from runners; and finally, among the species are members suitable for all positions in the aquarium,



• BARRY JAMES

except for the very front.

Vallisneria are world-wide in distribution except cold, temperate regions. They are completely aquatic and have no emersed forms. Indeed, they will shrivel and die if the body of water in which they are growing dries up completely. The insignificant flowers are borne on the tips of coiled stems, and the pollen is waterborne. However, these plants seldom produce viable seed in aquaria.

At one time botanists thought that there was only a single species, *V. spiralis*, with numerous growing forms. Nowadays, ten species are recognised, although the genus is in urgent need of revision.

The commonest species in commerce is Straight Vallis (*Vallisneria spiralis*) — the specific name refers to the coiled flower stem, not the leaves. It originally hailed from Southern Europe and the fringes of the Mediterranean basin. But it has now been introduced to most areas of the tropical and sub-tropical world and is cultivated widely in the Far East, South America and Florida by aquatic nurseries. It reaches a height of 80 cm, the blades being 4-8 mm broad. Colour is pale to mid-green according to conditions. *V. spiralis* should be used at the back and sides of aquaria. It requires no special substrate, plain washed gravel being sufficient.

Equally popular as the above species is a shorter plant with coiled leaves. The correct name is *Vallisneria americana*, but its



Deep tanks cry out for *Vallisneria 'contortionist'* but it is relatively delicate and subject to snail attack.

PRACTICAL FISHKEEPING

RASS!

Plant expert Barry James spills the beans on a group of plants which, like the goldfish, are so undemanding they tend to be taken for granted.

old name of *Vallisneria spiralis* var. *terrifolia* still persists, and it is referred to as 'torta'. This species only reaches a height of 40 cm and is often much smaller, making it an ideal candidate for the middleground of our popular 15" deep aquaria. It prefers a temperature in excess of 72°F and is happier in soft to neutral water. In harder water it will often glaze with the deposition of lime salts on the surface of the leaves.



The bright apple-green colour of *Vallisneria spiralis* is distinctive, but this plant requires plenty of nutrients.

I have noticed that when this plant is grown in aquaria with sub-gravel filters it will often form a depauperate form only an inch or so high. This is most attractive, but the plant reverts to its normal height when placed in tanks with other forms of filtration.



The staidly of tall aquaria, *V. gigantea* luckily needs modest levels of light and will stand low temperatures.



Many people think of *Vallisneria spiralis* as having twisted leaves but the name refers to the coiled flower stem. To confuse matters, a common name is 'Straight Vallis'.

Vallisneria spiralis comes from the Far East and Japan. It resembles a giant *V. americanum* with gently coiled leaves bearing tiny spikes along the edges of the blades. This species reaches a height of 60-70 cm, the blade width being 8-10 mm. It is a beautiful plant — bright green in colour — but does not appreciate temperatures lower than 75°F. It requires a rich bottom soil, preferably Laterite, to maintain its robust growth.

Vallisneria (contortionis) is a plant of unknown origin. Probably the most attractive of the genus, it has tightly coiled leaves of a pale, translucent green. These reach a height of 80 cm but are only 4 mm broad. It is a somewhat delicate species needing high temperatures, and is readily attacked by snails. However, a dense stand of this plant is an unforgettable sight, and well worth the challenge.

The monster of the family is appropriately named *Vallisneria gigantea*. This huge plant reaches a metre in length with leaves up to 20 mm in width. If this plant didn't exist it would have been invented for deep tanks! Not at all fussy regarding its surroundings, it will survive in temperatures as

low as 55°F. It is a greedy feeder and plenty of fertiliser should be added at regular intervals.

Under good conditions it is very prolific, throwing runners in abundance. We have imported from Java a Giant Vallis which is very short and stocky but which seems to grow to the



This is the giant of the Vallis family — *V. neotropalis* can reach two metres in height.

normal size in aquaria, so I assume that it is *V. gigantea* adapting to local conditions in that country.

Vallisneria neotropalis used to be called *V. gigantea* var. *rubra*. It grows even larger than *V. gigantea*, reaching a height of two metres, with leaves up to 30 mm wide. The colour varies from wine-red to olive-green according to the amount of sunlight it receives. It is said to come from Florida and Cuba, whereas *V. gigantea* was collected in New Guinea.

While in Singapore I had drinks with a gentleman who worked for the United Nations Department of Fisheries. He had just returned from New Guinea and claimed that in one of the high mountain lakes he had discovered a species of *Vallisneria* only a few inches tall with wine-red leaves. Such is the stuff that dreams are made of, as Dave Sands would say...

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Now and again, we come across a truly pioneering fishkeeper. In such a mould is young Scot Keith Todd, who is following in the footsteps of Victorian amateur biologists in studying the native creatures of Ayrshire's diverse shoreline.

In this year's Scottish Aquarist Festival, Keith's native marine furnished aquarium beat dozens of freshwater entries, my own included. This occasion drew my attention more than ever to the attraction of 'going native'. For while I've had several such set-ups over the years, all have played second fiddle to my tropical marine, and all have been temporary affairs. The inhabitants were returned to the sea when the warmer weather came.

Keith got rid of all the distractions. Out went his Avarosis, Clawed Toads, Cichlids, Catfish and aquarium heaters — though he did retain one tropical marine tank in his bedroom, alongside the posters of Kiss and Marillion and many weighty tomes on aquatic life that left me wishing I'd better applied myself at school!

Keith's coldwater marine hobby was to dominate the rear half of a double garage, which he insulated with thick polystyrene boards to keep out the heat. Every tank was turned over to natives, mainly set up conventionally. Some were 'natural' systems, others were equipped with trickle filters and protein skimmers. Each was an amazing replica of a local rockpool.

Barnacles in an inert aquarium opened to filter their living from the flowing water. Devil Crabs and Lobsters lurked in another. Pipefish, Butterfish,



Keith's eight-foot tank, whose inhabitants tend to emerge only at feeding time.

SHORE-FIA

You find the most unexpected sights in garages, says Scottish correspondent Gordon Walker. This month he meets a true pioneer in the field of native marines...



The bluish colour of a live lobster is quite a revelation to those who have only seen the boiled version.

Gobies, all gorgered and threatened amid red seaweed, in one tank. Eel Grass and a few sprigs of *Caulerpa* were growing, although Keith was concerned at the rather low light levels. Many types of living rock actually thrive in these duller tanks, their population of worms and sponges relying, not on light, but on water-borne food. Keith suggested that many of the more interesting inverts tend to hide under rocks in well-lit set-ups, but have no such reservations in the murk.

I watched Keith develop his own ideas about native marines, setting him apart from less investigative hobbyists. What do you do when there are no handy reference works? Keith is a practical fishkeeper, turning pipes and plumbing equipment into giant protein skimmers and filters, and generally relying on his own wits to make the project a success.

He's even got hold of two beer-cooling units, which he repaired and which now cool his 'prestige' eight-foot aquarium. Each unit is connected to an external canister filter to create a constant trickle of refreshingly chilled water. Normally 50°F is maintained, and even on the hottest summer day it never rises above the low sixties. This cool water is really essential if you intend setting up a tank based on the sub-littoral zone.

Dunes	Splash Zone	Upper Shore	Middle Shore	Lower Shore	Sub-littoral zone
	Salt spray at highest tides	Wet only for short periods	Rock pools but much exposed for long periods	Only uncovered for short periods at low spring tide	
No marine life of value to the aquarist			Mainly creatures hardy in well-maintained aquaria	All fish and inverts need low, stable temperatures and therefore a cooled aquarium	High tide Low tide
(A) Bivalve molluscs, Shore crabs, Barnacles and periwinkles. (B) Flatfoot anemones. See clags. See Hares, Octopus, Cockle stars, large Urchins.			A	B	Ocean fish (cod, plaice, mackerel, sharks, rays, squid, jellyfish, eels etc)

Collecting points on a typical stretch of Ayrshire shoreline, showing the various zones from dune to sub-littoral.



'Godalla' the conger, moving at speed (as usual) in pursuit of a meal.

E SUCCESS

In March and September usually around the 21st, the length of day and night is equal and the tidal equinoxes occur. These bring us the highest and the lowest tides of the calendar. Only at these times can a land-bound enthusiast collect unusual specimens from the lowest point of the exposed shore.

Interestingly, many factors affect the height of the tidal swell that sweeps round the British coastline every twelve hours and twenty five minutes. The height of rise of a spring tide at London Bridge is 20ft — at Avonmouth 40ft — at Portland, a mere seven feet. Most newspapers publish tide tables, and you should familiarise yourself with these before planning an expedition.

Seawater from the sub-littoral zone is suitable for domestic aquaria, but only if taken from a clean location. To be sure, pass it through a diatomic filter before use, to remove the suspended particles and any parasites that might be lurking. If in doubt, use 'Instant Ocean'.

Creatures such as Periwinkles, Ragworms and Flatworms still respond to the tides when kept in aquaria miles from the sea — migrating up and down the rocks with the rise and fall of the tides many miles away. Keith Todd is currently building two tidal tanks that will help such animals live a more natural life!

But his main triumph has been to successfully keep fish from waters deeper than the rock pools, fish that require low temperatures and stable conditions to survive.

At present his eight-foot tank is home to a Sea Scorpion over a foot long, with jaws almost as wide again. There's also a young Conger Eel which featured in Ayshire Aquarist Society's last open show in a 'guess the weight' contest — he scaled 12oz, but that was back in June. His appetite is enormous. Bright steely eyes

are constantly looking for any prey that may be swallowed whole or twisted from a carcass. Vying for star billing is a Dogfish with a similar 'Jaws' mentality.

None of this trio is especially active, apart from feeding time. They usually retire to a network of rocky caves, leaving a team of Blennies to mop up the scraps if the Devil Crabs don't get there first.

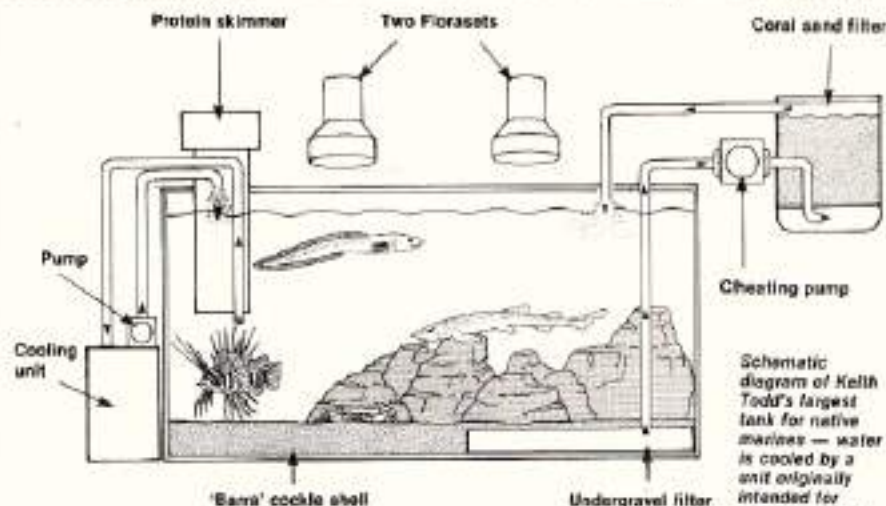
Large Common Starfish add an extra splash of colour to the scene, and are usually left alone if their companions are

well-fed.

Main filtration for the eight-foot is through coral sand in a large central heating tank, but some of the work is done by an undergravel beneath the rockwork. Water is circulated by a Grundfos steel central heating pump, a favourite model with Koi keepers.

Despite using two Floraset lights, Keith has not been able to maintain sea plants in the big aquarium for any time. Kelp disintegrates, leaving the water with a slimy texture. However, experiments in smaller tanks have been more successful with Eel Grass and Sea Lettuce.

Keith's determination to be different and his respect for marine life bode well for his future in the hobby, and like anyone who is really keen, he would be happy to talk to fellow native marine keepers — if only to find out how many there are! His address is: 14 Beech Avenue, Kilmarnock, Scotland.



Schematic diagram of Keith Todd's largest tank for native marines — water is cooled by a unit originally intended for draught 'heavy'.



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PERFECTIONISTS...

Once you progress beyond simply keeping a freshwater community tank of the hardest of species, then it really can become important to know more about the precise characteristics of the tapwater you use, or of the water actually in your various aquaria. Things like its hardness, its acidity or alkalinity, and the nitrite content.

This information is valuable if you want to attempt the breeding of even the most straightforward egg-laying species like barbs and some characins. For the rarer types, water conditions that are less than ideal can not only make it impossible to breed them, but difficult even to keep them while you are growing them to maturity.

For marine species, test kits are absolutely vital from the day you first set up the tank: the water will need to be monitored on an almost daily basis, certainly in the first few weeks, if losses of expensive fish are to be avoided.

Tetra offer test outfits to suit the needs of both freshwater and marine enthusiasts — for the former the **TetraTest Laboret**, for the latter the **TetraTest Marine AnalySet**. Each offers a useful range of indicators of water chemistry, packaged as a single comprehensive kit with clear descriptions both on the method of testing and on the interpretation of the results. Prices at £13.25, the **Laboret** comes in a fitted cardboard box.

The **Marine AnalySet** is far



The **TetraTest Marine AnalySet** is the prestige gift for any marine fishkeeper who really cares about water quality.

IT'S A GIFT!

You can't put a fish in a Christmas stocking, so what presents are suitable for the aquarist who has everything? Technical editor Cliff Harrison offers a few suggestions to suit all pockets.



Available in conventional or "looseleaf" binder form, it features virtually every species you are ever likely to find offered for sale (plus many others that you probably won't). In addition to an excellent colour photograph of each species, you'll find about a half-page of background information on its habitat, water conditions,

more comprehensive, with additional tests, water treatments and Tetra's unique colour matching wheels: it is packed in a fitted plastic mini-briefcase, and costs £37.65. Your dealer should normally have these in stock, but if not he can obtain them within a few days.

PIONEERS...

One of the most useful products I have ever tested is the **Meridian Water Changer**, from Interpet: it is a routine maintenance device that clips over the top of the aquarium at one end of a long length of flexible plastic pipe. It isn't ordinary pipe, but rather a Figure of Eight, with one pipe rather narrower than the other. The far end of the narrow pipe is connected to a coldwater tap, and this supplies water to a very fine downward-pointing spray in the head: at the same time, a siphon device in the head, connected to the wider pipe, is drawing water from the aquarium as it fills up to maintain a constant level.

The siphon is being continuously and automatically restarted by tapwater entering it in the head: and the far end of the wider tube must be placed into a sink, drain or



The '**Fishkeeper's Guide**' series by Salamander is fast becoming Britain's most popular range of aquatic books, with new titles appearing regularly.

some other waste outlet below the level of the aquarium.

It sounds complicated, but I've found it to be extremely useful. The spray of cold water entering the aquarium is so fine that the aquarium heater-stab can easily maintain the temperature over the hour or so it takes to achieve a partial water change, and the spray's aerating action helps to remove chlorine etc. as the water goes in.

Where the aquarium has a deep integral lighting compartment at the top, the rigid plastic siphon tube that extends down into the tank can be replaced with a longer one — your dealer may have a suitable pipe. Just remember that the bottom of it is the level at which the water level will stabilise during water changes.

The **Meridian** comes with approximately 20ft of tubing as standard, and costs £18.55. Twenty-foot extensions are available at £7.94, and for the shop or serious fish breeder, an 8-unit manifold kit is available for £141 complete. Again, this is something your dealer may have to order for you specially.

BIBLIOPHILES...

Books are always an acceptable gift at Christmas, and one of the very finest has to be **Exotic Tropical Fishes** from TFH Publications.

feeding, size and other useful or interesting facts. Unlike some books that are just "photographic dictionaries", **Exotic Tropical Fishes** is really a working book for the enthusiast, with additional sections on plants, breeding, feeding and general fishkeeping hints. Overall it runs to more than 1200 pages (that's the latest "Expanded" edition), and if you choose the looseleaf version you can update it with pages of new species available from the publishers, or with your own additions from a variety of sources. Retail price is £39.95 in the looseleaf form, £32.95 in conventional hardback.

An excellent series of inexpensive books is available under the banner '**A Fishkeeper's Guide to...**' Published by Salamander Books, the range includes titles such as **Plants**, **Central American Cichlids**, **Maintaining a Healthy Aquarium**, **Garden Ponds**, and **Reptiles and Amphibians**, plus more general ones covering the **Tropical Aquarium and Marines**. The illustrations are particularly good, the text clear, and the authors picked from amongst the most knowledgeable in their fields. Retail price is £4.95 each, though you may find some of the original editions of early titles around at £3.95.

Judging by the difficulty of obtaining copies, Tetra's latest handbook, **The Cichlid Aquarium** by Dr. Paul V. Lotzelle, has to be one of the most sought-after titles on the subject.



Last time this Tetra book was reviewed, it was wrongly stated to be translated from the German. In fact, this is the original English text.

AESTHETICS...

Aquarium decor has to be selected with great care, since so many attractive items turn out to be harmful to the fish: many natural rocks and branches will seep chemicals into the water over a period of time, and eventually this can

prove fatal to all forms of aquarium life. A safe answer is to turn instead to the **Simlawood** range of resin reproductions (below right) cast from ginseng, original pieces of birch and root, and handpainted in natural tones to be almost indistinguishable from the real thing. They are incredibly lifelike, and are ideal for aquaria, vivariums or plant displays.

Personally I think that many of the smaller pieces are more attractive than the larger ones, and they are likely to prove more versatile for siting among clumps of plants: the range numbers more than 50 separate items, including some rockwork reproductions, ranging in size from a few inches to several feet long. Prices start at under £3 for the smallest items, and a leaflet is available from the manufacturers. Contact **Batsford Products, 4 South St, Atherstone, Warwickshire**, enclosing a medium-sized stamped addressed envelope.

BUDGET-MINDED...

Algarda offer a variety of not-too-expensive products that are ideal stocking fillers, and which you'll quickly find are invaluable gadgets to have around.

Trying to arrange plants and decor in a deep aquarium can be very difficult, but with

Algarda's Aquarium Tongs — in 20" and 26" lengths — you can do the job while still looking in at the front of the tank.

Deep cleaning the aquarium gravel is as worthwhile an exercise as carrying out a regular partial water change, and their **Gravel Cleaner** lets you do the two together. A wide-bore clear plastic tube, attached to the siphon, is pushed into the gravel, causing it to swirl up and separate out from the waste and sediment (which end up in the bucket). Surprisingly, the gravel just sinks back again. Regular cleaning like this reduces the load on your filter system — mechanical or biological — and helps prevent unsightly waste being dug up by bottom feeders like barbs and cots.

Much of the output of your air pump may be wasted if you have a Heath Robinson arrangement for distributing the air to the various airstones and filters. **Algarda** offer a variety of airline accessories, the best of which are probably their gang valve sets which give really precise control over flow rates to aid balancing the various pieces of equipment.

Blocked airstones are equally wasteful of air: changing to **Algarda's Longlife Air Diffuser** will probably mean you'll never need to buy replacements again.

EXTRAVAGANT...

Extravagance at Christmas is a fault you can overlook in others — provided, of course, you are the beneficiary. In real terms, many items of fishkeeping equipment are far cheaper than they were just a few years ago, so value-for-

money would perhaps be a better description to justify purchase. **Powerheads** are a market that has seen a radical transformation, as many more aquarists recognise the advantage of converting their biological filters from air to motorised operation. Absolute silence and improved water circulation are the main benefits, and for marines the arrangement is almost essential.

Most of the leading manufacturers now offer suitable submersible pumps: **Interpet** has one of the very smallest, though others, like **Eheim** are not much larger (with a range of three models in different sizes and outputs). **Atlantis**, too, offer several models to suit different sizes of aquaria, these powerheads being based on the excellent **Internal Filters**.

GROUPIES...

Finally, for someone interested in a specialist group of fishes, consider membership of one of the specialist societies.

Typical attractions include newsletters, information sheets, regional meetings and shows, and often the chance to acquire quality stock.

Interest groups include marines, koi, cichlids, livebearers, killifish, catfish, and many others, including local associations. Typically, membership costs between £5 and £10 a year.

For more details, check out the "clubs" section in RPK's classified ads (at the back), or seek the advice of the Association of Aquarists in your search: contact **Jan Mallet, 31 Overstrand, Aston Clinton, Bucks**, enclosing an S.A.E. Merry Christmas!

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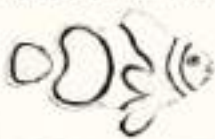
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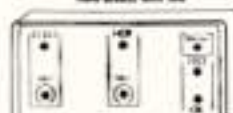
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Following my plea for better standards in goldfish varieties, a gentleman from Bristol contacted your editor, pointing out that the Bristol Society members were still breeding top quality stock.

Great, but where are these fish? Do they keep them to themselves, restricted to the tight circle of goldfish enthusiasts — I never come across them. My guess is that they obtain better prices selling to one another, rather than offering them to the trade where they would be received by a wider audience. This is quite understandable, but does nothing to improve the standards of goldfish keeping in general throughout the country...

I, of course, come across many garden pools during my travels, which although perfectly functional, suffer from one glaring defect. People seem stamped when it comes to putting an edge on the pool. Many simply lap over the liner, which means grass cuttings floating on the surface. Others use any old lumps of concrete, crazy paving, or discarded bricks which happen to be available.

This is such a pity, for why ruin the effect for the sake of just a little more time and expense? I have just edged one of my new pools with some gigantic slices cut from dead elm stumps. They had been lying in a wood by the nursery for the last few years. During this time they were covered by a layer of humus from fallen beech leaves.

Specialist societies continue to improve the standards of fancy goldfish — but do their efforts ever reach the general public?

COLDWATER DIARY

with Barry James



DECEMBER



Ferns are a natural poolside plant, and by siting them close to the spray of a waterfall you are giving them ideal conditions.

The slabs have taken on a beautiful, dark brown hue. They look extremely effective and will look even better when I have planted mosses and ferns in the spaces between them, giving a really natural appearance.

One plant which I frequently use as an edging plant is the golden Sagina. It will quickly form a golden carpet only one and a half inches high which is colored during the warmer months with tiny white flowers.

In this age of conservation, a lot of people are placing a couple of dozen tadpoles in their pool, hoping to establish a frog or toad colony. They are invariably disappointed when

no adults appear during the next few years. They fail to realise that the mortality rate among tadpoles and baby amphibia is colossal. Probably fewer than two per cent of tadpoles survive to return as adults to breed. It takes a minimum of two years for a frog to reach maturity, and it faces numerous predators during that period.

I have noticed that ferns are making a comeback after many years of neglect. Most water gardening catalogues now offer around half a dozen varieties. Of course, ferns and water have

a natural affinity, and no pool should be without at least a couple of clumps lining the bank. My own personal favourites are: *Athyrium filix-femina* (Lady Fern), *Onoclea sensibilis* (American Oak Fern) a species which will run in and out of the water but must not be planted in the water to begin with, *Metesuccia struthiopteris* (Cotrich Fern), *Cryptolaena flexilis* (Male Fern), *Phyllitis scolopendrium* (Harts Tongue Fern, evergreen) and *Polypodium vulgare* (Common Polypody, so common on old walls and banks in the West Country).

Most hardy ferns prefer a cool, rich soil that remains moist without becoming waterlogged. Such conditions can be obtained by digging in plenty of peat and leaf-mould into the existing soil.

The only real task in December in the water garden is to switch on the pool heater if ice formation persists for several days. However, if as the television news just announced, you are one of the forty five per cent of adults who suffer acute depression when the nights draw in, you can perhaps alleviate it somewhat by formulating new plans for improving your water features next season. ■

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NEWS AROUND

CALLING all club secretaries ... It may seem a long while to the 1987 Open Show season, but time marches on. Take advantage NOW of the FREE Practical Fishkeeping Diary Dates service.

Just send in details of your event, preferably on headed notepaper and three months ahead of the date your show takes place. We'll do the rest.

Address to write to is: *Diary Dates, Practical Fishkeeping, Bretton Court, Bretton, Peterborough, PE3 6DZ.* Meanwhile, here's a date you can't miss. June 20 and 21, Aquarian Fishkeeping Exhibition, Sandown Park Exhibition Centre, Esher, Surrey. Further details on 0422 50221.

So you think you've got problems ... Southport reader Nick Huxley suffered a 'catastrophic' loss of his Red Tailed Black Shark to one of his moggies, but which? Now he's watching his catfish closely, for as every student of aquatics knows, they're the ones with the Whiskas...

A farewell to Belle Vue

The thirty-fifth British Aquarists' Festival marked the end of an era — it was the last to be held at Belle Vue.

Next year, the organisers from the Federation of Northern Aquarium Societies will have to find a new venue. And there's no doubt that, while the old exhibition hall was light years away from being cool (on hot days), hot (on cool days) and comfortable (on any day) it will be missed by many.

Belle Vue certainly bowed out gracefully, with a record attendance through the doors on November 1st and 2nd.

Visitors saw Bertie, the *Polypterus ornatipinnis*, topped from his 'Champion of Champions' perch by the magnificent Central American cichlid *Cichlasoma hartwegi* owned by Les Gale of Basingstoke. But the seemingly vice-like grip on the Tablax category was maintained by Tongham AS.



It... and every inch a winner was this *Cichlasoma hartwegi* who brought his owners all the way from Basingstoke.



Winners

WINNER of October's 'Spot the Difference' competition is N. Panchat, of Links View, Northampton, who scoops a complete Jewel set-up worth over £350 from John Allen Aquariums Ltd. This month's competition does not back on to an editorial page, and we would point out that photostats of the entry form are acceptable. So enter now — details are on page 17!

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Results

Highest planted tables: 1 Tonham, 8/10; 2 Farning, 84; 3 Darwen, 80. Best fish in show: P. Mier, Basingstoke. Best Society Furnished Aquaria: Hatfield 7/10. Individual Furnished Aquaria: A. Woodhead, Hatfield, 7/10. Pairs: T. and D. Duckworth, G458; B. Aquascaping, 0. Mier, Darwen, 78. Novelty Aquascaping: M. and Mrs Walsh, Darwen, 78. Breeders Team: M. and Mrs J. Holden, Darwen, 83. Best Tropical Fish P. Mier, Basingstoke, 14. Best Tropical Fish: M. and Mrs G.H. S.S. 75. Exhibitor gaining most awards: 1 Lugg, Tonham.

Champion of Champions: 1 L. Galt, Basingstoke, 8/10 (Chlorocheilichthys harveyi); 2 R. Fowler, Worthing, 81; 3 M. and Mrs Baldwin, Sandgrounder, 80.

Show League: 1 Sandgrounder AG, 2/10; 2 Merrydale AG, 20; 3 Ditham AG, 25; 4 Farning AG, 10; 5 Wrecker AG, 5

Tropical Furnished Aquaria: 1 Hatfield, 7/10. Coldwater Furnished Aquaria: Hatfield, 04. Tropical Furnished Aquaria (Ind): A. Woodhead, Hatfield, 7/10. Coldwater Furnished Aquaria (Ind): A. Woodhead, Hatfield, 80. Marine Furnished Aquaria (Ind): P. Dobett, I.O.W., 8/10. Aquascaping Furnished: 0. Mier, Darwen, 7/10. Novelty Aquascaping: M. and Mrs Walsh, Darwen, 7/10. Plants: D. Shields, Hatfield, 77. Cactus Garden: D. Conkett, T. Marshall, Merseyside, 8/10. MNanking Bristol: London M. and Mrs S.H. S.S., 7/10. Moor & Vertala: M. and Mrs S.H. S.S., 8/10. Pansy Garden: R. Farnley, Chorley, 7/10. Plants: D. Shields, Hatfield, 7/10. AQV Coldwater: 1 Lugg, Tonham, 8/10. AQV Coldwater Pairs: M. and Mrs G.H. S.S., 70; 2 M. and Mrs Baldwin, Sandgrounder, 8/10. Single Tail: D. Cassel, Tonham, 8/10. Coldwater Breeders: AV Twin Tail M. and Mrs G.H. S.S., 8/10.

Golden G. Linn, Hatfield, 7/10. Moly C. Martin, Basingstoke, 8/10. Pairs: E. and S. Parr, Osher, 7/10. Swedish: J. Keeley, Merseyside, 8/10. AQV Liebman: P. Andrew, Reading, 7/10. AQV Liebman Pairs: D. Barrett, SLAG, 7/10. Riff Valley & Lake Ghelida: M. and Mrs Baldwin, Sandgrounder, 7/10. Dwarf Cichlids: AV L. Galt, Basingstoke, 7/10. Large Cichlids: J. T. Morris, Sandgrounder, 7/10. AQ Cichlids Pairs: 1 Lugg, Tonham, 7/10. Siamese Fighters: A. Coleman, Sandgrounder, 7/10. Small Anabantids: K. Buckley, Sandgrounder, 7/10. Large Anabantids: M. and Mrs Baldwin, Sandgrounder, 7/10. AQ Anabantids Pairs: M. and Mrs Baldwin, Sandgrounder, 8/10. Small Nemo: T. & D. Duckworth, G458, 8/10. Large Nemo: M. and Mrs Stevenson, Ditham, 8/10. AQ Nemo Pairs: T. & D. Duckworth, G458, 8/10. Small Characins: M. and Mrs Baldwin, Sandgrounder, 8/10. Large Characins: J. T. Morris, Sandgrounder, 7/10. AQ Characins Pairs: M. and Mrs Hales, Ditham, 7/10. Sharks and Foxes: M. and Mrs Baldwin, Sandgrounder, 8/10. Rascals: D. Sutherland, Ditham, 8/10. Guppies and Minnows: M. and Mrs Baldwin, Sandgrounder, 8/10. AQ Carp and Minnow Pairs: M. and Mrs Riley, Leeds, 8/10. Corydoras and Brodia Callan: K. Fowler, Worthing, 8/10. AQ Callan: P. Mier, Basingstoke, 8/10. Eggspying Toothpick: B. Wainwright, 8/10. AQ Eggspying Toothpick Pairs: B. Drake, 8/10. AQ Toothpick: D. T. Mier, Darwen, 7/10. AQ Lash: Pairs: M. and Mrs Baldwin, Sandgrounder, 8/10.

Native Marine Fish: Pairs: Mrs Andrew, Belle Vue, 7/10. AQV Tropical Fish: M. Doubleday, Brackley, 7/10. AQ Tropical Fish: Pairs: M. and Mrs Baldwin, Sandgrounder, 8/10. Breeders Eggspiers: Group One: M. and Mrs T. Holden, Darwen, 8/10. Group Two: J. Martin, Darwen, 8/10. Group Three: K. Buckley, Sandgrounder, 7/10. Breeders: L. Liebman, Groups One and Two: K. Buckley, Sandgrounder, 7/10. Breeders: S. Kelly, Sandgrounder, 7/10. Groups Three and Four: M. Stange, Basingstoke, 7/10. Aquarists: Non-Dangerous: M. and Mrs Holden, Sandgrounder, 7/10. Aquatic Planting: A. F. Hales, E. Call, Ditham, 8-15 Years: P. Brighton, Basingstoke, 12-18 Years: M. Hall, Worthing, Over 18: M. Hall, Sandgrounder.

Photographs of Fish: A. Morris, Sandgrounder. Photographs of Furnished Aquaria: 1 Lugg, Tonham. Aquaria: Hatfield: 10; 2 L. Holden, Darwen.



Out . . . 'Bertie', the Polypterus ornatiptinnis, could manage only third place in the Champion of Champions. Sometimes, life can be a real bichir . . .

Seeing all the champion fish at the S.A.F. the editor realised that behind every winner was an aquarist out of the ordinary. So if your name appeared in these results, why not drop Practical Fishkeeping a line, telling us about yourselves? It could lead to a feature — in any event, all letters will be gratefully received and personally answered.

THE FISHKEEPER'S CALENDAR

Good fish food is an excellent staple diet for tropical and warmwater fish — but there is a wealth of free or inexpensive alternatives that may be fed as a treat. Don't be misled: it is possible to get glassworms. These, if ingested by larvae, are able to give adult fish, but may prey on them.

Yawning. Put a vital water-tight lead, an escape-proof, plastic or rubber tubing at top of water or waterproof in a shallow wooden box. Add damp bread to feed the worms, cover box with a sheet of glass and a wooden lid. The glassworms will breed readily and may be reared with regularity around the bread.

Most worms are cultured in objects of various size. Use 100mm polythene covered with glass and plastic. At 7/10 or above, they multiply fast and cover the sides of the tubs. Remove them at a low point and feed by hand using salt-water solutions, so they become stable after 2 weeks or so.

Cichlids are usually associated with the feeding, but cichlids have their own. Adult cichlids (especially those the smallest) should be securely housed in a warm place and fed on pieces of apple, potato and cereal-waste. They will breed if plastic-tubs or tanks lined are provided.

Use exposed head with finger; then grasp and withdraw gently from bucket.

Beefheart is better of African cichlids, if given and fed are removed. It will not cause the gills to rot. Remove heart and stick, sufficient for one feeding from the salt tank, returning it quickly to the bucket. Alternatively it may be given.

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If you have a water-curtain, there will usually be a supply of good larvae and pupae. Substrates are found in the sand and willow on the bottom. Such are suitable — but a water curtain for 'beefheart' and 'beefheart' is best.

Dec

MYSTERY TOUR OF THE MONTH

Circumnavigate the M25 to junction 4 and leave motorway by A21 spur. At the first roundabout, leave by first exit. At second roundabout (Badgers Mount) leave by second exit. After about 300 yards, turn left onto concrete drive into a huge car park. Weather permitting you may spot a 20ft Koinobori proudly flying. You will certainly notice some strange red oriental hieroglyphics, but what you will find inside to delight you, knowbody knows. Certainly, a limited number of 8"/10" Japanese koi in several varieties that have grown on in Kent and are offered at less than air freight costs from Japan? Probably Koi Kalenders for '87 along with other Christmas goodies. But just what beautiful koi Glyn and Bill will find in Japan will remain a mystery until their return. They will not disappoint you.

**Come solve
the mystery**

**Late
November
onwards**

NEWSROUND... NEWSROUND... NEWSROUND... NEWSROUND...

Pythons and Boas
by Peter J. Stafford
(TFH Publications, £17.99)

PERHAPS herpetologists are more serious-minded than fishkeepers, poodle-fanciers or breeders of cage birds. Or perhaps Dr. Herbert R. Axelrod has a morbid fear of snakes. Whatever the reason, and despite the somewhat serious cover-price, this volume can be wholeheartedly recommended to constrictor-lovers.

Photographically, it covers not only the commonly kept species, but snakes unlikely to ever find their way into vivaria... Ground Boas, Burrowing Pythons and all the lesser beasts from Australia, the West Indies, Madagascar and North America.

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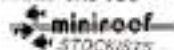
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3rd Morris, J.T., Club, Sangrounders.....	8

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3rd Club/Society, Merseyside.....	676



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