

October 1979 60p

# Practical fishkeeping

Britain's best selling MONTHLY for Aquarists

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Tankside guide**

**Keeping Catfish**  
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**Tetra**  **no one understands fish better.**

# Practical fishkeeping

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Your chance to win this superb prize in our FREE contest.

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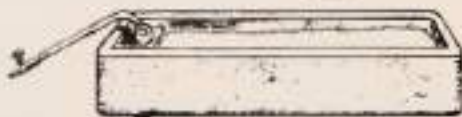


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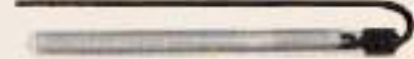
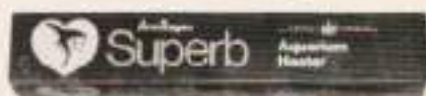
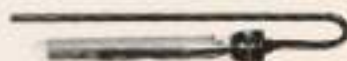
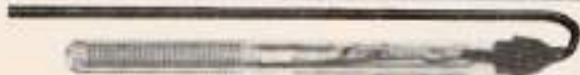
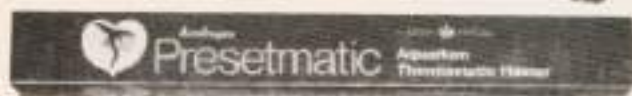
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- Neon indicator glows when heater is on.

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Aquarium capacity (gallons)	Room heating conditions		
	Heated day and night	Heated daytime only	Generally unheated
3	50W	50W	75W
6	50W	50W	100W
9	50W	75W	150W
12	75W	100W	150W
16	75W	150W	200W
20	100W	150W	200W

A08

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Cabomba peltocarpa	35p
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- ★ SUITABLE FOR MARINE OR FRESHWATER AQUARIA
- ★ THREE MODELS: (See right)

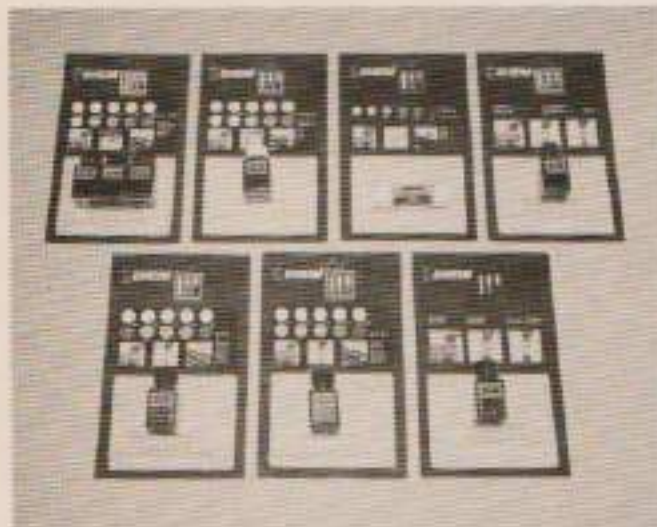
### THE MODELS

MODEL	SIZE	PRICE	FINISH
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# **EHEIM** aqua- diagnosis *a breakthrough in test kits*



One of four comparator sets available



Single pack test kits.

#### WHY USE A TEST KIT?

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The EHEIM diagnosis is clearly laid out, practical and extremely easy to use. The most modern analysis methods, the effective measuring range and the considerable cost saving per analysis all combine to make the aqua-diagnosis a perfect low-cost miniature laboratory.

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Telephone (0284) 5051-2,3.



Right: A shoal of beautiful iridescent Rasbora (*Rasbora kalochroma*). These originate from Malaya and Borneo. They are reddish and brown in body colour with reddish fins and iridescent pale green stripes along their sides. They are also recognised by two darker spots on the flanks.

Left: Another super little Rasbora is the Scissor Tail (*Rasbora trilineata*). This is more popular in the aquarium. And it is easy to see why. The elongated tail with delicate markings give the fish its name.

Right: The Archerfish (*Toxotes jaculatrix*) is a fascinating fish by anyone's standards. It gets its name from the ability to shoot down insects by squirting drops or even a stream of water up to five feet from the surface.

The Archer does this with a special development of the mouth and tongue. You will need to keep this species in a tank of its own with as much surface area as possible.

The fish comes from the brackish and freshwater along the coast of South East Asia, the Philippines and Australia. Keep them in aged aquarium water with two teaspoons of marine salts added for each two gallons of water.



# Something different

A look at some lesser known tropical species

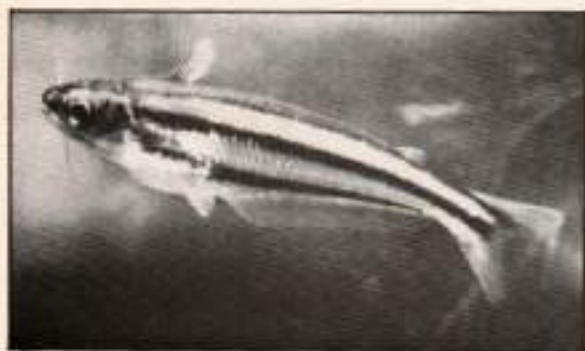
EVERY tropical fishkeeper has tried their hand at keeping, perhaps even breeding, the more common species — especially the community fish. But there are thousands of more unusual varieties that you can keep if you want to expand your collection of tropicals.

Many are not good community dwellers but if you have an extra tank they can offer a new attraction to your hobby. Here we take a picture! Look at a few of the less popular species. One of these might just be the fish you are looking for...

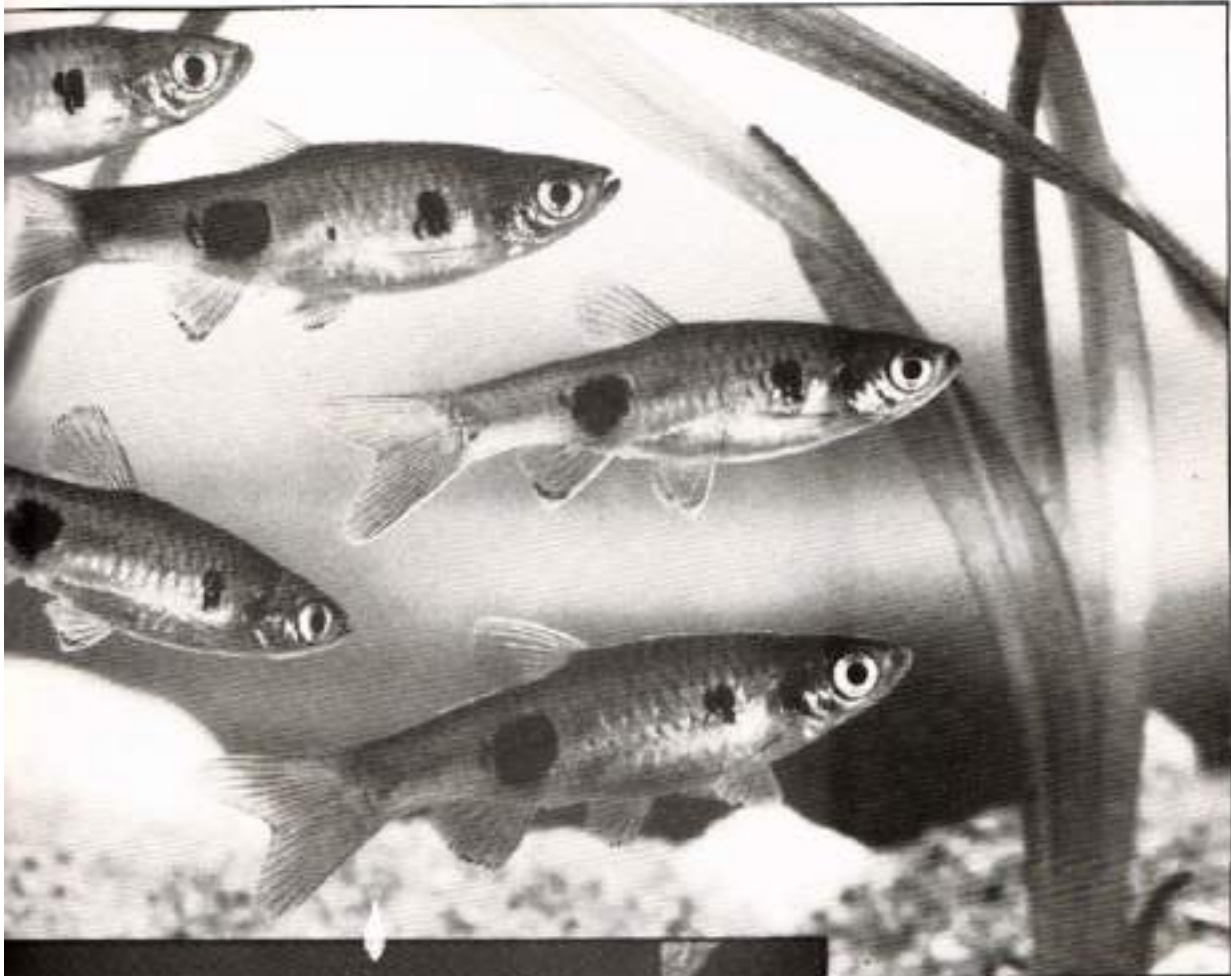
Far left: It isn't difficult to see how the African Glass Catfish (*Eutropiellus debauwi*) came by its name. It is almost transparent with three long blue/black stripes. The fish is found in the Congo Basin of Za

Below: Another pretty Characin is Pearl Headstander (*Chilodus punctatus*) from wide areas of South America.

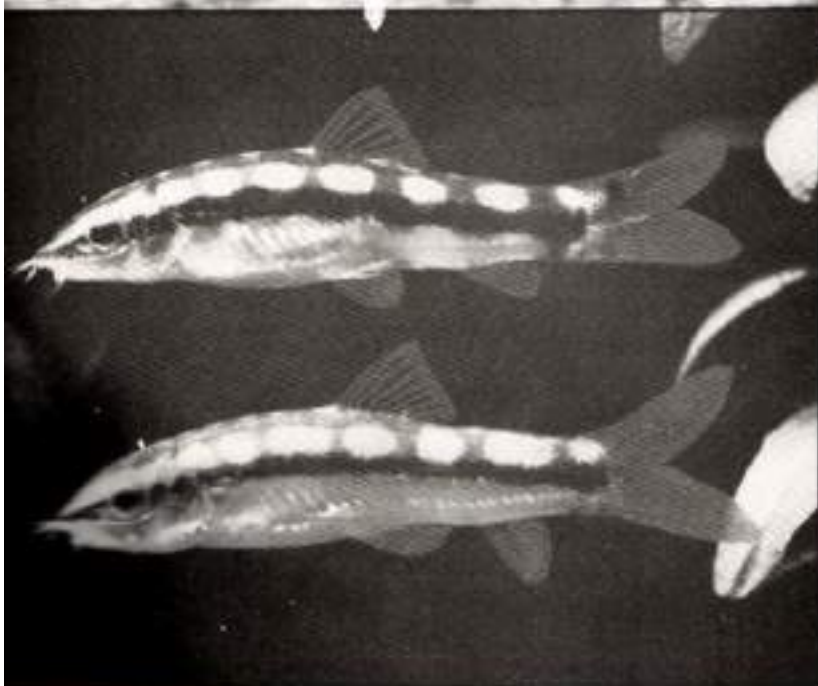
The fish swims in an odd fashion with the head down. It is an schooling species.







Left: For fans of Catfish and Loaches the Dwarf Loach (*Botia sidthimunki*) can hardly be bettered. It is magnificently marked with dark bands and stripes with a basically golden body colour. This fish is best kept in groups.



Below: The Checkered Darler (*Characidium lasotatum*) is one of the lesser known Characins. It is found throughout wide areas of the South American continent and consequently varies greatly in colouring.



What better way to calm down after a hard day than by gazing at a beautifully planted tank with equally peaceful fish. But it isn't as simple as that. Or so the psychiatrists say.



# Fish psychology

Do fish calm your nerves? Nick Fletcher explains why

If the only Freud you know is the chap who steals the thunder from the bloodhound in those dog food commercials; if you know you're sane, and it's everyone else who is barmy; if you are told to give the first word that comes into your head and reply "chips" when someone says "fish" then don't read on.

In all probability you're too far gone to be saved, in any case.

If, however, you are interested in the psychology behind fishkeeping I should warn you at the outset that it's not all sweetness and light. Behind that tank of guppies lurk a host of hang-ups and complexes you've never dreamed of. Until now.

First of all, why do you keep fish in preference to warm-blooded animals? Perhaps you are afraid of entering the close relationship involved in looking after a dog. Maybe you are a "cold fish" yourself. Make a note to ask the wife about that, when you've finished digging that 20 foot pond at the bottom of the garden.

A psychiatrist also tells me that cagabrics and fish are favourite pets of women, especially the maiden aunt variety who live in places like Bath and Cheltenham, and believe that children should be seen and not heard. The reason, he claims, is that fish and birds are outwardly sexless and attract keepers who shy away from any involvement in that direction.

Now you and I know that platies and mollies are real little sexpots. But does Austy Agatha? Maybe she thinks all that chasing about is just playful zest.

The soothing effect of a tankful of fish is legendary, and the medical profession seems to be agreed on its usefulness. Next time you go to the dentist—that'll teach you to use your toothbrush to clean algae off the tank—note whether or not there are fish in the waiting room.

If there are, it means one of two things. Either Dr Molar is concerned for your well-being, or he's tight fisted with the gas.

To understand this last statement, you need to know something about anaesthetics. If you have two people of identical build and weight, one calm and one apprehensive, it will take a far bigger dose to put the fearful patient under. The reason is that the fearful

patient's brain is being kept alert by excess adrenalin, the "fight or flight" chemical.

What the dentist pays out in electricity to run a fishtank, he more than recoups in gas bills.

But why are fish so soothing? A doctor friend of mine summed it up well: "A fish tank provides a focus of attention and a distraction of the mind."

"You can project yourself into the world of the fish in the tank, and momentarily forget what is, for most people, a nasty experience—waiting for the doctor, and what he might say or do.

"Peoples' fears of disease and illness are very normal, and a visit to the doctor is a very stressful experience for them. A tank of fish is quiet, and the fish in their smooth, steady movements seem to emanate calm, serenity and, at the least distraction.

"Anything is better than looking at old magazines" he concluded.

A hypnotherapist—do I not keep weird company?—offered a rather more mystical explanation for the attractions of fish.

The Greek word for "fish" is "ichthya" and the initial letters are those of the words meaning "Jesus Christ, Son of God, Saviour". According to the hypnotherapist, people are aware either consciously or subconsciously of the link, and it gives them comfort.

"The fish, I believe, gives the appearance of being liberated from cares and worries. The very opposite to the spider, which in its web is a symbol of being trapped.

"Spider hang-ups are commonly encountered in my job, and I normally find that people with Arachnophobia (fear of spiders) are themselves trapped in a physical or mental way. They have "hang-ups", in fact.

"By the same token, fishkeepers should be a well-balanced lot," he said.

But what does the state of relaxation amount to? The hypnotherapist claims that taken to extreme limits, it can lead to floating off the ground.

"Watch fish in their tank. They are free and floating. You can be the same," he said. And mylids grew heavier by the minute.

"Floating is similar to levitation. If you relax your arms long enough, and think of their being light as a feather, they are bound

to float. Relaxation leads to meditation, which in turn produces levitation. Hypnosis and meditation are one and the same."

And watching a tank of fish, with their restful movement, can lead to self-hypnosis, he claims. The best fish for the purpose are the large ones with fluid movements. Little "darty" fish like tetras are not half as effective.

Even behind the bars of prisons and maximum security mental hospitals, the therapeutic value of fish is recognised and capitalised upon. Remember the Bert Lancaster film "Birdman of Alcatraz"? One of the points it raised was that even the most violent criminal can be calmed if he has something on which to lavish care and attention.

That, apparently, is still the view of criminal psychologists, and many a child has found itself doing a "five strich". Note to any other "Fletchers" reading this... be sure to pick long-lived fish or they won't survive the sentence.

There seems to be some link between the stress of a person's job and the likelihood of his keeping fish. Those in occupations that involve real physical discomfort, like factory workers exposed to machinery noise, are high on the list of fish fanciers. So, too, are decision-making business executives.

These people often bring a fishtank into the office. It fulfils three functions—it calms the executive down, it is a nice status symbol, and with its soothing properties, it makes clients more susceptible to suggestions. Just as the background music in supermarket lulls the housewife into buying the large economy size.

So the next time you look into the limpid eyes of your Piranha, take care and be warned by the following story:

A man was showing his friend how his Angel Fish would follow the movement of his finger. "Mind over matter," he explained. "Just show them who is boss."

The friend was anxious to try, and the fishkeeper left him to it while he answered the phone. Five minutes later he returned... to find the man goggling at the fish and making gulping noises.

**FISHKEEPING** is an undemanding hobby. You can subject your fish—at least for most of the time—to shabby treatment and neglect without them coming to any real harm.

But a little extra care and attention will pay dividends in keeping your stocks healthy, in prime condition and looking good.

However no fish is completely safe from infection or damage. Disease can strike without warning and for no apparent reason. It is at this time that a little extra effort and a few minutes work can mean all the difference between life and death to the unfortunate victim.

Modern fishkeeping has the benefit of good medicines and treatments for just about every ailment going. All the aquarist needs is the knowledge and understanding of how best to protect his valuable fish from unnecessary shock at a time when their natural resistance is very low.

Follow the picture guide for a few simple, easy to follow tips on how best to protect valuable fish from unnecessary shock at a time when their natural resistance is very low.

Follow the picture guide for a few simple, easy to follow tips on how best to nurse your fish.

## Medicines



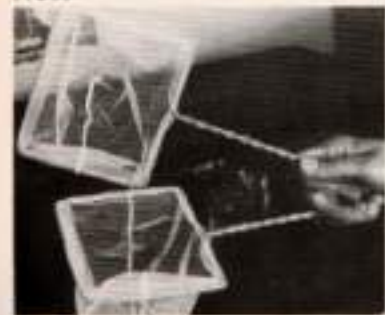
Modern chemical treatments are easy to use but take care before rushing in with a variety of miracle cures. Some are not suitable for all species and do not mix with other treatments.

Read the instructions carefully and make certain you have the right mixtures BEFORE subjecting the sick fish to any dose.

And don't go mad with the dosage—too much is worse than nothing at all.

Measure the dose into a separate container and then add water before introducing it to the main tank—that way any slip need not be fatal.

## Nets



Two nets of a sensible size are required to catch the fish needing treatment. The mesh should be fine and soft to avoid rubbing off

# Netting and treating

Allan Haines explains how to catch and treat fish with little stress

the fish's protective slime and causing further weaknesses where infection could set in.

## Catching the patient



Care must be taken not to panic the sick fish. Don't chase it all over the tank until its stamina runs out—that way only reduces its chances of survival.

Use one net to steer the fish towards the other net and once inside lift carefully so that the net top is just clear of the surface.

## Lifting the fish for further treatment



Slowly and carefully lift the fish and net clear of the tank, using your free hand to fold the net gently over the fish. In that way it cannot jump out or flap around. Support larger fish as much as possible with your hand, which must of course be kept wet.

## Transfer to a treatment tank

A small glass or plastic tank should be kept solely for treatment purposes. Use water from the tank in which the fish for treatment has been living but throw it away after each dose has been applied. NEVER tip it back into the main tank for obvious reasons.

Gravel and plants should not be introduced to the hospital tank. Keep it away from direct light and in some cases it may need to be covered to exclude all light. Again read the instruction for guidance.

Introduce the sick fish slowly into its sick bed, still supporting the base of the net with

your hand until the net is deep enough into the water to allow the fish to swim away.

## Direct application of medicine



Some injuries, such as badly damaged fins or body cuts, can be treated by direct application of a suitable treatment.

If this is to be carried out apply the chemical to a piece of wet cotton wool.

## Application



Having applied the medicine to a wet cotton wool swab the fish should be caught as described earlier and supported in the net by your free hand, closing your fingers over the fish to hold it gently in the net. The cotton wool can now be used to treat the infected part, after which return the patient to the hospital tank, keeping an eye open for further signs of distress.

Flower of the Sea — the *Cerithus delle chiave* anemone. This creature is part of the giant coral reef tank.



One of the beautiful invertebrates on show at Nancy. This is a *Sebastes indicus* species.



# World Beater

Dr David Ford visits the incredible Nancy Aquarium



A delicate combination of blue from ice through to navy makes this *Siganus virgatus* a magnificent sight.



Dr David Ford became a man in a suitcase during part of his work in developing the Aquarian range of fish ponds.

He was sponsored by his firm to travel the world to see most of the important public aquaria. It sounds a dream job for a keen aquarist!

Dr Ford has therefore seen a huge number of exotic fish and methods of keeping them.

His new series takes PRACTICAL FISHKEEPING readers on an armchair world tour.

SET in the East of France, the picturesque University city of Nancy can boast one of the most fabulous public aquaria I have ever visited.

Based at 34 Rue Ste Catherine, the aquarium consists of a large entrance hall with a shop selling educational material including excellent sets of slide photographs of the fish.

From the hall, galleries run east and west housing over 70 display tanks ranging from 200 to 8000 litres.

The aquarium was opened in 1968 and the director is Professor Bruno Conde, Zoologist, University of Nancy I, who has a full time staff of 13 scientists and technicians.

About 65,000 visitors a year are catered for and the aquarium is the headquarters of the French Federation of Societies.

They prepare and circulate an excellent full colour magazine on the hobby called "Revue Française d'Aquariologie et Herpétologie".

The aquarium is supported jointly by the local council and the University.

The scientists on the staff are members of that University and undertake research into ichthyology.

The marine section has more than 200 species from coral reefs. It uses artificial seawater maintained by mechanical and biological filtration through foam filters.

The water is returned to the display tanks via ultra violet radiated tubes.

Great attention is given to water quality and as a result several marine species have been bred in captivity.

Many specimens are between eight and 10 years old, some up to 12 years old.

The freshwater section specialises in the Western European fishes, Atherinids and Cichlids.

The highlight of the aquarium is their giant marine tank containing 8000 litres of water.

It is made with 19mm thick glass but as it occupies the whole west wall of the aquarium they couldn't get a single piece big enough!

The effect of an entire coral reef is created by stepping the glass in several places.

It really is one of the finest tanks you could wish to see and overall Nancy must boast one of the finest aquaria in the world.

The nice thing is that it isn't so far away. Anyone who plans a holiday in France can visit. And I am sure they won't regret it.

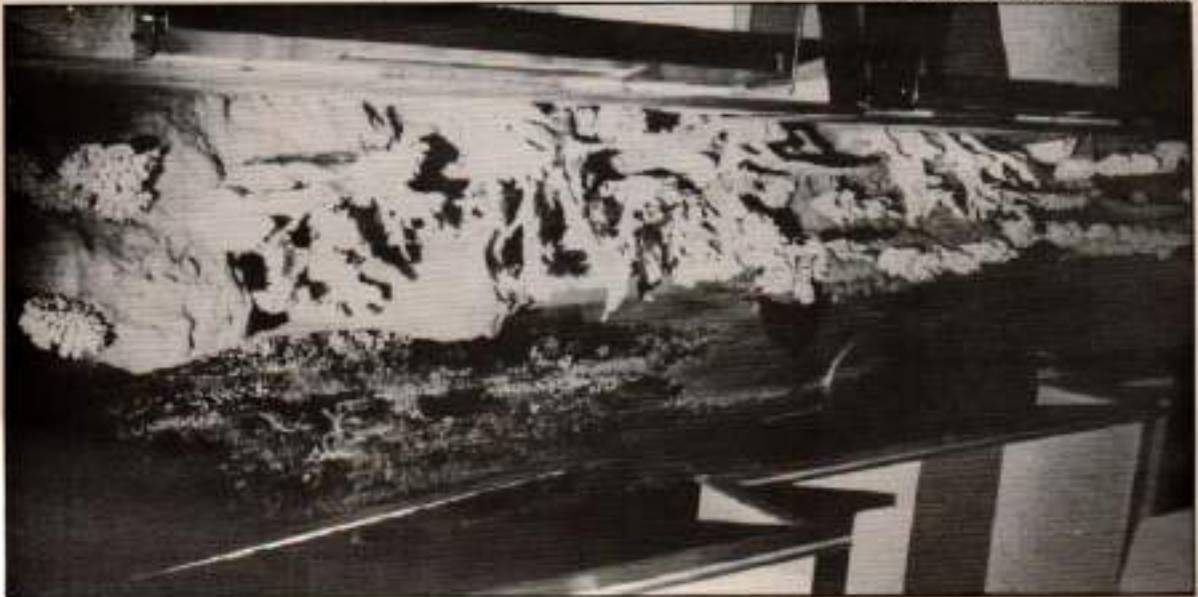


The imposing aquarium building houses the best displays I have seen.



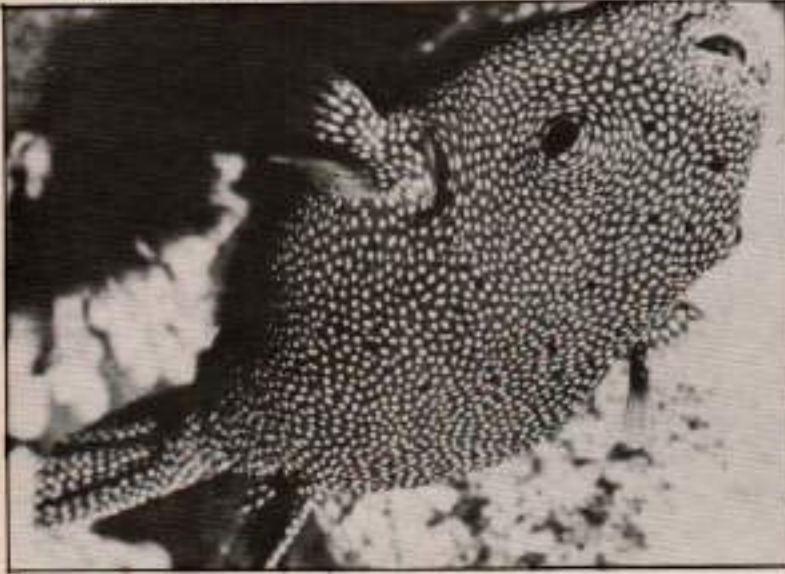
One of the superb displays.

The giant coral reef tank at Nancy.



An impressive display of fins from the Fox fish (Lo. furtiva). The yellow finnage is not only pretty yellow it is really poisonous.

Above: This White spotted Puffer (Archon pacificus) from the Pacific makes an impressive sight.





If you have an aquatic problem the best, quickest and most effective way to get expert advice is by writing to the PRACTICAL FISHKEEPING Aquatic Queries service.

On hand to help you are Dr David Ford of Aquarist—one of the most knowledgeable aquarists in the country. David will be answering freshwater queries and some marine problems.

Our marine expert is Graham Cox—managing director of the Middlesex firm SeQuarima.

All you have to do is write to Aquatic Queries, EMAP, Practical Fishkeeping, Bretton Court, Belton, Peterborough PE3 8DZ.

State your problem. Enclose black and white head and shoulders picture of yourself, if you have one. Include a stamped addressed envelope if you want a personal reply.

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# AQUATIC QUERIES

Research by Dr David Ford.

## Checking water conditions



The Chain Sword—a good aquarium plant which will colonise the floor of your tank.

I AM currently setting up my 36 x 12 x 15 aquarium and I have a number of problems I would like answering.

The first concerns the water conditions. The water in my area is moderately hard and pH 7.6. I intend to soften and acidify the water in an outside filter using ion-exchange resin and peat fibre.

Would it be OK to use these two working together at the same time?

I have also the problem with *Echinodorus tenellus*. Am I right in saying that this plant's common name is *Micro Sagittaria*?

Could you please give me the conditions necessary for growth and the height it obtains with maximum growth?

I am going to buy all my plants from a nursery and I was wondering how to order them. Could you give me an example of some suitable wording (I am ordering the plants from an advertisement seen in your

magazine).

The light I am going to use is two 20 Watt fluorescent tubes, one Gro-lux and one Warm White. Is this enough for about 70 plants?—Paul Caden, Hartlepool, Cleveland.

Yes, you can use ion-exchange resins to soften the tap water and then use peat to acidify. Alternatively, you could use rainwater with peat in the collection barrel.

*Echinodorus tenellus* grows to only 1 or 1½ inches high and with propagation from root runners it can carpet the bottom of an aquarium. It does well in all waters but needs bright light. The common name is "Chain Sword", the *Micro Sagittaria* is a different plant, *Sagittaria microfolia*.

If you are unsure about ordering plants by mail, why not order a collection? See for example page 59 in the June issue of Practical Fishkeeping. The Everglades Aquatic Nurseries Collection for your 36 inch tank is good value. And many of our advertisers offer similarly good service.

Your choice of lighting is adequate for a 36 inch tank, the number of plants is irrelevant since it is density of light per unit area that is important.

I do not recommend river sand for your tank because it may compact and give anaerobic conditions. If you want a sandy base use aquarium quality sand from your local aquarist shop. Better for plant growth is a layer of peat topped with a fine gravel.

## Snake Fish

COULD you please let me have information on the African Snake Fish (Reed Eel or Reed Fish)?

I have got one of these fish, but can't find any books with any information about it. R. H. Hancock, Banbury, Oxon.

There is an "African Snakehead" (*Ophicephalus argus-Warphacpwa*) and a "Reedfish" (*Calamochtyls calabaricus*), but no "African Snake Fish" or "Reed Eel" in the literature.

The *Ophicephalus* genus is a collection of primitive fishes with auxiliary breathing organs, they are mean specimens quite unsuitable for home aquaria.

The "Reedfish" (also called "Snake fish" in USA) is also unsuitable for home aquaria being nocturnal, predatory and, like *Ophicephalus*, has air-breathing organs. It looks more like a snake than a fish.

## Tough Tiger rules tank



Tiger Barbs—too aggressive for most community fish.

PLEASE could you tell me the main community species? Will Tiger Barbs live with them?

When my Japanese Medaka spawned the eggs were ready to hatch but after three weeks nothing had happened. Can you tell me why?—Gary Headech, Ashford, Kent.

The most popular community species are:

Angel Fish (*Pterophyllum scalare*); Guppies (*Poecilia reticulata*); Swordtails (*Xiphophorus helleri*); Black Molly (*Molliesia sphenops*); Neon Tetra (*Parachanna innesi*); Zebra Danio (*Brachydanio rerio*); Catfish (*Corydoras spp.*).

Tiger Barbs may prove aggressive with these fish.

Your Japanese Medaka may be infertile. The Golden or Red varieties have been bred from the grey/green wild fish *Oryzias latipes*, but the strain is not a strong one.

## Keeping coldwater fancies



Fancy Goldfish—how to keep them happy.

COULD you tell me the approximate cost of the following fish? A Celestial, Bubble-eye, Peacock, Veiltail and Pom Pom.

What is your expert opinion on how to keep them all happy?—Ian Angel, Plumstead, London.

The fish you list are all varieties of Goldfish and their cost depends on size and age as well as colour and shape. The young fish should be around £1 but the adults may cost ten times that.

The varieties are less hardy

than ordinary Goldfish and so require an aquarium, heated if necessary.

Water quality is important, so carry out lots of partial water changes.

Feed a varied diet of flake, live and chunky foods.

The best conditions are 30 square inches of surface water per one inch of fish, pH 6.4 to 7.4 and 60 to 70°F. Lots of mini feeds are better than one or two large feeds per day.

## Habits of the Tinfoil Barb

MY three Tinfoil Barbs are about 10 or 11 months old and range from five to eight inches in size.

I feed them on pool pellets three times a day and earth-worms once a day.

My tank is 48 x 20 x 18 with a deep gravelly bottom and six sandstone rocks. The only other fish is a two inch Sucking Loach.

Can you tell me their feeding and breeding habits?—A. Dawber, Wigan, Lancs.

The Tinfoil Barb is *Barbus schwanenfeldi*—a peaceful fish, but very active. It prefers soft,

slightly acid water and a varied diet with plenty of vegetable matter.

Its main drawback for the average hobbyist is that it grows and grows, anything up to 14 inches.

There are no major sex differences, except that the male is deeper in colour.

Few breeding details have been published, but it is claimed that the fish will spawn in a large tank (at least three feet) in slightly acid water at 27°C.

Eggs are scattered over plants and the preferred peaty base. Up to 500 fry hatch in 24 hours.



Tinfoil Barb—It can grow to 14 inches in the aquarium.

## Scavenging Spine Loach



Shubunkie—lives peacefully with the Spine Loach.

CAN you identify my coldwater Loach? It is a long, eel-like fish which lives peacefully in a two foot coldwater tank with a Shubunkin and a Chocolate Pentail. It eats dried foods as well as scavenging on the bottom. It has ten whiskers and is pinkish in colour with clear fins.—G. Parker, Reading, Berks.

Your fish is a member of the family Cobitidae. The common names are Spine Loaches and your member of the group is a Weatherfish.

They are so called because their activity varies with the weather—the barometric pressure actually.

The fish tolerates a wide range of temperatures and so can be housed in a coldwater tank, providing the temperature is in the upper 60°s.

They are excellent scavengers, undemanding and peaceful.

From your drawing, your particular fish seems to be *Misgurnus anguillicaudatus* variety—common name Japanese Weatherfish.

## Chinese show

IN one of my tropical tanks I have a *Gyrinocheilus ayonien*. What category should it be entered under for showing? What size can I expect it to grow in a three-and-a-half foot aquarium? It is now six inches long.

What should I feed freshwater Minnows or?—R. Stone, Scarborough, Yorks.

*Gyrinocheilus ayonien*—The Chinese Algae Eater—comes from a small and unusual family, Gyrinocheilidae. This is only found in South East Asia. There is only one Genus and of the three species only yours is known to the aquarist.

The fish is sometimes erroneously classed as a Catfish because of its sucker and underslung mouth. The FBAS give it a Class "M" category with an ideal size of ten inches snout to peduncle.

Freshwater Minnows will need a diet of screened daphnia, bloodworms, tubifex and such natural foods because of their wild origins. But with patience they can be weaned on to a flake diet.

## Merry Widow

I HAVE recently obtained an old book on tropical fish which mentioned some livebearing fish which I cannot find in any of my local shops.

Four of the species have common names which are: Blue Limia, Hump Back Limia, Mosquito Fish and Merry Widow. Two others had only scientific names. These were *Girardinus metallicus* and *Bizyrdichthys falcatus*.—G. White, Ladywell, S. London.

Blue Limia is *Poecilia melano-gaster*, Hump Back Limia is *Poecilia nigrofasciata*; Mosquito Fish is *Heterandria formosa*; and Merry Widow is *Phallichthys amates amates*.

*Girardinus metallicus* is the Girardinus Fish. *Glyrdichthys* is incorrect and I believe you mean *Girardinus falcatus*, the Yellow Belly Fish.

All are indeed livebearers and are listed in most aquarium books. Your local stockist will have to get the fish to special order from their wholesale importer.



## Indian Fern



Java Moss—a similar plant.

I WOULD like to know if Indian Fern is a seasonal plant as mine always dies off in the summer, going brown and not growing.

In the winter my plants have lots of tall shoots and are quite bushy and green.

I think the leaves are most attractive and would appreciate any information you have. I now have Gro-lux lighting but the results are the same as when I had ordinary lighting. The lighting time is the same in summer and winter and the tank gets very little window light. —G. Davies, Corby, Northants.

Indian Fern is not a common name that I recognise. Your plant could be a Sumatra Fern (*Ceratopteris thalictroides*) or the Java Fern (*Microsorium pteropus*).

Both produce daughter plants and do well under artificial light in medium hardness water.

The Sumatra Fern grows well during the winter months, so your problem with plants dying back during summer indicates you have this species. If so, you must accept the winter growth cycle.

26

# AQUATIC QUERIES

Research by Dr David Ford

## Water store

I WOULD be grateful if you could give me some information on the keeping and breeding of *Otocinclus affinis*. Also, what vegetable foods are preferred and how should I prepare them?

I would also like to know whether or not water can be stored in a new plastic dustbin for any length of time safely?

Finally, I should like to say that your magazine is the very first aquarium magazine that I have bought and I am very impressed by it. Keep up the good work. —Paul Caden (16), Hurtlepool, Cleveland.

*Otocinclus affinis* is a true herbivore and needs a good growth of algae to feed on. If absent, or supplemental feeding is required, use lettuce scalded with boiling water (to break down its cellular structure), cooked peas and a proprietary flake such as Aquarian Vegetable Diet.

Plastic dustbins can be used for storage if they are white, brown or black. It is the brightly coloured types that may contain toxic dyestuffs. Soak it and scrub out well, if new, to remove any plasticiser (also toxic).

## Leaping Koi is normal



Koi are naturally "leapers" and will often clear the surface.

ONE of my two Koi has taken to leaping out of the water and landing with a splash. Is this normal or has the fish got some sort of parasite?

My pond is ten feet by seven feet and as well as the two five inch Koi I has Goldfish, Orfe, Rudd and a Tench. I read that Koi should not be kept with other carp because of interbreeding. As Goldfish are carp is it possible that any fish produced would be any good? —N. Cackram, Bristol, Avon.

Koi are great jumpers, so leaping is not a sign of distress.

The Goldfish and Koi are different species although of common ancestry. Goldfish are *Carassius auratus auratus* and Koi are a hybrid of *Carassius auratus gibelio* and *Carassius carassius* (the European Carp).

Many years of breeding have developed the two lines into the Koi's characteristic shape and colour and to cross breed Koi and Goldfish in your pond would just undo all this work.

## A tank of deadly Red Piranhas

I AM a relative novice at fishkeeping, having only maintained a small tropical tank for two years. However, I recently purchased a 36 x 15 x 12 tank

and I am exploring the possibilities of keeping a fairly large (four to five inch) Red Piranha in it.

Up to date I have had great difficulty in getting information

on this fish. Could you help with some advice?

Is it feasible to buy three small Piranhas and bring them up together in a tank of this size? —Jonathan Woodward (16), Bramhope, Leeds, Yorks.



Piranhas can attack each other.

The Piranha genus has several species, of which the Red Piranha (*Percostictiella nattereri*) is one. It originates from the Amazon area where it can grow to 30cm (11½ inches). But in captivity it is usually much smaller.

It will take Carnivore flake and chunky foods such as earthworms, meat, fish and prawns. There are no records of the fish breeding in the aquarium, as far as I am aware.

You may keep several Piranhas together if brought up from a small size, if any one fish outgrows the others you may find chunks removed from the smaller fish—Piranhas are just like that!

A paperback is available from TFH called "The Piranha Book" by G. S. Myers.

PRACTICAL FISHKEEPING



## Magnificent Malawi Cichlids



Malawi Cichlids are really interesting aquarium fish.

I have a 48 inch tank, how many Malawi Cichlids could I keep in it? What is the best breeding temperature? Is there any advantage in Rift Valley salts? What filtration is best? Are they territorial and can they cross breed? What sort of tank is needed to raise fry?

Some of the fish I am hoping to keep are: *Pseudotropheus auratus*; *P. zebra*; *P. Livingstonii*; *P. microstoma*; *P. johanni*; *Aulonocara nyassae*; *Lobotropheus fuelleborni*.

Will these be suitable together?  
—R. Weaver, Luton, Beds.

Lake Tanganyika is unusual in having a fairly uniform temperature. It is 80F at the surface falling to 75F at the bottom. So your aquarium could be kept at a uniform 78F and breeding should occur without temperature fluctuation.

It is not the number of Cichlids, but their size that determines the stocking level. Assume one inch of fish per 24 square inches of surface area.

If you mix the fish when young they should not fight because

territorial claims should develop naturally. Use rocks to allow each species an area of its own.

Introducing new fish later will create problems, of course.

Cross breeding can occur if each species is not paired. The outcome of cross breeding is usually genetically poor stock.

The water for the tank should be hard and alkaline—about 10DH and pH 8, achieved by using Malawi salts available at a specialist Cichlid dealer.

You can use smaller tanks to raise fry, but use the same water as the breeding tank.

Aeration and filtration help maintain water quality—without them more frequent water changes are necessary.

Your list of species should breed in the aquarium without special aids but you are dealing with fish of little known breeding requirements. You will need to do your own research!

Crushed seashell helps maintain an alkaline pH but it is not essential if salts are used and partial water changes made frequently.

## Changing ponds is simple

In my garden I have a plastic moulded fish pond and I would quite like to change it to a concrete one.

But my uncle has a concrete pond and he seems to lose a lot more fish than I do. Do you think there is anything poisonous in the concrete?

I was advised to clear out my pond with Dettol to kill disease. Is it wise to use this?—Garry Grant, Frome, Somerset.

The choice of pond types depends on many factors. Certainly the preformed plastic or fibreglass type is easy to install and maintain, but they are only available in small sizes.

A formal pond with built-in

filter beds, so essential for the clear water required for Koi, needs to be built with concrete.

The irregular shaped pond for the water garden is best made by lining the hole—or raised walls for a pond above ground—with Butyl sheet specially made for the job.

Concrete can be harmful to fish until mature and is no longer releasing alkali into the water. A way round this problem is to coat the inner surface with fibreglass resin.

Dettol and similar household disinfectants are ideal for sterilising ponds. But every last trace of the liquid must be flushed away before refilling and adding fish.

## Can my Goldfish be cured?

I RECENTLY bought a Comet Longtail which is a beautiful fish with a long flowing tail almost longer than its actual body. It seems quite lively and eats well, but I've noticed it has a few white spots or blubs on the tail.

There are no spots elsewhere on its, just on its tail. There are also what looks like red veins. Can you tell me what is wrong with the fish and if it can be cured?

I have three other fish, all quite old. One must be ten years old by now. At the moment its scales protrude. It went like this before but recovered. What causes this and can I do anything to help the condition?  
—Miss A. Pugh, Moston, Manchester.

The spots on the Comet's tail may be growths and surgery is the only solution to this problem.

For this operation, consult your local veterinary surgeon—if he knows little about fish pathology you can contact me at the Animal Studies Centre, Freaby Lane, Waltham on the

Wolds, Melton Mowbray. Let me for a list of vets who do specialise in this field.

Remember that the fee for this service may be more than the cost of a replacement fish.

The red veins you quoted are indeed just that. It is a condition that develops with age and there is little you can do.

The severity of red veining is made worse by poor water quality so ensure that your aquarium is gin-clear.

There is no need to isolate the fish, the condition is not infectious like White Spot.

The raised scales on the old fish is due to absorption of water by osmosis and an inability to excrete it either from disease or age.

Again there is little you can do without diagnosing and treating the original disease. One control—but not cure—is to keep the fish in salty water and so reduce the osmotic effect.

Start at one level tablespoon per gallon then add a second tablespoon per gallon over several days.

## Breeding Livebearers

I AM a beginner in aquarium keeping but I am interested in starting to breed livebearers. I have a 23x13x11 aquarium.

I also own a 18x10x10 tank but it has no lid or light fittings. Would it be suitable to breed with? Do I have to buy another pump filter hood? The tank has a metal frame. I hope I have given you enough information for you to advise me.—Luzy Stephens, London NWS.

Livebearers can be bred in any container with a reasonable surface area of water for oxygenation. Many Guppy breeders have banks of mini-tanks made from sweet jars to plastic shoe boxes.

There is no need to buy pumps, hoods and lights etc. Just use a cover (glass, rigid plastic etc), to keep out dust and prevent leaping and rely on partial water changes to keep the water sweet.



The Butyl sheet pool being filled.



## Hard water



Mixing marine salt—use tapwater.

I HAVE read that hard water should not be used in mixing up marine aquarium water. As I want to start a marine tank could you advise on this point?—S. Cornell, Chatham, Kent.

Any tap water is suitable for preparation of synthetic sea water. Only the chlorine needs removing. This is usually dissipated during the preparation and storage. The dissolved solids of the final seawater are far higher than the hardest tapwater.

## Lighting

I HAVE read your marine queries regarding the lighting for anemones. I have a 36 x 18 x 12 tank with fish and two anemones of six inch diameter which are just as good as the day I bought them three months ago.

The tank has one two foot 29 Watt Gro-lux. There is one and a half inches of algae growing on the sand, do you think it is necessary to increase the lighting if the anemones are OK, and will I be over-run with algae if I increase the light?—A. Smith, Kirby-in-Ashfield, Notts.

If everything is in good order then leave well alone. You should harvest that heavy growth of algae so more can grow. You will then continuously remove soluble material such as nitrates with the algae.

# All about Marines

Research by Dr. David Ford.

## Problems with green algae

I HAVE a fair amount of green algae growing. I bought a small Sailfin Tang which keeps the algae pretty well under control. Where the coral has algae growing on it I have noticed a large number of air bubbles clinging, and if I scrape them with a glass rod they rise to the surface. Is this situation alright?

Finally, could you sort out this problem of tank lighting for me please? One reads so many different set-ups I get a bit confused. Gro-lux, True-Lite, North Light, Tungsten etc.

In my tank I have one two foot Gro-Lux which is placed at the front of the tank in the hood. It is

left on from around 10am to 11pm. Is this arrangement alright or should I have a few more of a different type of tube? Also does the Gro-Lux light make fish go blind after a while?—C. Arnold, Twerton, Bath, Avon.

The "air bubbles" you notice are actually oxygen produced by the photosynthesis process of the algae and it is beneficial, not harmful, of course, for the fish.

Since you have a good growth of algae producing oxygen bubbles your lighting arrangement must be satisfactory. Too

much light appears to cause blindness in marine fish, but no scientific study has yet been published. Certainly a bright light suddenly turned-on can cause death in marine fish probably from heart failure.

The choice of lighting is yours. For low cost fluorescents (North light or Warmlight) is best, but for better plant growth a special fluorescent is preferred (Gro-lux or True-lite). The tungsten bulb is still recommended by many plant growers and preferred for Herpetological aquaria since it gives off light and warmth.

## Treating and cleaning marine invertebrates

Bruce Smith, London N1.

It is certain that marine invertebrates suffer a variety of diseases and parasites since every living thing on earth is susceptible to some pathogen.

However no systematic study of such diseases has been undertaken in the aquarium so no firm information is available yet.

One thing is certain, the invertebrates are much more susceptible to toxins in the seawater than the fish and if the water quality deteriorates it is the invertebrates that will die first.

The Eheim system has a plastic impeller which is unaffected by seawater with a magnetic drive which isolates the flowing seawater from the motor and spindle. Therefore

you will have no problem.

Clean your corals and sea fans by rinsing in tepid tapwater, if alive. Or use bleach solution if they are dead skeletons. In the latter case all trace of chlorine must be rinsed away by prolonged washing.

Many of the bacteria in the gravel bed are indeed killed by chemical treatment and so chemotherapy should always be carried out in a separate hospital tank.

Antibiotics, Formalin and Methylene Blue can destroy biological filters. But Malachite Green has only a small effect and this chemical is used in many seawater treatments.

Bacteria grow so rapidly that a biological filter can recover within hours, unlike invertebrates!



Living coral—before preparation.



Dead coral skeletons—the most popular.

## Reducing the lighting



A natural-looking marine set-up.

THREE months ago I set up a tropical marine tank after keeping tropical freshwater fish for three years.

I have a three foot tank, 15 inches deep, and its only source of illumination is a 20 Watt, two-foot Osolux for about eight hours a day. It gets no natural light at all, being situated in an alcove in the hall, well away from any windows.

My problem is that an excessive amount of algae, the brown type, quickly grows making the tank very unsightly. I realize that a certain amount of growth can be beneficial, but my set-up seems to be very prolific in its output and has to have all surfaces cleaned about every five days.

I tried reducing the light to five hours a day, but still it returned and soon covered the glass, heater, sand and coral.

## Covering a tank stand

I HAVE recently opened an aquarium shop and have now reached the stage when I am ready to install a marine section, but I have a problem. I have had a large aquarium stand made from mild steel, rectangular hollow section.

The frame is not painted or covered in any way, and I think this must be done to protect the steel from the highly corrosive salt water that will inevitably come into contact with it. My problem is, I do not know of any non-toxic paint or other coatings that will withstand salt water.

I wonder if you could supply me with this information also their availability? D. Groves, South London.

With good housekeeping the

PRACTICAL FISHKEEPING

Is there anything to stop this or even slow it down, even my Dragon Fish is looking a bit browner than it should, although this is probably my imagination? I would be most grateful if you could advise me on this.—Ian Ramsay, London SE5.

When a marine tank is set up it passes through a maturing process as complex biological changes occur. One of those changes is the algae growth.

The first stage is the growth of brown algae because the chemistry of the water is most suitable for this species. Gradually the green variety takes over as the system matures.

Perhaps your maturing time happens to be rather slow, but be patient and do not scrub everything clean and renew all the water because you must then pass through the maturing process all over again.

Just problem should not arise if the stands are given a good coating of metal primer, undercoat and polyester top coat.

Another solution is to look in the Yellow Pages for a local firm who do polythene or nylon coating.

Polythene gives an attractive white smooth coat but it does age brittle and will need recoating in about seven years.

Nylon can be white or black and remains unchanged for a lifetime, however the only coaters I know cannot handle items over 2ft 9in (the frames are dipped whilst red hot into vats of powdered nylon and 2ft 9in is the maximum vat depth). You may find better facilities in London.

## Adding new fish safely

I HAVE a 4ft x 12 x 15in marine tank, the undergravel filters are powered by a Wisa 200 pump. I also have an Eheim 201B power filter. To oxygenate the water more, I have a Rena 301 pump attached to a foot long air diffuser.

Lighting is by two three foot Trulite tubes.

The occupants of the tank are as follows: one Allardi Clown; one Electric Blue Damsel; one Humbug; one Mandarin.

I have had the fish for six weeks and they all look healthy. I feed flake food in the morning and either frozen Brine Shrimp or Bloodworm at night.

My questions are as follows: Is this set up adequate? How many more fish can I safely add after the 6 months maturation period, and what varieties do you suggest?

When should I start using trace elements in addition to four-monthly partial water changes?

When and how should I rejuvenate the filter medium? Could you give me some information about the Mandarin? Would it be safe to add live baby brine shrimp to the tank?—S. M. Harper, Ditchling, Sussex.

Yes, the set-up is adequate. Clean out (cold rinse is adequate) the Eheim frequently, at least every other month.

You could safely double the number of fish you have. It is possible to have even more fish, but then the frequency of the

Eheim cleaning and partial water changes must be increased.

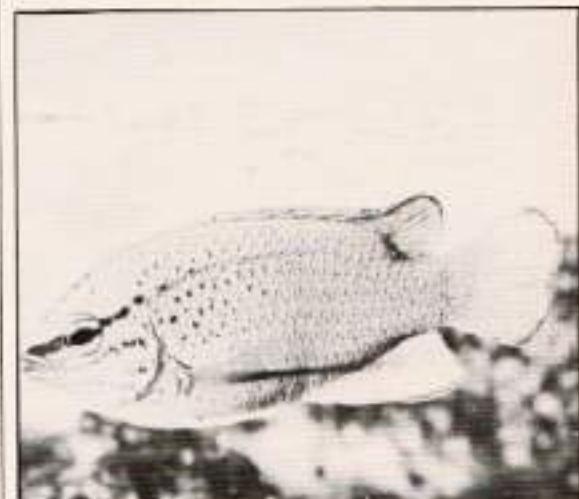
It is possible to list suitable varieties because it is really a question of what's available. Choose non-aggressive specimens of course, but they must be "pedigree" fish (of known history. Additions of wild marine fish freshly imported, or of short quarantine, to an established tank is inviting parasitic infestation.

Trace element additions are necessary now if you plan four monthly partial water changes. More frequent partial changes make such additions unnecessary, and, just like freshwater aquaria, the more the number of partial changes the better.

You do not say what filter medium you use—assuming it is bagged charcoal, just rinse it clean in cold running water (to retain biological activity). Use a pad of nylon filterwood under the bag to catch the initial dirt and discard and renew at each clean-down. There is no need to renew the charcoal.

The Mandarin fish (*Synchiropus Splendidae*) comes from the Indo-Australian Archipelago where it grows to three inches (so you have a good specimen). It is peaceful with other species but fight among themselves, so only one specimen per tank is recommended. They will eat all foods, usually off the bottom.

Yes, live baby brine shrimp is taken by small fish (and many invertebrates) and is a very useful addition to the diet.



Electric Blue Damsel—one of my present fish.

WINTER will be well and truly with us next month. But don't let November get you down. Brighten up your month with PRACTICAL FISHKEEPING the biggest, best and most colourful aquarist magazine you can get.

Practical is our name... and it is the practical aspects of fishkeeping that we concentrate on.

We always try to give you the expert help and advice that will help you to make your hobby more rewarding.

Those long winter nights are the ideal time to concentrate on your fish.

Make a date with PRACTICAL FISHKEEPING now.

The November issue is out on November 1 and it is packed with information and features—here's just a selection

#### Christmas is coming

You may groan and wish it was all over. But that doesn't alter the fact that November is the time for Christmas shopping.

Make it easy by buying any fishkeepers in the family a useful present to help his hobby.

We will make it simple with a round-up of equipment and books to give you some ideas.

Plus of course there are hundreds of advertisers in our pages who will be delighted to supply the goods.



#### Fish research

Dr David Ford's articles and the advice he gives in the Aquatic Queries section are some of the most widely read in PRACTICAL FISHKEEPING.

Although Dr Ford is a keen hobbyist and an expert in his own right, he bases a lot of his opinions on scientific research.

Dr Ford has set up a new fish laboratory at one of the foremost animal research centres in



Europe and has toured the World.

Next month he takes you on a tour of the San Francisco Aquarium and its superb fish—it is really interesting behind-the-scenes information.



#### Ponds in Winter

You may think that November is a dead time for the pondkeeper. But that just isn't true as we will prove next month.

Winter is an excellent time for planning. With your fish carefully protected you can sit down and think of Spring.

Next month our pond experts Roger Cleaver and Peter Bull will be doing just that.

They will be telling you more about landscaping and making your pond look more attractive with a really informative piece on conifers.

Disease experts Andrew Stagg and Ken Digby are also on hand to cover the diseases and problems of pond fish.

Read their views now and be prepared when your fish start to become active late in the New Year.



Editor Norman Wright's look at the fishkeeping world

#### Keeping Catfish

David Sands will be back from his big collecting trip to Brazil with a host of new species that will delight catfish fans and convert anyone who doesn't keep "cats".

Who knows, he might even discover a new species!

Don't miss this fascinating article next month.

#### All about Angels

Angels are justifiably one of the most popular of aquarium fish. They are majestic, stately and friendly.

Nick Fletcher looks at Angels next month with information on how to keep them, the types available and how to breed them.



THE aquatic trade certainly deserve a pat on the back for the products they are producing for the British aquarist.

My visit to the Yorkshire Aquarist Festival at Doncaster where most of the major manufacturers and wholesalers exhibited proved the point.

Almost every stand featured new items to help the fishkeepers and most looked really good quality.

PRACTICAL FISHKEEPING'S technical writer Cliff Harrison was there as well and he lost no opportunity in collecting the new gear and testing it.

You can find out what's new and Cliff's opinion on the equipment on Page 48 this month.

It's nice to see these new developments in food, filters and general equipment.

And it was good to see such an excellent crop of stands making it easy for the products to be demonstrated and displayed to the public.

I HOPE you have found the free booklet on the cover of this month's PRACTICAL FISHKEEPING helpful.

And I also hope you will find it useful over the months. It is designed to be a Tankside guide and I hope that's where you will keep it.

THERE's a super prize in this month's PRACTICAL FISHKEEPING competition on Page 10—a complete marine aquarium with tank, equipment, fish and corals.

It is free to enter and with such a good prize, well worth sending off.

It can be enjoyable for the whole family searching for the tenderness between the two cartoons.

I can assure you that there ARE ten differences this month although in the September issue a printing error meant there was only nine!

I apologise to anyone who tried to complete the contest and spent a long and frustrating time without success.

The price of PRACTICAL FISHKEEPING has gone up to 80p from this issue. Increased production costs have forced us to take this step.

But I think you will agree that our 84-page magazine is the brightest and best for fishkeepers and still represents good value for money.

You could easily spend 80p on a single tropical fish.

By investing 80p in PRACTICAL FISHKEEPING every month you can make sure you keep that fish alive, in good condition and in a good-looking tank by following the advice of our experts.

PRACTICAL FISHKEEPING

Write to:

# Letters

Practical Fishkeeping, Bratten Court, Bretton, Peterborough, PE3 8DZ

## Sun Bass

**DURING** a recent freshwater fishing holiday in Bridgewater, Somerset, a friend caught in a pond what he thought to be a strange-looking fish. The local anglers said it was a Japanese Sun Bass.

However, the only fish I can find in my books which slightly resembles the 'Sunbass' is the *Lepomis megalitis* (Long Eared Sunfish).

The Sunbass was about 4 inches long, had a deep yellow underside and was covered with blue/green iridescent spots.

The dorsal fin was spiked as in a freshwater perch, and one of the locals claimed he had caught one weighing 8oz.

I am hoping you can publish the letter to prove to my friends that this is not a story of the one that got away! — M. Bridgewood, Belle Vue, Doncaster, Yorks.



No good publication is the same without a lively letters page. We want you, the readers to have your say — to tell us of your views and experiences. So come on! Put pen to paper.

## Mystery fish

I WAS interested to read in your 'All About Marine' section the letter from Chris Arnold of Bath,

in which he described (by drawing) his Angel Fish and asks for identification.

I am pretty certain the fish he describes is *Chaetodontoplus mesoleucus* (Singapore Angel Fish), but as you say it is difficult to identify a fish from colour patterns only.

If this identification is

confirmed I would be interested to hear how Chris progressed with this fish and how it settled down as I was recently tempted to buy an example of the same species but was warned off, being told that they could be rather difficult to feed and did not tend to settle down to tank life very easily. — Tom Wells, Manselton, Swansea, S. Wales.



Perch—similar rays to Sun Bass—see M. Bridgewood's letter.

## Relax with...

Do it the easy way—have your copy sent to you each month by post. Simply take out an annual subscription at £9.20 per year by completing the form below.

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# Survival

Livebearers have developed unique ways to protect their species  
says John Dawes



Swordtails—a typical livebearer and cleverly adapted.



## Background to Fishkeeping

There are plenty of fascinating stories to be told about the fish we know and enjoy keeping. And in our series *Background to Fishkeeping* John Dawes is planning to tell some of these stories. He starts with egglayers and how they have evolved their many unusual methods of spawning.

LAST month's article dealt with some of the ways in which Egglayers tackle the problems concerning reproduction. Before moving on to some of the methods employed by livebearers this month, it may be of some help to discuss briefly the main problems that are involved.

In fish, as in most other sexually-reproducing organisms, the two sexes are quite separate. In other words, each individual is either male or female at any one time (this is in no way incompatible with the phenomenon of sex-reversal).

Having separate sexes means that some method must be found of accomplishing the successful fertilization of eggs. A wide range of courtship displays and colours which make this possible have in fact been evolved over time.

The problems don't end after fertilization, though. It is essential that some of the offspring survive to adulthood if the species itself is to survive.

Again, fish have found many ways of ensuring this, sometimes producing such large quantities of fry that, even without parental protection, some are almost certain to survive.

Where parental care is provided, the number of offspring is correspondingly smaller. Furthermore, the higher the level of parental care, the lower the number of offspring, as a rule. This trend applies both to Egglayers and Livebearers, with one important distinction—most Livebearers produce fewer offspring than even "modest" Egglayers.

For example, it would take a very large and fertile Swordtail female to produce anywhere near as many offspring as even a small Dwarf Gourami female. The reason for this will,

hopefully, become apparent as this article progresses.

Some books describe Livebearers as fish that produce live young. In a way, this description is very misleading for it almost implies that egg-layers produce dead young!

It would therefore be more correct to say that livebearers are fish in which the fertilization of eggs is internal and in which complete embryonic development takes place inside the body of the female and not outside, as in Egglayers.

Although Mouthbrooders do keep their eggs inside their mouths, these eggs can be regarded technically as being outside the body in the sense that they are in constant contact with the external environment.

It is the constant flow of water through the parent's mouth that helps the eggs to develop properly. This does not apply to livebearers whose eggs are kept truly inside the female and have no direct contact with the external environment.

A second term that needs some clarification is also concerned with the Livebearer's method of reproduction. Many, perhaps most, books say that livebearers are "viviparous" fishes because they produce fry, as opposed to eggs!

This, I feel, is not quite correct. In viviparous organisms, the eggs "hatch out" relatively early inside the female's body as more or less incomplete embryos and then undergo the rest of their development "outside the egg", as it were.

In the vast majority of Livebearers, this does not happen. Embryonic development takes place inside the egg. It is only when they are fully developed that the young hatch out inside the female and are then expelled from the body.



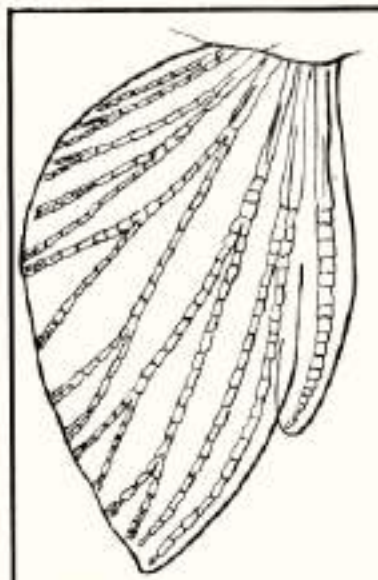
John Dawes is a lecturer at the University of Bath. His job is to teach student Biology teachers. And he draws on his hobby of fishkeeping to help them teach some aspects of their subject.

John (34) comes originally from Gibraltar where his parents still live. He began fishkeeping during his schooldays.

Therefore, although the final product is superficially similar to that found in truly viviparous organisms, most livebearing fish can be said to be ovoviviparous.

A further possible confusion between viviparity and ovoviviparity may arise when we consider that very fundamental characteristic of viviparous organisms—the nourishment of developing embryos.

If nourishment occurs, then one could expect a large increase in weight of the developing embryos. In fact, it has been estimated that Mosquitoe (*Heterandria formosa*) embryos increase in weight approximately four hundred times during gestation.



Female pelvic fin of the Swordtail (*Xiphophorus hellerii*).

On the other hand, most other Poeciliids show very little, if any, increase at all, even though the fertilized eggs remain within their sacs (follicles) embedded in the wall of the ovary during the whole of their development.

In the case of the Mosquitoe, I feel that we can regard them as truly viviparous. The same would apply to all the Goodeids (I will refer to these again later). Most Poeciliids would however be regarded as ovoviviparous.

Having opted for internal fertilization, livebearers have done away with the necessity for marking out distinct territories, building nests, producing large numbers of eggs, having to offer parental protection in the form of nest, egg, and fry-tending etc.

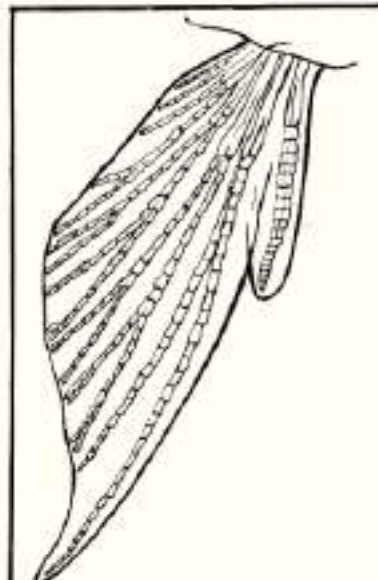
However, internal fertilization presents a new set of problems. For example, it may well be advantageous to offer the eggs the protection of the mother's body but, unless some means of actually fertilizing these eggs *in situ* is found, this potential advantage cannot be exploited.

The answer, as far as most livebearers are concerned, is provided by the gonopodium. This is the name given to the sexual organ found in livebearer males. It is made up of a number of anal fin rays modified into a rod-like (grooved rather than hollow) structure through which sperm are introduced into the female's vent. The tip of the gonopodium of many livebearers carries one or more hook-like structures which appear to be essential for effective sperm-transfer.

There is, in fact, experimental evidence to show that the effectiveness of the gonopodium in these fish is decreased when one or more of the hooks is removed, culminating in no successful matings if all the hooks are removed.

This may well be one of the reasons why Lyretail Swordtail males are incapable of successful mating. None of the Lyretail gonopodia that one of my colleagues and I have examined have any hooks of any kind.

There are other reasons for the apparent sterility of Lyretail males but it would be premature of me to write about these until the



Male Swordtail pelvic fin—notice the difference.



Mouthbrooders—eggs are technically outside the body.

research programme is completed.

Since the actual process of sperm transfer can be completed in as little as one second, elaborate courtship displays do not appear to be as necessary for livebearers as for egglayers.

There are displays, nevertheless, and these are sometimes quite dazzling, albeit short-lived. Even so, mating sometimes takes place with no apparent co-operation on the part of the female.

This apparent disinterest sometimes even makes one wonder whether some females ever become aware of having been mated. It becomes even easier to believe this when one sees livebearer males such as Mosquitoes (*Heterandria formosa*) apparently stalking females, then liberally darting out from among vegetation to mate, and finally beating a quick retreat.

In other cases, however, there does seem to be some female co-operation. In the Merry Widow (*Phaethichthys amates amates*), males appear to nuzzle females around the vent area.

This seems to serve two purposes (at least, this is the conclusion that I've arrived at after observing this behaviour pattern many times). Nuzzling often seems to pacify the female in some way so that, at least, she doesn't swim away as other livebearer females are prone to do.

Secondly, *Phaethichthys* males have rather long gonopodia. Interestingly, the length is about the same as the distance between the base of the gonopodium and the tip of the male's snout so that, when the gonopodium is swung forwards, it covers the same distance as that covered by the whole front half of the male's body. It may well be, therefore, that the nuzzling action serves in the capacity of a "range finder", thus increasing the male's chances of success.

It must be stressed, however, that these are merely my thoughts based on my observations and, as such, they don't constitute proof of any kind that nuzzling does indeed fulfil these functions.

# Survival

Anyway, with or without female co-operation, livebearer males have found their own ways of tackling the problem of internal fertilization successfully.

In fact, in order to ensure success, some livebearer males, such as Guppies and Swordtails, have carried their modifications even a stage further. The pelvic fins of these males have modified rays which seem to function in rather an ingenious way.

As the gonopodium is swung forwards to make contact with the female, the pelvic fin is also directed forwards and comes into contact with the gonopodium in such a way as to form a more effective channel than would otherwise be formed by the gonopodium on its own.

When mating is going to take as short a time as it does in most livebearers, then, clearly, any modification that is likely to enhance the chances of successfully transferring the "packets" of sperm (spermatophores) from the male to the female, is going to be selected for and developed in due course.

After mating, livebearer males play no further part in the reproductive process. This is left entirely up to the female which, in response to evolutionary pressures, have developed a variety of techniques for handling their part of the proceedings.

Most can only accommodate a relatively small number of eggs when compared to egg-layer females. One of the reasons for this is that, as mentioned earlier, many livebearer females keep the eggs within their sacs (follicles), actually embedded within the walls of the ovary during gestation (the period of development of the embryos).

The number of eggs will therefore be restricted by, among other facts, the actual physical size of the ovary itself. As it happens, the increased level of protection afforded by internal development reduces the need to produce large numbers of eggs, thus balancing things out to an extent.

The ovary of livebearer females is really quite a remarkable organ. In addition to being able to accommodate developing eggs, it also appears to have the ability to nourish sperm and keep them alive within its tissues for a considerable period.

Therefore, since a single insemination is likely to provide many times more sperm than will actually be required to fertilize one batch of eggs, it makes good sense to keep surplus sperm alive and viable till the next batch of eggs is ready.

This is why a livebearer female, once mated, is able to produce a number of broods over a period of a few months, even in the absence of males.

"Virgin" broods may be explained away in this way. In such cases, the chances are that the female was mated either in the dealer's or importer's tanks prior to purchase.

In one particular livebearer, the pressures of "ovarian gestation" have led to a rather unusual way round the problem of numbers. Mosquitofish females are very small and, as a result, would, under normal circumstances, either produce incredibly minute offspring, or else, very few per brood.

As mentioned earlier, experimental evidence shows that Mosquitofish embryos increase four-hundredfold in weight during development. This suggests that the



Work in John's laboratory includes these studies. The fish have been digested away leaving the skeletons.

solution opted for will inevitably result in very small broods; unless, that is, some modification to the basic pattern is developed.

The answer for the Mosquitofish and a few other livebearers lies in adopting a method of fry-production usually referred to as "superovulation". Basically, this comes down to a staggering in the rate of egg-production. Mosquitofish females, therefore, carry in their ovaries, eggs at various stages of development, each one being fertilized by stored sperm as and when it opens.

As a result, embryos reach full development in sequence and are born singly rather than in batches. The overall effect of this is that these fish can produce very large well-developed fry, in relation to their body size, and these, over a period of time, probably survive to adulthood in comparable numbers to those of other livebearers.

As each fry is born, it creates room within the ovary for the next egg in line to complete its development and so on in "conveyor-belt" fashion.

Remarkable though this method of reproduction may be, it is, in some ways, no more than a refinement of existing methods. For a marked departure or major breakthrough in technique, though, no group of livebearing fish can compare with the Goodfolds.

There are relatively few Goodfold species, yet their biological significance is difficult to overemphasise. These livebearers come, almost exclusively, from Mexico and are so different to all others in the way that they reproduce, that they warrant a separate article all to themselves.

They have tackled the same problems of reproduction as all the other livebearers but have come up with very different answers. Some of these are most "unfishlike" indeed, demonstrating a level of parental protection in the form of nourishment of the developing embryos that, not only allows them to reduce the number of offspring without increasing the risk unduly, but even resembles in some ways the method used by that most advanced group to which we ourselves belong—the mammals.



# Colourful Congo

One of the most delicate members of the Tetra family

*An African species, the Congo Tetra is both superbly coloured and easy to keep. Its iridescent body seems to feature every colour of the spectrum.*





# Pond protection

Experts Roger Cleaver and Peter Bull explain how to save your fish from the cold

ROGER Cleaver and Peter Bull are well qualified to write about pondkeeping for PRACTICAL FISHKEEPING readers each month.

Both are experts on the subject with Roger specialising in fish and Peter being a pond plant specialist.

Both men come from Coventry, W. Midlands, and both are managers of aquarist shops.

Roger is chairman of the growing Midlands Koi Society.

WITH the thought of last winter still clearly in our minds and the value of fish on the increase, now is the time to make serious plans so fish have the best chance of survival during the bad weather.

With the idea of giving their fish the best chance, more and more people seem to be turning to protecting their pools with some form of covering.

Obviously many materials and methods of construction, some really most elaborate, are used, but we hope in this article to give some basic methods.

Sketch No. 1 shows a partial cover constructed from timber using  $\frac{3}{4}$  inch planking around the edge and 1 x 1 for the supports for the polythene cover. There should be a slope from front to back to allow water and debris to fall away from the pond and on to the surround.

One must bear in mind that it may have to support a great weight of snow and care in the construction will pay dividends.

The joints should be of sound design adding rigidity to the whole frame. The timber prior to having the horticultural grade polythene fitted may be treated with something like varnish or any non-toxic preservative.

Then fit the sheeting over the frame and fix in place with battens rather than just tacking the sheet directly to the wood.

If the structure is made approximately 10 to 12 inches high at the front tapering down to about 6 inches at the back it can double as a cold frame in the spring.

Sketch No. 2 shows a similar principle, but it must be made so that the poly sheet remains clear of the water at all times.

Planks are shown in the drawing, but one can use canes. These tend to warp and sag with the weight, so are not recommended.

The final sketch shows a pool which is completely covered with a poly sheeting tent. Going to the extremes, one might say, and in some instances impracticable, but with the value of fish on the increase and fact that more and more people are turning to Koi as the sole inmates of their ponds it may be worth considering a cover of this nature.

It will serve two main purposes, firstly as a

protection from the winter elements and secondly have the effect of a greenhouse keeping the water temperature a few degrees warmer thus allowing the fish to feed later and begin breeding earlier.

In effect it shortens the winter, so promoting growth and health, especially as Koi do not seem to tolerate very long winters unless there is sufficient depth of water—which many people do not have.

Construction should not present too many problems, size of timber depends on the span to be covered. Clear poly sheeting is about the best covering for the frame, although semi-rigid translucent sheeting is also excellent.

Whatever cover is used obviously provision will have to be made for feeding and viewing the fish when it is in position.

One or two hinged sections would be useful, or a flap at the ends.

One other simple method of pool covering is simply to lay a sheet of polythene over the entire pond in the evening and remove in the morning. Obviously this method will allow the pool to freeze during daylight hours and may prove heavy after a fall of snow or rain which can collect in any sagging which may occur between the supports which are laid across the pond.

It should be said that the idea of covering a pool in winter for extra protection is really aimed at the Koi keeper and not the person who has an ornamental garden pool containing the many other varieties of coldwater fish, as it has been shown that Koi if subjected to prolonged periods of cold may begin to suffer from hypothermia and chills.

Although if a pond is shallow this protection will certainly help any fish with the added protection afforded by covering during severe cold spells.

The average pond can be protected with several methods which have proven themselves over the years.

These include pool heaters which will maintain a hole in the ice day and night allowing the toxic gases to escape and a small amount of oxygen to enter the water to supply the fish with their minimal requirements.

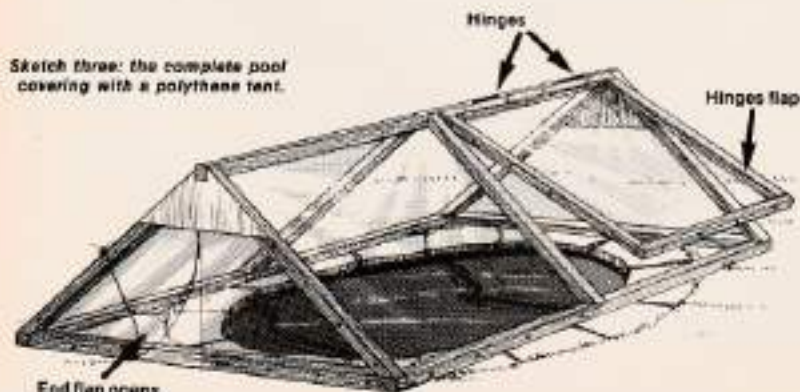
Other methods include floating a ball or a piece of wood which may be removed to leave a hole during the day and replaced before evening.

These also act as "shock absorbers" against ice pressure, so relieving the strain on the pool edge as the ice expands.

Referring back to pool heaters which normally float on the surface we came across an idea which has proved very successful. That was to place on the bottom of the pool a box container with an end removed of sufficient size to accommodate the inmates of the pool and to place a pool heater actually inside the container and allow the water to become slightly warmer than the main body of the pool.

Central heating for fish? We actually do know of Koi pools which are heated, but we would imagine it would be quite costly—but then so are the pool occupants.

Sketch three: the complete pool covering with a polythene tent.



Whilst covering your pool, or installing some means of preventing the pool from freezing will greatly aid and protect your fish during the winter, they are not, especially if the winter turns out to be like last year, an absolute guarantee that everything will be all right. So perhaps we should look at the two most common problems which may still occur and how we can get over them.

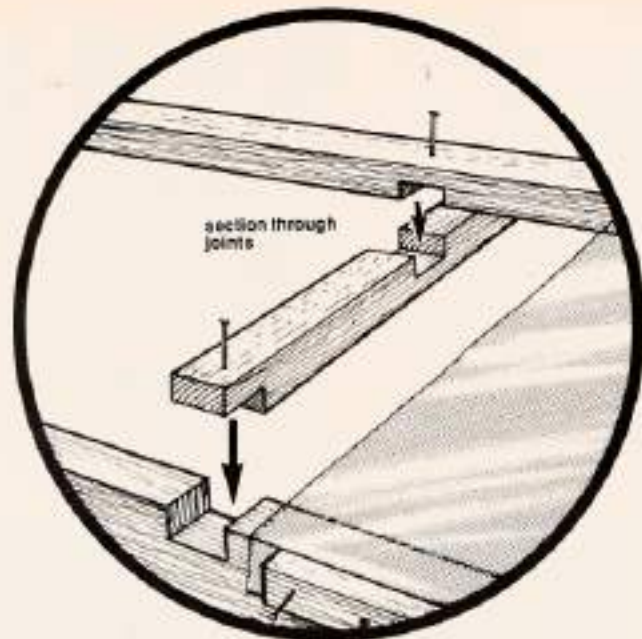
The first problem is that of the total freeze out. This may still happen even if we take precautions against it. For instance we may be caught out by a sudden early freeze.

Obviously people who take no precautions will be faced with the problem of a frozen pool throughout the winter and will need to break a hole in the ice sometimes several times a day.

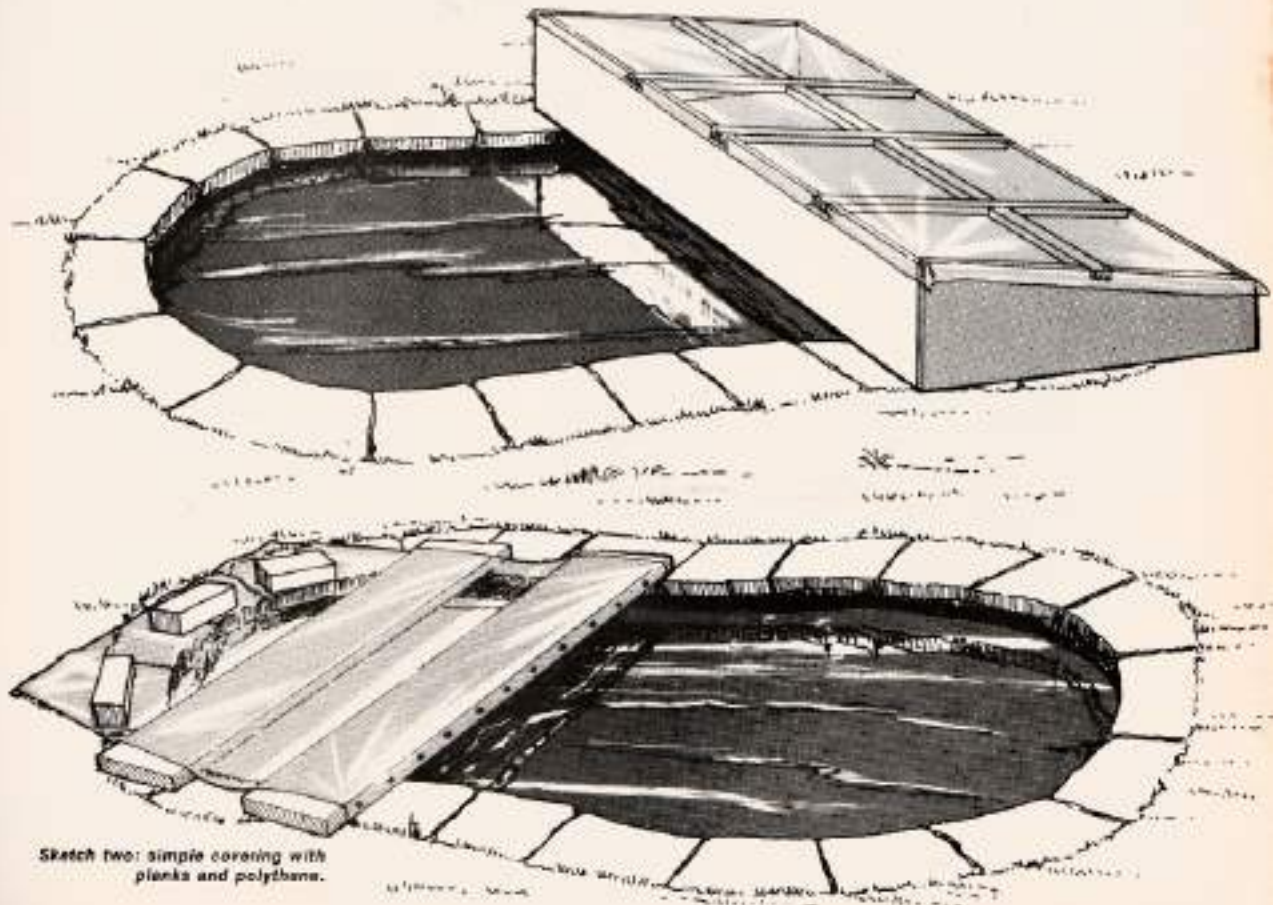
Often faced with the problem of how to form a hole, the beginner falls into what could be a fatal trap for his fish, he uses a hammer or heavy object and batters a hole in the offending ice.

This produces shock waves throughout the pool and the result can be drastic, either stunning the fish or even completely killing them. A more effective way is to place a pan of boiling water on the surface and allow its heat to melt the ice.

If the ice is very thick then the pan will probably need repeating several times. Although long winded, this is by far the best way.



Sketch one: the "cold frame" type of pool cover. The drawing above shows the joints to use.



Sketch two: simple covering with planks and polythene.

Dr David Ford is a specialist in fish nutrition and head of the Fish Research Laboratory of the Animal Studies Centre, Melton Mowbray. The team of Veterinary Surgeons, Biologists, Nutritionists and Technicians, using the facilities of the Centre, which is Europe's largest Pet Care Study Unit have completed more than five years of research and trials into modern fish foods. The result of their labour has been Aquarian, made in the highest quality control conditions and developed as the perfect food for all fish.

Dr Ford himself is a Chartered Chemist and Food Scientist who has been keeping fish now for over 35 years. He answers some common questions raised about Aquarian.

**WILL ALL MY TROPICAL FISH EAT AQUARIAN?**

Yes. Trials at the Animal Studies Centre have proved Aquarian to be the one favourite

tropical fish food. Even finicky feeders, like Piranha, Discus and Butterfly fishes, have thrived exclusively upon it! The reason's simple. Aquarian has fresh meat, fish and vegetable. It's because these fresh ingredients are closer to the foods tropicals would choose in the wild that Aquarian is a more attractive diet. More than that, however, it's nutritionally right. Aquarian has all the highest quality proteins, vitamins and amino acids, essential for top class condition, in a perfect balance. Whereas traditional foods concentrate on quantity of materials and sacrifice quality, Aquarian achieves top quality in all ingredients. That's why it's healthier. And that's why it's more appetizing. Aquarian is the one flaked food all fish enjoy.

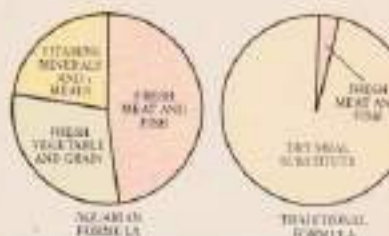
**WON'T THE FRESH FOOD CLOUD THE WATER?**

By cooking the fresh food into flakes we avoid this problem, achieving a food form that's perfect for all fish. Flake a float for surface feeders, suspend for middle feeders and lie

discreetly on the gravel for bottom feeders, all without clouding. And thanks to Aquarian's high quality proteins, fish excrete less ammonia and nitrite to pollute the water.

**DON'T ALL FISH FOODS HAVE FRESH INGREDIENTS?**

No. Extensive trials proved quite conclusively that the world's traditional fish foods were either cereal or fish meal and meat meal based with an almost negligible fresh content.



**"Aquarian flaked food a**

Aquarian, however, has fresh meats, fish and vegetables backed up by aquatic insects and added vitamins and minerals.

**ARE THE COLOURED FLAKES REALLY DIFFERENT?**

They certainly are! For example, the brown flakes are fresh meats, the greens fresh vegetables and so on, all nutritionally balanced. There are also correct levels of oils and fats to keep fish in peak condition. Aquarian's coloured flakes combine to make the ideal diet for all tropical fish.

**WON'T THE FRESH CONTENTS OF AQUARIAN DECOMPOSE FAST?**

Our airtight container guarantees you get Aquarian's full freshness. And once you've opened your container you can retain that freshness with the special rockable lid.

**WHAT DO LEADING AQUARISTS THINK OF AQUARIAN?**

Their reaction to Aquarian has been amazing.



CAROTENE COLOUR ENHANCER

EGG & VEGETABLE PROTEIN

FRESH LIVER

FRESH FISH CUT MEAT

FRESH VEGETABLE

FRESH FISH & LIVER

FRESH WHITE & GILY FISH

VITAMINS & TRACE ELEMENTS

They've tried it, tasted it, proved it and are now endorsing it openly as the one food they can trust. And the fact is, the majority of prize winners in the national shows for the past three years have used Aquarian.

Professional fish breeders too, have been equally open in their appreciation of Aquarian's quality and reliability.

**WILL IT BE TOO EXPENSIVE FOR THE HOBBYIST?**

Although each container of Aquarian has the freshest of natural food ingredients balanced scientifically by fish nutritionists, and has a back up of years of research, it is no more expensive than many other foods.

**IF I DO CHANGE TO AQUARIAN, WHAT DIFFERENCE WILL I SEE?**

Aquarian will make all species bigger, brighter and more full bodied, and for two reasons. Firstly, because of the natural healthy freshness. Secondly, because it's an appetizing, enjoyable food. All fish find that goodness attractive.

**WHAT ELSE DO AQUARIAN MAKE?**

There are thirteen different fish foods developed by Aquarian, ranging in speciality from Marine fish food to Goldfish food. There are also tablet foods, pellets for pondfish and a series of seven remedies and water treatments.

Each has just as intense a research and quality control back-up as Aquarian tropical fish food.

so you can see why Aquarian is a name in fish care that you can rely on.

**IF I HAVE ANY PROBLEMS CAN I CONTACT YOU?**

Yes. We run a free service for all Aquarian users, including a very special guide for beginners. Write to me:-

Dr David Ford,  
Aquarian Laboratories  
Animal Studies Centre,  
Freeby Lane, Waltham on the Wolds,  
Melton Mowbray,  
Leicestershire LE14 4RT.

**aquarian**

The fresh approach to flaked fish food.



is the one  
"all fish enjoy"

Dr. David Ford.

# A successful start

Dr Christopher Andrews puts the finishing touches to his new tropical tank



As well as being head of the Tetra Information Centre Dr. Christopher Andrews is a keen aquarist.

He began keeping fish, amphibians and reptiles as a boy and also worked in a pet shop at weekends.

Later he obtained a Honours Degree in Zoology and has recently been awarded a Ph.D for his research on the parasites and diseases of fish.

He joined aquatic food and product manufacturers Tetra three years ago and has been with their Information Centre since it began in 1977.

The Centre answers between 50 and 100 aquatic problems a week.

The finished tank complete with fish, plants and decorations.



APPROXIMATELY one week after setting up my new tank and planting, a dozen small yet hardy fish (Golden Barbs, Glowlight Tetras, Sucking Loach, Spotted Catfish) were added.

These quickly settled down and began feeding. During the week that followed these fish were observed closely for signs of disease, and the nitrite content (as N) was measured regularly (about once every other day).

On the day that the above fish were added to the tank, the nitrate content (as N) was 0.05 milligrams per litre (mg/L). About six days later this figure had risen to 0.5-0.7 mg/L, a potentially harmful level.

This sudden rise in nitrite content is quite characteristic of a newly set-up tank, and is the result of the time taken for the gradual establishment of a bacterial flora in the filters and gravel.

These bacteria gradually increase in number, and carry out the extremely useful task of converting waste products from fish (and excess food) through nitrite, into much less toxic nitrate.

This nitrate is then used as a food by the plants. Levels of nitrite in excess of 0.5 mg/L, although not directly poisonous to freshwater fish, may cause them to become more susceptible to certain diseases or simply to go off their food.

Therefore, I promptly carried out a 30-40% water change, topping up the tank with tapwater treated with AquaSafe, brought to the correct temperature with boiling water.

A day or two later the nitrite content was 0.2 mg/l, and after a further few days, had returned to 0.05mg/L. The partial water changes had reduced the nitrite content giving the bacteria in the filters and gravel time to become established and begin converting nitrite to nitrate.

This type of water quality testing is vital in newly set-up marine systems, and also illustrates why too many fish should not be stocked into a newly established freshwater tank.

Initial overcrowding may lead to high nitrite levels, and problems (particularly amongst more delicate fish) which baffle newcomers to the hobby, perhaps even putting them off fishkeeping for good.

A much used rule of thumb for estimating the maximum safe stocking level in a tropical freshwater aquarium is "ten square inches of water surface for every inch of fish (excluding tail fins)".

My tank measures 30 inches long by 12 inches wide, and hence has a water surface area of (30 x 12) 480 square inches. Using the above figures my tank could thus support a maximum of about 48 inches of fish (excluding tail fins).

This figure may be increased with filtration and/or aeration, although the whole system will then have a smaller margin for errors (eg pump failures). In addition, tropical fish do grow, and account must be taken for this when the fish are first added to the tank.

Some fish may also require additional space to set-up territories and spawn successfully in a community tank. Therefore, when I receive letters from beginners requiring advice on the stocking density that their tank will safely support, I often recommend that they begin with a small number of hardy fish, and then build up to about one inch of fish for every 12 or 15 square inches of water surface over a period of weeks.

Overcrowding (like overfeeding) must be avoided by hobbyists if they wish to be successful at fishkeeping.

With the above problems in mind I decided to add a few more fish to my tank. All had gone well for about three weeks now, and so I added five Serpae Tetras and six Cardinal Tetras.

As before, these fish soon settled down and developed a healthy appetite. The Cardinals in particular were a little pale at first, although regular feeds soon brought out the best of their electric blue and red colouration. At the time I was treating a friend's sick Goldfish in my hospital quarantine tank, and hence these fish were released straight into the set-up tank.

About one week later I noticed one or two all too familiar white cysts on the lateral line of a couple of the Serpae Tetras.

Knowing how quickly White-spot can multiply and become a real problem in a tropical aquarium, I carried out a rapid course of treatment with Contra-ick. This seemed to stop the infection in its tracks, and within five days it had apparently disappeared. As with many other fish diseases, rapid diagnosis and treatment is essential for the successful control of White-spot.

Over the next few weeks the following fish were added to the tank:

One pair Golden Gouramis

One Khuli Loach

Three (small) Keyhole Cichlids (Brown Acara)

One pair (small) Kribiasia

Two Marbled Angels

Two Black Widows

Each batch of fish was obtained from a local aquarists shop, and then quarantined for at least five days before they were released into the set-up tank.

During their quarantine period a close watch was kept for any abnormal behaviour or symptoms of disease. So far (touch

PRACTICAL FISHKEEPING



wood!) they are all in excellent condition and the community tank itself is thriving.

The Kribensis have spawned and hatched their first brood of about 50 eggs only two weeks after being released into the tank. At this moment in time the protective parents are keeping most of the other fish in one half of the aquarium, while the shoal of tiny, hovering fry explore further and further afield, feeding well on Brine-shrimp and a fine dried food for the young of egglayers.

Such pleasing results are not, however, achieved without a certain amount of routine tank maintenance. Every week since the aquarium was first set-up between 25-40% of the water has been siphoned out, along with accumulated debris and any algae scraped from the glass.

It is often a good idea to gently stir up the top half inch or so of the gravel bed with a planting stick before siphoning, since this helps to keep the floor of the tank fresh and clean. On each occasion the tank was topped up with fresh tapwater (treated with Aqua-Safe) brought to the correct temperature with boiling water. Water from the hot water tap should never be used for fishkeeping, since it may contain toxic metal ions.

As the fresh water was added, a full dose of Blackwater Extract was distributed throughout the tank.

PRACTICAL FISHKEEPING

Marbled Angel one of my new fish and a beautiful addition.



The foam filter I use in each corner of the tank.



Dr Andrews organises another partial water change—which he does weekly.

At the same time as the partial water change was carried out, the filters were also serviced. Regular cleaning and refurbishing of the internal box filter turned out to be a rather messy and time consuming business.

In comparison, the removal of the foam pad from the poly-foam filter was quick, simple and clean. All it required was a good rinse in cold water, and it could be slipped back onto the filter column.

Therefore, the internal box filter was eventually discarded, and a second poly-foam filter installed in its place. With two such filters, one in each corner of the aquarium, the water has remained clear and the fish and plants in excellent condition.

About twice a month (just before a partial water change) the pH, water hardness and nitrite content of the aquarium water is tested, to ensure that it remains within acceptable limits. Although not considered important by many aquarists, information on aquarium water chemistry can be very useful, and the detection of variations from the norm will allow prompt remedial action.

The correct feeding of aquarium fish is of paramount importance for their long-term health and well-being. The fish in the above tank are fed a variety of dried flaked foods obviously my own products, TetraMin, TetraRuby and Tetra Vegetable Conditioner.

Occasionally freeze dried Bloodworms along with a tablet food are also fed.

Food is offered 2-4 times per day, and only as much as is consumed in a few minutes. The rush of fish to the water surface to take the flakes from your fingers is an excellent sign, and an indication that they are not being overfed.

Put simply, hungry fish are healthy fish! A full colour booklet on feeding pet fish is available from the Tetra Information Centre.

I hope this information has been useful, if you have any problems with your tank, why not drop me a line?

# Underwater

Norman Wright visits a growing new aquarium

THE screech of a parrot is hardly the welcome you would expect at an aquarium! But that's the greeting you will probably hear as you arrive at Underwater World near Farnham in Surrey.

For although this new aquarium has a big display of exotic fish, there are exotic birds nearby as well.

Underwater World is attached to the internationally famous Birdworld and it is following the successful style of its big brother.

Birdworld is aimed at protecting birds by breeding rare species in captivity and providing a display that people in this country might otherwise never see.

The aquarium has similar objectives and since it opened two years ago has made an impressive start.

On show are around a thousand freshwater, marine fish and invertebrates.

And unlike many of Britain's public aquaria, which seem to be housed in buildings totally unsuitable for the purpose, Underwater World has been specially designed.

That leaves plenty of room for viewing nicely set out tanks. The tanks — from two feet to eight feet — are let into stepped walls so that you can only see one exhibit at once and one leads on to the next.

It was also nice to see displays of the more common tropical species in well planted tanks as well as the rarer varieties and marines.

In fact the decoration is one of the high spots of a visit to the aquarium for the planting and coral and invertebrate displays are very good.

Birdworld was opened in 1966 by naturalists Roy and Pat Harvey. It is a family concern with their three children all working at the complex.



Above: Underwater World features several big Puffers. This beauty shows his powerful teeth and jaws.



Left: Tame Batfish. This tank features three large Batfish and they are so friendly they will take pieces of banana from Dave Harvey's hand.



# World



Pictures by Clive Nicholls

Right: A fine Malawi Cichlid display is featured. And here is a superb inmate. The Malawis are breeding very successfully.

Underwater World is the brainchild of 20-year-old David Harvey. He explained: "I have always been interested in fish. I worked at Birdworld and I am very fond of birds, but the fish are my favourites."

David's interest in fish prompted the family to think up the aquarium idea. And, true to form, it was a family project.

Once the 132 feet long building was up, they took over. They finished the project with their own designed interior, which included making all the glass and fibreglass tanks on the site and installing and setting up the tanks.

The result is a purpose built system that is good to look at from the front of the tanks and easy to maintain and keep attractive behind the scenes.

David prepared for the task of keeping so many different kinds of fish and invertebrates by working at Brighton Aquarium for a while.

Graham Cox of Waterlife Research also gave valuable help and advice.

But now after two years David feels he has the experience to expand and improve the aquarium.

During the winter he plans to install another big tank for his ever growing Nurse Shark.

A tank of huge South American Pacu needs rehoming as they are also growing rapidly.

Underwater World uses artificial sea water. And that means 240lb of salt a month.

David believes in regular water changes and all tanks including the freshwater tropicals have a routine change at set intervals.

Food is a major problem. David provides a mixture of live, self prepared and proprietary brands for the inmates.

Fruit is an unusual addition to the diet!



Sometimes confused with Piranhas are Pacus. This specimen is huge—almost too big for the tank!

"It is very convenient to use some fruit as we have a supply for the birds. And we have found that many of the fish really enjoy some fruit and thrive on it," said David.

He illustrated the point by dapping a banana into the Betfish tank. A cluster of hungry mouths immediately appeared at the surface and began feeding greedily and aggressively on the offered morsel.

David is full of ideas to improve the educational quality of Underwater World. He tried a project which illustrated the evolution of some species of fish into amphibians and eventually reptiles.

Underwater World is well worth a visit. It is at Holt Pound on the A325 Farnham to Petersfield road.

Car parking is free and you do not have to visit Birdworld to get to the aquarium. Mind you, the bird section is well worth seeing as well.

The aquarium is open 364 days a year from 9.30 am and parties from aquarist groups are welcomed.



# Beautiful Barbs

Give these fish the credit they deserve says Nick Fletcher

ASK a child to draw you a fish, and he'd probably come up with a barb, or something looking very much like one.

With new, exotic fish being imported every year, the hobbyist has to fight hard against the temptation to buy the bizarre rather than the beautiful. Malawi cichlids arrayed in outlandish livery; catfish adorned with whiskers, growths and warty excrescences; characins that stretch the bounds of credibility.

Barbs aren't like that. Without exception, they look like fish ought to look. When William Blake wrote of the "fearful symmetry" of the tiger, he might easily have been describing the tiger barb.

It is because barbs lack any startling qualities that most true enthusiasts appreciate them only after they have compared them with other fish. A typical case would be



One of the most popular Barbs—the Rosy Barb.

Below: The Black Ruby Barb—one of the most attractive aquarium species.

the beginner, setting up a community tank and including two or three common barb species among the tetras, livebearers and dwarf cichlids.

The livebearers gave him the first thrill as they produce young to order. The parental behaviour of the dwarf cichlids is fascinating, even if they do end up eating the eggs. And if that red-eye tetra, bought as a tiny fish, does grow like the Incredible Hulk and ends up scooping the net, what matter? All the while, the barbs are going about their active business—colourful, peaceful, constantly on the move. One day the aquarist is going to see them in a new light—not just as makeweights in a community tank, but as a family of fish deserving the lasting appreciation, long after the weird and wonderful has lost its appeal.

The barbs most commonly kept are Asian





The One Spot Barb—an unusual member of the family and well worth keeping.

In origin. They belong to the Cyprinidae, the largest freshwater fish family which is well represented in Britain by roach, dace, bream, carp, tench, rudd and barbel. The largest members of the barb family include giants like the Indian Mahaseer, which grows to six feet or more. The smallest reach barely an inch long. Those of interest to aquarists all fall within the 1½–6 inch range.

The name 'barb' is derived from the whisker-like projections from either side of the jaws in most, but not all, species. These are well equipped with nerve endings and are used to locate food. The presence of barbules, as they are called, is a good indication that the fish spends at least some of its time rooting in the bottom debris.

Temperamentally, barbs are bustling and boisterous, rather than overtly vicious. Tiger barbs, for some reason, have acquired the reputation of being tin-rippers. They are no better and no worse than other in this respect, and any damage inflicted is usually on other fish which are already under the weather and behaving or moving in an unusual fashion.

There are, however, two considerations when buying barbs for either a species or a community tank. One is the size to which they will grow, the other is whether or not they can be sexed.

It makes sense to buy your barbs young. For one thing, it keeps down the cost. For another, you can be sure that your fish are not about to expire from natural causes—barbs usually live only two or three years, although some, like the Black Ruby (*Puntius nigrofasciatus*) can survive for ten.

But unless you know about the adult size of the fish, you could be storing up trouble. The Tinfeil barb (*puntius schwanefeldi*) was first brought to this country as a three-inch fish, but grew on to a maximum size of 18 inches! This, along with its plant eating habits, make it bad news unless you have a six-foot tank furnished with plastic plants.

The same problem occurs, to a lesser

degree, with some of the most colourful barbs on the market. The Clown Barb (*Puntius everetti*) is a real beauty, with its rusty-red body adorned with bold blotches, and tomato red fins. But it grows to nearly six inches, and this, plus the fact that it is a really energetic swimmer that swirls up to the top to be fed and then dives down to root in the sediment, makes it unsuitable for tanks of less than 48 inches.

The Spanner barb (*Puntius lateristriga*), the Filament barb (*Puntius filamentosus*) and even the old favourite the Rosy barb (*Puntius coschoniensis*) all approach six inches long at maturity.

Some barbs exhibit true sexual dimorphism—that is, the males and females are sufficiently different to be able to tell apart at a glance. Among them are the rosy barb, where only the male has the dark dorsal; the Black Ruby, where the purple-black dorsal is again only possessed by the male; and the Checker barb (*Puntius oligolepis*) where the male has the black leading edge to an orange dorsal.

Other barbs look alike when young, but sexual differences as they mature. The Filament barb (*Puntius filamentosus*) starts life looking not unlike a washed-out tiger barb, but later the bars fade to a single blackish mark on the wrist of the tail. At this time, the male develops elongated dorsal rays. This is also true of the Arulius barb (*Puntius arulius*).

Some barbs, however, can be sexed only by watching their behaviour towards one another, or by the more rounded appearance of the female as she fills with spawn prior to breeding. The Spanner barb is a good example.

All this is worth bearing in mind if your space is limited and you wish to restrict yourself to one or two pairs of each barb variety. And here I would bring in a bit of personal prejudice against a popular fish—the Golden barb. Not the dwarf barb *Puntius gelius*, from India, but the variety

also known as Schubert's barb. They look attractive enough as youngsters, but as they grow they become portly and antisocial. They come closest to any of the barbs in having a territory, usually a corner of the tank which they monopolise. Still, you learn by your mistakes.

Most barbs are readily spawned, but this cannot be done in a community tank. For one thing, the fish seem reluctant to perform unless they are segregated from other species. Give them half a chance and they will devour the eggs as soon as they are laid.

Whereas barbs can be kept in fine health in hard water, they really prefer it soft for spawning. If you mix two-thirds old rainwater with a third straight from the tap, this will simulate natural conditions—which to a barb means a fast-flowing stream with plenty of dissolved oxygen.

The water should be a few degrees higher than normal for spawning, around 80°F being right, and should fill the breeding aquarium to a depth of about six inches. Barbs all conform to the pattern of laying adhesive eggs which stick to underwater plants, so plenty of cover should be provided. This has the dual effect of stimulating the female to lay eggs as she is pursued through the thickets by the male, and affording some protection to the spawn from the hungry attentions of the parent fish.

One can use natural plant, like Ludwigia or Gabomba, or use an artificial medium like coconut fibres, or nylon wool. Very good, if you can get hold of it is Spanish Moss in the dried form. In the wild, this plant adorns trees and telegraph poles in thick, hanging curtains. The tough, inner fibres have been used to stuff furniture and will withstand the boiling necessary to ensure sterile conditions in the breeding tank.

Your barbs should be segregated until they show signs of coming into spawn, a process that will be speeded if you give them a varied diet that includes live food.

Because the males are such vigorous drivers, it is better to put two or three females into the breeding tank with one male. If they are introduced in the evening and allowed to settle without disturbance they should begin courtship within a day or two. The male will chase his chosen mate round and round the tank, nose to flank, nudging her all the while. She will dart into the cover of the spawning medium and release the eggs in small batches, which are immediately fertilised by the male.

Depending on the species, eggs can number up to 2,000. They are relatively large, and amber coloured.

If you spawn barbs in a simple, planted tank you will lose a large proportion of the eggs through cannibalism. By using a breeding trap, losses are considerably reduced. Basically, the trap fits inside the tank and has a perforated base so that the eggs falling from the spawning medium pass through to safety. As soon as you think spawning is complete, the parent fish can be removed.

The eggs hatch within a couple of days and the first fry will be seen as minute, thread-like creatures hanging on the side of the glass. At this stage, they can be fed one of the proprietary brands of egg-laying fry food. This is preferred to infusoria, cultured from lettuce leaves or similar, with its accompanying danger of polluting the water.

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**Corydoras species**—this is the Catfish most known to the average aquarist. It is a fascinating fish with a history of something like 30 million years!



The world of Catfish keeping is really wide because they are so hardy. As a complete contrast here is an Asian Cat' of the *Myxus* species.

# Keeping Catfish

A new series by David Sands



**CORYDORAS** are one of the smallest members of one of the largest groups of fishes existing in freshwater—Catfish. They are a part of the "armoured" Callichthyidae family which have a distribution in the river systems of South America.

Perhaps the best known river is the Amazon, which begins its course thousands of feet up in the Peruvian Andes, a mere hundred miles from the Pacific Ocean, and finishes, powered by its tributaries spilling into the Atlantic Ocean. Taking all the rivers into account they provide two thirds of all the earth's freshwater.

Not surprisingly these massive river systems—"nature's waterworks"—support some of the most adapted and diverse examples in the Catfish group. These include the Loricaria (Whiplails), Hypostomus etc, the Naked Cats, Pimelodidae and of course the Armoured Catfish.

*Corydoras* and relatives *Brochis* spp., *Callichthys* *hoplosternum* and *Dianema* are described as armoured because they possess bony scutes in place of the usual fish scales.

These scutes or plates occur in two rows across the flanks of the fish. They all have the mouth barbels (whiskers) almost an emblem of the Catfish group, usually two pairs. Some species are known to have a third "lip" pair.



*Corydoras amblicus*—this is very variable in markings but it always has the shoulder spot.

The barbels succeed over the small eyes as sensory aids for taking their native creeks/invertebrates; sifting through debris (in the aquarium through gravel) for food particles.

A great many ichthyologists have been involved in the study of *Corydoras*, the instigator was Bloch who described *Corydoras punctatus* in 1794. European ichthyologists, Steindachner (who described to science *C. elegans* 1877, *C. Juhr* 1906, *C. multimaculatus* 1907) and Regan (who described *C. melanistius melanistius* 1912, *C. undulatus* 1912, *C. melanosternus* 1912) became most involved with these catfish well before *Corydoras* reached the hobbyist and enjoyed today's popularity.

An American, W. A. Gosline reviewed all existing work on *Corydoras* at a time when Europe was deep in war (1940), this revision summarised written work rather than a re-examination of all the type specimens (a preserved specimen on which the original description was based).

His work suggested 34 species described (including 3 species he described) were valid and claimed a further 18 species were simply duplications of previous descriptions (Synonyms) given a new name.

This total contained one fossil species which he did not refer to by name *C. jewelatus* (Cockerell 1925). The problems of wartime limited Gosline's work but the published paper remains a base for all ichthyologists to follow.



This attractive specimen is *Corydoras arcuatus*.

The activity of the 'turn of the century' and Gosline's work led many other ichthyologists into involvement with new species.

At the British Museum (Natural History) Frazer Brunker, Weitzman in America and more recently Nijssen in Amsterdam who has described over 30% of all accepted valid species known today (as sole author) with Weitzman or his fellow Dutchman, Isbrucker

DAVID SANDS is one of the leading Catfish keepers in Britain. Until recently he was secretary of the Catfish Association of Great Britain.

Now he is planning to move from London where he was financial director of a company back to his native North West to start an aquarist shop.

David is married with a small daughter. He has just returned from a collecting trip to Brazil where he spent three weeks searching for Catfish of all descriptions.

David begins a series on keeping Catfish this month with a look at the favourite *Corydoras* species.

as co authors.

Dr H. Nijssen and Mr J. H. Isbrucker have worked on a revision of the *Corydoras* genus for the last 14 years and the first part of this scientific review has now been published.

This paper, a foretaste of the complete work lists all the *Corydoras* species described to science—beginning with *Corydoras punctatus* (Bloch 1794) and ending with the most recent *Corydoras ornatus* (Nijssen & Isbrucker 1976).

Many well known *Corydoras* names are now found to be synonyms (because the specimens thought to be new had already been described—following the rules of zoological nomenclature the first author is credited).

*Corydoras microps* Eigenmann & Kennedy 1900 was in fact a specimen of *Corydoras aeneus* Gill 1858—*Corydoras myersi* Miranda Ribeiro 1942 was *Corydoras rabaulti* La Monte 1941 (wartime!) and *Corydoras melanistius melanistius* Hoedeman 1952 was *Corydoras amblicus* Cope 1872. These represent a few from the list only discovered by comparing the actual specimens and descriptions.

The fish known by these names in current aquarium publications had been incorrectly identified in the past—the specimens called *Corydoras microps* were really *Corydoras undulatus* Regan 1912.

As a result of the publication of this paper we now know 95 valid species and subspecies of *Corydoras* exist which confirms how large the genus has become to science. This list includes the fossil holotype (a holotype is the original specimen on which the description is based) *Corydoras revillei* (Cockerell 1925) discovered by him whilst he collected for fossil insects in Argentina (Cockerell deposited all his collection at the British Museum (NH)).

From the surrounding rock beds, Cockerell dated the fossil to late Tertiary which suggests this particular species swam South American waters between 20 or 30 million years ago!

He compared this specimen fossil with various known species of *Corydoras* of that



# Keeping Catfish

time, including *Corydoras paleatus* (Jenyns 1842) as discovered by Charles Darwin on the voyage of the *Beagle*—but as with other comparisons he could not match them with his new find; so *Corydoras revelatus* stands as a valid species and probably always will because examination is limited when dealing with an imprinted fossil!

Nijssen and Isbrucker's revision of the genus *Corydoras* has required a great deal of painstaking work, comparing type specimens deposited in various museums throughout the world.

Dr Nijssen travelled to the major European and American museums examining collections of preserved *Corydoras* for comparisons and waited, sometimes year long, for specimens to be received from South American museums to complete the research.

The main problems of the revision had been created because many species had been described from a single specimen or even from aquarium specimens without locality information.

It is now known species can vary with populations so exact locality information is of great importance. Well known *Corydoras* such as *C. paleatus* Jenyns 1842, *C. leopardus* Myers 1935 and *C. arcuatus* Elin 1939 come under this heading.

Some type specimens had been lost forever. *Corydoras barbatus* Quoy and Gaimard 1824 and *Corydoras reticulatus* Frazer Brynner 1936 share this fate.

In addition to all these problems Nijssen and Isbrucker are still receiving new species on a regular basis—but the revision should solve many old problems and will probably follow Dr Nijssens' previous revision. The Surinam representatives of *Corydoras* were



*Corydoras reticulatus*—this caused problems of identification with colour patterns that can show great variation.

published (following his research work in South America) in 1970.

In that paper the doctor grouped several "linked" species together and created about eight main groups.

Apart from all this scientific activity, *Corydoras* prove more popular each year to aquarists, few community aquariums do not have at least one species, "sifting" gravel.

Purchased as scavengers, a title which suggests they do not require feeding, which is untrue, these Catfish are peaceful towards

all tank companions. They show exceptional hardiness and seem to resist many of the ills which attack upper water fish such as Rasboras or Tetras.

*Corydoras* are shoaling fish and as such should be kept in groups—the same species, if that is possible, but this is not a requirement, for many species will shoal together.

Keeping the same species together is a must for any breeding scheme—the best ratio of male and female is 2-1. They feed well on finely chopped earthworms or tubifex and daphnia which they rake up in their barbels—tablet food can be useful for a basic diet (on the lines of the new Aquarian tablets).

The aquarium should have a substrate of rounded gravel (sharp splinters of stone can wear down those sensitive barbels) planted well with shady Cryptocorynes. Feeding is best done in the evening at "lights out" because although *Corydoras* are not entirely nocturnal, they feed in the half light.

*Corydoras* are exported from Brazil (almost 50% of the total valid species are from Brazil, not surprising when its three million square miles are considered), Peru and Columbia.

Other Countries export them, such as Surinam, Guyana, Ecuador, Venezuela and Paraguay to the United States and Europe—millions every month.

Singapore fish farms have been brooding the "Bronze" and "Peppered" *Corydoras* for years—these are exported in thousands as well. The Albino is from Singapore—it would not survive from predators in the wild.

The next moment you find to check a tank of *Corydoras* in the local tropical fish shop—look again and perhaps open up a new world or re-awaken a very old one.



This is the first *Corydoras* to be described to science—*Corydoras punctatus*.



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Join David Shields for the next few months in his new series we have called *Perfect Planting*.

It is the ideal way to describe David's articles, for he is a plant perfectionist and his expert advice can help you to display plants and fish to their best.

Each month David will show you how he matches up various species of fish to the plants available and makes both look beautiful.

David is well qualified for this task. He is a leading show winner in furnished aquaria sections and his selection of plants grown at his Halifax, Yorks, home is tremendous.

David (38) is a sales manager and he is a leading member of Halifax A.S. He has been a fishkeeper for more than 20 years.

# Planting with the experts

Follow the show rules to make your tank even better says David Shields

TRADITIONALLY the British Aquarists' Festival at Manchester is the country's leading event for furnished aquaria. It is certainly the show I most want to win at.

The 1979 Festival last month was really pleasing for me as both the Halifax A.S. and myself were among the prizes (full story Page 56—Editor).

This show is the highlight of my plant growing year. And for people like me who are totally captivated by the challenge and competition of the furnished tank classes it is just great.

But I think that there is a lot in the furnished tank section for the aquarist who isn't the slightest bit interested in competition or showing.

Most fishkeepers—from the complete beginner to the really experienced man—are keen on having a showpiece tank.

In my experience most want a good looking display tank in their house which shows off their fish and makes an attractive addition to the room.

If you follow the sort of principles that govern the furnished tank show men you can

get plenty of ideas and methods to make your own display tank look even better.

Obviously when I design a show tank I bear in mind the rules and techniques which I know will get me points.

If you are designing your own tank it is more important to please yourself rather than judges.

Even so, you can still follow my show methods to create your own top tank.

A tank at the festival illustrates this point exactly.

One of the best looking entries was a tank of Harlequins by the Northwich Society. It had a beautiful piece of driftwood hollowed out. The main plants were Java Fern and Java Moss.

It probably relied too much on these two plants to get highly pointed. But it was very pleasing to the eye, very pleasing indeed.

The fish were magnificent and the whole tank was nicely proportioned and well designed. That shows that a tank doesn't need to be a winner to be good—every fishkeeper can produce a good looking aquarium.



## Perfect Planting

*Left: The Hallex AS winning society tropical tank complete with Cardinals from my lounge tank.*

Mind you, there's nothing wrong with showing your designs. It is easy to enter furnished aquaria and good fun too. The Federation of Northern Aquarist Societies publish a booklet called Judging Methods and Show Rules. That will tell you all you need to know.

I will run through briefly the points we have to bear in mind to prepare furnished aquaria. You will see how much these will help you to plant your own tank.

First of all there's the fish. They should be in good condition, they should be the right size for the tank and layout and they should not be overcrowded. In addition the fish should be suitable for the rockwork and plants you use.

I think that makes sense whatever type of tank you are planning.

The plants should be of a colour and texture to blend with the fish and rocks. You shouldn't overstock with plants or with too many varieties—something I have stressed before.

The plants shouldn't be oversized for the tank, but in proportion. And they should be the correct varieties, that is tropical plants in tropical set-ups not in coldwater tanks.

On to design technique now. The layout should show good general grouping of plants.

The overall effect should be a harmonious picture and above all the fish should be visible. This can be a problem. That's why I use fish that have been in my lounge tank. They are used to people and when the judges approach they will be at the front thinking it is feeding time!

Fish which have been kept in a fish house with people about only two or three times daily will be in hiding in the plants.

Originality is another important attribute the judges look for. Like in most things everything has been done before but everyone has their own ideas and that's where originality comes in.

I saw one furnished tank some years back without a single plant. It just had rockwork, Blind Cave Fish and skulls and bones arranged on the gravel. It didn't win but it got a place and looked terrific.

The tank should look permanent so that



the plants are capable of surviving and growing so the tank will keep its appearance.

The water should be crystal clear. A lot of points rest on this. Going back to that Norwich tank I mentioned earlier. In this the water seemed to sparkle. It really made that layout something special and crystal clear water will make your tank the same.

The gravel and rocks should tone in with the colour and texture of the plants to create a natural look.

With my coldwater tank I managed to use some shale from the same material as the rockwork.

This gives the impression that it has naturally come from the rocks when you sprinkle it on the gravel.

Lastly you need to tidy up all the loose ends. Make sure the planting looks natural around the stones, make sure no lead weights are showing etc.

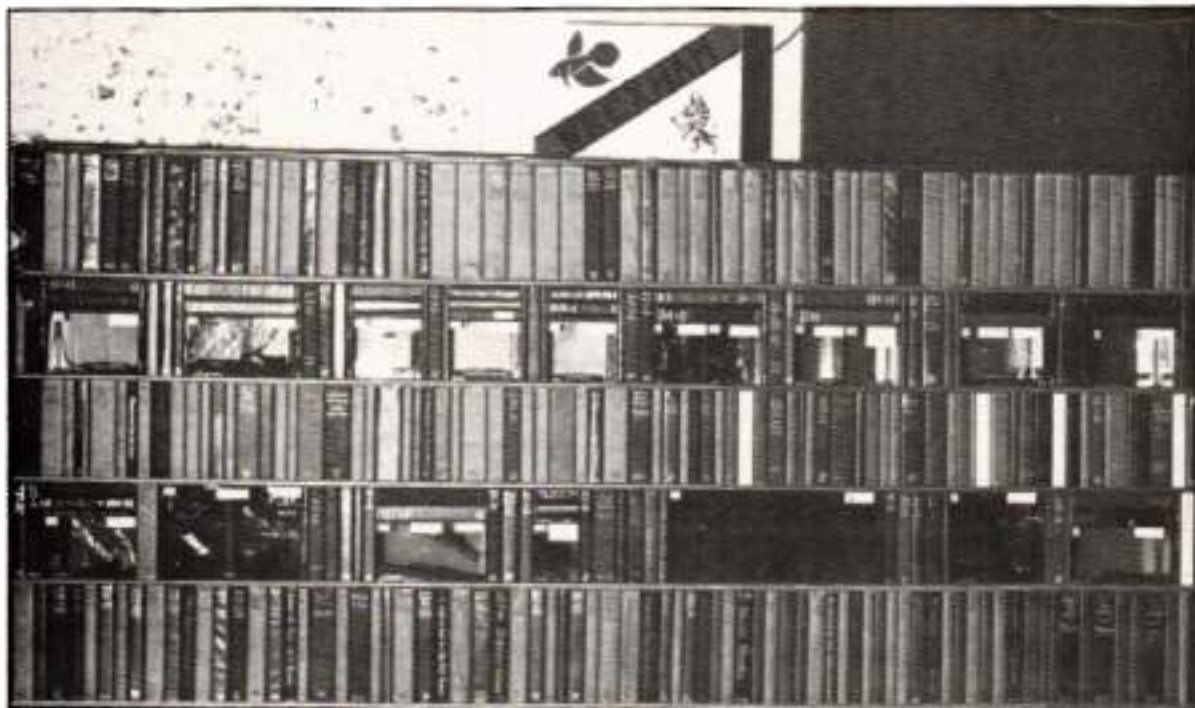
There is a lot of work involved if you do it properly. But it is quite easy to do and if you follow your own imagination, you will soon have a tank to be proud of.

*Top: Here is my successful coldwater tank. All the plants came from my garden pond. The Creeping Jenny in the front right hand corner looked really good.*

*Above: My individual winning tropical tank complete with shoal of Serpae Tetras. The small Cryptocorynes on the left were the finishing touch.*

*Another superb looking tank which came third in the tropical section. That big plant in the middle probably cost a few points because of its size.*





Wrexham AS's Manchester tableaux winner—a nicely finished exhibit well worthy of the prize.

# AQUATIC SHOWPIECE

Norman Wright visits Fishkeeping's two biggest shows



The PRACTICAL FISHKEEPING stand at Doncaster. Shortly after the picture was taken we were taken over by readers—and we were delighted to see so many of them on the stand and at our Meet the Experts Forum.

FISHKEEPING'S two biggest shows of 1979 proved just what a varied, interesting and rewarding hobby British aquarists have.

For at the superbly organized and magnificently presented **Yorkshire Aquarists' Festival** at Doncaster and the **British Aquarists' Festival** at Manchester, all shades of the hobby were catered for.

And the thousands of people who visited the two big shows—both held in the past few weeks—looked delighted with what they saw.

**Yorkshire's** fifth festival at the beautiful exhibition hall in Doncaster Racecourse's main Grandstand was one of the best I have seen.

The tableaux entries for which the show is famous were excellent and judging proved a tight affair.

In the end a really original entry of a One-Armed Bandit Arcade by the **Bridlington Society** won the trophy which is surely the most prized for any tableau entry.

Bridlington spent many weeks on construction—two members having to commute back from Scotland during building—their attention to detail and finishing was perfect.

Two new societies were at the show: **Wolverhampton**, who also took their tableau to the Manchester event, and **Dumfries** who travelled hundreds of miles from Scotland with their entry and took fourth place.

Trade stands were the other main attractions—with some well presented shows and some special offers on fish and equipment.

PRACTICAL FISHKEEPING



*Champion of Champions—this Discichodus sexfasciatus won the coveted title for its owner Bob Atherton of Hartlepool at the Manchester event.*

On the PRACTICAL FISHKEEPING stand we were delighted to see so many readers and new readers taking advantage of our free fish offer.

Most of our Platies and Goldfish were given away over the weekend.

Our Meet The Experts Forum was also a big success with aquarists having their aquatic problems solved and seeing a slide show by Dr David Ford of Aquarlan and a planting demonstration by David Shields.

The trout on the PRACTICAL FISHKEEPING stand was also very popular. He was provided by the Anglian Water Authority and visitors to the stand tried to guess his weight. The final weight was 2 lb 10 1/2 oz and two lucky winners spent £25 on the Keith Baraclough stand at the show.

David Shields was much in evidence at the British Aquarists' Festival at Belle Vue Manchester a couple of weeks later... he and his Halifax AS club swept the board in the furnished aquaria section.

If Yorkshire is famed for its tableaux, then Manchester is the top furnished tank showpiece.

David won both the tropical and coldwater individual sections and Halifax won both society categories.

It is one of the first times that all four top awards have gone to one society.

Wreatham were tableau champions with another original idea—a bookcase. Each book had a corny fishkeeping title which must have taken longer to think up than working on building the stand!

Congratulations must go to the organisers of both events and all the prizewinners. The work that went into running the shows and entering fish and tableau was tremendous.

Now let's take a look at the shows in pictures...



*Victorious members of the Bridlington AS in front of their tableau winner at Doncaster. They are (left to right) John Mellors (15), David Hulme, Sylvia Hulme, Pete Robson and Alan Scott. Weeks of work went into the championship.*



*The Original Water Bed, this tableau won fourth place from Dumfries AS who completed a 600 mile round trip to enter the Doncaster event for the first time.*

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## SEPTEMBER

**Thursday, September 26:** Kent Area Group C.A.G.S. 1st Annual General Meeting, at Galle Hall, St Philips Church, Waterloo Street, Maidstone. Details from J. G. Best, 1 Highfield Cottages, Lower Hatfield, Canterbury. (S.A.S. please.)

**Sunday, September 22:** Tonbridge and District AG Open Show at Haddon Village Hall, Willemsheld, Haddon, Tonbridge, Kent. Details from Mrs B. Pritchard, 6 Albert Road, Tonbridge.

**Sunday, September 28:** Reaxley Heath & District Aquarist Society 1st Open Show at T.A.V.R. Centre, Welling Street, Reaxley Heath, Kent. Details and schedule from Norman Haven, 38 Mount Pleasant Road, Lewisham, London, SE13 6RD. Tel: 01-693-8954. This notice replaces the T.A.V.R. Centre.

**Sunday, September 28:** Bexleyhead & District Aquarist Society 1st Open Show at The Croyford School, Iron Mill Lane, Croyford, Kent. Details and schedule from Mr N. Haven, 38 Mount Pleasant Road, Lewisham, London, SE13 6RD. Tel: 01-693-8954. This notice replaces the T.A.V.R. Centre.

**Sunday, September 20:** Bishop Auckland Aquarist Society Annual Open Show, King James 1st Community Centre, Details, Mr Gough, 49 Clyde Terrace, Spennymoor. Tel: 0282 81538.

**Sunday, September 28:** Greater & District Aquarist Society 1st Annual Open Show, Paines of the World in the Town Hall, Colston Commensing at 2 p.m. (Reserving 12 noon): a display of freshwater, tropical and goldfish fish. Everyone welcome. Admission 10p.

## OCTOBER

**Sunday, October 2:** Walsingham Aquarist Society Open Show at Oakley Community Centre, Renshing between 12 noon and 2 p.m. Details from Mr L. Crook, Tel: Walsingham 03363.

**Sunday, October 14:** South Leeds Aquarist Society Annual Open Show at Harwell Boys Club, Mill Road, Leeds 10. Running 12 to 2 p.m. 26 classes, annual trophies for section winners. Trophies for all class winners. Schedules from Show Secretary, Mr A. Ashwick, 551 Thrusfield Road, Middleton, Leeds LS10 4HT.

**Saturday, October 26:** Ipswich Health Society National Open Show at St Pauls Church Hall, Woodford Bridge, Essex. 7 classes including a sales class. Trophies and plaques will be awarded in every class except the sales class. There will be entry for the new challenge shield. This is a specialist show for freshwater goldfish only. Details and schedule from Mr G. Lewis, 91 Bourne Avenue, Mayes, Middlesex. Tel: 01-873-1770.

**Friday 19 October - Sunday 27 October:** Scottish Aquarium Society's 25th Annual Open Show at McLellan Galleries, Southside St, Glasgow. Details from Show Secretary, Mr W. Hamilton, 12 Darn Street, Paisley, PA1 1NY.

**Sunday, October 7:** Newcastle Guppy & Livebearer Society and the Tyne/Wear section of the Fancy Guppy Association are holding a joint International All Livebearer Open Show at St Gabriel's Church Hall, Chillingham Road, Heaton, Newcastle upon Tyne. Details from Mrs J. Henton, Halfbrook House, 140 Chillingham Road, Heaton, Newcastle upon Tyne, NE8 5BY.

**Saturday, October 26:** Ipswich Health Society National Open Show at St Pauls Church Hall, Woodford Bridge, Essex. 7 classes including a sales class. Trophies and plaques will be awarded in every class for the new challenge shield. This is a specialist show for freshwater goldfish only. Details and schedule from Mr G. Lewis, 91 Bourne Avenue, Mayes, Middlesex. Tel: 01-873-1770.

**Sunday, October 14:** South Park Aquatic (Multi) Society Inter-Club Show for Coldwater Fish at "Drake House" St. Georges Road, Wilmston, 95W, Leighton and schedule from L. S. Crook, 10 Overhill Way, Beckenham, Kent. Tel: 01-693-6954. This Society will also be holding an Open Show for plants, tropical and goldfish fish on the same day and same venue.

**Sunday, October 21:** Doncaster Aquarist Society 9th Open Show at the Don Valley High School, Jersey Lane, Scawthorpe, Nr. Doncaster. Running 12 noon to 2 p.m. Judging 2.15 pm onwards. Details Mr R. Lamberton, 20 Gynas Gardens, Doncaster. Tel: Doncaster 57823.

**Sunday, October 21:** British Kiffak Association AGM at Moor Hall Hotel, Pines Oaks, Sutton Coldfield. Members only plus facilities to join for non-members.

# Holiday offer

WITHOUT doubt, the fabulous Eilat Coral World on Israel's Red Sea coast offers a unique chance to see exotic marine fish in their natural environment.

For the observatory at the Coral World Aquarium is one of the few in the world which is built beneath water level next to a coral reef!

Visitors are put in the position of a skin diver. From the viewing panels of the observatory you can see Red Sea fish living among the corals.

Now readers of PRACTICAL FISHKEEPING have a special opportunity of seeing this magnificent world of marine colour for themselves. We are planning a PRACTICAL FISHKEEPING holiday to Eilat in January for readers of the magazine.

And it promises to be the trip of a lifetime.

As well as the incredible underwater observatory, the Coral World offers a beautiful selection of marine aquaria — unquestionably a fishkeepers paradise.

Our party will be able to look around the exhibits at their leisure and we have a special host for the trip who will act as guide so that you can be sure not to miss any of Coral World's attractions.

The guide will be John Mitchell. John has visited Eilat many times. And after his last

visit he returned with a superb picture feature which appeared in PRACTICAL FISHKEEPING'S February issue.

John is a press photographer from South London. He has been a fishkeeper for many years and is an ideal guide at Eilat.

As well as the Aquarium there are plenty of other attractions at this seaside resort.

There's the sun, the beach and the sea for starters. Eilat is a popular resort and offers all the usual seaside facilities.

And there are plenty of excursions and trips you can fix up after you arrive.

The holiday starts at Gatwick Airport on January 24 1980. And for a week long trip the price is £270 per person in a twin room. If you require a single room the cost is £298 per person.

And in case you would like to make this into a fortnight's holiday, we are able to offer an extra week's stay in the hotel for £122, twin rooms, or £150 single.

We shall be staying at the Hotel Laromna and breakfast and dinner is included in the cost. Entrance to Coral World is also included.

To secure a place on this fabulous holiday for yourself or the whole family, nothing could be simpler. Just fill in the booking form on this page and send it to the address given.

### Booking Form

TO: Practical Fishkeeping Holiday - Abbeigate Travel Limited, Apex House, Dundie Road, Peterborough, PE2 9NN;

Please reserve ..... places on Practical Fishkeeping Holiday to Eilat departing on the 24th January, 1980. We require ..... twin rooms ..... single rooms for 1/2 weeks. \*

NAMES: .....

ADDRESS: .....

\* Delete whichever duration is inappropriate.

If we enclose our cheque/PO for ..... being deposit of £25.00 per person, plus insurance premium (if required) of £7.20 (£5.80 for 2 weeks duration) and accept the normal booking conditions of Abbeigate Travel. \* / Red Sea Holidays. Cheques to be made payable to Abbeigate Travel Limited.

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68

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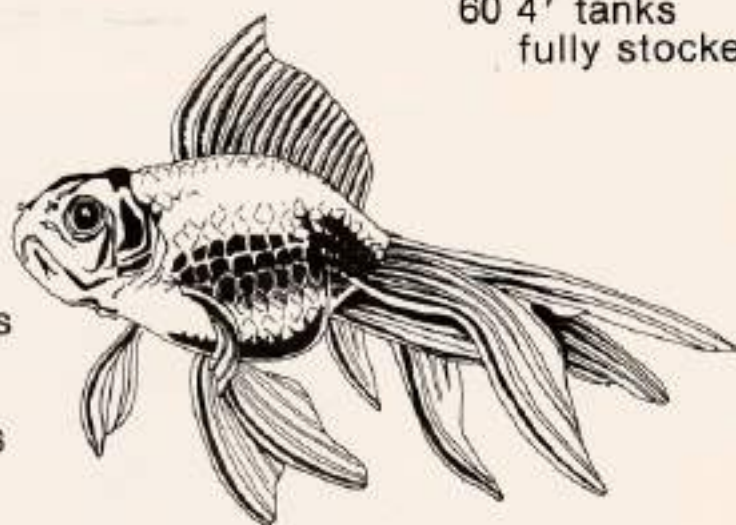
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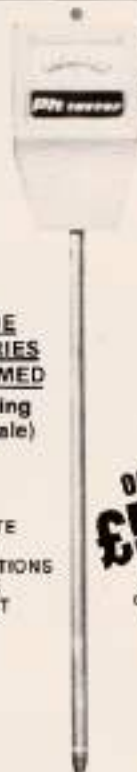
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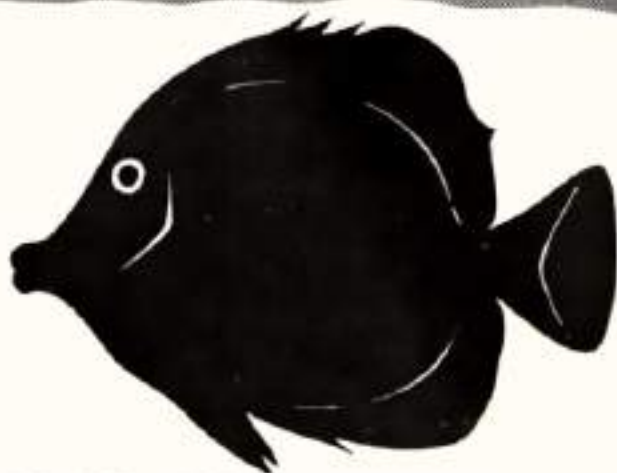
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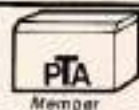
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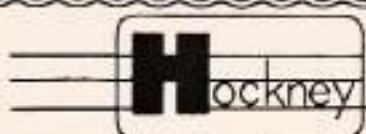
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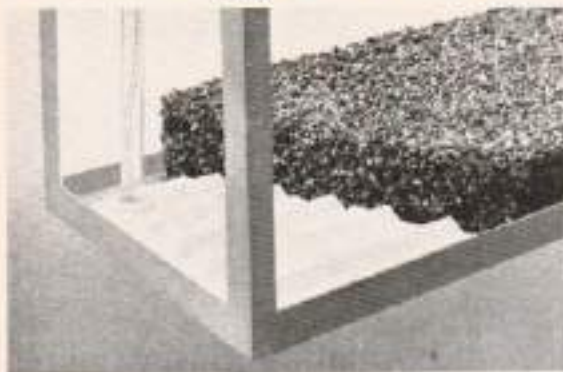
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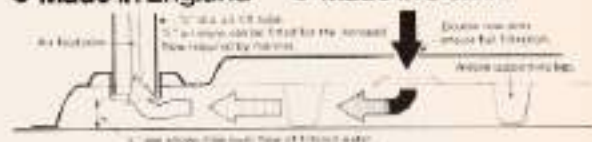


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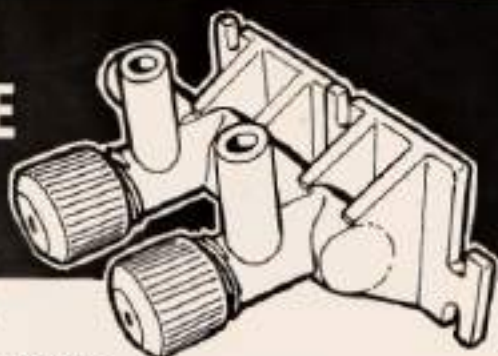
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We could opt for an easier life by sticking to the more popular ranges, but then we wouldn't be able to give the kind of service our customers have come to know and appreciate.

We also pride ourselves on knowing our suppliers and their products perhaps better than they know themselves. We evaluate everything we carry and can tell you without fear or favour what any product will do, how good we think it is, and how it should be used.

What's more, we have a weekly van service covering most of Southern England, which means that most orders you need can be in your shop in a matter of days from your order.

That's service! If you aren't getting it from your present suppliers just give us a ring . . .



## NORWOOD AQUARIUM LIMITED

Weldon House, Junction Road,  
South Croydon, Surrey.  
Tel: 01-880 3435/3747

**TRADE ENQUIRIES INVITED**



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