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Practical Fishkeeping's new editor

Practical Fishkeeping has an editor! He's 26-year-old Norman Wright who takes up his new duties after four years, two of them as news editor, with one of EMAP Nationals' biggest selling weeklies, Angling Times.

A tropical fish enthusiast, Norman started his journalistic career straight from school with the Northamptonshire Evening Telegraph, which is based at Kettering.

He also worked on several weekly newspapers before joining Angling Times as a reporter.

Norman says of his first few days in the chair that he's extremely impressed by the amount of correspondence between the publication and its readers. "Many people write asking for advice which our experts are only too glad to give. So keep those queries coming. We are delighted to see them," said Norman.

Other areas which he will be improving include news coverage, diary dates — and letters. "I appeal to all clubs and associations to send me their results as soon as an event has taken place. I shall be delighted to carry them in the next available issue — and the same goes for all items of news and dates of events. Also don't forget to write to our letters page. We want to hear your views and experiences of the hobby."

"Practical Fishkeeping is going to be just what its name implies — a publication packed with information to make YOUR particular type of fishkeeping successful, and full of interest as the top magazine for YOUR hobby."

"FINALLY, IF YOU WANT TO MAKE SURE OF A REGULAR COPY, FILL IN THE ORDER FORM ON PAGE 24 AND GIVE IT TO YOUR NEWSAGENT. IF YOU STILL HAVE PROBLEMS WRITE DIRECT TO ME".



Norman Wright

Our new winner

THE first winner of the Practical Fishkeeping "Find the Fish" competition is 30-year-old Andover, Hants, wood machinist, George Henderson.

And what a boost the fully furnished and stocked tropical aquarium will give to George's fishkeeping.

For the last six months George has been without a tropical set-up. He sunk all his resources into buying a new all-glass tank to try marine keeping for the first time.

"Everything is going well after six months and at the moment I have one lionfish. Later I hope to build up my stock," explained George.

"But this tropical tank is fantastic. It means I can continue with both sides of the hobby which I couldn't really afford to do before," he added.

George won a Jewel Bookcase Aquarium with heater, thermostat, fish, plants and gravel worth £250 in the December competition.

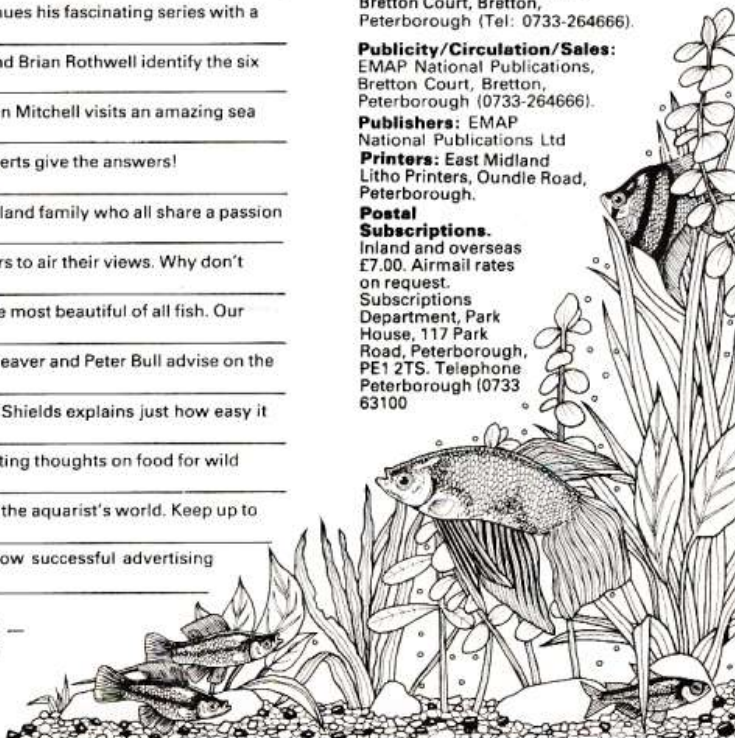
It is supplied by Keith Barraclough Aquarist Ltd.

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Cover picture: A pair of beautiful Golden Gourami — a variety of the Three-spot Gourami (*Trichogaster trichopterus*).

An unavoidable delay has prevented us printing our feature on the African fish catcher in this issue.



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FIND THE FISH Practical fishkeeping COMPETITION



Here is another chance to win a super prize in our easy to enter Find the Fish contest. It's a fun competition for all the family and a test for your knowledge of fishkeeping. The picture on this page shows a furnished tank, but its occupant a tiger barb (*Puntius tetrazona*) has been removed. Using your skill and judgement, from the information contained in the picture and your knowledge of the species, decide where this fish is likely to be.

Indicate the spot where you think the eye of the fish is likely to be, by marking a cross in ink or ball-point pen on the picture. You have a maximum of 25 crosses. The winner will be the person who, in the opinion of our panel of experts, places a cross nearest to the spot where they think the eye of the fish is most likely to be.

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news

Boost for Koi men

MEMBERSHIP of the Midland Koi Association is still booming. At the association's fifth annual meeting last month it was predicted that membership will top the 100 mark by the end of 1979.

Members elected new officers for the year at the meeting. They are:— President, **Dr. David Ford**; vice president, **Mitsuo Nakamori**; chairman, **Roger Cleaver**; vice-chairman, **Roy Hunter**; secretary, **Ron Causer** treasurer, **Christine Jeavons**; newsletter editor, **Peter Nothover**; librarian, **Keith Sale**; committee, **Joyce Lloyd**, **Tony Walsh**.

Subscriptions for the year are as follows:— Husband and wife, £4; single membership, £3.50.

The date of the association's annual National Koi Show will be July 1 in Coventry.

Any information about the association, contact **Ron Causer**, 8 Swinburne Road, Mill Hill Estate, Hinckley, Leic. Tel: Hinckley 30145 (before 9 pm).

Stan on tooth carp

STANLEY WADE was the guest speaker at the latest Ilford and District Aquarist and Pondkeepers' Society meeting in Essex.

He gave a lecture on keeping and breeding egg laying tooth carp.

Membership is open for the society. They meet on the second Monday of the month at the Churchill Rooms, Wanstead Library, Spratt Hall Road, Wanstead, London E11.

Details from the secretary **Michael Shadrack**, 61 St. Barnabas Road, Woodford Green, Essex.

Manchester

MANCHESTER society, Bridgewater AS, have appointed new officers. They are:—

Chairman, **R Horsfield**; secretary, **D Newman**, 33 Newearth Road, Worsley, Manchester; treasurer, **D Mason**; show secretary, **M Burgoyne**; librarian, **D Jones**; committee, **S Ainscough**, **G Chadwick**.

New Group

A NEW area group of the British Killifish Association has been formed in Northern Ireland.

Anyone interested in Killifish will be welcome, but prospective area group members will be expected to join the British Killifish Association as well.

Those interested should contact **D. Bryans**, BKA 490, 35 Knockagoney Drive, Belfast 4, Northern Ireland.

PRACTICAL FISHKEEPING



Coventry on the move

THE Coventry Pool and Aquarium society has moved its meeting place to St. Christopher's School, Winsford Avenue, Allesley, Coventry.

From now on the general meetings on the second Tuesday of the month will take place there.

New officers for 1979 are:— Chairman, **Terry Emms**; treasurer, **Sue Bartlett**; secretary, **Austin Simmons**; show secretary, **Rob Cleves**; social secretary, **Richard Bartlett**; newsletter editor, **Roger Cleaver**; committee, **Robin Rice**, **Chris Bates**; librarians, **Derek Jones**, **Jeanette Bates**.

Norwich new look

NORWICH and District AS started off the year with their committee elections. Appointed were:—

Chairman, **M Keeler**; secretary, **Mrs B Williamson**, 24 Magdalen Road, Norwich; treasurer, **A Waring**; show secretary, **Mrs J Waring**.

Loughborough Open date

IN Leicestershire the Loughborough and District AS now have a new committee. It is:

Chairman, **J Booth**; secretary, **A Onslow**, 8 Garfield Road, Hugglescote, Leicestershire. Tel: Coalville 31606; treasurer, **G Howe**; Show secretary, **I Purdy**; Show manager, **G Taylor**; news letter editor, **A Onslow**; public relations, **A Onslow**.

The society are planning an Open show for June 3 this year.

Interpret error

The price of the New Super Millmatic advertised by Interpret on page two is £5.74 NOT £5.47 as stated.

Delightful Damsel



A DAMSEL fish hides in the tentacles of a sea anemone at the fabulous Eilat Fish Observatory in Israel. This super shot was captured by London journalist John Mitchell. Turn to Pages 21, 22 and 23 for more fascinating pictures and the full story of John's visit to this paradise for fishkeepers.

Goldfish results

HERE are the full results from Goldfish Society of Great Britain convention.

Shubunkin (Bristol): 1 H Whiting, 2 T Ball, 3 R Whittington, 4 King; veiltail: 1 B Cook, 2 G King, 3 T Longstaff, 4 W Cook; bramblehead: 1 B Lumley, 2 J Pollard, 3 Mr and Mrs Lewis, 4 J Davidson; pearl scale: 1 A Lesurf, 2 A Lesurf, 3 M Dudley, 4 A Lesurf; celestial: 1 H Berger, 2 E Metcalfe; pom-pom: 1 J Barker, 2 P Whittington, 3 J Parker, 4 J Parker; bubbly-eye: 1 H Berger, 2 R Saxton, 3 H Berger, 4 J Pollard; common goldfish: 1-3 D MacKay, 4 J Ross; shubunkin (London): 1 P Whittington, 2 P Whittington, 3 J Pollard, 4 W Leach; comet: 1 H Berger, 2 D MacKay, 3 D MacKay, 4 A Barnes; fantail: 1 J Kingsland, 2 J Pollard, 3 L Clapp, 4 M Dudley; oranda: 1 & 2 Mr and Mrs Lewis, 3 & 4 A Lawman; broadtail moor: 1 B Cook, 2 J Day, 3 J Day, 4 L Clapp.

Breeders Shubunkin (Bristol): 1 B Cook, 2 V Cole, 3 A Pyne, jnt 4 D Nutt and A Barnes; veiltails: 1 B Cook, 2 J Linale, 3 E Metcalfe, 4 J

Linale; pearlscales: 1 & 2 A Lesurf; brambleheads: 1 J Parker, 2 Mr and Mrs Lewis, 3 & 4 A Lawman; celestials: 1 & 2 J Linale, 3 E Metcalfe; pom-poms: 1 & 2 J Parker; bubble-eyes: 1 E Metcalfe, 2 D Mills; common goldfish: 1 & 2 A Law; shubunkin (London): 1 P Whittington, 2 W Leach, 3 P Whittington; orandas: 1 & 2 A Lawman; broadtail moors: 1 V Cole.

Matched pairs Bristol shubunkins: 1 R Whittington, 2 J Amos, 3 B Cook, 4 W Cook; novice class (any variety): 1 A Barnes, 2 B McHugh, 3 Mrs S Brown, 4 Mrs J Amos.

SPECIAL AWARDS: Best owner bred fish: B Cook; best fish: B Lumley (6 months' subscription to Practical Fishkeeping); highest pointed basic variety breeders team: B Cook (6 months' subscription to Practical Fishkeeping); highest pointed basic variety: B Cook; highest pointed metallic veil: G King; highest pointed popular variety: J Kingsland; highest pointed single-tailed popular variety: D MacKay.

FROM the successful breeding of livebearing fishes like guppies and mollies to the raising of egglayers is but a short step — yet it is one which many aquarists never take.

Often in a community tank, the more obliging egglayers — barbs and danios — perform the courtship ritual and eggs are deposited among the plants or gravel . . . only to be eaten, either by their own parents, or by other hungry inhabitants to whom the tiny specks of life are nothing more than a passing snack. And the keepers of these fish, not knowing what to look for, complain that their charges will not breed.

Breed they will, but the young fish, under those conditions, will never reach the swimming stage. Yet all that you need to do to breed the 'easier' egglayers is have a small spare tank at your disposal, complete with heating and filtration. It is then a simple matter to 'bring off' as many broods as you please . . . in fact, you will never need to buy another parent fish, and you will probably find yourself with so many fry on your hands that you will be only too pleased to give them away, or feed them to any carnivorous fish you may possess.

The egg-laying fish we will use as our example is the Zebra Danio (*Brachydanio rerio*), a

Egglayers

Create 'spring' in your tank
for simple breeding — by Nick Fletcher

native of Bengal, in India. Like the tiger from the same jungle area, the Zebra is boldly striped . . . a brilliant blue and silver pattern running from nose to tail and including the fins. Overall body colour is olive green, but when in breeding condition, the males develop a golden sheen. Both sexes reach two inches, and live for two years.

In their natural habitat, these fish live in fast-flowing shallow streams, and breed at the time of the spring rains. At this time of year, two factors are at work — the sun's heat increases, and the rain puts fresh water into every rivulet. The combination of warmed, fresh water triggers off the spawning urge in

the Zebra, and it is easy to duplicate these conditions artificially in the tank.

For a spawning tank, 18 x 10 x 10 is a good size, though a smaller one will do. Into this goes a layer of small, broken rocks, or marbles. Instead, you can use special plastic plants, which are mounted on a grid. All perform the same function — to give the newly-dropped eggs some cover, from their voracious parents.

Water in the spawning tank should comprise one third aged aquarium water (from the community tank is ideal) and two-thirds tap water. Temperature should be three or four degrees above the level of the parent Zebras'



A good thermometer is essential to ensure a higher temperature in the breeding tank. This one simply sticks to the glass with the aid of a rubber sucker.



The spawning dance of the Zebra danio. The male (the slimmer fish below) chases the female in a circular motion until she is stimulated into releasing her eggs.

tank.

The parent fish should have been kept apart, to avoid premature spawning, and conditioned up on whiteworm, tubifex and daphnia. In no time at all, on this diet, the female should develop a noticeable pot belly, telling the aquarist she is ripe and ready, while the male shows his appreciation by acquiring the golden breeding sheen.

The pair — or two or more pairs if a really large hatch is desired — should be introduced during the evening, and if all goes well, should have spawned the following day. If you get the chance to witness the courtship display, you will never forget it.

Stimulated by the artificial 'spring' — warm, fresh water with plenty of dissolved oxygen — the male begins to chase the female, who doubles back on him until the pair are performing a whirligig dance at breakneck speed. All fins are held high and erect, and at the height of the excitement, the female releases the small, clear, non-adhesive eggs which are fertilised as soon as they leave her body by her ardent partner. They fall in a steady stream to the bottom of the tank, where most of them lodge between the rocks or marbles, where they are hard to get at.

You should have a maximum of six inches

of water in the breeding tank, so that the eggs have only a small distance to descend to safety. Even so, it is quite likely that the parents will intercept some, but losses will be small.

Once spawning has taken place, made obvious by the female's slimmer shape, the parent fish can be placed back in the community tank. Don't forget that the basic rule of fish transfer applies — use a plastic bag and suspend it in the tank for half an hour, so that the fish are gradually acclimatised to the change in temperature.

The eggs should have gentle aeration at this stage, just sufficient to keep the water moving slowly. A sponge filter is ideal, since it purifies and aerates in one.

These eggs, numbering anything from a few hundred to a couple of thousand or more, take between 24 and 72 hours to hatch. Don't despair if you don't see anything after three days, since Zebra fry are minute. It takes a trained eye to spot them until they rise and cling to the glass.

As soon as the first young are observed, they must be fed. Being so tiny, they need infusoria to start them off, and this can be provided, either by crushing some lettuce leaves in the tank, or by feeding a brand of

liquid fry food. As the young progress, they can be weaned on to newly-hatched brine shrimp, micro-worm or finely-powered dried food. Zebra Danios mature at 18 weeks, ready to start the cycle all over again.

You will find that natural hybrids occur quite readily among danios, and the Leopard and Zebra cross is the most common. But these fish are sterile, and seem to lack the attractive qualities of their parents, so don't deliberately encourage fish of mixed parentage.

One final tip — Zebra Danios aren't the only fish that respond to a touch of spring in the air. How many other egg-layers do you have in your tank, that are getting egg or milt-bound simply because conditions are not quite right? If you have fish that are looking over-plump, lethargic and lack-lustre, you can always do for the community tank what you did for the breeding set-up. A fifth of the water taken out and changed for fresh tap water, and a slow rise in temperature by a few degrees will be enough to stimulate many of the Cyprinid family into spawning.

Even if the fry never hatch, you will be doing the parent fish a favour and they will repay you by living longer and being more active . . . simply by doing what comes naturally to them.



Broken rock is a cheap alternative to glass marbles in the bottom of the spawning tank. Both ensure that the eggs fall out of reach of cannibalistic parent fish.

Above: Netting out a suitable pair for spawning can pose problems, as Zebras are such active fish. Here we have a Zebra and a close relation, the Leopard danio, but although the two will hybridise, the young will be drab and sterile. So it's back to the drawing board.

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news



Monday dates for Malvern

THERE is a change of venue for the monthly meetings of the Malvern and District AS, Worcestershire.

The society now meet on the first Monday of the month at St. Joseph's Hall, Newtown Road, Malvern.

New officials of the society are:— **D. Kaufman**, chairman; **R. Higgott**, vice-chairman; **J. Walton**, 1 Beaver Close, Lower Wick, Worcester (Tel: Worcester 422002), secretary; **A. Parsons**, treasurer.

Annual award winners were:— **S. Sanders**, best catfish; **D. Kaufman**, cichlid cup; **S. Sanders**, any variety plate; **P. Parsons**, barb cup; **P. Parsons**, livebearers cup; **C. Baker**, characins cup; **G. Roan**, anabantid cup; **D. Williams**, sharks cup. **A. Parsons**, best senior fish; **C. Baker**, best junior.

New faces in 1979

FIRMLY established Hounslow and District AS held their 29th annual meeting recently and elected the following new committee men.

H. Parrish, chairman; **R. Melhams**, 35 Exforde Ave, Ashford, Middlesex, secretary; **Mrs S. Parrish**, treasurer; **T. Bolingbroke**, show secretary; **R. Hart**, show manager; **A. Constantine**, social secretary; **R. Allum**, newsletter editor; **P. Smith**, librarian; **J. Carpenter**, PRO; **Mrs R. D. Craft**, trophy secretary; **Mrs R. Brewer**, **C. Day**, floor members.

The society meets every other Wednesday at St. Stephen's Church Hall, Whitton Road, Hounslow, Middlesex.

Name change at Marlow

THE former Marlow and District AS has changed its name to Wycombe Marsh AS. But the Buckinghamshire society will continue their usual series of informative events in 1979.

Attractions for members at meetings in coming months are:—

February 19, tape and slide show on livebearers.

March 19, talk on aquatic plants by **Ron Forder**.

May 14, F.B.A.S. chairman, **Bob Gosson**, on furnished aquaria.

June 11, talk by **Dr David Ford**.

The society are still arranging speakers for meetings on March 5, April 2 and April 30.

PRACTICAL FISHKEEPING

Meetings are held at The Swan, Abbey Barn Road, High Wycombe, at 8.30 pm. Further details from secretary **Mike Fox** at 24 Kelvin Close, High Wycombe (Tel: High Wycombe 38823).

More members boost society

MEMBERSHIP, of the Trowbridge and District AS, Wilts, is booming. The increase is so encouraging that the usual monthly meetings have been doubled.

The new fortnightly events will be held for a trial period.

Schedules for the society's Open Show on May 19 are available from **Mrs M. Bennett**, 30 Lewis Crescent, Frome, Somerset.

Southend's new committee

SOUTHEND, Leigh and District AS have appointed new society officers for 1979.

They are: **A. Chapman**, president; **F. Gardner**, vice-president; **R. Stanford**, treasurer; **D. Cheswright**, secretary.

The society meets at 8.30 pm on the first and third Tuesdays of each month at St Andrew's Hall, South View Drive, Westcliff-on-Sea, Essex. Information from the secretary at 2 Cedar Avenue, Wickford, Essex.

Welcome at Great Yarmouth

GREAT Yarmouth and District aquarists have elected their new committee.

Their officers now consist of:— **R. Durrant**, chairman; **R. Stearne**, vice-chairman; **P. Watson**, secretary; **D. Lacey**, treasurer; **A. Kemp**, PRO; **G. Drewry**, show judge secretary; **M. Watts**, assistant secretary; **D. Knights**, **T. Thorpe**, **J. Cannell**, **R. Czykieta**, **D. Thorpe**, committee members.

Club nights are on the first Monday of the month at the Imperial Hotel, Gt. Yarmouth, Norfolk, starting at 7.30 pm. New members are welcome.

Next month

PRACTICAL FISHKEEPING is YOUR magazine produced specially for YOUR favourite hobby, so don't miss next month's super issue.

March readers will find a top service of news and diary dates plus four solid pages of answers to your aquatic problems.

And there are some great features lined up for you too. Here are just a sample:—

SETTING UP A MARINE TANK

A special step-by-step picture guide to show you how to enter the world of marines.

AQUARIUM LIGHTING

How much for how long? We provide the answers.

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Roger Cleaver and Peter Bull — on pondkeeping.



David Shields — on plants.

Graham Cox — answering marine problems.

And there's much more of that sort of practical help and information to assist your fishkeeping skill.

Don't miss the March Practical Fishkeeping. The only way you can be sure of a copy is by ordering one regularly from your newsagent. Simply ask him to supply the magazine or cut out the form on page 24, fill it in, and hand it to him.

Building a tank

Allan Haines shows how simple it is with this step by step guide



Emery cloth
Paper towel or cloth
Cleaning fluid
Scissors
Heavy square
Silicone sealer
Sticky tape
Small squares

Modern fish tanks come in a variety of shapes and sizes. Most are well made and not expensive considering the cost of raw materials.

But many aquarists prefer to construct their own, often to a particular specification to fit into a recess or existing set-up.

The advent of silicone glues made this a simple operation that can be undertaken without special tools and finished in an afternoon.

The cost, unless you can find a source of secondhand glass such as old shop windows, will be somewhat higher than the shop bought item, but the end product can be custom built to suit your needs.

But telephone around the local glaziers and it's surprising how many can help with cheaper cuts.

Silicone glues, although very strong must be used with glass of suitable thickness that is able to provide enough rigidity throughout its length. The sealer will stand up to the flexing created by the weight of water but the glass will not.

For a guide, tanks up to 24" x 12" x 15" can safely be made from 32 ounce glass — that's about three sixteenths of an inch thick — but anything bigger must be from 1/4 plate glass or thicker.

For our picture feature we chose a 24" x 12" x 15" tank — the ideal tank for a newcomer to try, and one that will always find a home in the specialist's set up as a breeding tank or fry rearing home.

Step 1



The glazier cuts our glass to order. Provide him with the sizes, worked out in advance as follows: One piece 24" x 15" for the base. Two pieces 24" x 12" for the back and front and two 12" x 14 1/2" for the ends. These five pieces will make up the basic tank but two other pieces of 24 ounce glass were cut at 23 1/2" x 7 1/4" for cover glasses and two thin strips of 32 ounce 14 1/2" x 1/4" for cover supports.

Follow the step by step picture sequence for exact details of how these went together.

Step 2



For bigger tanks the faces to be joined can be strengthened by having the glazier grind them flat after cutting. This is however not essential unless you plan to make the tank with no sealer between the faces — a method often employed by commercial manufacturers — a system that works but looks a bit frightening all the same.

Step 3

Tools are simple, the most essential item being a firm base on which to work in a warm room.

Scissors, sticky tape and a piece of grinding stone or fine emery paper will be needed along with some form of square to line up the glass and support it while being glued in place. We used two small wooden squares and a steel square borrowed from an engineer. (See diagrams left).

PRACTICAL FISHKEEPING

Step 4



Rub down the edges of the glass with the stone or emery paper to remove the sharp edge. Take care at the corners not to chip the glass and watch your fingers.

Step 5



The glass must be clean and free from grease or dust along the faces and edges to be joined. For this task use any dry cleaning fluid or methylated spirits and a cloth. Allow to dry before starting the next stage.

Step 6



The base is in place on the work surface and a thin flow of sealer is run along the top edge of one long side. Try to keep it thin but continuous all the way along. A tip here is to push the nozzle of the tube forward rather than drag it along, this will help the sealer flow evenly. Remember this throughout the assembly operation and all will be easy.

Step 7



With squares at hand — bricks will serve well if nothing better can be found — offer up the front plate and sit it down gently over the sealer. You must work quickly once the sealer is on the glass as it starts to cure within five minutes.

Square up the glass and support with the square or two bricks.

PRACTICAL FISHKEEPING

Step 8



Run a thin smear of sealer along the top edge of the base at one end and along the inside edge at one end of the front plate.

Step 9



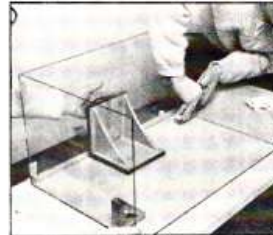
Offer up and position the end glass on to the sealer, making sure that it butts up squarely to both base and front edge. Again use a square to help keep everything in trim.

Step 10



Although the sealer will start to dry very fast the glasses should be taped in place with several strips around the outside of the corners just joined together.

Step 11



Now comes the other end face, glue up the inside of the long glass and along the top edge of the base in the same manner as before.

Step 12



Again tape the corner after checking all is square and glue along the remaining side of the base and up the edges of the two end plates. At this point it is worth noting that the smaller end glasses are always fixed inside the back and front NEVER the other way around.

Step 13



On goes the final long glass and tape holds it in place. The tank is now more than halfway to becoming watertight.

Step 14



The inside of the tank must now be sealed with a continuous fillet of sealer. Start at the bottom and run the tube along the whole length, up the sides and down the other side until the complete inside faces have all been given a nice even fillet. Don't forget the tip to push the nozzle and not drag it along. This operation is the most vital to ensure the finished tank is strong and leak proof.

Step 15



Let the tank stand for 30 minutes during which time the sealer will harden off enough to allow further work. Glue up the long edges of the two narrow strips of glass which are to be used as holding ledges for the cover glasses. Fix them at each end of the tank about threequarters of an inch from the top and tape them in place.

Step 16



The two cover glasses need very little work but some form of handle will help with their removal during the day to day operation of the set up aquarium.

Small glass strips can be glued to them with sealer or try two glass marbles as neat little lifting devices.

Follow on with the addition of a standard tank hood — available from most aquarium or pet shops and the tank is complete.

But for the sake of keeping peace at home test fill the tank outside on a level base. Should it leak, empty, dry off completely and run another layer of sealer along the unsound edge.

SPOTLIGHT

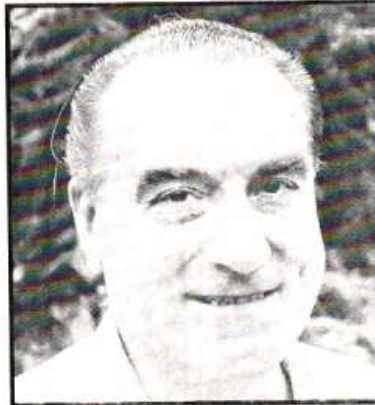
on breeding

The Emperor and the Dwarf

The Emperor Tetra — a body of iridescent bluish silver



Problems
behind rearing these
two species
—by Don Martin



Since he retired from the Norwich City Police, 56-year-old Don Martin has developed a fish-breeding business specialising in community species that will get along together in the tank. His successes include Harlequins, Rams, Kribensis, Corydoras and, perhaps most significant, the South American bristle nose catfish, *Ancistrus Lineolatus*. Don reckons he owes a lot of his success to experiment, intuition, and not relying too much on what the books say. Consequently, some of his methods are unorthodox — but they work.

EVER wondered why some species are so much more expensive to buy than others? In the case of fish which don't spawn in captivity, price is directly related to the cost of shipping them to this country. But with fish that are known to breed in aquaria, many other factors come into consideration.

This month I will deal with the Emperor Tetra, which is pricey because the parents are difficult to spawn and which at best has rather small broods; and the Kribensis dwarf cichlid, which spawns readily enough, but presents other problems.

The Emperor Tetra (*Nematobrycon palmeri*) is a characin native to South America, and a very beautiful fish indeed. Growing to three inches, its body is iridescent bluish silver, and mature males have elongated dorsals and a three-pronged caudal fin.

To spawn these fish, I use a mixture of three parts old rainwater and one part old tapwater, which I strain through fine muslin. The rainwater is collected on glass into an oak water butt, which makes it acid — and I have noticed that since an industrial estate was built near my home, broods of Emperors have reduced in numbers. That says a lot about atmospheric pollution.

You can use just one pair of fish, but since 30 eggs per pair is the norm, I generally put three pairs into a 3ft tank. Emperors are unlike other tetras, in that the ripe female doesn't get noticeably fat. So the only way to select suitable spawners is to feed up your stock on live food, but not too much whiteworm, then select the most colourful specimens. Sexing the fish is easy — apart from the dorsal extensions, the males have blue eyes. Those of the female are green!

I normally leave the tank empty for a week except for coconut fibre spawning medium aerating strongly, until the pH is 7 (neutral). Then the females are introduced two days before the males. Adult fish are never fed in the spawning tank.

Nothing generally happens for 24 hours then the fish begin to pair up. The male makes quivering approaches to the female, who shoots away from him. Several 'dummy runs' occur, during which colours in both sexes are heightened and the fins are spread wide. Then, as excitement mounts, both fish swim



The male Kribensis Dwarf Cichlid

PRACTICAL FISHKEEPING

deep into the coconut fibre. As they turn on their sides, the eggs are released and fertilised ... but here I have a confession. I have never seen these eggs, despite long hours spent with a magnifying glass. And other breeders will tell you the same.

This, I'm sure, has led many would-be Emperor breeders to slip up. For the fry, on hatching 48 hours later, are minute. And it's usually at least ten days before they become visible — and then only if you shake the coconut fibre, when they will appear as tiny, silver slivers darting in and out of the strands.

How many broods, I wonder, have been thrown out like the baby with the bathwater, simply because breeders didn't spot them?

Although characins have a reputation as egg eaters, I don't remove the parent fish as soon as they have spawned. It's best to see first whether all three pairs are going to perform, and only take them out if it's obvious that some are not. The coconut fibre is quite dense, and if, as I suspect, the eggs are adhesive they will stay deep in the spawning medium where the parents will find them hard to get at.

Once the young are free swimming, I give them liquid fry food but not much. At this stage, the tank should be shaded, for young Emperors don't like too much light. I have a lamp on a swivel which I can swing over the tank when I want to inspect the brood.

The young tetras grow extremely slowly, and after three months are still only half an inch long. That, and the necessity to get well-conditioned parent fish in winter, when live food is scarce, is what makes them a dear proposition to buy from the shops.

Kribbs, as the species *Pelmatochromis kribbensis* is popularly known, are a source of much heartbreak to breeders. They are one of the most popular African dwarf cichlids, and few people who keep them can say they have never had some young appearing in the tank. But to raise a whole brood is another matter.

The thing about Kribbs is that some fish are ideal parents, while others are notorious cannibals. And the first time a pair breeds, there is no way of knowing to which school they belong. I have no doubt that often it's other fish in a community tank which get the blame for young Kribbs disappearing, when all the time

it has been the parents' fault. To illustrate this, I had a tank roughly divided down the middle with a sheet of glass. In one half were adult Kribbs, in the other a shoal of 20 lace gouramis. One day I noticed young Kribbs swimming merrily in the gourami quarters — they had obviously got through the partition, which wasn't a tight fit, but no youngsters were visible on their parents' side — they had been gobbled up.

While Kribbs have a definite courtship display, this is no guarantee that breeding is imminent — they do things in their own time. So when I want a brood, I set up a 24 x 12 x 12 tank with water at pH 7.2 and observe adult fish in other quarters. The female, when ripe, gets very plump and develops a plum-coloured patch on the rear of the abdomen. When she has selected a male of her choice, she approaches him with a quivering motion, arching her body towards him to emphasise her plumpness. It is this 'maternal' shape which stimulates the male, who shows his eagerness with a similar quivering dance.

At this stage, I put the parent fish into the breeding tank. Sometimes they spawn almost immediately, sometimes it's days before anything happens.

Kribbs like something to spawn under, and clay flowerpots are ideal. Some breeders use a whole pot stood on end, with a hole knocked in the side — but that way, you can't see what goes on inside. I prefer to use a three-inch pot cut in half lengthways with a hacksaw to make a neat job — though it's a quick way to get through hacksaw blades. This half pot is laid on its side, with the open end facing the front of the tank. If you use a whole pot it's essential to enlarge the drainage hole, so that the parent fish do not get stuck as they swim through it.

The eggs, brick coloured and averaging 100 per brood, are laid on the roof of the pot, where they stick. They hatch in three days at 80°F, and the fry are free swimming in six or seven days. It is then that you will know into which category the parents fall. If they don't eat the young, they will bring them up with typical cichlid devotion, herding them to safety when danger threatens, and taking stragglers into their mouths to be spat to safety. If they turn out to be cannibals, there's

nothing you can do to save the first brood — but you can take steps to save subsequent offspring.

As soon as the eggs are laid, they must be removed to safety. I use the transparent lid of a horticultural propagator as a floating nursery, which is half the price of anything purpose built. The only snag is that these propagators have a couple of holes in the top, but these can be easily plugged with Araldite.

The half flowerpot, complete with eggs, is taken from the breeding tank and placed in the transparent lid, which floats like a boat on the surface of the water. Enough water should be in the lid to cover the pot.

Without the natural fanning of the parent fish, strong aeration is essential, and I use a 'Long John' airstone.

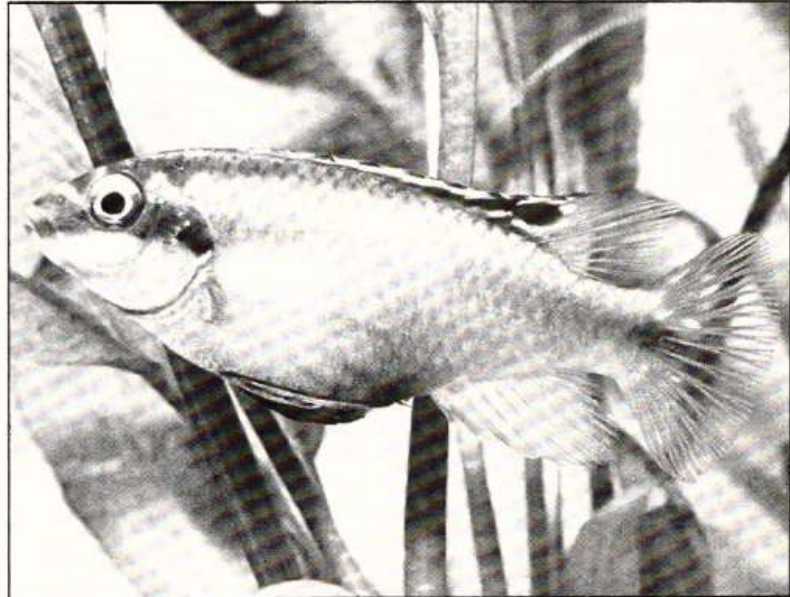
Once the fry hatch, they must be removed to roomier quarters — a three-foot tank is ample for one brood, filled with old tap water and again well aerated. This time I use a sponge filter.

While young kribbs need at least seven inches depth of water, it does not do to tip them from the nursery container straight into a deep tank. At birth, these cichlids have a pronounced yolk sac, and if there is too sudden a change of pressure there is a danger of it bursting. So add water a little at a time to the tank. This will give the young Kribbs time to acclimatise.

Two words of warning — never use chemicals in the water when breeding Kribbs, and never feed the young on liquid fry food. They are very susceptible to both, just like the Rams we discussed last month.

Finally, one last problem with breeding Kribbs. Broods, as I said, average 100, though I have had up to 180 fish at one spawning. The young fish grow quite rapidly. But depending on whether the water is acid or alkaline, the broods will be predominantly of one sex, acid tending to favour the males, alkaline the females. So if you have a pal living in a different area of the country and with opposite water characteristics to your own, it will pay to arrange swapping half your broods before you distribute them.

Don Martin was talking to Nick Fletcher



The female Kribbs Dwarf Cichlid

news



Aquarists on show

LONGRIDGE and District AS, Lancs, are planning to hold an open day for the general public so they can see just what fish-keeping is all about.

The event will include the annual members' show, with extra classes for novices, a slide show, demonstrations and refreshments. It is hoped that presenting the activities of the club in this way will boost membership.

The scheme was drawn up at the society's annual meeting when it was decided to launch a determined assault on the F.N.A.S. Show League next season. Longridge finished a creditable sixth in 1978, but would like to get into the prizes.

During the evening the secretary reported that the society had faced problems during the year at its meetings due mainly to the failure of some lecturers to honour bookings. It was decided to revert to meeting once a month, on the second Wednesday. In this way a really full night could be planned for each meeting.

The society's Senior Show League was won by **B. and B. Durham**, with **T. and J. Durham**, second, and **David Garstang**, third. **David** also carried off the Junior League from **M. and J. Bradshaw**, second, and **Paul Durham**, third.

Officials elected were: chairman, **John Tinker**; vice-chairman, **John Marsh**; secretary, **Don Matthews**; show secretary, **Albert Lyons**, treasurer, **Phil Kay**; public relations officer, **Barry Durham**.

Odd and unusual

THERE was plenty of interest all types of aquarists at the latest meeting of the Thorpe and District AS, Norwich.

Members saw a slide programme featuring corydoras, catfish, reptiles and terrapins, marines and odd and unusual species!

Officers for 1979 are **Dr David Ford**, president; **Kevin Appleton**, chairman; **Colin Fearnley**, treasurer; **Tim Driver**, PRO and show secretary; **Trevor Cork** (Tel: Norwich 405176), membership secretary; **Neville Newby**, 125 Witard Road, Heartsease, Norwich, secretary.

A full programme of events has been planned for 1979. New members should attend one of the meetings which are held on the first Wednesday of the month at The Canary public house Heartsease, Norwich at 8 pm.

Table show results: breeders: 1

K. Appleton (Girardinus); 2 **I. Newby** (swords); 3 **P. Sparkes** (three spot gourami). Livebearers: 1 **P. Sparkes** (mosquito); 2 **C. Fearnley** (ameca splendens); 3 **K. Appleton** (girardinus). Loaches: 1 **D. Cooper** (beaufort botia); 2 **I. Newby** (flying fox); 3 **T. Driver** (redfin botia). Angel fish: 1 **K. Appleton**; 2 **G. Balls**; 3 **C. Fearnley**. breeders, juniors: 1 **I. Briggs**, 2 and 3 **J. Norton**; angel fish, juniors: 1, 2 and 3 **D. Hunn**. 1978 table show championships: Class one: 1 **P. Sparkes**; 2 **G. Balls**; 3 **T. Driver**. Class two: 1 **K. Appleton** and **G. Balls**; 2 **T. Driver**; 3 **C. Fearnley**. Juniors: 1 **D. Hunn**; 2 **I. Briggs**; 3 **J. Norton**.

Easy win

Brighton and Southern AS were comfortable winners of the second leg of their inter-club contest with Mid-Sussex AS.

Neutral judge, **C. Pannel** of Hastings AS gave Brighton the match by 36 points to 18. They also won the first leg.

Before the event — staged during the Mid-Sussex society's monthly meeting at Haywards Heath — members heard a lecture on the breeding and keeping of marine fish in a marine laboratory.

Results: Characins: 1 **J. Smith**, Brighton; 2 **P. Levine**, Mid-Sussex; 3 **T. Ramshaw**, Brighton. Loaches: 1 **B. Sayers**, Brighton; 2 **T. Ramshaw**, Brighton; 3 **B. Sayers**, Brighton. Guppies: 1 **J. Birch**, Mid-Sussex; 2 **L. Pinney**, Mid-Sussex; 3 **D. Billings**, Brighton. Cichlids: 1 **Mr and Mrs D. Smith**, Brighton; 2 **E. and T. Tester**, Mid-Sussex; 3 **T. Ramshaw**, Brighton. Any other variety: 1 and 2 **T. Ramshaw**, Brighton; 3 **F. Hyne**, Brighton. Breeders egg-layers: 1 **R. Hard**, Brighton; 2 and 3 **B. Perrin**, Mid-Sussex.

New standards

WORK is progressing well on the Northern Goldfish Society's new Goldfish Standards book, which is due to be published later this year.

At their last meeting, society members were shown the foreword to the book and drawings of the veiltail, fantail, common goldfish, shubunkin, lionhead and moor.

Marine sculpture



WORLD-famous sculptor in porcelain, **David Fryer**, has turned his attentions to marine fish — as you can see from this beautiful lionfish model.

David's sculptures range in price from £195 to £5,000. And, in addition to his lionfish, he has captured many tropical fish in porcelain.

Aquarists who would like to see more of his work can visit exhibitions at two London stores — Fortnum and Mason and Harrods.

Welsh champions

NEIL Clifford and **Bob Morgan** are the toast of the Merthyr AS, S. Wales.

Neil is the society's Junior Aquarist of the Year and Bob the Senior Aquarist of the Year. Results were announced at the club's latest meeting.

Table show results: Champion of Champions: 1 **P. Willis**; 2 **R. Morgan**; 3 **P. Willis**; 4 **E. Morgan**. K.O. livebearers: 1 **P. Willis**; 2 **R. Morgan**. K.O. egg-layers: 1 **N. Clifford**; 2 and 3 **E. Morgan**. Aquarist of the Year: Senior: 1 **R. Morgan**; 2 **E. Morgan**; 3 **P. Willis**; 4 **M. Hagerty**. Junior: 1 **N. Clifford**; 2 **C. Morgan**; 3 **D. Morgan**; 4 **P. Jones**.

New line-up

ANOTHER society with new officers is the South Shields AS, Tyne and Wear.

Peter Haswell, of 32 Oxford

Street, South Shields, continue as secretary, with **C. Enright** chairman; **L. Ruffel**, vice chairman; **Mrs E. Ruffel** treasurer; **Mrs L. Scott**, social secretary.

The club meets fortnightly on Tuesday evenings and new members are welcome. Write to the secretary for details.

Lifetime's work

JIM AMOS gave members a talk on his lifetime experience of breeding and keeping Bristol shubunkins.

He illustrated his talk with 11 slides of his ponds and fish houses.

Table show results: Veiltails: **B. Cook**; Lionhead: **J. Parker**; Oranda: **A. Lawma**; Moors: **G. Kendrew**; Pompon: **J. Parker**; Pearl scales: **A. Lesu**; Bristol shubunkins: **B. Cook**; London shubunkins: **Mrs P. Whittington**.

PRACTICAL FISHKEEPING

aquarian

Advisory Service Bulletin No 11 — Protein

COMPLEXITY

Fish nutrition is a very complex subject and the processes involved are just as complicated as human nutrition (and similar in many ways because we evolved from the fishes).

AMINO ACIDS

One important ingredient of fish nutrition is protein, but proteins are themselves a complex mixture of some 20 amino-acids. The proportion of each is also important, especially as some of the amino-acids can only be digested, not synthesised, and these are called the essential amino-acids.

The Aquarian range of fish foods contain fifty food ingredients including fresh fish, meats and vegetables. There are ten different formulae to cater for all aquarium species.

QUALITY

If one or more of the essential amino-acids are absent no matter how much proteinaceous material is present, the fish cannot utilise the protein and will show symptoms of poor nutrition.

QUANTITY

The quantity of protein is usually measured chemically as the total nitrogen content (since all amino-acids contain some nitrogen) and so the percentage value is no guide to the food value. In fact it can indicate poor raw material, since a low quality protein source (such as some fish or meat meals) has to be included at very high levels to compensate for low essential amino-acids. Such high levels give unbalanced foods since the other important ingredients (fats, carbohydrates) are displaced.

IDEAL PROTEIN

Trials at the Animal Studies Centre have shown that a good maintenance diet for most petfish should contain 30% high quality protein and 15% fat — this is why Aquarian uses fresh fish and meats in their formulae to achieve this balance.

A more detailed leaflet is available on request.

Dr. D. M. Ford

For more information on Aquarian and free advice on all fish-keeping questions, please write to: Dr. D. M. Ford, Animal Studies Centre, Freeby Lane, Waltham-on-the-Wolds, Melton Mowbray, Leicester LE14 4RT.



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TO the uninitiated, one goldfish can look much like another. But once you enter the world of fishkeeping, it soon becomes apparent that there are many distinctive types of goldfish, each with its own special characteristics.

Unlike in the case of pedigree dogs and cats, however, there is yet to be one national standard for judging fancy goldfish at shows. But the signs are that this is on the way, and my own organisation, the Northern Goldfish and Pondkeepers' Society — formed in 1959 by a group of enthusiasts in the Manchester area — has gradually widened its membership and combined its knowledge with other major coldwater fish societies in Britain.

The object is threefold — to aid the novice and the experienced fishkeeper alike to produce better quality fish; to encourage consistency, both in breeding and judging; and to aid the appreciation of the goldfish varieties.

My society has scored considerable success in shows far away from the North of England, and a particular example I would like to give is Brian Rothwell of Hale, Cheshire, who for the past three years has won first prize in the breeders' class for Bristol Shubunkins — on Bristol Aquarists' Society territory. That society has agreed with our own on the standards to adopt when judging fancy goldfish. And these standards, some of which appear later in this article, are to be put to the Federation of Northern Aquarists' Societies and the Scottish Federation in the hope that the standardisation of judging can be further extended.

What, then, is a fancy goldfish? All the varieties we know today come from a common stock originating in China — a small, olive coloured carp, *Carassius auratus*. Occasionally, in the wild, this fish would produce mutated young whose colour or shape differed from that of the parents. Hundreds of years ago, red-coloured mutants were prized by Chinese fishkeepers, and as the popularity of goldfish increased, so did the range of mutated specimens develop into strains of true-breeding fish.

To 'fix' a particular characteristic such as telescope eyes, tumorous head growths or domed scales, a technique is employed called 'line breeding'.

Even if parent fish have all the desired characteristics, it is likely that only a handful from their thousands of young will be of the same, or better quality. So if the breeder is to improve his stock, he must carefully select these prime specimens and in turn breed from them. After some years of interbreeding, fish from different stock may be introduced into the breeding cycle, to further improve the strain. At the end of this long and painstaking business is an elusive goal — the ultimate goldfish, which is an object of beauty to its owner.

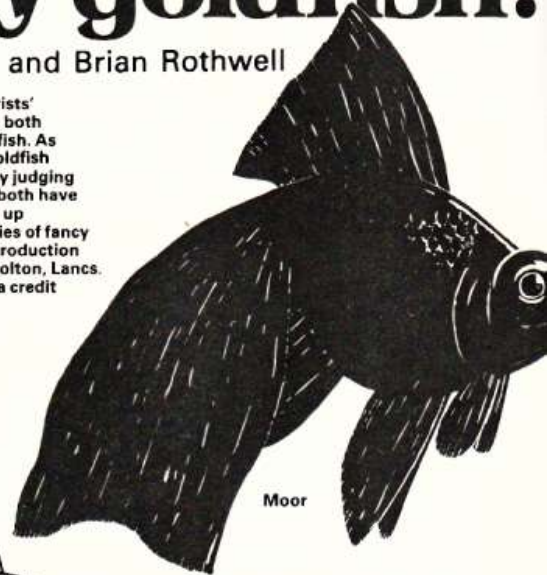
The hardest part for many goldfish keepers is the discarding of fry which do not come up to standard, but it must be appreciated that only if this is done can the breed be improved. Those who let sentiment rule will be wasting valuable live food and tank space on fish

Identifying the six standards

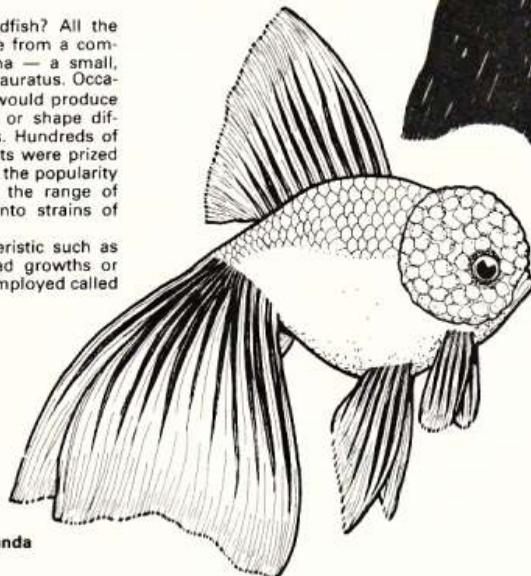
Just what is a fancy goldfish?

by Bill Ramsden and Brian Rothwell

Bill and Brian, known in aquarists' societies as 'The Two B's', are both respected authorities on goldfish. As members of the Northern Goldfish Society they travel the country judging and officiating at shows, and both have been instrumental in drawing up standards for the many varieties of fancy goldfish. Bill is a 52-year-old production and planning engineer from Bolton, Lancs. Brian, from Hale, Cheshire, is a credit salesman.



Moor



Oranda

which will never make the grade.

At four weeks, those fish which exhibit poor body shape, single tails where the standard requires double, or similar bad traits must be weeded out and painlessly destroyed in a bucket of strong disinfectant. Colour, an important factor in deciding the perfect fish, is not always easy to pick out at an early age. All young goldfish are born a greenish hue, with the exception of 'matt' fish, which are almost transparent to begin with and later show a whitish colouration.

A typical cull would be where two nacreous parents are bred together — nacreous refers to fish with a mother of pearl finish to the body, where the colours shine through but the scaling is not apparent.

From the brood, 25 per cent of the fish would be matt, 25 per cent metallic and 50 per

cent nacreous. If you were breeding calicos, another name for nacreous fish, the first thing would be to discard all the matt fish, as they are useless to the purpose. The metallic fish, those with burnished, well-defined scales, would also have to go, leaving you with half the original numbers. From these fish, only the best would be allowed to reach maturity.

The following standards are those of the Bristol Aquarist's Society and adopted by the Northern Goldfish and Pondkeepers' Society, though we would hope that they will eventually become a national yardstick.

COMMON GOLDFISH: Body evenly and moderately arched, with smooth outline above and below. Depth of body less than half the length. Rounded snout, small mouth and nasal septa, with iris eyes. Colour, metallic only — red, yellow or variegated with silver. A calico version of this fish is recognised as the London Shubunkin.

Finnage — dorsal fin moderate in size and erect, commencing at the highest part of the body. Paired pectoral and ventral fins, moderate size, rounded and held away from the body. Single, rounded anal fin and tail fin with short, rounded lobes with shallow forking.

BRISTOL SHUBUNKIN: Body slim and streamlined, with depth of body less than half body length. Length of head less than one third length of body. Snout rounded, nasal septa and mouth small with iris eyes. Colour calico only.

Finnage — dorsal fin to commence at highest part of body and stand broad and erect, in height three quarters of body depth, slanting back to the wrist of the tail but not touching the base of the tail fin. Top margin to be

slightly concave and first ray slightly convex. Pectoral fins to be paired and of even length, with rounded ends and held well away from body. Ventral fins to be paired and of even length, three quarters of depth of body, well spread with rounded ends. Anal fin single, long, broadening with a rounded end. Tail fin single, carried in a vertical plane without folding or overlap. Lobes large, rounded and well spread. Distance from top to bottom of caudal fin to correspond with distance from top of dorsal to bottom of ventral fins.

The general impression of the Bristol Shubunkin is of overall brilliant blue, together with the other calico colours. The streamlined, slim body accentuates the large, flowing caudal fin.

FANTAIL: Well rounded body, with smooth contours above and below. Short, deep head with small mouth and nasal septa. Rounded snout with iris eyes. Calico or metallic colours.

Finnage — dorsal medium height, carried erect in a vertical plane. Paired, short rounded pectorals. Paired, slightly longer and rounded ventrals. Anal fins paired, short and equal. The caudal fin should be a fully divided twin tail, with short lobes, rounded and moderately forked. In short, a twin-tailed, round-bodied fish with short, rounded finnage and well-spread tail.

VEILTAIL: Round, almost sphere-shaped body, with smooth contours above and below. Short, deep head with small mouth and nasal septa, iris eyed. Colour is calico or metallic.

Fins — dorsal fin to stand erect in a vertical plane and equal in height to the body depth. Upper margin slightly convex. Paired, long, round-ended pectorals, with paired ventral fins equal in length to the height of the dorsal fin, giving a balanced appearance. Paired, long and equal anal fins. Fully divided, twin tail, long and broad, falling below the level of the ventral fins, with straight bottom edge. Ideally, the veiltail is a twin-tailed, round-bodied fish with long finnage, high dorsal and straight edged, flowing tail.

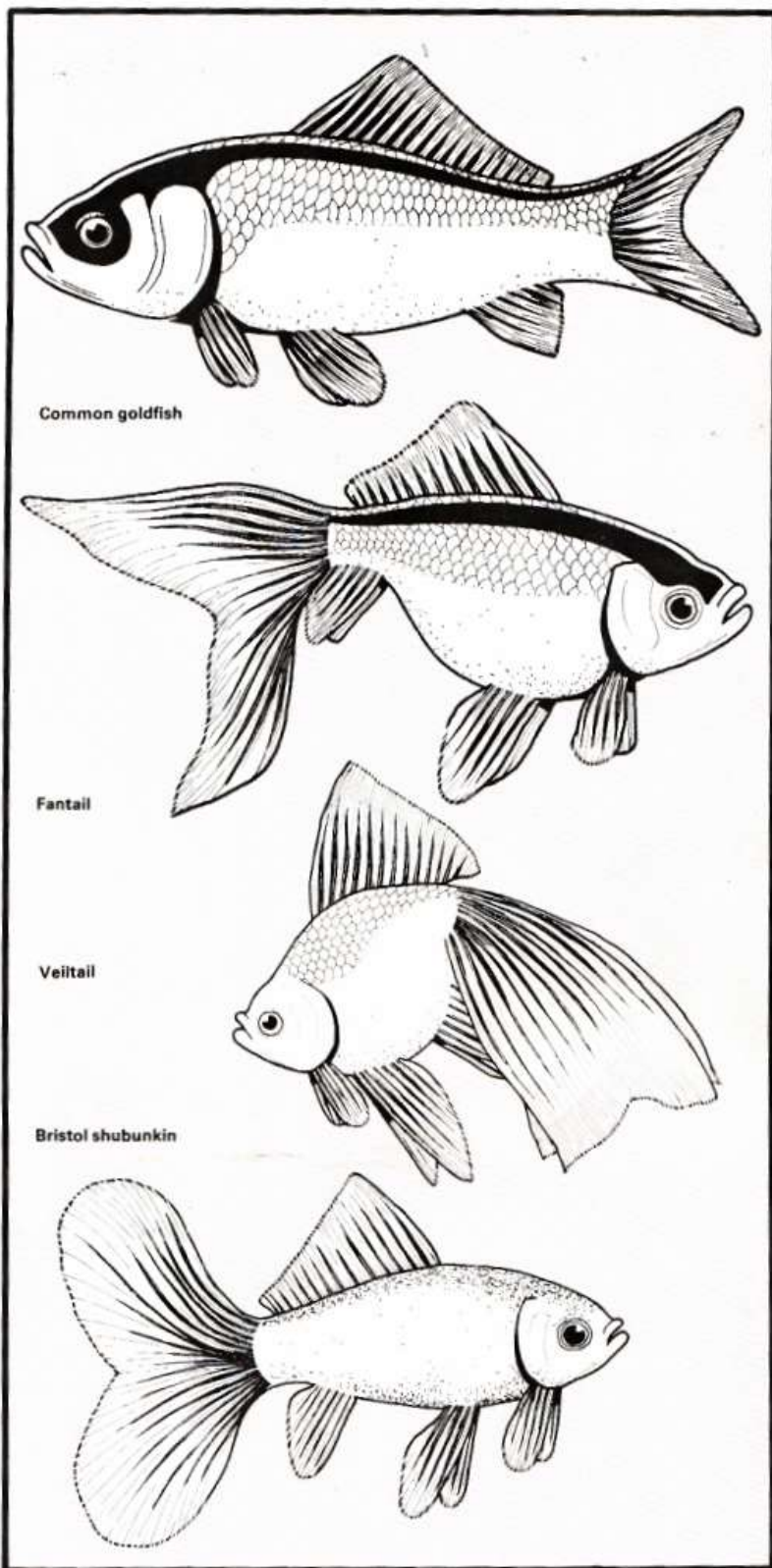
ORANDA: Round, spheroidal body, short, deep head, widely spaced between the eyes. Small mouth and iris type eyes. The whole of the head should carry a raspberry-like growth or hood, protruding from the general line of the body. Colour calico or metallic.

Finnage — dorsal to stand erect in a vertical plane and equal in height to body depth. Upper margin slightly convex. Paired pectorals, long and with round ends. Paired ventrals, equal in length to the height of the dorsal fin. Paired, long and equal anal fins. Fully divided, twin tail, long and broad, falling below the level of ventral fins. The bottom edge should be straight. In all, a twin-tailed, round-bodied fish with long finnage, high dorsal fin and straight edged, flowing tail. Excellence in development of wide head and hood growth.

MOOR: Rounded body, approaching a sphere, with smooth contours above and below. Head short and deep, with small mouth and nasal septa. Large, protruding telescopic eyes, which should be equally developed. The colour is metallic black only, extending throughout body and finnage, to give a black, velvety appearance to the body.

Finnage — dorsal fin to stand erect in a vertical plane and equal in height to the depth of body. Upper margins slightly convex. Paired, long, round-ended pectorals. Ventral fins paired and equal in length to the height of the dorsal fin, giving the fish a balanced appearance. Anal fins paired, long and equal. Caudal fins shall be a fully divided twin tail, long and broad, falling below the level of the ventrals, with a straight bottom edge.

In short, a twin-tailed, round-bodied fish with long finnage, high dorsal fin and straight edged, flowing tail. Excellence in development of telescope eyes and black colour.



Common goldfish

Fantail

Veiltail

Bristol shubunkin

6 out of 6 with the new Seadrometer



Seadrometer

The second in a new and improved range of products to celebrate our tenth anniversary

The SeAquariums Promise – No 2.

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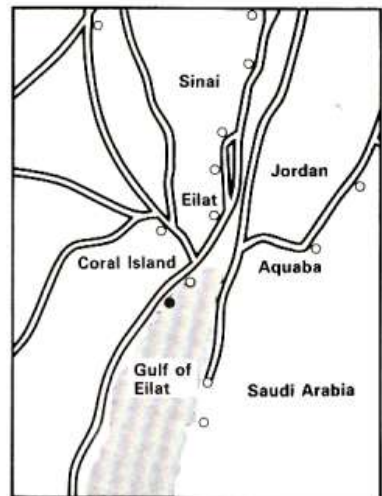
SeAquariums

Two-page picture special
on Eilat overleaf.

A Fishkeeper's Paradise

Journalist John Mitchell visits an underwater world
of outstanding colour

Right: The sign which greets visitors to Eilat's amazing Coral World.



Far right: Not far from the Jordanian border, Eilat is a marvellous centre to study marine life.



Well-known London journalist John Mitchell has just returned from a trip to Israel where he visited the famous Eilat Coral World to view tropical marines in their natural environment from an amazing underwater observatory. Here he files his pictures and story from that never to be forgotten visit. John was at one time a council member of the Federation of British Aquatic Societies and a founder member of the Friends A.S. in the Brixton area of south east London. He has kept tropical marines and has helped organise many aquatic shows in south east London.

PRACTICAL FISHKEEPING

A PARADISE for fishkeepers, with a hundred species on show in aquariums, and countless more to be seen by visiting the underwater observatory at the end of the pier.

This is Eilat Coral World on the Gulf of Eilat, Israel — some 2,600 miles from England and considered by seasoned travellers as the best display of underwater marine tropical life anywhere in the world. Coral World has to be seen to be believed.

Sited five miles south of Eilat in the Coral Beach Nature Reserve, the whole concept took four years of planning and biological research before it was opened to the public in 1975.

On shore there is a marine museum with an extensive collection of shells and invertebrates, then two marine aquariums — one with fish, corals and sponges and the other, showing, for the first time in the world, a collection of fish that live in total darkness and are luminescent — and finally a 100 metre long bridge to the underwater observatory.

How are the marine fish in 23 aquariums with the largest tank holding shark, kept alive? This is the big question that all aquarists ask. The answer is simple. Water is pumped from the sea into a storage tank and then into the aquariums without filtration 24 hours a day. The flow is adjusted to suit the various species in the tanks. Feeding is from plankton introduced with the water flow.

There are five underwater observatories in the world and until Eilat was built the one at Miami was considered the best. But without a doubt Coral World is unique. The observation room is 15 feet below sea level and on a coral reef which is constantly visited by fish — attracted by natural and introduced food. During the week I spent there just before Christ-

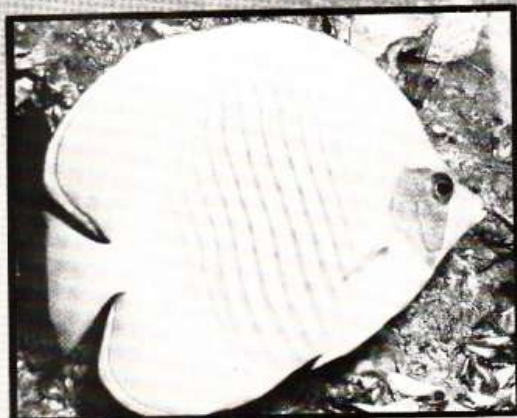
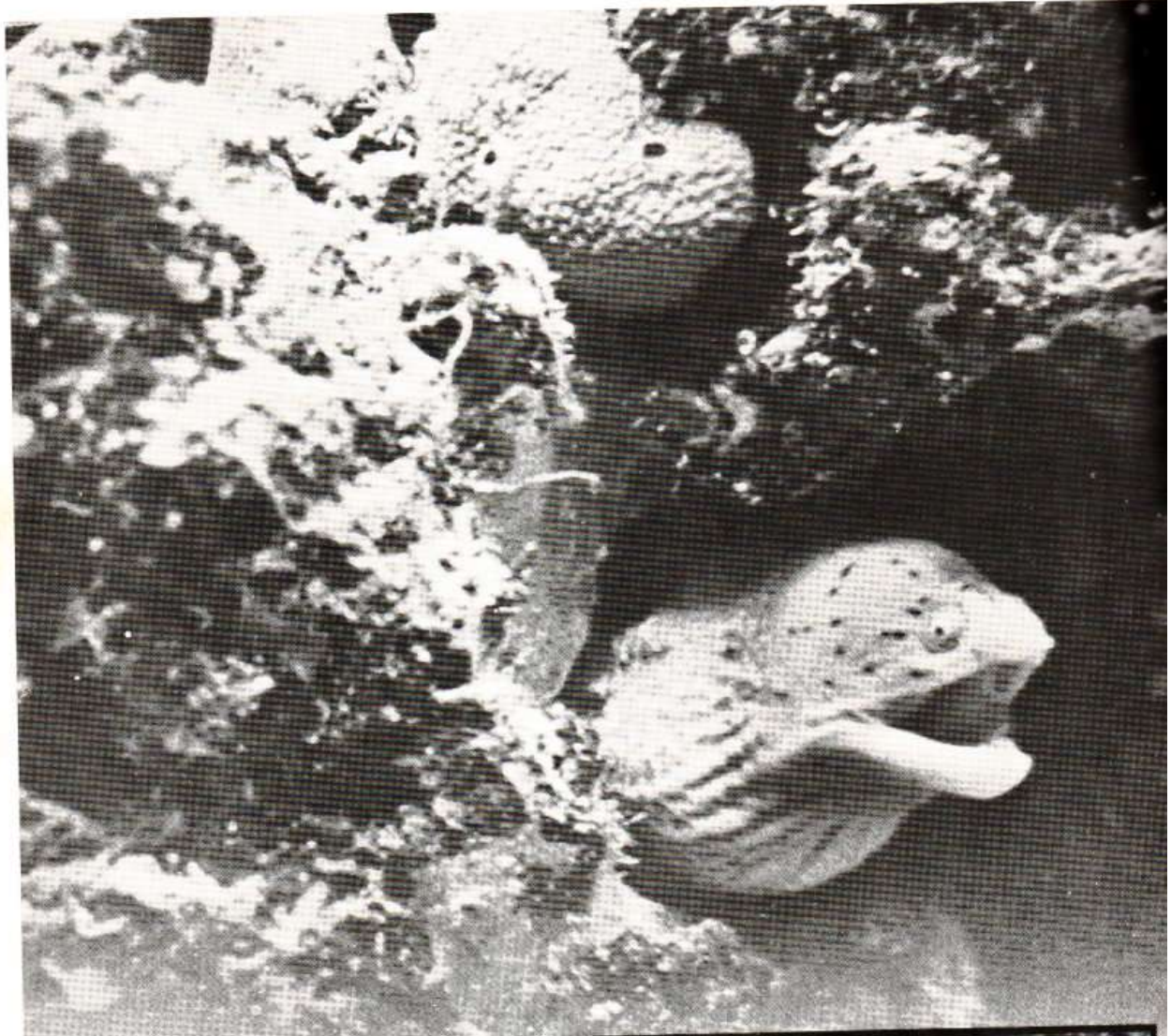
mas, the main fish were shoals of flute fish (*Fistularia petimba*), goat fish (*Parupeneus forskali*), sea bream (*Diplodus noct*), and many varieties of butterfly fish including the lemon (*Chaetodon semilarvatus*) and threadfin (*Chaetodon auriga*).

The Gulf of Eilat is at the northern tip of the Red Sea, some 110 miles long and up to 14 miles wide. It is between Israel's Sinai with the town of Eilat at the north and Ophira in the south. On the opposite banks are Saudi Arabia and Jordan. The Gulf has a winter water temperature of 22 degrees C and in summer rises to 26 degrees C. It has very deep water due to the fact that it is in the Great Syrian-African Rift Valley and at the deepest it is over 6,000 feet.

More important it holds over 1,000 species of fish including some that had never been seen by man until Israeli marine biologists discovered them. David Fridman is curator of Coral World and an almost purple fluorescent fish named after him is found only in the Gulf.

The tanks hold such beauties as Blue tang, (*Zebrasoma xanthurus*), Emporor Angel Fish (*Pomacanthus imperator*), Right-angled Butterfly Fish (*Chaetodon trifascialis*), the delightful Seahorse (*Hippocampus hystrix*), Picasso Fish (*Rhineacanthus assasi*), Puffer (*Arothron stellatus*) and so many more that I could really fill the whole of Practical Fishkeeping. A visit to the Coral World of Eilat really leaves the keen aquarist with the feeling that he can never repeat what he has seen in the tanks.

But if he cannot repeat the beauty, colour and variety, at least he can record it on film, and that is what this writer plans for the very near future. I am going back to Eilat with cameras and films to get more pictures. Be seeing you . . .



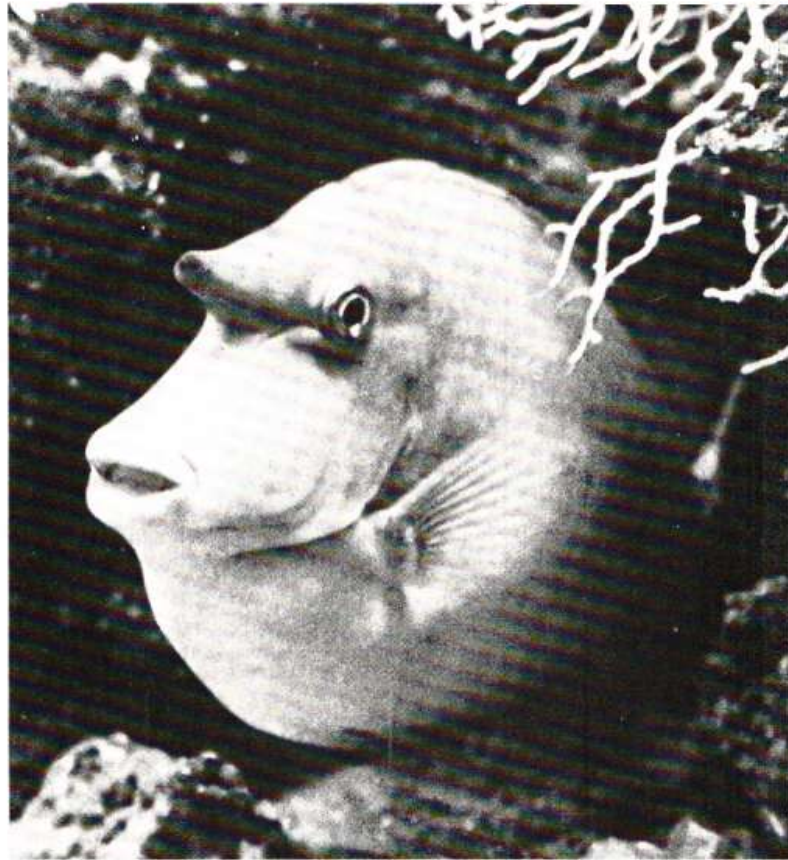
Always a beautiful sight — the Lemon Butterfly Fish (Chaetodon semilarvatus) drifts gracefully through its environment.



A distinctly marked Boxfish (Tetrasona gibbosus) swims into view. It is sometimes known as the Hovercraft because its nearly transparent, rapidly beating pectoral fins cause it to move through the water with no visible means of propulsion.

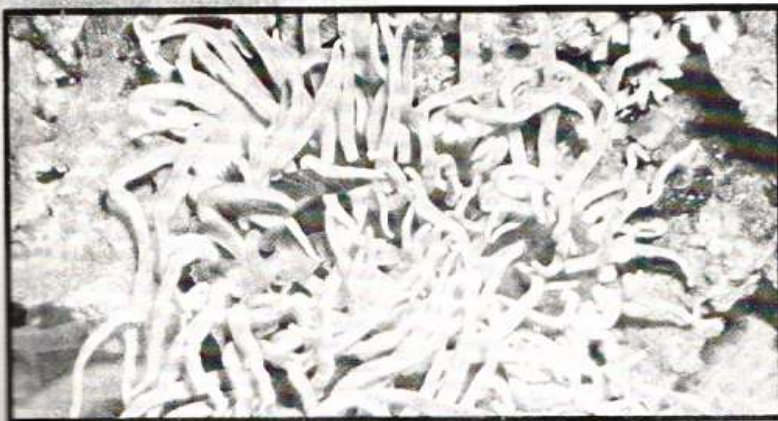


*This Moray eel (*Gymothorax grisea*) doesn't seem too happy about the attentions of John Mitchell's camera at his front door.*



A Fishkeeper's Paradise

A splendid shot of a pufferfish as it weaves through the rocks and plants of one of Eilat's aquariums.



An amazing shot of a tiny Clownfish settling among the tentacles of a predatory sea anemone which would seize most other species.



*The Sea Horse (*Hippocampus hystrix*) is one of Nature's great wonders. Here it goes on an unconcerned trip of its natural surroundings.*



THIS new reader advice service is here to help enthusiasts at all levels of the hobby. Beginners and experienced aquarists alike will find it useful — and informative. We genuinely want all your queries — be they basic or technical, specialised or general.

Much of the information will come from our own resources — but experts such as Dr David Ford, of the Aquarian Advisory Service, and marine man Graham Cox will add their technical expertise.

Graham, by the way, became a professional aquarist in the early 1960s and was Director of a major public aquarium before he founded Middlesex-based Seaquariums Ltd in '68.

Such men are only too happy to help YOU, the hobbyist. So send your queries to: Aquatic Queries, Practical Fishkeeping, EMAP, Bretton Court, Bretton, Peterborough, PE3 8DZ. If you want a written reply, please enclose a sae.

AQUATIC QUERIES

Research by Nick Fletcher and Dr. David Ford

■ Get your plants growing well

I READ with interest the first issue of your magazine PRACTICAL FISHKEEPING particularly the article by David Shields "Choosing the right Plants". However while he mentions the problem of keeping plants healthy and growing he does not elaborate on how.

As I am shortly going to re-set-up my tank (39 x 12 x 15 Gem). I would much appreciate any advice you can give me on how to set up to ensure a good growth of plants. The equipment I have is undergravel filter, internal box filter, undergravel heater, 30 watt Grolux light. The water in this area is neutral alkaline and app. 7-8° general hardness (Tetra-test kit). My problems in the past have been algae, although the tank is as far as possible from natural light and when adding algicide it seems to choke the plants also. The fish would include tetras, livebearers, angels, golden barbs, pencilfish etc. I hope I have given you enough information. S.A.E. enclosed. — C. W. Pepper, Melton Mowbray, Leics.

Just like the fish, each plant has its own preference for a type of water, the temperature, hardness, pH, flowing or still, as well as brightness and duration of lighting. Study the needs of the species you wish to keep and arrange your aquarium conditions to suit, or choose plants that will grow in the type of aquarium you set-up.

Many aquarists claim that plants will not grow properly in bare gravel, especially if undergravel filters are used and recommend a one inch layer of peat beneath an inch or more of the gravel. This gives something for the roots to grow into and supplies nutrients. Pre-soak the peat to remove acid and colour.

We note your algae problems and have asked Dr Ford to send you one of his special leaflets on the subject.

■ Winter problems can be beaten



Hygrophilla



Ludwigia

WHEN I first started up my tank, I bought some very nice simple plants. They grew very rapidly and became so thick you could hardly see the fish. This was last February. Then quite suddenly the plants began to die. I have bought more from the same dealer, but they are going the same way. Is this due to the winter months, and if not can you advise what is wrong and how I can correct the situation. — G. Sutton, Reading, Berks.

I deduce that the variety of plants you bought was probably Ludwigia or Hygrophilla, both of which make rapid growth. Winter is not really the best time to buy these, which under natural conditions grow most rapidly in the summer months. Since both of these are fairly

tolerant of water conditions I can only suspect lack of nourishment. A plant starved of food will still 'bolt' before withering away. All I can suggest is that when you replace your plants again, you bear the following in mind.

- Make sure they are true immersed plants. Many varieties in the shops are bog plants, which thrive best with only their roots in water.
- Make sure the roots are healthy, with signs of recent growth (look for white, fleshlike growth with no sign of algae clinging to them.)
- When you first plant them, reduce the amount of light to four or six hours daily. This will give them a better chance to establish, rather than 'bolt'.
- Try feeding a proprietary brand of plant food once a fortnight.

■ Catfish with a mighty appetite

I HAVE had two specimens of *Pimelodella gracilis*, both six inches in length, for about two-and-a-half years. When I first got them they measured two inches in length and have grown mainly on flake food and pond pellets with occasional tubifex. I wonder what other foods they will eat to give them a bit of variety. The two *pimelodella* share 30" x 12" x 12" tank with a six inch "Flat-headed" catfish (is this likely to be the correct name for it?) and a four inch long loricaria (whiptail) which has thrived on the algae in the tank for 18 months. Can I put any other fish in this tank of midwater swimmers, of good

size, without our crowding it? I might add it has undergravel filtration and a couple of diffusers.

Also, how do I get plants to grow in an 18" x 10" x 10" tank. The pH of the water is 7.2-7.6, therefore alkaline. The plants just don't grow and become brittle and covered in algae. Should I put soil under the gravel so they can grow off this? Is the water too hard for them? Should I grow ones which come from hard water areas or soften the water? The water temperature is 75-78°F.

The tank receives indirect light winter and summer from the north-west through a window, about 10 feet from it. The lighting on the aquarium is an 11 inch clear tube (240/250v 30 watt). Is this right to get plants growing

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Q AQUATIC QUERIES

Continued from previous page

Which cichlids?

I HAVE a 36 x 15 x 12 tank and the contents are as follows:-

Two pearl gourami; two blue gourami; two kissing gourami; two dwarf gourami; two sunset platies; two angel fish; one Siamese fighting fish.

I would like to introduce some cichlids into this tank. Do you think this would be advisable? If so, which cichlids would you recommend (other than angel fish), and how many? — M. Lewis, Maghull, Liverpool.

Cichlids are rather special fish needing special water treatment to make it suitable for them. It is always best to keep them in a special tank.

But if you do want some cichlids for the community tank, a few do not need special water conditions and are less aggressive. Try dwarf cichlids such as kribensis.

I suggest you add five more fish to bring your stock up to reasonable levels. Your tank should not exceed 30 inches of fish.



A male Kribensis — suitable for a community tank.

Goldfish switch

I have kept tropical fish for many years, and have bred most of the more common species. I was very interested in dwarf cichlids of the Apistogramma species and also Malawis which I bred in a small outbuilding.

In the autumn I decided with reluctance, to sell most of my stock, also some tanks, as the high cost of electricity and paraffin, for heating, was getting to be beyond what I could afford, especially with the winter coming on. I still kept some fish in the house

including a pair of Discus.

In the tanks I have kept I should like to breed fancy goldfish. The sizes are 1 x 48", 1 x 36", 1 x 24", 2 x 18" and several smaller plastic ones. But how do you go about breeding goldfish indoors, in a shed using the above tanks? I have read most books on the subject — I work for Lincolnshire Libraries — but none seem to agree. Most are reprints and the methods are old. I would also be obliged if you could tell me where I can buy good local bred stock. — Patrick Beresford, Bracebridge Heath, Lincoln.



Goldfish like this specimen are easy to breed.

Tank terrors

COULD you please tell me if it is advisable to include terrapins in a community tank? I have asked various people, but none seem to know for certain.

I have a 24 x 12 x 12 tank with a good variety of tropical fish, plus two small terrapins. They all seem quite happy with each other. — C. Holton, Stone, Staffs.

In a word my advice is NO. Terrapins will take a bite out of anything around them. Possibly your pair are not grown enough to start this yet. But they will attack your fish eventually. Terrapins should be kept in a separate terrarium.

Your terrarium should be a tank with water shallow enough to allow the terrapin to get his nose above the surface while standing on the bottom. He is an air breather and if the water is too deep will have to keep swimming on the surface all the time.

There should be an island — either a rock or a floating log — to allow the terrapin to bask in the "sun", an overhead light. Use a normal fluorescent tube. They must dry their shells off to harden them.

Terrapins feed on chunks of kitchen scraps and fish foods. Lots of partial water changes will keep them clean and healthy.

Scrap this tank

I HAVE an aquarium 23½x9x12, made of quarter-inch thick glass. I once used it as a home for gerbils, which as time passed removed all the joint sealant.

Is this tank suitable for fish-keeping? If so, is there any product with which I could re-seal it? And as it seems rather flimsy when filled with water, would it need any external support, such as a metal frame. Finally, could you inform me how much it would cost to buy a heater and filter? — Kevan Winch, Swansea.

I am rather perplexed that you are able to fill the aquarium with water if, as you say, the gerbils removed all the joint sealant. It sounds (and I am assuming it is an all glass tank) as though the actual jointing remains intact, even though the gerbils may have nibbled away the surplus. An aquarium 12 inches deep really needs three-eighths glass (9mm) if you are to be absolutely sure it will stand the strain. The thickness of glass, of course, depends solely on the depth of the aquarium, not the other dimensions. It would make no difference having a metal frame if the glass were too thin. Finally, although it is possible to buy sealing and jointing compounds from any aquarist, this would mean completely stripping down

It is not surprising that books you have read on Goldfish seem to disagree with each other. You must realise that you are dealing with a biological system and so every aquarium or pond is unique. An author can only describe his experiences with his individual tanks or pond; but you should study these experts' findings to guide you until you too are an expert.

Goldfish are seasonal breeders and it is the rising temperatures in Spring that trigger hormonal changes in the fish to bring them into breeding condition. A female needs to be ripe (i.e. swollen with eggs) to make males start chasing her and eventually spawn. To breed in aquaria you should stock with fish older than a year (preferably three to four years old) that have been over-wintered.

Feeding should include live foods such as earthworms, bloodworms, Daphnia etc, and the temperature kept near 60°F. When sexing is obvious put a female with two males in your largest tank and add bunches of plants, long grass, soft hay, etc. To trigger breeding try the various techniques you have read in the literature — or try your own ideas and, if successful, write an article for us.

To get local bred stock contact the Goldfish Society of Great Britain for members who live near you — write to their press officer: Mr Lawman, 45 Village Road, Enfield, Middlesex.

All about Marines

with Graham Cox

and cleaning the glass panels to remove all trace of grease and dirt, then re-assembling. In view of the flimsiness of the tank, I would really not recommend you putting yourself to the trouble — better to buy a new tank and start from scratch. The cost of heaters and filters is covered in the January issue of Practical Fishkeeping.

Tough to spawn

I NEED information on the breeding of axolotls. I have three and they have spawned, but the eggs do not seem to be developing. — Gordon Munro. (15).

Very little information is available on breeding axolotls. Our advice is to keep trying. If you have success, please write and tell PRACTICAL FISHKEEPING readers how it did work. In the meantime, if any readers do have any experience in breeding these creatures, please write and tell us about it and we will pass the information on to Gordon.

Raise the heat

MEMBERS of my club, the Kettering Aquarist Society, have found difficulty in keeping mollies. After buying a large pair and placing them in a community tank, they develop the 'shimmies' and die within a couple of days.

I have tried mollies in a weak solution of saltwater, but the same thing happens. Is there any way that mollies can be treated after purchase, so that they can live in clear water in a community tank? — R. Vickers. Kettering, Northants.

The 'shimmies' (where the fish remains in one place while weaving from side to side, fins down and looking generally sorry for itself) is due not so much to the percentage of salt in the water as to too low a temperature. If your community tank is heated to only 70°F this is probably fine for the majority of fish, but not high enough for the mollies. Try raising the temperature *gradually* by about five degrees.

Wild mollies are certainly found in brackish, estuarine water but all the fish imported into this country are now artificially reared, and by the time they reach the dealers, will almost certainly be accustomed to water without any salt content at all. They do best in hard alkaline water which is well matured. Mollies also need a percentage of green food in their diet, so if there is no algae in your tank, I suggest you give them a regular feed of chopped lettuce to make up the deficiency. If you consider all these points, you will probably find that one or more factors is contributing to your lack of success so far.

PRACTICAL FISHKEEPING

Salt blockage

I have a marine tank and have experienced a couple of problems which I hope you may be able to sort out. First is that I find salt crustation and build up tends to block the tubes of the under-gravel filter, thus cutting down the aeration. I have tried removing the fish while I clear out the tubes but this only frightens them and possibly may cause injury. I have also tried while the fish are in the tank, again with the same results.

The other problem is the lighting, on a timer switch, which gives about six to eight hours light per day. I have a build up of green algae which I reckon to be caused by insufficient light. How long should lighting be left on for a marine tank? — T. A. Moore, Horsham, West Sussex.

You do not say what type of undergravel filter you use but we assume it has very narrow uplift tubes if actual blockage occurs. The diameter should be about 2 cm. Algarde do an extension airlift and bend that may help. The bend directs the water flow along the surface and so cuts down spray. If you are having problems with the air-tube we suggest buying a few cheap stone diffusers (e.g. Petcraft) and file them down to slip easily down the uplift tube. When clogged these can be cheaply replaced rather than attempting to clean them.

If you have green algae growing in the marine tank it is a sign that everything is healthy and the lighting is adequate, so you do not have a problem.

Mixing marines

I HAVE just set up a marine aquarium (36 x 18 x 18) and at the moment I am maturing the filter-bed. Nitrite reading is strong so I hope I can soon start to stock with show fish.

I hope to have the aquarium furnished with coral and tufa rocks with fish only. The two I have in mind are a yellow tang and a lionfish. Will these get on together and will they cause problems to other fish?

How many other fish will I be able to keep and should I steer clear of any types as a beginner? — G. Abrahart, Chaddesden, Derby.

A lionfish of either the *Dendrocheirus* or *Pterois* genera will not cause any problems to a normal sized yellow tang, that is 3in (7cm). As you have room at one inch of fish to four gallons of water for 10 inch of fish you can

add to your stock.

But I advise against buying fishes small enough to fit inside the lionfish's mouth. In other words never tempt piscine nature — the results can be costly and unpleasant to watch!

I would avoid buying any other species of surgeon fish or tang, since in an aquarium of your size there would almost certainly be trouble between two fishes of the same family.

Otherwise simply avoid all those fish listed as being delicate or difficult and avoid buying two fish belonging to the same family. Your aquarium should NOT hold more than 10 in of fish for the first six to 12 months.

Thereafter, you may safely double this to one inch of fish to two gallons of water provided that your feeding programme and techniques are critically based and that you test the pH, nitrite and nitrate contents of the sea water every week.

Bonus algae

I HAVE set up a marine tank of 20 gallons (39 x 12 x 15). At the moment I have three common clowns, three feather duster worms, one soft coral and one anemone. I want to add one dwarf angel and a butterfly. Is this O.K.?

In some books it says you must stir up the oolite sand every two or three months and syphon off the mulm. But I have a layer of algae on the sand and do not want to disturb it. Can I leave it?

What can you do about feeding when you are away for two weeks' summer holiday. I am reluctant to leave the task to a neighbour who has no experi-

ence of fishkeeping. What do you suggest? — K. Lewan, Broxburn, Scotland.

You may have been worried about stocking more fish because of the invertebrates you have. But as they do not breathe the water in the same way as fish, you may stock as many invertebrates as you like. Therefore your choice of new fish will be adequate. Remember it is normal to stock a marine tank at about half the level of a freshwater equivalent.

Algal growth is a very good indication that water quality in your tank is in good condition. It is best to leave well alone in this case. Of course, if the algae starts to die, you will need to take action immediately and start siphoning. A marine tank is a biological system. Therefore it is impossible to generalise on what attention they will need. Each one is different.

Providing your fish are all adult and in good condition, you may leave them for two weeks without feeding. If you have any young fish they must be fed once, half way through your holiday. Do not give extra food before you go as the fish will eat only their normal quota and the rest will pollute the tank.

If you measure the food before you go, a neighbour could feed just one time. Better still why not join a local aquarists' society. Then you would have plenty of people willing to feed while you are away, with the added advantage that they are experienced enough to do the job properly and take action if anything is wrong.



Lionfish will share a tank with Yellow Tang.

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NUMBER 10 Hyde Road looks just like any other terraced house in the quiet Warwickshire town of Kenilworth.

But behind its front door lies the unique world of Unit 59 — an aquarium society with members all from the same family. They include mum and dad, that's Fred and Evelyn Underwood, and their children.

A home made, three foot tank is the focal point of the living room. Bedrooms have been invaded to house the children's tanks and Fred has transformed a cupboard in the hall to a fish house.

And even with seven children, the Underwoods have still found plenty of time and energy to devote to their hobby, in which each and every member takes a very active interest.

Even young Alan Underwood, at six months old, spends many hours gurgling at brightly coloured tropicals that have earned countless show winner's cards and trophies. As he grows older it's odds on that he will follow traditions that have brought much pleasure to his parents, brothers and sister Karen.

But how did it all begin? Why a club from a single family?

Fred Underwood, an electrical contractor, kicked off with the hobby back in 1965. His fish tank was an old glass carboy. It served to house the usual run of beginner's fish and soon Fred was trotting off proudly to the local pet shop with his first brood of baby livebearers.

"I was hooked right from that moment and before long I had bought a tropical tank, which was soon to be increased to several breeding tanks and eventually into an eight-foot long shed for a fish house," said Fred.

At this stage, it was time for the natural progression to a club — Leamington and District Aquarium Society — which was to provide valuable experience and help quench the ever growing thirst for knowledge in the Underwood household.

Even in those early days there was an urge for something better and before long Fred was forming what was to be known as the Spa Aquarium Discussion Group — a club of 16 adults and 14 children.

Meeting in each others' homes worked well and the group gradually developed their

No 10 HYDE ROAD

Behind its front door lies the fascinating world of Unit '59

By Allan Haines



Unit 59 founder Fred Underwood has managed to find room for all the family's fish. His biggest problem now seems to be finding space for the almost never ending run of awards collected by their fish.

show fish to a standard suitable for the Midland Aquarist League. Awards started to roll in and one member, Eddie Bird, went on to win the famous Belle Vue show with a 22 inch long lemon finned barb.

Then suddenly, almost overnight, Fred and Unit 59 lines up: Karen Underwood (13), Kevin Hancock (16), Iain Hancock (15), Andrew Hancock (17), Keith Hancock (16), Ian Underwood (16), Fred Underwood and his wife Evelyn with six month old Alan.

Evelyn lost interest and for a time gave up the hobby. But with Fred now a Class A, Midland Association of Aquarium Societies judge, fish keeping was in his blood and the whole family again returned to the hobby.

At this stage 'Unit 59' was born. Evelyn



explained the title: "Unit 59" was named that way for a very good reason — it was the number of our home at the time — and the "Unit" bit just suited us as a family."

There is nothing fancy about their fishkeeping today. It costs very little and stimulates a fantastic comradeship among the youngsters who would otherwise be at the age when one torments the other simply through boredom.

Boredom, however, is something unknown at number 10 Hyde Road. There is always something to do. A fish to be cared for. A tank to be planted or new stock to be collected.

"We go out and collect fish from the local streams and ponds," said 16-year-old Ian Underwood, who has already passed six O level exams and is now going on to take his A levels in the hope of finding a job in biological research.

"We look around local waters and try to find bullheads, sticklebacks or miller's thumbs. If we get good ones we grow them on and eventually enter them in shows," Ian explained.

And their enterprise has not gone unnoticed as winners cards will justify.

Simplicity continues throughout Unit 59. There are no exotic species that would cost a fortune — just well cared for fish — everyday specimens purchased at the local pet shop. Guppies, neon tetras, characins, mollies and the odd dwarf cichlid grace their tanks.

"We have only about 200 fish at the moment because we have been having the house altered and stocks have fallen below normal. A figure of around 400 is more usual," said 13-year-old Karen Underwood.

Not content with a house full of fish plans are now being laid for a pond in the garden. "Then we will really be able to grow our local collection," said Fred's stepson, Kevin Hancock, an enthusiastic 16-year-old.

Pond keeping is nothing new to Fred as Evelyn will justify. "We had a craze for keeping temperate marines at the time," said Evelyn. "And a visit to the coast resulted in a pond full of crabs."

"Unfortunately one decided to go for a walk in the middle of the night and the whole family was woken up by it scraping its claws on the back door," she smiled.

Similar incidents have brought many happy times for all nine members of the Unit and their spirit of competition has seen them filling many a show bench with entries.

Fred, as secretary of the Midlands Aquarists' League encourages this participation. "We like to enter as many as possible simply to help create more interest in the show. Other clubs know we will field a lot of entries so they feel they must follow suit or lose bonus points," he explained.

"Entering fish in shows regularly gets them used to the show jar and they hold their position well and lose very little colour, both vital points that score in the judges' eyes," said Fred.

"How does fishkeeping upset the every day running of the home," I asked Evelyn: "Well I suppose it does disrupt our planning at times but it's such great fun you don't really notice," she said.

And even with so much involvement in fish Fred Undergood still has other talents to his credit. A member of the Spa Operatic Society, he has just finished playing a part in 'Carmen'.

However, fishkeeping will remain a big feature in the Underwood household and already an interest is being shown in turning baby Alan's bedroom into another fish room.

"The hobby is just like that. It gets hold of you and won't let go. We all enjoy it and win or lose on the show bench there will always be a lot of pleasure in it for us all," said Fred.

Brewing your own is a mistake

Marinist's notebook — with Roy Pinks

ANALYSIS of almost any set of examination results relating to local schools reveals that the youngsters of today are nearly as bad at chemistry as we were. It is not very surprising, therefore, that when we get talking about water quality for marine fish, many readers hurriedly turn the page, in the hope that some more digestible subject will appear on the other side of it.

They can hardly be blamed for dodging the challenge of a quite complicated subject, but it may be of some comfort that even the chemists and biologists do not always see eye to eye even on such an apparently straightforward issue as marine aquarium culture, and many of the more extravagant assertions may certainly be taken with a pinch of salt. Hence, there is nothing to be lost in following the recognised procedures for setting up aquaria using the normally available salt water synthetic mixes.

One should certainly beware of any source which recommends the compounding of your own brew, as the formulae were usually unreliable and in some cases totally misleading, and in any case the specialist manufacturers have in the meantime made great inroads into the processing mysteries which so confounded the hobby ten or more years ago. I am often asked whether one mix is as good as another, and whether it is safe to intermix them; and if so, in what proportions.

The answer is quite simple, in that for all practical purposes they are no different one from the other, and they can all be combined, observing, of course, the exact mixing instructions printed on the packaging.

The newcomer to the subject will find that these mixes are made up in sizes related to the number of gallons or litres of seawater which they will produce in solution by the addition of the water from your tap. In some cases everything you need is in one bag, but in others the trace elements are contained in separate wrappings or bottles, and these are added to the bulk solution after it has been prepared.

It will be found that it is cheaper to buy the larger packets of saltwater mix, and this is fine for the owner of the large tank, or for the aquarist who wishes to use a lot of salt water at about the same time, but there are a few doubts about the wisdom of keeping this for any length of time. So far as I am aware there is no very good reason why all the available mixes should not store quite well if they are subjected to ideal conditions, but these are seldom stated on the packet. A large glass tank with constant aeration would be admirable, but can you really expect anyone with such means not to fill it with clowns or some such at the earliest opportunity? The usual thing is that one buys rather more than is needed, and it is mixed in a plastic dustbin or a similar container. Invariably some is left over and the tendency is that another packet is tipped in and the contents mixed with tapwater, which provides a useful reserve. I have often mixed at double strength to economise in storage space, and I expect many readers will have done likewise.

There will be objections to this from some quarters because the softening agents in many plastics are attacked by seawater and can prove inimical to living organisms. There

is little detail on this at present, and I hope that the scientists will soon provide us with some reasonably reliable guidelines, but I am not convinced that the dangers are as great as they are alleged to be. I have exposed all my fish to water which has been stored for long periods in plastic dustbins, but the casualty rate has been so random that I find any linkage to be pretty remote.

All the same, there is almost certainly some unwisdom in this practice, and the ultra careful will take note. The only difficulty they will find is that of isolating a suitable container for their concoction, and the family bath remains the most likely candidate. But it has to be an enamel one, so I feel that I am one of the few people in the country left whose bathrooms possess items of such antiquity (and, incidentally, Stone Age plumbing).

A worry which does attend one's early efforts at mixing is the precipitation which often occurs when the chemicals come into collision with your tapwater. This appears as a cloud; also, some of the constituents of the mix simply will not dissolve. All that you need do is to stir vigorously with a clean wooden spoon or stick, until the whole mix is equally foggy. Then draw from it the quantities you need, stirring continuously in the meantime.

When added to your tank, and accompanied by vigorous aeration and filtration, the mixture will soon assume its intended form. Most of the mixes I have tried have concerned me somewhat as regards this disability to dissolve readily, and the only one which performed otherwise was Tropic Marin. This comment is not to impart this with any superior quality over the others, but merely to illustrate a characteristic which emerged in combination with my local tapwater. The point to be made is that, precipitate or not, there is nothing to get alarmed about, and one may buy any brand with a high degree of confidence.

FBAS Founder dies

EAST London Aquarists and Pondkeepers Association president, Mr. P. S. Campkin, has died at the age of 85.

Throughout the past 40 years, Mr. Campkin established himself as a practical fishbreeder of exceptional ability, particularly with Croydoras, Killifish, Labyrinths and livebearers. That during an era when little practical knowledge was available.

His career as an Essex school headmaster gave him ability to communicate information in an understandable form, as many societies and aquarists will remember.

The foundation of the Federation of British Aquatic Societies and its successful early years was largely due to his efforts.

In 1950, he was elected Federation chairman, and extended his policy of bringing Aquarists together with, in 1952, the Inaugural Meeting of the World Union of Aquarists, held in Holland, at which he was elected chairman.

His many friends, and our hobby generally will miss a truly kind man. To perpetuate his memory, a Commemorative Award will be created, by the East London Association, details to be announced at a later date.

Marines

A saltwater spectacular



Majestic Angel fish ▶

Pearl Scale Butterfly ▶▶



◀ Regal Tang

▼ Volitan Lion fish



Who can fail to be enthralled at the magical world of marine fishes?

A myriad of vivid colours dashing about the tank as coral reef fishes pursue their lifestyles at a fast and furious pace.

And then the reverse, with the relative calm of the slow-moving invertebrates idling away among the coral.

Even the dullest of the tropical marines far outshines the most beautiful freshwater fish — but it isn't only their beautiful looks that make marines such an attractive proposition.

A wealth of interesting habits make them equally fascinating study subjects.

Watch out for the territorial behaviour as each fish decides on and dominates its own little niche in the tank.

Look out for the different feeding habits. Some fish will feed happily, even taking titbits from your hand, while others shy away or skulk in dark corners.

Gaze at the beauty of the predatory anemone and its gently waving tentacles, the antics of the Fairy Shrimp or Boxing Shrimp, or the steady progress of the cowrie as it "lawnmowers" its way through the algae in your tank.

It's a beautiful world, and one you can't ignore.

Pictures taken at Sea Aquariums, Longford, Middlesex.

Plants for your pond



careful selection is the first priority
by Roger Cleaver and Peter Bull

A newly-completed pool, or an existing one in need of restocking, can create a great temptation to rush out and buy a batch of new fish.

But resist the urge for a few moments while we take a look at what should be done to ensure good health for the fish and give the best effect for the pool.

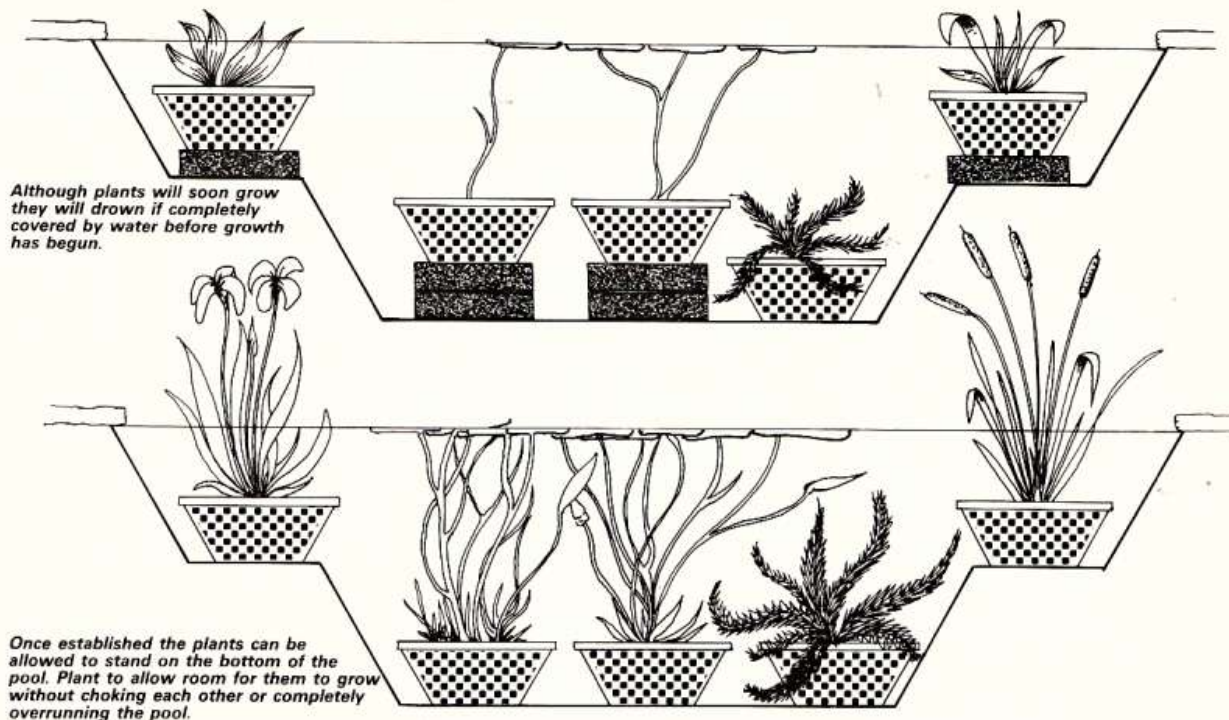
First on the shopping list — if the pond is to be a success — is a suitable selection of plants and the time needed for them to become established. Then, and only then, should your thoughts turn to introducing fish.

But why plant a pond in the first place? The answer to that one is simple. Firstly they make a pond much more attractive while at the same time helping you to maintain a balance and keep your valuable fish in good condition.

Perhaps the most important function they perform is keeping the pool fresh and wholesome. They do this by breaking down much of the waste matter produced by fish and even some of that which arrives in the water from other sources.

Without healthy plants the water will sour, become polluted and eventually kill off the fish. Secondly, plants provide shelter when the fish are frightened. And knowing this shelter is never far away they will quickly become tame and spend much of their time in open water where they can be watched.





Another bonus for the fish is that they provide shade and at the same time help you to keep down the growth of green algae. In hot weather, the fish will enjoy the protection from fierce sunlight that can quickly send water temperature soaring to intolerable degrees.

PLANTING

In this country, planting is usually undertaken between the end of April and early September. Reason for such a short season is because water plants, unlike those in the garden, can only be transplanted when their growth is strong. Never try to introduce plants that have stopped growing. They will just rot.

Actual planting is easy, thanks to the introduction of planting baskets and crates. These are made from a strong plastic and come in a variety of sizes. As the material is not affected by water they will last the life of the plant.

Each basket has perforated sides which allows the plant to draw nutrients from the water, making the need to cover the pool bottom with soil a thing of the past.

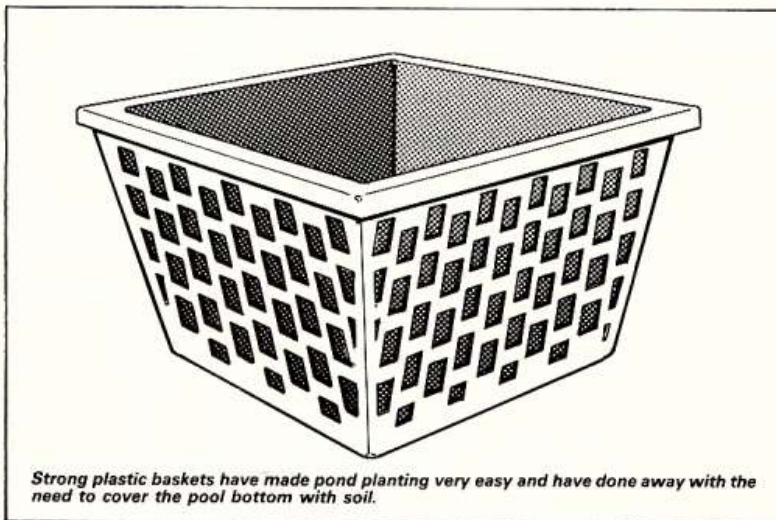
Now, before we consider the types of plants needed, let's take a look at how best to undertake the actual planting. The method is simple but always try to plant as soon as possible after arriving home from the dealer.

Take a basket and line it with a layer of hessian or old sacking. Then fill with soil or loam to within one inch of the top. If soil is used, use one with a high clay content if possible. Manure or fertilizer must never be used.

Once filled, make a hole in the soil and gently insert a plant, taking care to spread, but not break off the roots. With lilies, however, the roots can be cut back with a knife if they are very large.

Once in place the soil is then rammed down around the plant after which a layer of clean gravel is spread over the basket to prevent large fish from disturbing the soil. In the case of very big fish or koi carp we would use large stones so that the plant is not uprooted by their digging.

PRACTICAL FISHKEEPING



INSTALLATION

Having planted the baskets, we must now get them into the water — a simple task if carried out with a little thought. But remember! Pool plants will drown if fully covered by water before they have become established. This may mean baskets need to be stood on blocks for a time until growth can be seen to be taking place. At this stage the blocks are then removed and the basket lowered to the pond's bottom.

Remember also that water plants need room to grow. Provide it by not overcrowding each basket in these early days.

Recommended sizes of basket for pool plants are: **Large** 12" x 12" x 8"; One lily or 12 oxygenators. **Medium**: 10" x 10" x 6"; One or two marginals or 10 oxygenators. **Small**: 8" x

8" x 4": One miniature lily or one marginal or six oxygenators.

TYPES OF PLANT

Pool plants can be split loosely into four classes: Lilies, marginals, oxygenators and floaters, a selection of which will make a very attractive pool.

Water lilies, or the larger plants, are used for the deepest part of the pool and these usually have very beautiful flowers and large leaves which float to the surface, providing shade.

No pool should be without at least one lily but take care to ensure they have a lot of room.

Marginals. Used around the edge of your pool these plants can be found in a wide variety, some growing tall, others short, while some spread across the surface of the water.

Plants for your pond

► Most flower or have an ornamental foliage which performs well in breaking up the sharp outline of the pool edge.

Oxygenators. Although these have little value as ornamental plants they are vital to good health of the pool's fish. Oxygenators consume mineral salts and ensure an algae free pool which shows off your fish to the full.

Although oxygenators are submerged and not seen very much by the pool admirer the fish will enjoy their rich aquatic growth which provides shelter, a place to spawn, a food source, shade and a safe place for fry to hide.

But let us clear just one myth that surrounds these plants. Many people believe that if their pool is full of oxygenators their water will be rich in oxygen. Unfortunately this is not true. Certainly they give off oxygen during the day but once darkness falls they cease to function and in fact draw oxygen out of the pool throughout the night.

With this fact in mind never allow them to overrun your pool. A free swimming area must be available at all times.

Floating plants. Again not the most spectacular plants but their leaves help in the control of algae and provide shade. Again never allow them to take over the pool completely.

WHAT TO BUY

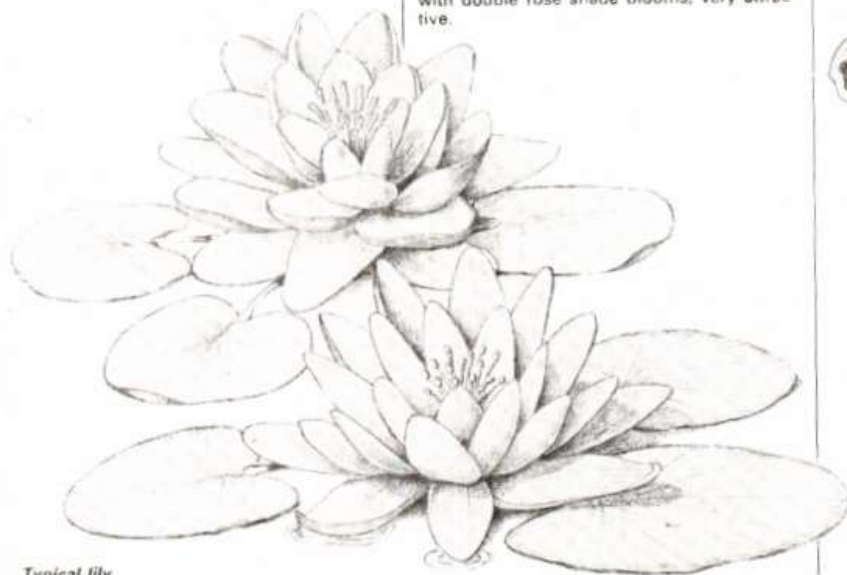
To help the newcomer we have prepared a list of the more commonly available plants which are ideal to the garden pool. But the actual number of plants needed will vary considerably from one pool to another. Seek your advice from the local dealer, using our table as a rough guide.

Water lilies. One plant per 20 to 25 square feet of surface area.

Marginals. About one third of the perimeter should be planted.

Oxygenators. One plant to every two square feet of surface area in small pools, while one to every four square feet for pools over 100 square feet.

Floating plants. One bunch to every 10 square feet.



Typical lily

Colour and variety

RED LILIES

Escarboucle — probably the best red available, being large intense red flowers of perfect shape, also free flowering once established.

Attraction — very large free flowering lily, with garnet red petals, lighter towards the tips, white sepals.

James Brydon — beautiful cup-shaped blooms of carmine red, with yellow centres, medium size purple leaves, which make it suitable for even small pools. Will succeed where the pool is well shaded.

YELLOW LILIES

Marliacea chromatella — always popular this reliable yellow lily, occasionally listed as Golden Cup, mottled foliage, prolific.

Odorata sulphurea grandiflora — sulphur yellow blooms, produced freely standing above the water surface. Attractive mottled foliage.

Sunrise — American variety which when established can produce blooms of up to 10" across. This variety can be identified by the hairy stems to the blooms and leaves. Does prefer warm summers.

WHITE LILIES

Marliacea albida — large white waxen blooms with bright yellow stamens, and leaves which have a brownish tinge around the edge. Its classic shape deserves its popularity.

Gladstoniana — a large water lily with pure white blooms and large green leaves, affording good surface cover.

Tuberosa richardsoni — another large lily which produces rounded pure white blooms, freely produced over a long season, with apple green leaves.

PINK LILIES

Marliacea carnea (Morning Glory) — large pale pink blooms, freely produced.

Rose Arey — the best of the pinks, not only for its colour of bright rose pink, but with long incurving petals, the blooms, which when established reach six to eight inches across, are delicately scented.

Madame Wilfron Gonnere — a beautiful lily with double rose shade blooms, very attractive.

MARGINALS

Acorus calamus variegatus (Sweet Flag) — green and yellow striped, Iris-like leaves, very attractive.

Butomus umbellatus (Flowering Rush) — clusters of rose-pink flowers on a stem, rush type leaves.

Calla palustris (Bog Arum) — glossy heart-shaped leaves, white Arum-lily like flowers, which later form clusters of red berries.

Caltha palustris plena (Double Marsh Marigold) — golden yellow double flowers with green leaves.

Eriophorum angustifolium (Cotton Grass) — grass-like foliage with pure white tufts.

Iris laevigata — striking violet-blue flowers, wide sword-like leaves.

Iris kaempferi variegata — striped green and cream leaves, this Japanese clematis-flowered iris, is a rich purple.

Iris pseudacorus (Yellow Flag) — bright yellow flowers, with green sword like foliage.

Iris sibirica orientalis — violet blue flowers with speckled centre.



Mimulus luteus

it's all here

Lobelia carinalis — deep red foliage, with attractive scarlet flowers.

Mimulus luteus (Monkey Musk) — a well known and popular marginal, bright yellow flowers continue all through summer.

Mimulus ringens (Lavender Musk) — violet blue flowers forming on the stems.

Myosotis palustris (Water Forget-Me-Not) — clusters of dainty blue flowers as that of the garden variety, but lasting longer.

Pontederia cordata (Blue Pickerel) — spikes of small blue flowers, resembling the delphinium, also has striking foliage, of shiny heart-shaped leaves.

Ranunculus lingua (Great Spearwort) — resembles a giant buttercup with shining yellow flowers.

Sagittaria japonica plena (Double Japanese Arrowhead) — as its name suggests, the leaves are arrow-shaped, which make this plant both unusual and scarce, with very full double white flowers.

Scirpus zebrinus (Striped Rush) — the bright green and white stems are vertically striped, making this a very effective plant, desirable just for its fine foliage effect.

Typha latifolia (Great Reed-Mace) — often referred to incorrectly as a Bullrush, this vigorous grower has the chocolate-brown bosses, which are millions of tiny packed seeds.

Typha minima (Miniature Reed Mace) — as suggested a miniature form of the above plant, even to the tiny rounded bosses.

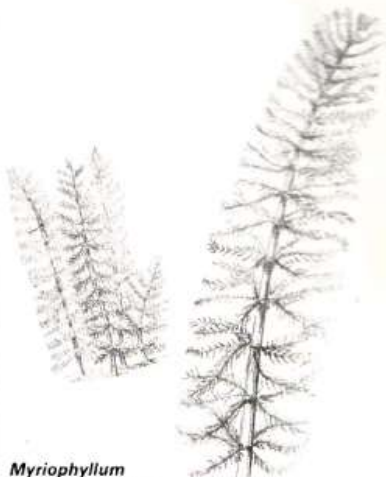
DEEP MARGINALS

Aponogeton distachyus — sweet-scented Water Hawthorn, white flowers with black centres and oblong shaped leaves which float on the surface of the water.

Zantedeschia aethiopica — the ever popular Arum Lily, arrow-shaped leaves, fragrant white flowers.

OXYGENATING PLANTS

These essential plants are necessary for all pools, not only for water clarity, but to support fish life. Various varieties are available, but for the average pool keeper a selection of mixed are more reliable than trying to obtain one particular type.



Myriophyllum proserpinacoides

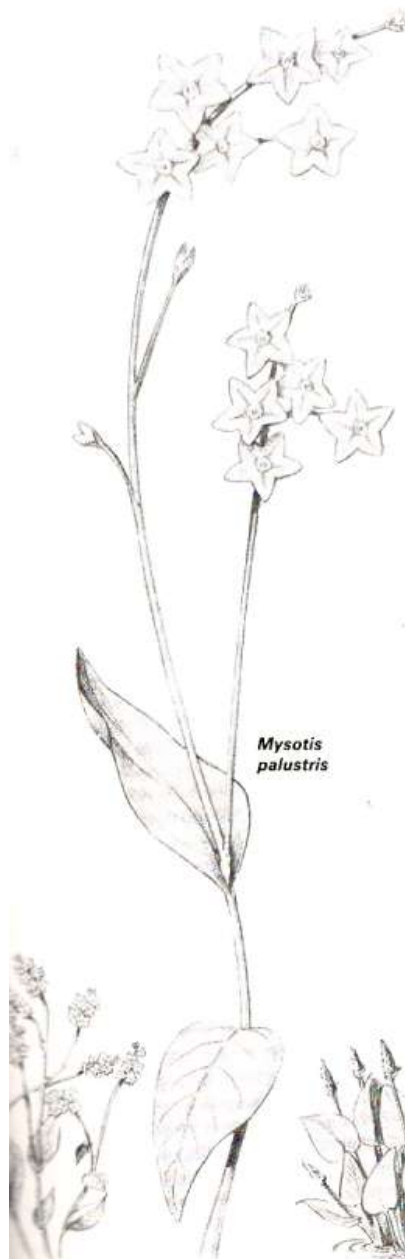
FLOATING PLANTS

Azolla caroliniana (fairy moss) — a small floating annual fern, which changes colour from bright green to dark red during its seasonal cycle.

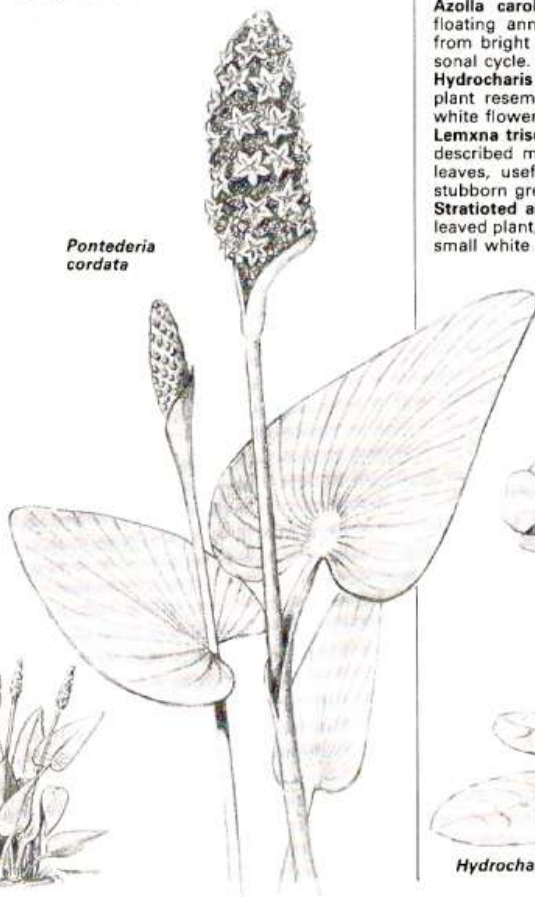
Hydrocharis morsus ranae (Frogbit) — this plant resembles a miniature water lily with white flowers.

Lemna trisulca (Ivy-leaved Duckweed) — as described miniature ivy-shaped bright green leaves, useful as a water clearer for those stubborn green ponds.

Stratiot aloides (Water Soldier) — a spiky leaved plant, resembling a pineapple top, with small white flowers.



Myosotis palustris



Pontederia cordata



Hydrocharis morsus ranae

Two suggested aquarium lay-outs

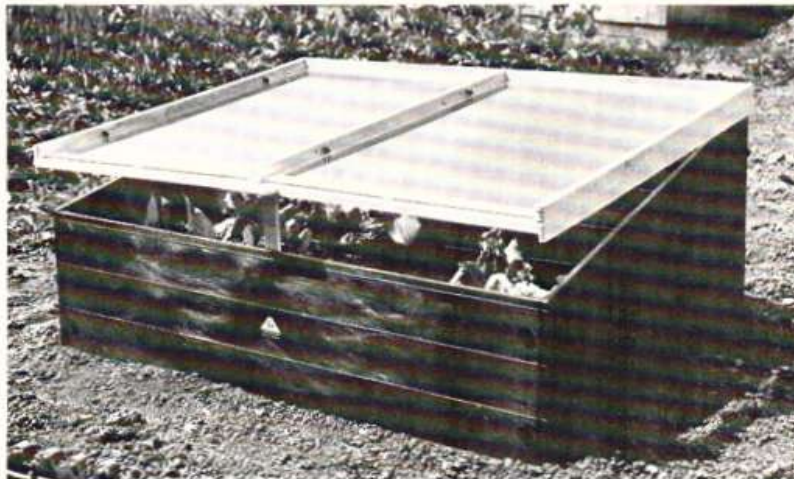


Of course you can grow your own plants

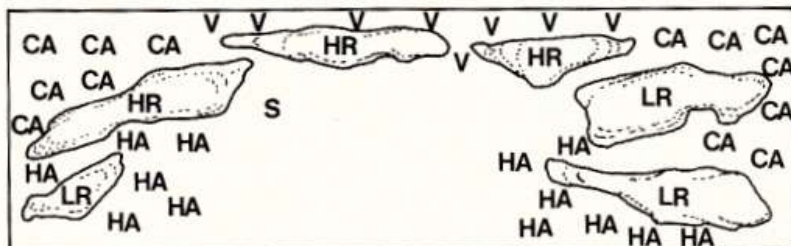
David Shields explains just how easy it is

DAVID Shields is the man behind the Halifax AS successes in the tank furnishing sections at the 1978 British Aquarists Festival at Belle Vue, Manchester. His efforts gave the society first place in the tropical section and runner-up spot for a coldwater tank.

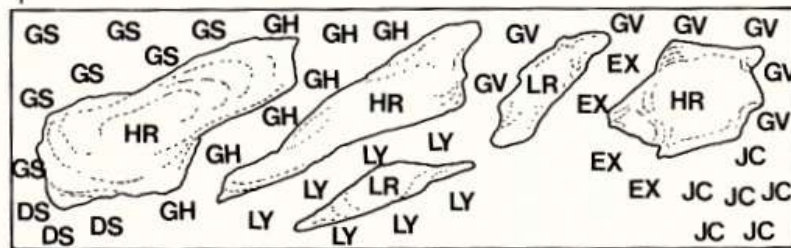
A 39-year-old sales manager from Halifax, David has kept fish since he was seven, and spent most of the time specialising in plant cultivation.



A garden cold frame such as this is ideal for young plants — particularly on those chilly days in early Spring.



1



2

1

CODE	SCIENTIFIC NAME	COMMON NAME	CODE	SCIENTIFIC NAME	COMMON NAME
CA	CABOMBA CAROLINIANE	FANWORT	GV	VALLISNERIA GIGANTIA	GIANT VALLISNERIA
V	VALLISNERIA TORTA	TWISTED VALLISNERIA	LY	LYSIMACHIA BRASILENSIS	BRAXILIAN MONEYWORT
HA	ELOCHARIS ACICULARIS	DWARF HAIRGRASS	EX	ELEOCHARIS XINGUA	GIANT HAIRGRASS
S	NUPHAR LUTEUM	SPATTERDOCK	DS	ECHINODORUS PUSILIS	DWARF CHAIN SWORD
GS	SAGITTARIA LATIFOLIA	GIANT SAGITERIA	JC	CARDAMINE LYRATA	JAPANESE CRESS
GH	NOMOPHILA STRICTA	GIANT HYGROPHILA			

TALK to most aquarists about plant propagation and you'll get anything from a blank stare to tears.

'I can't grow plants in my tank, let alone cultivate them on any bigger scale', is one plaintive cry, or: 'I haven't got the experience, room or equipment.'

They couldn't be more wrong. You don't need a lot of room, you certainly don't need any special equipment, in either heating or lighting, and experience will come soon enough.

All you need is a watertight container, peat river sand, gravel — and a little patience.

What most people don't seem to realise is that so-called tropical plants just do not need tropical temperatures to grow in. Plants like vallisneria, ludwigia, cabomba, hairgrass and many other basic plants can be grown quite happily in trays in your garden.

You don't even have to worry if you haven't got a garden. Flat-dwellers can use any hand window ledge that receives a bit of sun. Like ordinary garden plants or flowers, you can expect any joy from trying to cultivate plants in the winter, so now is the time to start preparing things for the warmer weather in early Spring.

It couldn't be easier, unless you try some of the more difficult tropical varieties — and doesn't cost very much either.

Let's start off with something simple, like hairgrass or ludwigia. All you need for these is an ordinary plastic seedling tray from any garden centre. They only cost a few pence, but make sure you get a watertight tray — many are sold with little draining holes in the bottom, and you don't want your water to run out.



Plants grow on in profusion in one of David Shields' greenhouses, soon they will be ready for his tanks.

At the same garden centre, or even your local supermarket, buy some plain ordinary garden peat — I prefer the finer lawn peat, but any type will do. Start off with a half inch layer of peat in the bottom of the tray, add a thin layer of river sand, and sprinkle some gravel over the top. Then top up with water.

The main reason for the gravel is to provide a little weight to hold the peat down until it absorbs enough water to stay put at the bottom of the tray.

Let the whole thing stand for a week or two and you have the perfect cultivator for plants like hairgrass or ludwigia. Make sure you leave enough time for the peat to become really soaked, though. You don't want it floating up to the surface when your cuttings are planted.

The next step is just as simple as planting cuttings for the garden. Just push the plants or cuttings into the peat and leave them in a light and sunny place in the garden — or on that handy window ledge.

It can help, especially early on in the Spring, if you can leave the trays under glass. A garden cold frame is ideal, though a sheet of glass or even clear plastic supported by a few bricks is just as good.

As with tomatoes, it gives the plants a good start. Don't worry about unexpected frosts killing off your plants. I have left trays out in the garden all Winter — and the plants in them have grown back the following Spring. And if you have a greenhouse, even better — if the wife will let you have the room.

Being in the open air, they get all the natural light they need, and as I said before, the basic varieties don't need any extra heat.

PRACTICAL FISHKEEPING

The tray method works perfectly for the smaller plants, but long plants like vallisneria, or delicate plants like cabomba, do need deeper containers. A trough or one of those old porcelain sinks that so many gardens seem to own is perfect.

Incidentally, the cover glass has another useful function. As well as keeping plants that little bit warmer in early Spring, it also helps to keep out grass seeds, which also find the trays the perfect place to grow.

And when you want to move plants into your tank, don't worry about acclimatising them as you would with fish. Just pop them straight in. Incidentally, don't worry about renewing your peat for every new tray of plants, as you would for many garden seedlings. I have used the same peat for several years now and am still getting great growth.

And just a word here about bulbs. If you are one of these people who buys a plant like cryptocoryne or Spatterdock only to see it lose its leaves and die back, don't throw the bulb away. Pull it out of the tank and give it a gentle squeeze. If it is soft and mushy, you have had it — but if the bulb is still firm and healthy, put it out in a tray and it should recover completely.

It is only fair to say here, though, that cryptocoryne can be a problem plant for the beginner, so don't expect miracles until you are a little more experienced.

I will be giving a few guidelines on the more difficult plants in the coming months. Much of the work is trial and error, but I have been through it all myself in the past and will be able to steer you in the right direction.



David Shields makes full use of every available inch! Here, plants and tanks live side-by-side.

FEEDING marine fish is rather different to feeding freshwater tropical fish for quite a number of reasons. First, and most significant, is that all the fish are wild stock.

Few aquarists — and I am happy to report being one of them! — have bred marine fish in captivity, but no-one has made spawning a commercially viable project. Hence most of those exotic species offered for marine aquaria have been caught in the Coral seas. This means the fish are infested with all their local parasites and diseases.

Treatment of the fish to eradicate these diseases takes place in the collectors' aquaria and also in the importers' and often retailers' aquaria too. Treatment is usually based on chemicals such as Formaldehyde, dyes and copper salts. These powerful chemicals can cause as many problems for the fish as the original parasites or diseases.

Some collectors still use cyanide compounds to stun the fish for easy collection. This poison adds to the toxic effects of the subsequent treatments. It has been shown that cyanide can block certain digestive processes and even if the fish survives the stress of capture, treatment and transportation it will slowly starve to death because of the inability to digest the foods it may readily take.

Another consequence of the fish being wild stock is that its diet was completely natural from birth to capture. Such a diet would be impossible to maintain in the home aquaria. Furthermore a natural diet would inevitably lead to further disease problems. So the fish must adapt to some wholly alien form of foodstuff and probably feeding method too.

Yet another reason for the difference from freshwater fish is the greater variety of feeding types among the marine species. Almost all the freshwater aquarium fish are omnivorous

(can digest animal and vegetable food) because they originate from different geographical areas with roughly similar food supplies.

Most marines are Coral fish where they live in the same geographical area and so need to adapt to different food supplies within that one area in order for each species to survive. Hence the feeding types vary from the very carnivorous Scorpaenidae to herbivorous Acanthuridae and many species have specially adapted mouthparts such as the long-nosed Butterfly fish (*Forcipiger flavissimus*), and the fused crushing teeth of the Parrot-fishes (Scaridae).

Temperament is also very different among the marine fish. Most Tropicals are placid individuals who soon respond in a Pavlovian way to their owners' feeding regime. Marines vary from the aggressive Clown Trigger (*Balistoides niger*) who would happily "bite the hand that feeds him" to the delicate Majestic Angel (*Euxiphippops navarchus*) who would rather starve to death than accept most aquarium foods.

Another complicating factor in feeding marine fish is the "nitrite" problem. This phenomenon must be the subject of another article, but it can be accepted that nitrite (and associated Ammonia) will quickly kill marine fish, and any surplus foodstuffs will produce such toxins as soon as it begins to decay. Unlike freshwater fish, there is no possibility of delaying removal of surplus or rejected foods. The biological filter can only be expected to cope with the excreta from the fish's nutrition.

It is obvious from these differences that the hobbyist cannot seek just any species of marine fish and expect it to quickly settle into a community tank and immediately accept the aquarist's favourite fish food. The particular



requirements of a wanted species must be discovered from literature and the experiences of other mariners who have kept the fish.

This is because the published literature only reflects the experiences of the author, and possibly one fish, and other hobbyists may disagree with the published findings. Marine fish keepers are not numerous, of course, but most local societies have a mariner member. There is also the British Marine Aquarists' Association who can offer invaluable advice to their members.

This general information on the species can be augmented on the individual's feeding habits by discussing the matter with the retailer. You may think that all the necessary information on the fish can be obtained from this retailer, but often an aquarist shop owner has a fleeting relationship with his wares. After all, he has a business to run and cannot afford the time and money to carry out research.

The next important factor in marine fish keeping is to buy only fully quarantined species (of weeks rather than days) so that not only is the fish free of disease and parasites, those specimens suffering from toxic problems (such as cyanide poisoning) have died off. With long quarantines, a marine fish may also have been weaned onto some aquarium diet by the wholesaler and/or retailer.

Personally I only buy pedigree fish for my special marine tanks. That is fish which have been kept by other hobbyists, often for years, and who want a change of scene. Such fish are completely parasite-free and have become accustomed to aquarium life and commercial foods.

What foods are available for the mariner to offer? A lot more than beginners realise. With patience, all the popular marine fish can be weaned onto a high quality commercial fish food so that the correct trace elements are known to be supplied. Supplemented feeding can then be as varied as that available for the tropical freshwater fishes. This includes earthworms, microworms, whiteworms as well as

FEEDING

Wild Marine stock present different problems — by Dr. David Ford

Dr David Ford has spent 35 years studying tropical fish. He is head of the modern Aqualab at Pedigree Petfoods in Melton Mowbray, Leics, and will soon be joining the world-famous Animal Studies Centre at nearby Waltham-on-the-Wolds. Nottingham-born, Dr Ford has travelled the world in developing his range of Aquarian fish foods.

He is a chartered chemist and has a Masters Degree and Ph.D in research on the physical chemistry of aqueous systems. His knowledge is immense — as is underlined by the huge demand on his time as a lecturer.





This Yellow Devil (*Cichlasoma citrenellum*) is unlike some of his timid feeding marine colleagues in David Ford's laboratory. Not a marine himself, this tropical freshwater specimen will take a chunk out of anything.

kitchen scraps. Anything you can eat can be offered (cut down to a suitable size) and the fish will decide what they find edible, remembering always to remove rejected foods of course. Common sense must be used in this varietal feeding. If the preliminary studies have shown that the species is an algae-eater in its natural habitat, a diet of carnivore flake food, scraped beef heart and chopped worms is not suitable. Use vegetable flake food, peas, lettuce leaf and spinach etc. to discover the fish's preferences.

Experiments in the Aquarian laboratories have shown that once a marine fish has been weaned onto a flake food made from fresh ingredients, it can live exclusively on such a diet for many years. Such flaked foods have many advantages since there is no clouding of the water and consequent nitrite problems. Nutritional deficiencies do not occur because the flake food is designed to be a complete and balanced diet. It is sterile and so diseases or parasites will not be included. Surplus flake is easily seen for removal by a dip-tube or small net (such as a fry net).

Other types of commercial foods include freeze-dried Daphnia, Tubifex, Larvae and Shrimps. All are usually taken by carnivorous and omnivorous marine fish probably because their texture resembles the small crustacea found and eaten in the Coral reefs.

Commercial frozen foods are available, often given a small dose of gamma radiation to destroy any parasitic organisms that may be present. Such radiation does not make the food so sterile that it is stable without deep frozen storage, however, so such products must be kept in a freezer and only sufficient for each feed removed for thawing. Thawing and refreezing will give the same possibility for food spoilage as human-grade frozen foods.

PRACTICAL FISHKEEPING

These foods are very expensive in terms of pence per unit of protein when compared with the equally nutritious flake food, but they can be useful for tempting a new marine fish which is refusing all other foods.

Frozen foods can be prepared very cheaply by the aquarist. One of the most popular is Beef Heart because few marine fish will refuse this food. The Beef Heart can be bought from any butcher's shop. The fat is trimmed and discarded (animal fat is not suitable for marine fish, because they need and store their essential fats in the form of oils).

The raw meat is cut into Oxo-like cubes and individually wrapped in poly- or cling-foil and stored in the freezing compartment of the refrigerator or, better still, in a deep freeze. When required, one cube, still frozen, can be removed and shredded on a cheese grater for feeding to small marines.

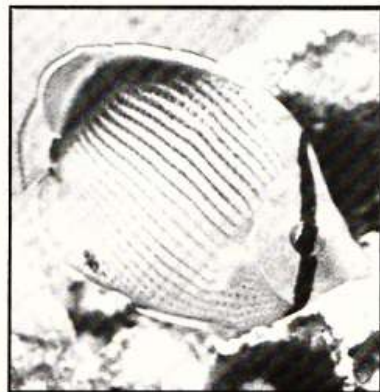
For larger fish, the cube can be cut into chunks after thawing. Like the irradiated foods, this is useful for tempting difficult feeders. Be careful not to overfeed with Beef Heart because it does leak blood into the water, hence the flavour attractions, which can quickly lead to nitrite problems.

Liver can be frozen in a similar way. Any species will do, including the offal within the popular frozen broiler chicken. The keen hobbyist can prepare his own mixture to be frozen and shredded in this way. From the studies of the fish's requirements the mixture can be a blend of raw materials that are suitable for the species, and if human grade foods are chosen there is no danger of including any disease organisms so irradiation or cooking is unnecessary.

Chunky food for the large fish can be meat, crab, prawn, shrimp, and fish. The meat can be raw but the other foods need to be cooked to prevent introducing disease. A good source of such chunky food is canned human grade products. Pickled fish and shell-fish are unsuitable because of the acid, of course. Similarly, seasoned foods, such as herring in tomato sauce, should not be used.

Shellfish are loved by marine fish, especially the carnivorous varieties who enjoy digging into an opened shell. Freshwater mussel is ideal because it needs only a rinse to make it clean enough to feed live. Cockles, Winkles and Whelks need rinsing in cold water to remove sand and debris followed by a five-minute boil to sterilise the meat — and open the shell of the Cockle.

For vegetarian fish, the boiled pea is an excellent food. This can be fed whole or the



Butterfly fish like this beautiful specimen are often timid about feeding in captivity. But they can be coaxed with a mixture of Coral food as David Ford explains here.

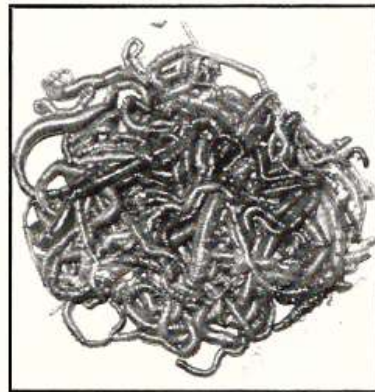
soft insides squeezed out for small fish. Lettuce is useful, but the cellulose must be broken down to release the nutritive components of the cells. This is best done by scalding with boiling water. Spinach is often used, the cooked frozen variety from supermarkets being suitable. Do not feed spinach excessively, say more than a quarter of the total diet, because although the vegetable contains many nutritious ingredients it also has low levels of oxalic acid, which is poisonous if fed above trace levels.

Butterfly fish who normally feed on Coral polyps will usually take flake food, but the odd species may be timid and slowly waste away in hiding. Such fish can be coaxed into feeding by making an artificial Coral food. Mix a spoonful of flake food with a few drops of water in a cup and blend into a paste. Smear the paste onto the tips of a piece of bleached coral and leave to dry out. The baited coral can then be placed near the fish's hiding place. If the fish still refuse to eat, the food must be washed off the coral of course, to prevent the usual nitrite problem.

There are a few live foods that can be offered to marine fish. The usual cultured foods for Tropicals can be used, from fruit flies to white worms, and the brine Shrimp nauplii. The latter are useful for the very difficult Marines like Seahorses (*Hippocampus spp.*) and Pipefish (*Synganthus spp.*). Living Brine Shrimp can be produced continuously by hatching batches of the eggs in a plastic pot mounted within the tank with one small hole drilled near the top to allow the nauplii to swim out.

For larger fish, a supply of guppies is easily raised in a spare aquarium and for very large fish, goldfish rejects can be purchased in bulk from breeders. However, you may have to justify such a diet to the Guppy and Goldfish fanciers! Predatory fish that take their prey whole can be trained to take chunky food by trailing it through the water with plastic — to avoid damage — tweezers. Pressing a flake or two of flake food into the chunk will ensure the fish gets the vitamins and minerals it needs for complete diet.

To summarise, feeding marines is a little more complicated than feeding tropical freshwater species, but not really difficult. With careful choice of the individuals and common-sense weaning of the fish onto convenience foods, a stable marine community tank can be established which will remain decorative and easily maintained for many more years than its freshwater counterpart.



Earthworms — a tasty dish to put before a hungry marine.

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FEBRUARY

Tuesday, February 6: Peterborough Fishkeepers' Association will meet at 7.30 pm at the Royal Oak, Lincoln Road, Walton, Peterborough. An illustrated talk on pond construction and keeping koi will be given by Eric and Hilda Allen, former chairman and secretary respectively of the British Koi-Keepers' Society. All visitors welcome.

Wednesday, February 14: Houslow & District Aquarists' Society meet today and every other Wednesday at St Stephen's Church Hall, Whetton Road, Houslow, Middlessex, at 8 pm. New members, old members and visitors welcome.

MARCH

Sunday, March 4: Yorkshire Koi Society AGM at De Lacy Motor Club, Brotherton, Nr. Ferrybridge at 2 pm. Dr David Ford will give an illustrated talk on his recent visit to Japan. Mr Smith of Pumping Services Ltd will talk about pumps suitable for Koi enthusiasts and slides of the winning fish at the 14th All Japan Nishikigoi Show will be shown. All are welcome.

Saturday, March 10: British Aquarists' Study Society, first spring meeting at the Meeting Rooms of the Zoological Society of London, at 2

pm. Killies — an afternoon of practical Koi-keeping with Ian Sainthouse and other speakers. To be followed by a visit behind the scenes of the London Zoo Aquarium by kind permission of the Curator, Dr H Gwynne Vevers. Tickets: £1.25 members, £1.50 non-members from W.F. Goodwin, 14 Dawlish Drive, Devon Park, Bedford.

Saturday, March 17: The Goldfish Society of Great Britain AGM, Conway Hall, Red Lion Square, Holborn, London.

Saturday, March 17: Riverside Aquarium Society Open Show at St Etheldreda's Church Hall, Clooney Street, Fulham Palace Road, Hammersmith, London SW6. For schedules ring 01-385 0276 or 024-032 2786, or write to W. Methersell, 13 Greyhound Road, Fulham, London W6 8N1.

Saturday, March 31: Croydon Aquarist Society Annual Open Show. Schedules from Trevor Skeet, 64 Summer Road, West Croydon, Surrey. Tel: 01-681 7861 and Les Derrick, 5 Glenthorpe Avenue, Croydon. Tel: 01-654 0984.

Saturday and Sunday, March 31-April 1: Scottish Aquarists' Festival, Motherwell Civic Centre. Open 10 am to 7 pm. Saturday: 10 am to 6 pm, Sunday.

APRIL

Sunday, April 1: Reading and District A.S. Open Show at St Peter's School, Church Road, Earley, Nr. Reading. Schedules from P. C. Rushbrooke, 32 Melrose Gardens, Arborfield Cross, Berks. Tel: Arborfield Cross 760303.

Sunday, April 8: Kettering Aquarist Society annual Open Show at McInley Theatre, Kettering. Schedules available from Mr D. McAllister, 105a Welland Vale Road, Corby, Northants.

Sunday, April 8: Malvern & District A.S. open show at St Joseph's Hall, Newton Road, Malvern. Schedules from J. V. Walton, 1 Beaver Close, Lower Wick, Worcester. Tel: Worcester 422917.

Sunday, April 15: Stockton-on-Tees 14th Open Show at the Kiara Community Centre, Roseworth Estate, Stockton. Schedules from D. Knibbs, 15 Gray Street, Norton, Stockton, Cleveland. Tel: Stockton 551009.

Easter Monday, April 16: Southampton Aquarists' Society Open Show at The Avenac Hall, The Avenue, Southampton. Schedules from Show Secretary, D. Mills, 30 Ferndene Way, Bitterne Park, Southampton.

Saturday, April 28: Bristol Tropical Fish Club Open Show to be held at the United Reform Church Hall, Whitefield, Memorial Tabernacle, Muller Road, Horfield, Bristol 7.

Saturday, April 28: Bristol Tropical Fish Club open show at the United Reformed Church, Whitefield Memorial Hall, Muller Road, Horfield, Bristol, to F.B.A.S. rules. Trophy class has been applied for. Schedules from show secretary, T. A. Coggins, 36 Leighton Road, Southville, Bristol BS3 1NT. Tel: 631307 (S.A.E. please). Postal entries accepted up to Thursday, April 26.

Saturday, April 28: Southend, Leigh and District A.S. Open Show at St Clements Hall, Feigh-on-Sea, Essex. Further details from Ray Stanford, 1 Hilary Close, Rochford, Essex. Tel: 0702-546090.

Sunday, April 29: Half Moon A.S., Billingham Green Teesside, Open Show at the Corporation Hall, West Hall, West Row, Stockton, Cleveland. Schedules from C. W. Buck, 22 Danby Grove, Thornaby, Cleveland. Tel: Stockton 65284.

Sunday, April 29: Corby and District A.S. Open Show at Corby Civic Centre. Schedules (from early March) from C. MacAllister, 18 Maidford Road, Corby.

MAY

Saturday, May 5: Brighton & Southern Aquarists' Society Open Show.

Sunday, May 6: Bournemouth Aquarists' Society open show at Kinson Community Centre, Polhams Park, Kinson, Bournemouth. Show secretary J. V. Jeffery, 30 Braemar Avenue, Southbourne, Bournemouth, Dorset BH6 4JF.

Saturday, May 12: Tonbridge and District A.S. fish exhibition, Lambeth Walk, High Street, Tonbridge. Further details from the secretary, Mrs B. M. Puchard, 6 Albert Road, Tonbridge, Kent TN9 2SR. Tel: Tonbridge 358225.

Saturday, May 12: Port Talbot A.S. Open Show at the Talbach County Youth Centre, Margam Road, Port Talbot, West Glamorgan. Schedules available from early March, from show secretary, A. E. B. Fouracre, 3 Cross Street, Velindre, Port Talbot, West Glamorgan. Tel: 3752.

Sunday, May 13: British Koi-Keepers' Society National AGM to be held at the Botanical Gardens, Edgbaston, Birmingham, at 1 pm. For membership details apply to: Mr M. Waumley, 165 Woodside Road, Amersham, Bucks HP8 6NR.

Saturday, May 19: Trowbridge & District Aquarists' Society Open Show to be held at St. Thomas's Church, Timbrell Street, Trowbridge, Wiltshire. Schedules available from Mrs M. Bennett, 30 Lewis Crescent, Frome, Somerset.

Sunday, May 20: Gloucester Aquarist Society Open Show at Chequers Bridge Centre, Painswick Road, Gloucester. 31 classes to FBAS ruling. Trophies for 1st and 2nd plus award cards. Dr D. M. Ford will give a slide talk on Aquaria around the World during judging. Schedules, from March, from S. Grainger, 2-10 Bazley Road, Marson, Gloucester.

Sunday, May 20: Caer Ufa A.S. Open Show at the Chulter Fale Community Centre, Benton Road, Whiteleas Estate, South Shields. Schedules from G. Wright, 19 Sydney Street, Boldon Colliery, Tyne & Wear.

Saturday, May 26: British Aquarists' Study Society, second spring meeting at the Meeting Rooms of the Zoological Society of London, Regents Park, NW1, at 2 pm. The Barbs, Dr Keith Barnister of the British Museum, Natural History and other speakers. Tickets £1.25 members, £1.50 non-members from W. F. Goodwin, 14 Dawlish Drive, Devon Park, Bedford.

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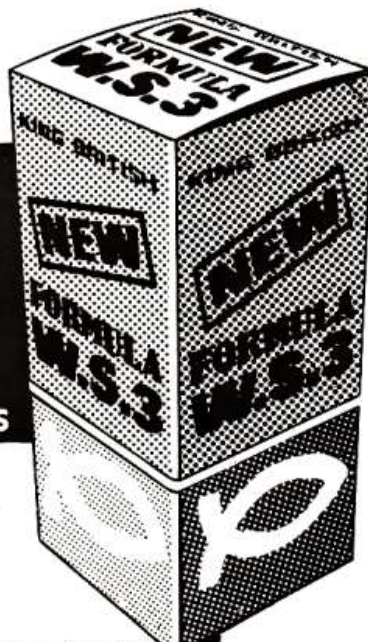
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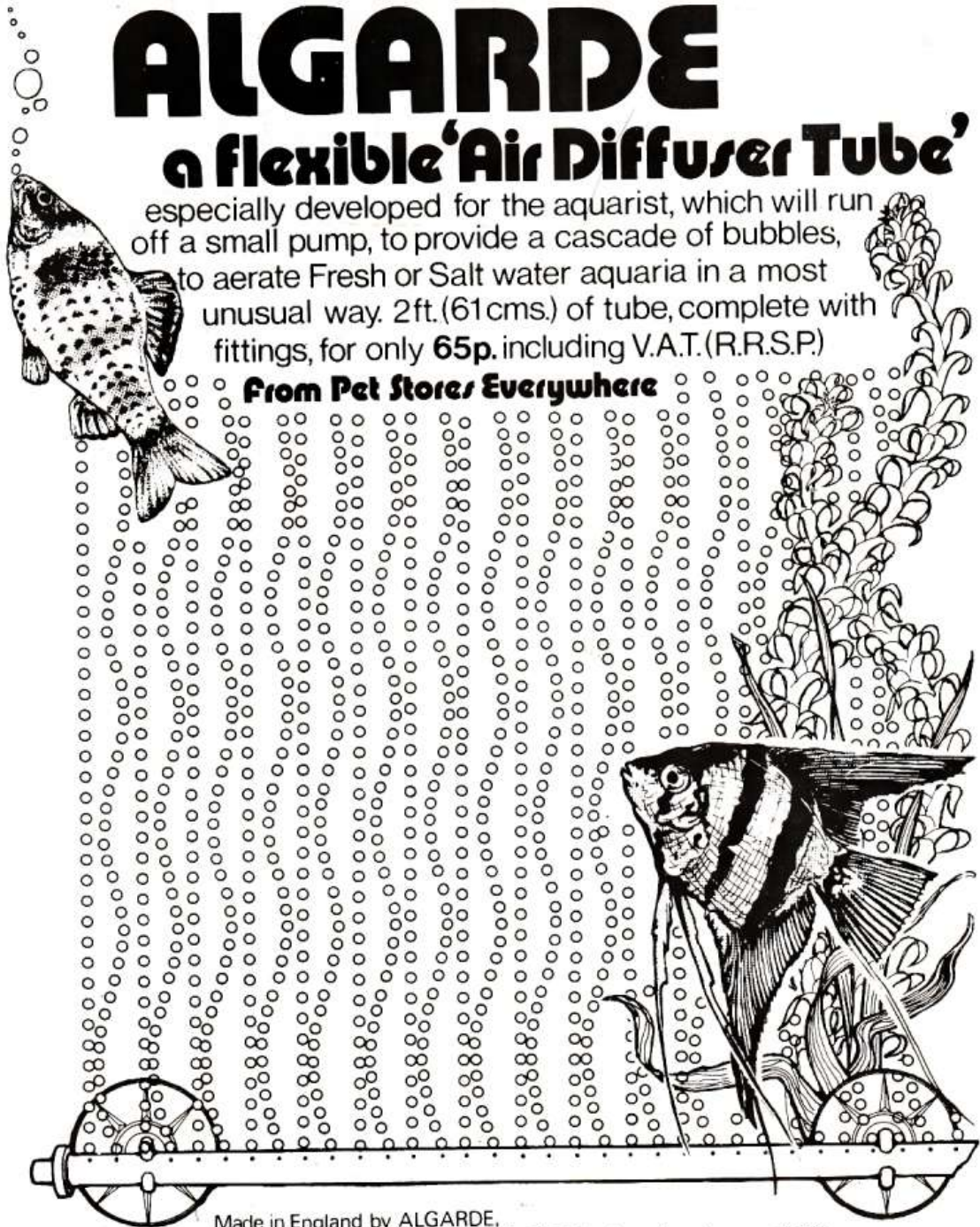
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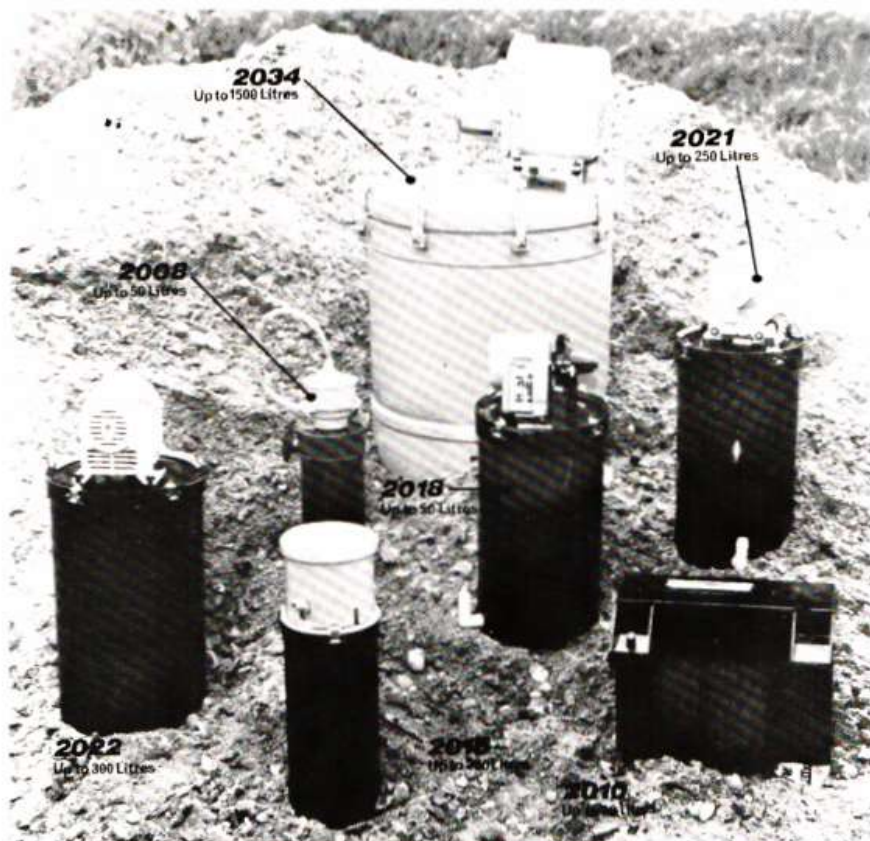


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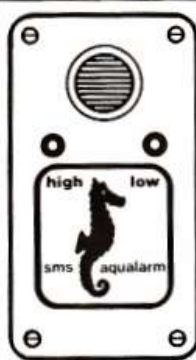


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Centropyge bicolor (Oriole Angel),
Centropyge bispinosus (Dusky Angel),
Centropyge slavissimus (Lemon Peel),
Centropyge vroliki (Pearly Scale),
Chaetodon auriga (Threadthin Butterfly),
Chaetodon bennetti (Bennetts Butterfly),
Chaetodon chrysurus (Pearl Scale Butterfly),

Trifasciatus (Redfin Butterfly),
Chelmon rostratus (Copperband Butterfly),
Forcipiger flavissimus (Long Nose Butterfly),
Heniochus acuminatus (Wimple Fish),
Zanclus canescens (Moorish Idol),
Euxiphipops navarchus (Majestic Angel),
Euxiphipops xanometapon (Blue Face Angel),
Holocanthus ciliaris (Queen Angel),
Holocanthus trimaculatus (Bluelip 3-spot Angel),
Holocanthus tricolor (Rock Beauty),
Pomacanthus annularis (Blue King Angel),
Pomacanthus imperator (Emperor Angel),
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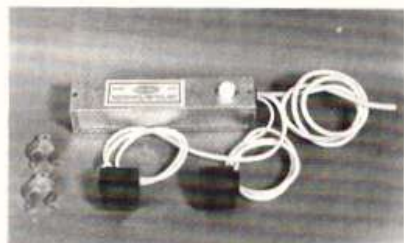
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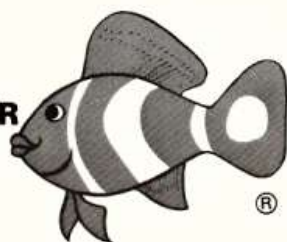
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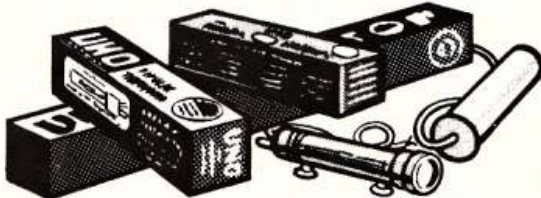
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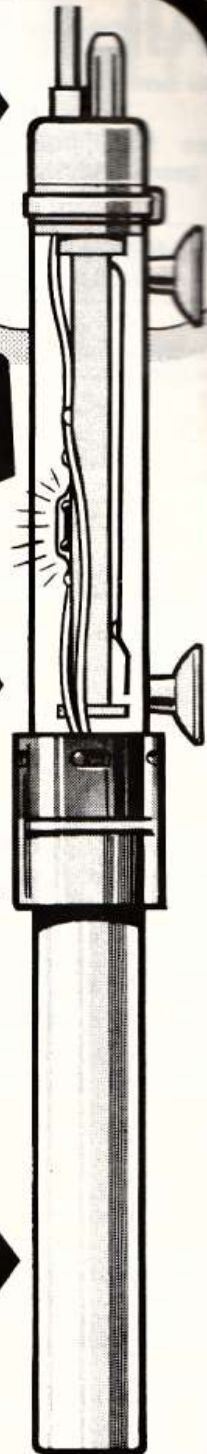
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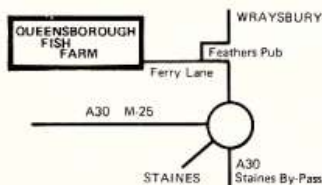
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