

SEPTEMBER 1979 50p

Practical fishkeeping

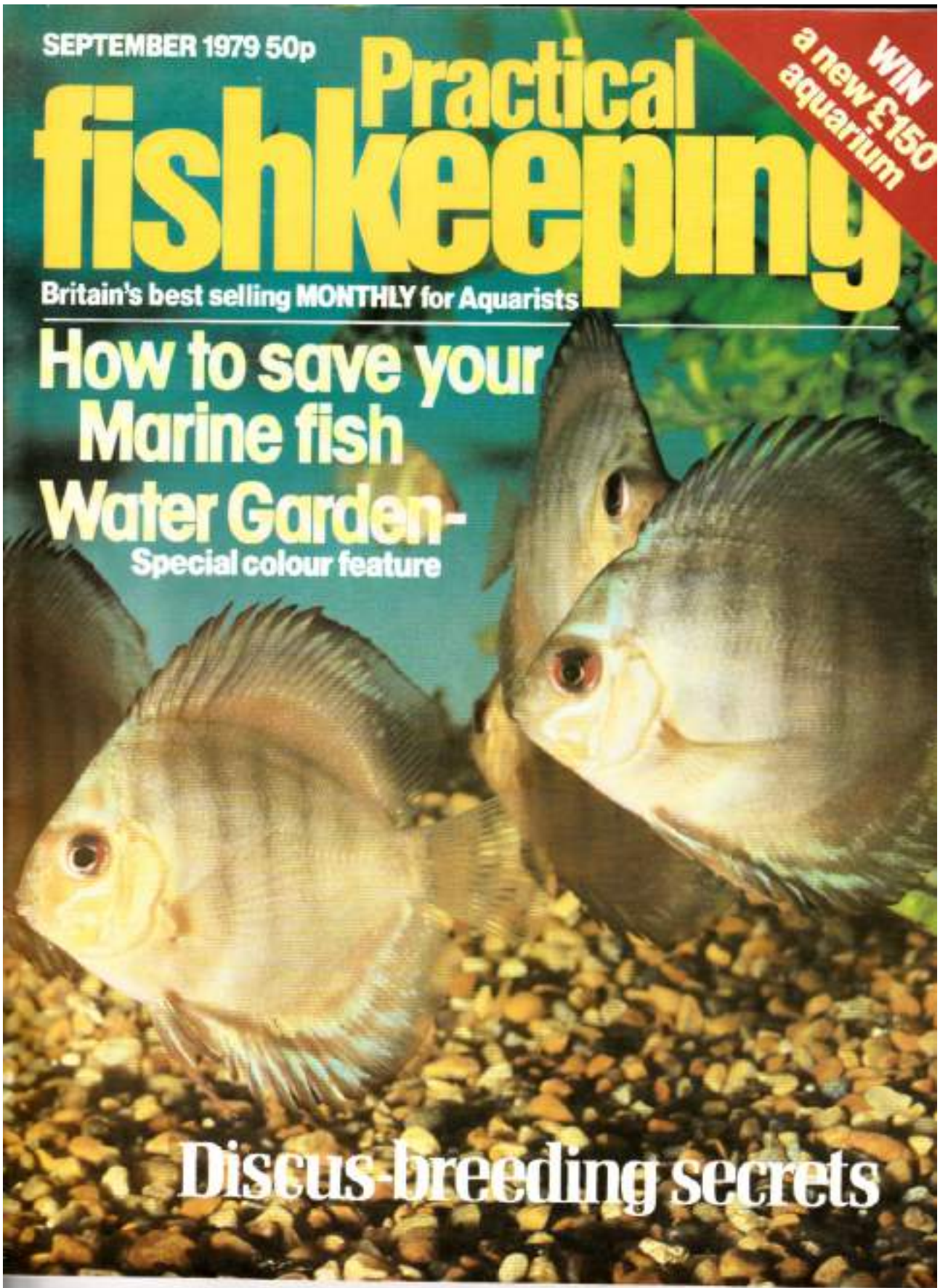
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Practical fishkeeping

Next month's issue
out on October 1

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Cool Plants

Plant expert David Shields designs a beautiful coldwater tank and explains how you can display your coldwater fish at their best.



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The Discus a beautiful Cichlid
which Nick Fletcher tells you how
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Picture by
Heather Angel.

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Aquatic News

Show reports, club reports and a round-up of fishkeeping news.

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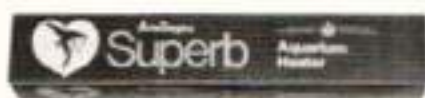
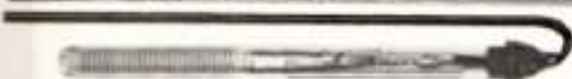
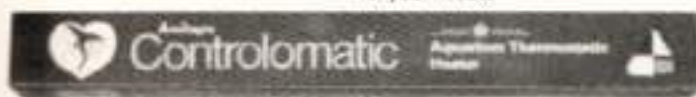
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12	75W	100W	150W
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20	100W	150W	200W

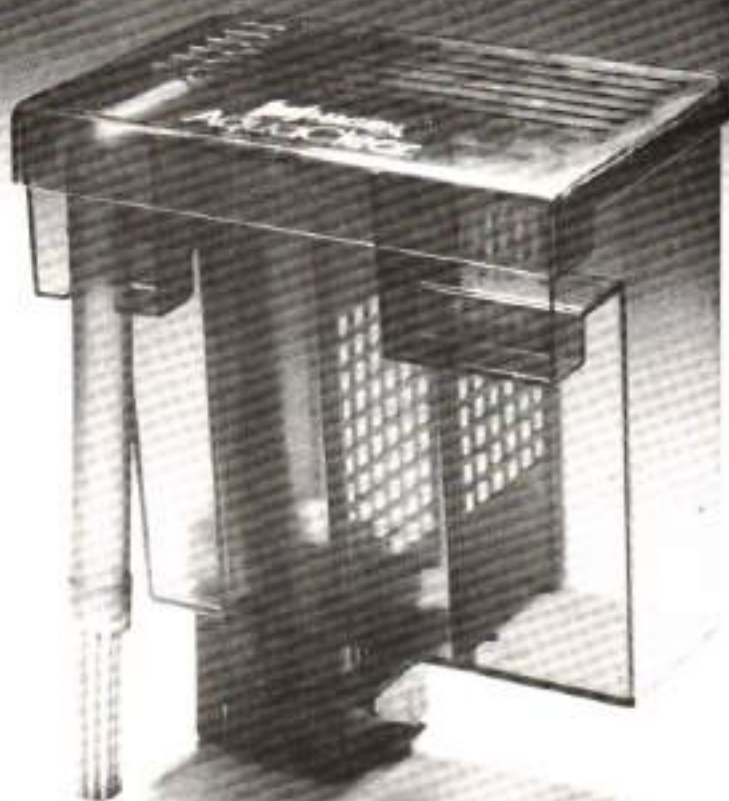
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<i>Jussiaea nitens</i>	50p
<i>Micranthemum ordii</i>	10p
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Please note, due to the fact that stocks of these rare aquatics are strictly limited, it would be advisable to telephone before ordering to confirm the actual stock position.

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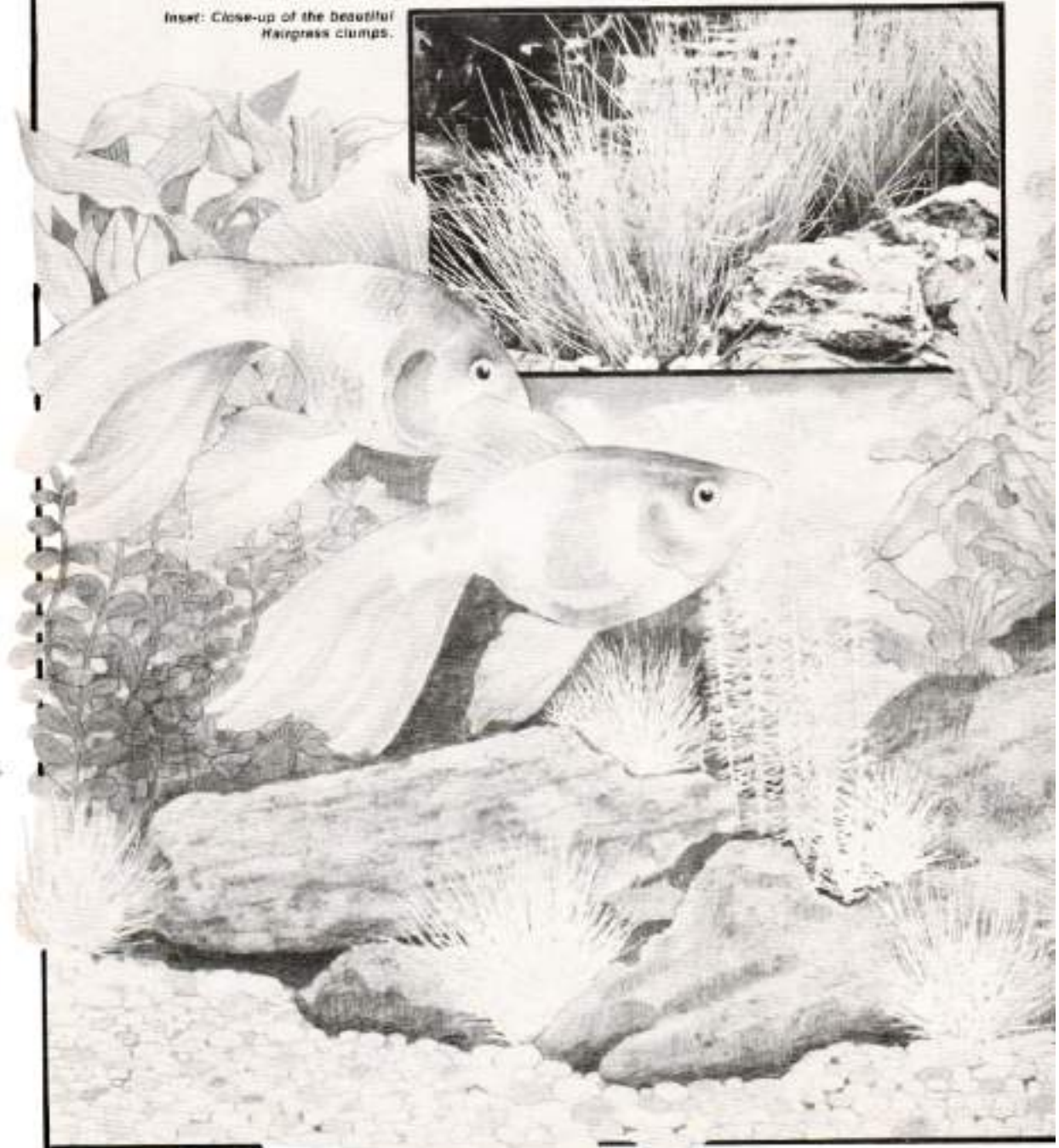
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Cool plants

David Shields designs a coldwater tank for fancy goldfish

Inset: Close-up of the beautiful Hairgrass clumps.





Perfect Planting

THIS is the perfect time of the year for coldwater plants—so I intend to carry on where I left off last month designing a tank for coldwater fish.

If you saw the last article you will probably remember that my tank was to display the native British river species.

This design is really for fancy goldfish. It is more complicated and allows more room for say a small shoal of young fantails.

I think it is wise to keep just young coldwater fish in this sort of aquarium. They can get far too large when they mature.

So the fish then, should be small fancy varieties which will look really good against the backdrop of coldwater plants.

Although this is a more advanced design than last month I have still used a lot of plant species you can gather from the garden, pond or local canal. So it is still an inexpensive tank to furnish.

The gravel is medium grade aquarium gravel with a dash of dark red sand to blend with the rockwork.

Incidentally, the rocks came from another of my holidays abroad. This time from Malta. I never leave the country without a sack and a geologist's rock hammer!

I have tried to create height at the back and sides of the tank with the rockwork and add space by staggering smaller pieces towards the front.

Again I have used an outside filter on this aquarium and the lighting is two 60 Watt bulbs or strip lights for eight to ten hours a day.

As in last month's tank I have used two free plants—Creeping Jenny (*Lysimachia nummularia*) which can be found in many gardens and will grow nicely underwater, and Wavy Pondweed (*Potamogeton lucens*) which is in every canal in Britain.

The Pondweed can be green or brownish red the green is from shaded areas and the coloured leaves are from sunlit stretches. Use a blend of the two to enhance the colour effect.

But to this tank I have added another free plant—Mare's Tail (*Hippuris vulgaris*). This makes a beautiful addition to the aquatic plant list. It is most unusual with its straight, thin stalks.

This clump of specimens came from my garden, around the pond, in fact. But it does grow in other parts of the garden although it is basically a marsh plant.

My Mare's Tail grows around the pond and in places has grown up through the water.

The old faithful Hairgrass (*Eleocharis acicularis*) is another relatively cheap and easy to grow plant.

My planting line-up is completed by Hornwort (*Ceratophyllum demersum*) and a fairly rare plant Giant Potamogeton (*Potamogeton lucens*).

This rare variety I have kept growing for several years and I haven't seen it advertised recently. But I find it an excellent coldwater decoration—all the better for being unusual.

I have used this at the back left hand corner with the contrasting light green of the Creeping Jenny in front of it along the side glass.

Then comes the distinctive Mare's Tail in the centre at the back.

Moving to the right comes the Wavy Pondweed with the Hornwort in the back right hand corner.

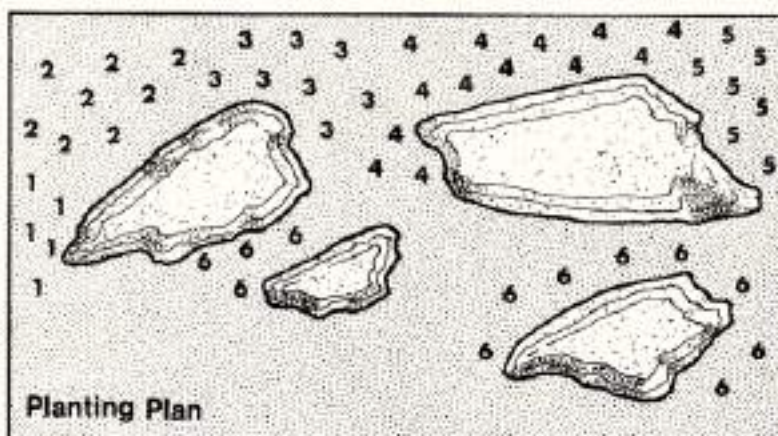
In the front right and along the front of the arrangement is the Hairgrass in clumps. The diagram will show you the exact line-up.

I think this combination provides a really rich backdrop for the beautiful golds and calico colours of fancy Goldfish.

Just to finish I will repeat my warning about plants you use from your pond, the garden or the canal.

Don't forget to sterilize them first to remove disease and pests. It is quite simple.

Fill a two gallon bucket with water, add a tablespoon of household salt and soak the plants for 20 to 30 minutes.



- 1 Creeping Jenny
- 2 Giant Potamogeton
- 3 Mare's Tail

- 4 Wavy Pondweed
- 5 Hornwort
- 6 Hairgrass



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

It is probably true to say that most people are initially attracted to fishkeeping by the brilliance of many of the popular species and varieties of aquarium fish.

There is certainly a great deal of enjoyment to be derived from merely watching a shoal of Neons or a collection of fancy Guppies, Mollys, Platies or Swordtails.

However, this initial burst of excitement can be relatively short-lived, being replaced by a deeper interest arising from the desire to keep and breed the more difficult species.

Once the aquarist adopts this approach, his whole degree of involvement shifts to a new, higher, and certainly more fulfilling level. As a natural progression, therefore, beauty is no longer interpreted in terms of the former criteria of colour or finnage, but rather in terms of new criteria associated with rarity or degree of difficulty.

At this stage of his development, the aquarist has moved from the "What-is-it?" phase to the "How-do-you-keep/breed-it?" phase. There is, however, a third, and even more exciting, phase awaiting the enquiring aquarist.

This is what I call the "Why?" phase. This approach to fishkeeping can best be illustrated by the following:— Instead of asking how one keeps and breeds a particular species, the question becomes:— "Why does a particular species behave, look and breed in a particular way?"

The answer is, almost invariably, that the observed behaviour, appearance or method of reproduction represents the solutions that particular species has evolved to a series of biological problems such as recognition of other members of its own species, attraction of suitable mates, repulsion of rivals (male or female), maximum breeding efficiency under existing conditions, etc., etc.

Consider for example, the problems facing all animals that reproduce sexually (as opposed to asexually or vegetatively as in many plants).

For a start, each individual is either one sex or the other. There is no question therefore, of an individual fertilizing its own eggs. Even in those rarer instances where both sexes can be found in a single individual (eg earthworms and leeches, fertilization usually requires an exchange of sperm between two mature adults.

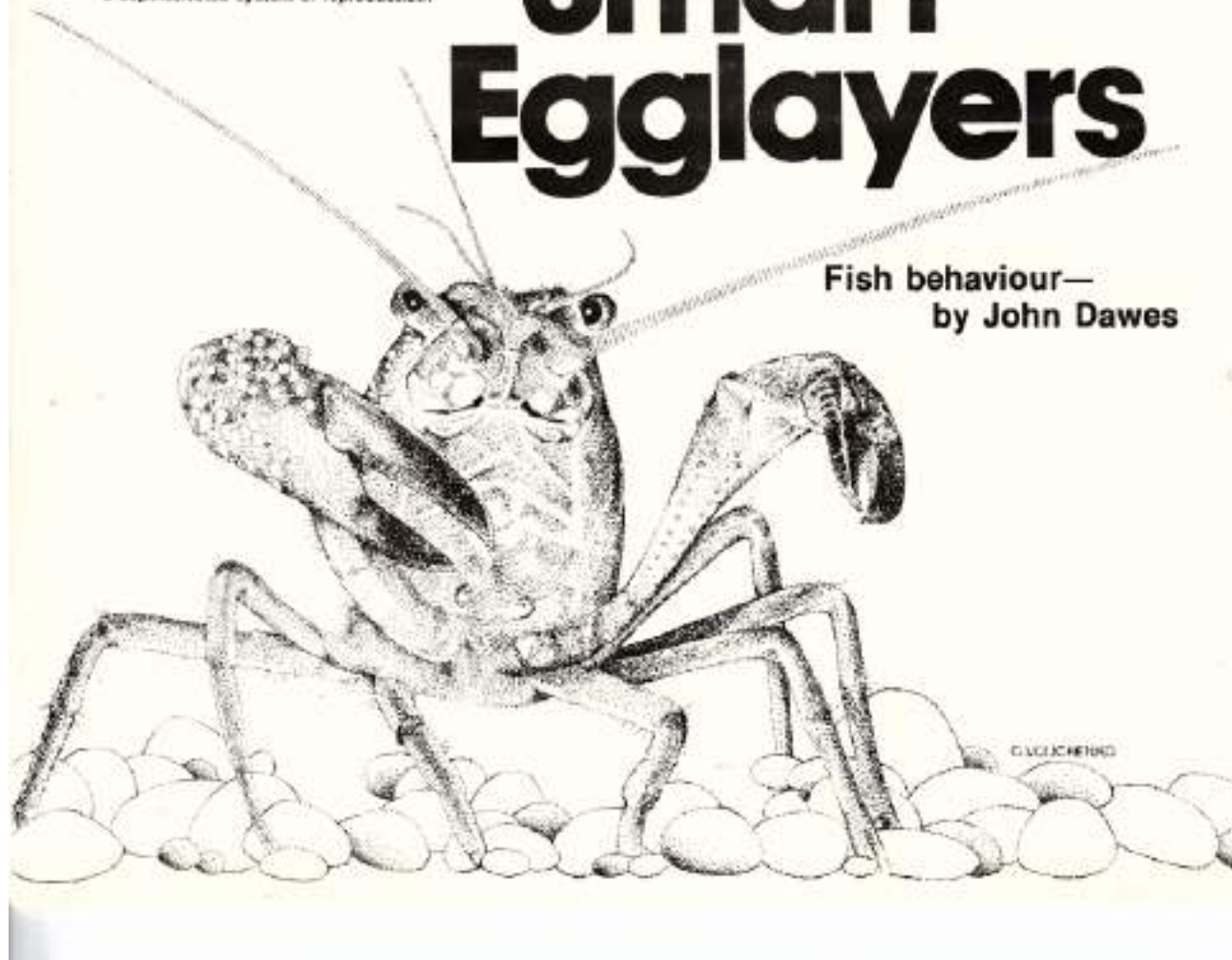
Most organisms, therefore, have to solve the problems posed by having separate sexes, such as:— what mechanisms, both behavioural and physical, need to be developed to ensure effective sperm transfer?

Remembering that the main purpose for reproducing at all is ensuring the survival of the species, effective sperm transfer must be followed by some answer to the problem of enhancing the chances of survival to adulthood of, at least, one offspring.

The Freshwater Crayfish—this has evolved a sophisticated system of reproduction.

Smart Egglayers

Fish behaviour—
by John Dawes



G. ULLACHER/IBID

The fact that such a bewildering variety of organisms exists to-day is living proof (literally) that these organisms have not only tackled the problems, but have in fact found more or less successful solutions to them.

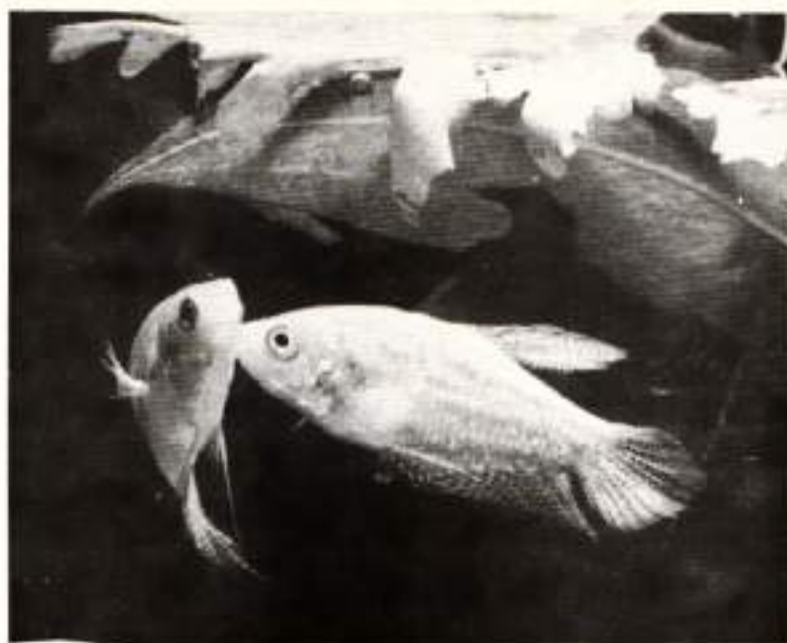
Land animals cannot exploit the possibilities available to aquatic organisms which can use the surrounding water as a transport medium for sperm and eggs.

Therefore, they are virtually restricted to methods of internal fertilization. Amphibians, however, are dependent, to a greater or lesser extent, on water for their survival and do exploit its advantages during mating.

One of the great advantages that water has over land is that it offers those animals living in it the possibility of external fertilization, something that is denied their land-living counterparts.

As a result, we find that internal and external fertilization methods have been exploited to the full by aquatic animals ranging from the external method employed by the jelly-like marine Sea Squirt to the internal one of the rather more "sophisticated" Crayfish.

Tropical fish are no exception and they have also developed their own solutions. Egg-layers have opted for external fertilization while livebearers have gone for internal fertilization. Some good examples of egg-layers which have evolved highly sophis-



Gouramis preparing to spawn and start off an incredible, clever and complicated egg-laying system.



Free swimming Gourami fry hiding beneath a leaf.



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 those stories. He starts with egg-layers and how they have evolved their many unusual methods of spawning.

PRACTICAL FISHKEEPING

ated approaches that are perfectly adapted to their environment are provided by that group of fish collectively known as "Gouramis" (mainly the genera *Trichogaster* and *Colisa*).

As is well known, Gouramis are often found in oxygen-deficient water. They therefore need to supplement the oxygen they take in through their gills from the surrounding water with atmospheric oxygen.

They have a very special organ, called the labyrinth organ, that allows them to do just that. This organ has evolved step by step, through time, from the first epibranchial bone which has been gradually modified into a number of folds.

The soft tissue that covers these folds receives a very rich blood supply which enables the fish to carry out gas exchange in a similar way to a human lung. The labyrinth organ, therefore, allows Gouramis to survive in conditions which many other fish would find intolerable.

Yet, Gouramis must not only survive under such conditions, they must also breed successfully in them. Their solution to this problem is both ingenious and logical.

Eggs and fry will not develop unless they have an ample supply of oxygen. The water in which Gouramis live is, clearly, totally unsuitable for this.

However, there is more than enough oxygen available just above the water surface. If some way could be found of bringing the eggs into contact with this

supply, then they would stand a much better chance of survival.

Allowing the eggs to float on the surface would certainly be one way round the problem. However, this has a number of serious disadvantages. For a start, the eggs would be spread far and wide, thus increasing the risk of loss or damage and making protection of eggs and fry an impossible task.

When such an approach is adopted (no parental care) huge numbers of eggs are produced—a quick examination of plaice, herring or cod roe will confirm this.

The Gourami male's solution is rather different. Air is taken in at the water surface and then blown out as small mucus-covered bubbles which float and stick together to form, in time, a raft onto which bits of vegetation are sometimes incorporated by some species.

Having built his nest, the male then attracts a female to it through a series of dazzling displays and spawns with her directly below the bubble.

Spawning can last several hours and takes the form of a series of embraces during which the male clasps the female in such a way that the genital openings of both fish come to lie very close together.

Towards the end of each embrace, eggs and sperm are released into the water. The close proximity of the fishes' genital openings virtually ensures fertilization.

An added "bonus" that Gouramis have evolved to maximise breeding success can be found in the composition of the eggs themselves.

Each contains a small oil droplet which makes them buoyant and will therefore cause them to float up into the bubble nest without the need to be picked up and put there.

In those labyrinth fishes where little or no oil is present, such as in the Siamese

Smart Egglayers

Fighting Fish. *Betta splendens*, a different pattern of behaviour has been evolved which consists of a systematic mid-water and bottom search for eggs by the male at the end of each spawning embrace.

After spawning, Gourami males will continue to tend the nest and, later, the fry till they become free-swimming. Post-spawning behaviour is particularly interesting because of a rather unusual characteristic which is typical of Gourami males (especially *Colea* males) but which is hardly ever mentioned.

This behaviour consists of what, for want of a better term, could be called "opercular aeration". I have never observed this type of bubble-blowing before spawning has been completed and this may be one of the clues as to its function.

During opercular aeration, the male gulps in air at the water surface a few inches away from the nest in the usual way.

However, rather than blow it out as normal bubbles, he positions himself under the nest and flaps his gill covers, at the same time shaking his head from side to side.

As he does so, he expels the air as a fine mist of minute bubbles which float upwards and come to rest on the undersurface of the nest.

What useful function could this unusual behaviour possibly fulfil? My own theory goes something like this:

The eggs that have just been laid need a plentiful supply of oxygen. However, at the time of laying, there is a barrier, several bubble layers thick, between them and this supply.

They therefore need to be lifted physically above the water from their initial position below the surface. The best way of doing this is by adding extra layers of bubbles underneath and using their lifting power to raise the eggs.

However, a "large" bubble rising between two other large bubbles will not produce maximum lift; there is, in fact, a risk that the "new" bubble will force the two "older" ones apart. If this happens, then the net lift is nil.

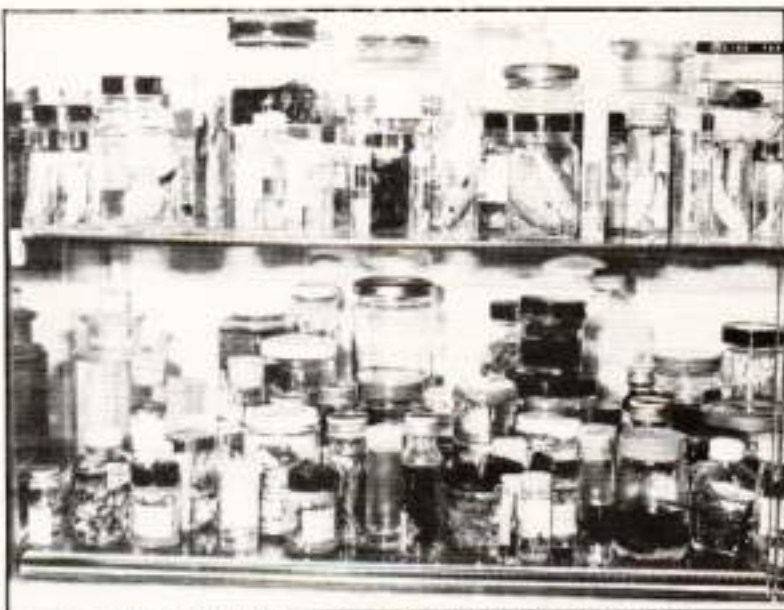
When the same amount of air is spread out over a larger area in the form of much smaller bubbles, their net "side" force becomes less while their lifting potential is improved.

Therefore, overall movement will be upwards. Have you ever wondered how it is that eggs which were originally laid under the nest can be seen clearly from above the nest after a time?

The answer may be that opercular aeration gradually "lifts" the nest further and further above the water and, as "early" bubbles dry out and burst, progressively "newer", lower layers come into view.

Eventually, the mucus-bubble-covered eggs reach the uppermost layers of the nest. There seems (to me at least) no better way of ensuring that your eggs receive a plentiful supply of oxygen in adverse environmental conditions when all you have at your disposal is a labyrinth organ and mucus-secreting cells.

Gouramis, then, have evolved excellent solutions to the many problems that



John Dawes has a laboratory full of fish—including these preserved specimens.

reproduction in poor conditions poses. By building a nest, all the eggs and fry can be kept within one small area thus making it possible for a single male to guard a considerable number of offspring (as many as two or three thousand).

By attracting a female to the nest, he ensures that the eggs are all going to be released within the same small area.

Therefore, he will not have to swim away from the nest in search of eggs, leaving the nest unprotected. By building his nest out of bubbles and later raising it out of the water through opercular aeration, he will maximise the eggs' chances of successful development in an oxygen-rich environment.

These chances are further improved by the buoyancy which the oil droplets inside the eggs provide. By clasping the female in a spawning embrace, successful fertilization of the eggs is virtually ensured. By having the ability to internally "colour" during the

breeding time, males make their presence unequivocally known both to females and other males.

Bright colours can be a hindrance rather than an advantage at other times since predators can detect the owner just as easily as possible males.

Breeding time is, indeed, a high-risk period in the life of many organisms. Gourami males lessen this risk, to an extent, by becoming excessively aggressive during mating.

However, once this period is over, their colouration and aggression both decrease, thus helping to restore the risk factor to a more normal and acceptable level.

It would be untrue to say that these solutions are better than those developed by other egg-layers. They are certainly effective under the prevailing conditions but, change these conditions, and they could be practically useless.

For example, a bubble nest is not much use if mating has to take place in fast-flowing water! Other solutions must be found. As a result, we find all sorts of conceivable successful permutations among egg-layers.

Some Characins, for example, scatter large numbers of very transparent, adhesive eggs which attach themselves to vegetation, becoming virtually invisible.

Under such conditions, the need for parental care obviously disappears. Other egg-layers, such as many Cichlids, reduce the number of eggs dramatically but offer, instead, an amazing degree of parental protection.

I refer here to mouthbrooders and others such as the Discus which goes even a stage further by providing its fry with highly nutritious body mucus. The list is endless.

I hope that more aquarists will start asking the question, "Why?" in addition to, "How?" The answers are invariably interesting, informative and highly rewarding. In my next article, I will be looking at the ways in which the other large group of tropical fish, the livebearers, have tackled and solved the problem of reproduction.



The University's freshwater eel, Elms, emerges from under the gravel.

BE SURE of your copy of PRACTICAL FISHKEEPING next month and collect a FREE 32-page booklet which will prove invaluable to your fish.

Every copy of the October issue will carry this free Tankside Guide on the front cover.

And once you read it the booklet will certainly live up to its name and stay by your tank as a handy reference.

There are lots of things to remember in fishkeeping... from the right water conditions for different species through to how many gallons of water your tank holds.

And if you forget one of these important facts it can be a nightmare leading through magazines and books to look it up again.

Everyone can remember that they have read what they need somewhere. But where? It could be a back number of PRACTICAL FISHKEEPING, or one of several reference volumes.

Our Tankside Guide, produced in conjunction with Aquarian, is designed to keep all those facts and figures at your fingertips... in fact right next to the tank where they are needed.

Written and edited by Dr David Ford of Aquarian and PRACTICAL FISHKEEPING editor, Norman Wright, the Guide is filled with information in a handy booklet form.

It covers water conditions and how to measure and correct them.

There's a vital section on how to avoid poisoning your fish with simple household products.

Then there's a section on disease which reminds you of the symptoms of the common ailments so you can recognise and treat them quickly.

And if you want to treat disease or add anything to your tank you will need to know the precise gallonage allowing for plants, rocks and gravel. The booklet tells you.

There are drawings, pictures and tables of facts. Don't miss the PRACTICAL FISHKEEPING Tankside Guide—available only with the October edition.

Mind you, the contents of the October magazine make it well worth buying on their own.

Here's a selection of the features in store for you next month:

The World's Best

Dr David Ford continues his jet set tour of the world's aquaria with a visit to what he considers to be the finest—across the Channel to Nancy in France.

Is this the World's finest aquarium? Judge for yourself next month.

PRACTICAL FISHKEEPING

Next Month OCTOBER

Fishkeeping the Right Way

Allan Haines has been looking at those simple jobs in and around the aquarium that you can make a mess of.

It is essential stuff for beginners and for more experienced aquarists who will find that brushing up their techniques will mean better fishkeeping.

Next month Allan takes a look at how to catch and treat fish with the least stress and damage to them.

It's another feature that justifies the "practical" in our title.

Livebearer secrets



A tank of Guppies.

Livebearers are the simplest of species to keep and breed successfully.

But behind the development of these fish lies an incredibly complicated system evolved over millions of years.

John Dawes reveals some of those fascinating facts in October.

He draws on his research into a batch of unusual livebearers to explain his theories.

Win a Marine Tank

Your chance to own a fabulous marine system in our simple to enter, free Spot The Difference contest.

You can win a complete set up including corals and fish. So don't miss out on the October special prize.

Psychological Fish!



Fish can calm anyone down—even two Policemen! But could they stop your nerves if you were waiting to have your tooth out.

Most fishkeepers find looking at a tank of their favourites very relaxing.

That's the theory behind all those doctors and dentists who try to calm their nervous patients by installing a tank in their waiting rooms.

But does the psychological approach really work?

Nick Fletcher takes a tongue in cheek look at the psychology of fish next month.

Pond Protection

PRACTICAL FISHKEEPING pond experts Roger Cleaver and Peter Bull started their preparation for winter in this issue.

But October is the time when you need to add the finishing touches to a thorough pond protection.

That way your fish should survive the weather. Just remember the last winter and that awful freeze-up. Then you will appreciate just how vital the proper protection is.

Roger and Peter know the pitfalls, they need to be certain with ponds full of valuable koi to worry about. Pick their brains next month.

If you value your pond fish don't miss out on expert advice.

Don't miss the October PRACTICAL FISHKEEPING complete with your FREE 32-page Tankside Guide.

It is on sale at your newsagent or aquarist shop from October 1. Make a date with Britain's best selling aquarist monthly now.

How to get your October copy

DEMAND for the October issue with its free gift on the cover is bound to be high and you may find your newsagent selling out!

If you want to make absolutely sure of getting the magazine next month and in succeeding months there are two ways of being certain.

The first is to place a regular order with your newsagent. He will be delighted to either deliver a copy to you or reserve one for collection at his shop.

There's a form on page 26 this month for the newsagent. Just fill it in, put it out and hand it to him. Or just copy the details on to another sheet of paper to avoid cutting the magazine.

The second way of obtaining a

copy every month is to take out a subscription direct from PRACTICAL FISHKEEPING. You can find a form for this on Page 68.

It will cost you £7 and for this we will post the next 12 issues to your house as soon as they are hot from the press.

PRACTICAL FISHKEEPING is selling more copies every month and we strongly advise you to place a regular order to make sure of getting one.

If you have any difficulties at all in obtaining your magazine please write to the editor at Bretton Court, Bretton, Peterborough.

We will make sure that any problems are ironed out quickly.



Editor Norman Wright's look at the fishkeeping world

22,055

That's the Practical Fishkeeping sales figure that makes us Britain's number one aquarist's monthly.

I AM delighted to report another milestone in the success story of the new-look PRACTICAL FISHKEEPING: We now have an official circulation figure—22,055.

This figure is an average monthly sale for the January to June period of 1979. It was produced by the Audit Bureau of Circulation (ABC) who are independent circulation auditors.

I believe this is a significant figure to achieve after less than a year publishing PRACTICAL FISHKEEPING and all the indications are that our next six monthly average will be higher still!

It certainly is a reward for the work the magazine's team has put in to make PRACTICAL FISHKEEPING the brightest and best monthly for aquarists.

And it isn't just good news for me, much as I enjoy knowing that our readership is on the increase. It is good news for our advertisers and, most importantly in my view, for YOU the reader.

This figure of 22,055 means we are comfortably the biggest selling aquarist magazine in Britain.

Good news for advertisers, that, for they now know their adverts are getting through to more potential customers than any other magazine.

Good news for readers, too. Because the more advertising we can get, the bigger issues we can publish giving more and more space for the articles and features that so many of you have written to say you like. Take this September issue as an example. We have been able to make it into the biggest issue of PRACTICAL FISHKEEPING ever published, by adding eight pages to complete an 86 page edition.

That's more editorial space for you to enjoy.

I would like to thank all the readers who have helped me by writing in with their comments and ideas during the first few months of the new magazine.

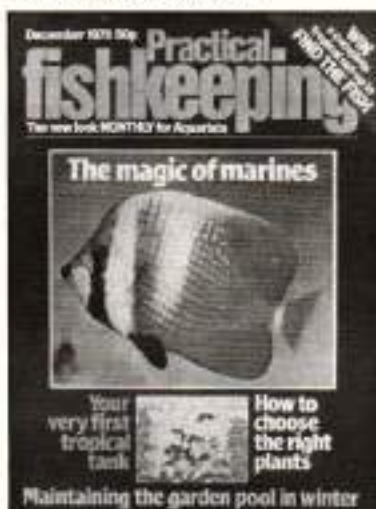
And thanks also go to the advertisers who have given us their backing during our early days.

I am sure the future will bring more success, but I am still anxious to hear from anyone who has any comments on the magazine.

We aim to create the sort of monthly YOU want.

WHAT a superb show the Yorkshire Aquarists Festival at Doncaster is.

Their 1979 effort last month was another huge success.



December: our first issue of the new-look PRACTICAL FISHKEEPING.



June: By June we were selling 22,055 copies—the biggest in Britain.

Congratulations go to the organisers, exhibitors and judges for a first class festival.

I really enjoyed the weekend and my thanks go to all the readers who turned up for a chat on the stand and who attended the "Meet the Experts" forum over the two days.

I had hoped to include a full report on the Festival in this issue. But early printing deadlines made that impossible.

So instead I have held that picture report over until next month. For all those who didn't get to Doncaster it's well worth a look, the show was that good.

DAVID Sands is undoubtedly a Catfish fanatic. And just to prove it he is off to Brazil at the beginning of this month for a collecting trip.

It just shows what fishkeepers can achieve if they have the interest, because David's trip is heavily sponsored and he has enlisted the help of the British Natural History Museum and the University of Amsterdam.

David and his companion on the trip, Steve Pritchard will be joining a collecting party from the University of Sao Paulo.

David is a former secretary of the Catfish Association of Great Britain. He has been living in London but has now left his job and plans to start a new aquarist shop in his native North West.

The pair will be travelling to as many parts of the massive South American country as they can. And they will be looking particularly for Whiptails but any Catfish will be gratefully collected.

Helping with the sponsorship are PRACTICAL FISHKEEPING, Aquarian, D and V Aquarium, Tropic Aquarium, the FBAS, Derek Lambourne, Adrian Blake, Kodak, Fotofast, FAMA of America and the Catfish Centre.

David begins a new series in PRACTICAL FISHKEEPING next month all about keeping Catfish.

He begins with the most popular aquarium 'cats'—Corydoras. It is certainly a fascinating read.

And he will also be telling readers all about his Brazilian trip in the November issue.

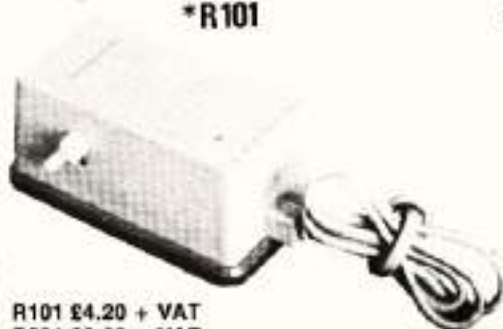
ALONG with Dr David Ford I have been working on our Tankside Guide booklet which will be given away free with every copy of the October issue.

And already I have found it useful reference for my own tanks. I hope you will make a date with the magazine next month and find it just as helpful.

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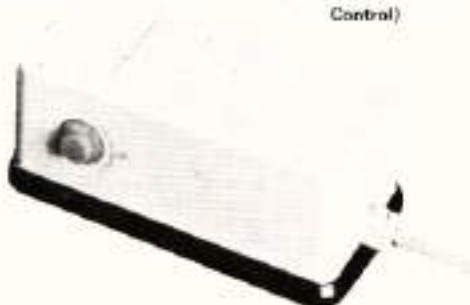
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TO MY NEWSAGENT

Name _____

Address _____

AQUATIC QUERIES

Research by Dr. David Ford.

Old Age

A COUPLE of days ago I noticed my Goldfish swimming near the surface with a very swollen belly. The anal region was very red with veins near the surface. I took him to the vet who thought it could be a growth. The fish will not eat but does not appear to be in distress.

I have had the fish for 14 years and he is kept in a very large tank. Can you help as I do not want to lose the fish if he can be cured?—Mrs Lynda Oates, Heckmondwike, Yorkshire.

I regret the prognosis is not very good for your Goldfish. He is quite old now and as your veterinary surgeon suspected, a growth could be forming.

There is no cure for such conditions since surgery is not practicable.

Try treating him for constipation by feeding red earth-worms and keep the water very clean by lots of partial water changes.

If the fish deteriorates the kindest thing would be to dispatch it quickly and buy a successor.

Tank shrimps

MY wife and I have had our aquarium for three months now and recently we spotted a very slight movement in the tank. The result was that we appear to have freshwater shrimps.

We don't know how they got into the tank or where from. No live Daphnia were fed to the fish. How do we deal with them?—A. Bird, Dover, Kent.

Your freshwater shrimps probably came in with the plants. If they survive the attentions of the fish they make interesting additions to the tank. They are good scavengers and will take surplus fish food flakes.

Does noise annoy fish?



Golden Gouramies—a spawning ritual under their bubble nest.

I HAVE just bought an outside filter and new twin outlet air pump. I am also running two sinterstones off the pump because I was told that a pump would become quieter by giving it a lot of work to do. Although it is quiet now it still drones.

Because of this I wondered if the noise affects the fish and disturbed them. If it does, could you advise me on what to do?

If I need to switch off the pump at night how do I stop the dirt in the filter from siphoning back into the tank?

How often should I clean the filter wool and wash the charcoal?

Could you give me any information on breeding Golden Gouramies and Kuhli Loach? How can I sex Angel Fish?—Miss Sandra Lockwood, Wakefield, W. Yorks.

It is wrong to switch off any filter because the dirt therein tends to go foul and when the filter is switched on again the foul gases pollute the water.

There is no evidence that the noise of pumps affects the fish, therefore there is no need to switch off your pump.

If the noise affects the owners it is simple to house the pump in another room, in the hall or even outside. Run the air line tube through small holes drilled in the walls.

A pump certainly needs to work at maximum efficiency but this means throughput of air, not back pressure.

Try fitting a 'T' piece with one short airline closed with a clip. Open the clip to allow air to escape. By fine adjustment of

this clip you can get the pump to run flat out and quieter.

Change your filter wool whenever it looks dirty. Don't change the charcoal, rinse it clean every few weeks.

The absorbing qualities of charcoal are soon saturated—within a matter of hours—and it is only the large surface area that is of benefit by growing bacteria to feed off nitrites etc.

The Golden Gourami is *Trichogaster trichopterus* the Blue, Three Spot and Opaline Gouramies are the same—each is a variety of *T. trichopterus*.

They are bubble nest breeders and are easily spawned.

The male is more colourful and the pair should be separated and fed with live food to condition them.

The breeding tank should be large—about 30 inches—but but with only six inches depth of water.

Floating fern (*Ceratopteris thalictroides*) is a useful addition. The female is added first and the male two days later.

Remove the female after spawning, and the male when the fry are free swimming.

The fry need infusoria, then brine shrimp naupli and ground foods.

Kuhli Loach or Coolie Loach are extremely difficult to breed in aquaria. I should give them extremely clear, clean water and see if you can persuade them to spawn.

Angels are difficult to sex. The only practical way is to see a pair and observe which lays the eggs.

Breeding hints

CAN you give me details on how to breed Dwarf Gouramies? I am very interested in this particular species.—S. Roach, Ambrosden, Oxfordshire.

To breed Dwarf Gouramies (*Colisa lalia*) you need a bright, well planted tank that receives some sunlight too, if possible.

The water should be very slightly acid to complete the tank conditions.

Some live foods will help bring a pair into condition. The female is paler and fattens with eggs.

The male blows a bubble nest that includes bits of plants etc. hence the need for a planted tank with some floating debris.

The fry are very tiny and need fine infusoria during the first stages. Unless many cultures are prepared in advance the majority of the fry will starve to death.

After about a week newly hatched brine shrimps can be fed and then the usual fry and growth foods.

Quivering Silver-Tips

I HAVE a 24 x 12 x 12 tank that I have set up for Tetras, recently I added six Silver-Tips.

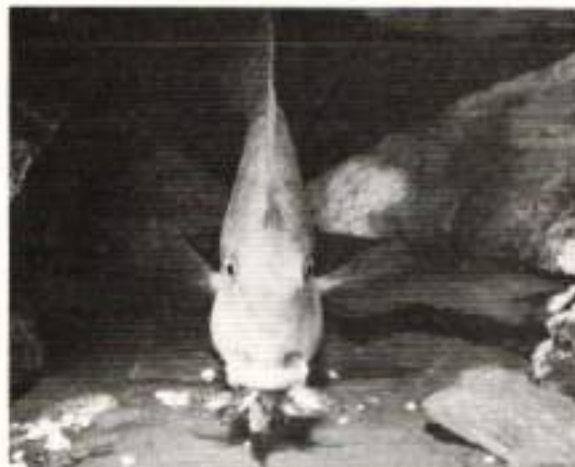
They have been in for about a month and I have noticed on two or three occasions two separate groups of two doing a quivering dance. Could you tell me whether they are pairs or males marking or defining territory?

I have requested two books from our local library on Tetras and how to breed them, but after two months I have just about given up hope on getting them, our library only seems to ever have childrens books on Goldfish and Terrapins.—P. Parfitt, Brinsley, Notts.

The Silver-Tipped Tetra (*Hemigrammus nanus*) is a peaceful fish that swims in shoals, so your fish are not fighting or marking territories, hence you must have breeding pairs. Move the best pair to a separate breeding tank with shallow water, soft and slightly acid, and when the pair have spawned move them back immediately because they are great egg-eaters. The fry are easily raised on fry and growth foods.

Sorry to hear of the library's delay in getting your books. It may help to request an interview with the Chief Librarian.

Non-stop spawners



Mouthbrooder—it isn't unusual for them to breed almost continuously.

I HAVE a pair of Mozambique Cichlids that first produced a brood in March. After the female let the first brood out we noticed she had some more eggs in her mouth. This process of breeding has continued during the summer. Is it usual for this species to breed so rapidly—

Mrs J. Musson, Long Eaton, Notts.

The Mozambique Cichlid, like many Mouthbrooders, is a prolific breeder. It is not unusual for the females to overlap in this way. You will soon need more tanks!

Cheap pond

AFTER keeping tropical fish for some years I would like to keep coldwater fish in a pond. But as I am only fourteen, finances are limited. Can you advise me of the cheapest way of building a pond?—S. Senior, Acomb, York.

Nothing is cheap these days, so it matters little whether you choose concrete, butyl lining, plastic or fibreglass ponds, they will work out fairly pricey. Why not try to search for a second hand pond. Some gardener who wants to move a small pond would probably let you have it free, if you do the digging!

None of the established methods of pond construction listed above are cheap. You can however use polythene sheeting as a lining which obviously can be very cheap indeed. But is not certain that it will last for long without leaks. Having said that, there are hundreds of polythene lined ponds which have lasted years.

Use a heavy grade of polythene and take care to remove stones or anything that could puncture the lining from the sides of the hole you dig. Then line the hole with sand or sieved earth to allow you to bed the polythene lining in carefully.

Growing Koi to full size without a pond



Koi—the only way to get them to really big sizes is in a big pond like this.

I AM a novice aquarist with a 36 inch tank which holds nine Koi. I would like to grow these on, but haven't the facilities for a garden pond. Would it be possible to rear them to maturity in a disused birdroom 13 ft x 6 ft x 8 ft? How should I convert this to a fish house?—Neil Carr, Ashington, Northumberland.

Koi will not grow in aquaria to anywhere near the size of pond fish. However, they remain healthy and active and will mature and breed despite their small size.

To grow them to their full-sized beauty they really need a large pond of clear water.

The bird room can be converted to a fish house by simply installing a plastic or fibreglass pond. You could also build a brick walled pond and line it with Butyl rubber.

For more information on Koi send a postal order for 56p to Mr F. Ayres, 35 Manor Drive, Hilton-in-Cleveland for his "Koi Keeping For Beginners".



Strange Mollies

SINCE taking up fishkeeping in January I bought a bigger tank and transferred all my plants and fish into it. Then I noticed some small Guppy-like fish. As they grew they looked like Sailfin Mollies. But the Gold Sailfins in my tank had produced fry and they looked nothing like them.

The Black Mollies had also bred but they didn't look like those. The nearest I have seen is a tank of Green Sailfin Mollies in the local fish centre shop.

How could these have got into my tank or are they a genetic throwback?—Stephen King, Thornton-le-Clay, Yorks.

It is impossible to say what type these babies are as Mollies have been bred into many different varieties whose fry all look similar until maturity.

You should be able to identify the species better when they are mature in three or four months time.

Rare livebearer

A FRIEND of mine has a livebearer called *Xodonice elsonii*. It is probably a member of the Platy family judging by its appearance.

Could you supply us with any further information as all we really know is the name?—Colin Kenney, Helston, Cornwall.

The name you have given is not quite right. I think the fish is *Xanotoca elsonii* and there is no common name.

It is a member of the Goodeidae family and sub-family Goodeinae. The super family is Poecilioidae and so the fish is a typical livebearer.

I have no published data on the actual species but if treated like a Platy or Guppy you won't go far wrong.

AQUATIC QUERIES

Research by Dr David Ford

Kuhli Loach

FOR many years I have been interested in Half-banded Kuhli Loaches. I bought one two years ago and recently added three more—one of which was full of pale green eggs.

My old Kuhli and this female spawned but no eggs could be rescued. Last week they spawned again and although two dozen eggs were saved they fungussed.

Is there any chance of breeding them?—Colin Lindsay (18), Moygashel, Co. Tyrone, N. Ireland.

You have confused two species of fish—the Half Banded Loach is *Acanthophtalmus semicinctus* and the Kuhli Loach is *Acanthophtalmus cuneovirgatus* or kuhli.

The latter is also known as the Coolie Loach as well.

There is little information on breeding the fish, except that clear clean water is essential and the tank should be dimly lit as both species are nocturnal.

A fine gravel or sand is best with the best temperature between 78 F and 82 F.

If you meet these requirements, perhaps the eggs will survive.

When the eggs cloud and become fungussed it indicates they are infertile and one or both of the breeding pair are at fault.

Will this catfish fit in?



The Armoured Catfish—will he fit into a tank with two Shark?

WILL an Armoured Catfish fit in with my new aquarium set-up? My tank is 18 x 10 x 10 and I have just started to keep tropical fish. I recently bought four fish—two Sharks and two Elephant Nose fish. The two Elephants died, but the two Sharks have survived.

Will the Catfish mix with these? What food will they eat and will they need an aquarium with plants? I would be grateful for any information you can give.—Nicola Wilton (11), Knutsford, Cheshire.

The Armoured Catfish is *Callichthys callichthys*. It is an active fish with no special water requirements. Best temperature is 75 F. It is a greedy feeder and

will swallow small fish if present in the community tank.

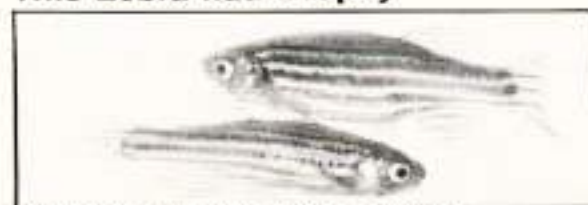
It can uproot plants too, but plants are not essential for the species.

Some aquarists have had a specimen in a tank for many years when they will achieve five inches or more in size.

Your aquarium is rather small and you will have to watch the water quality carefully if you want to add this fish to your others.

It is not a common species and therefore the price will not be cheap. You must discuss buying one from your local aquarist shop. They could then probably order one from their suppliers.

This Zebra had Dropsy



Zebra Danios—these fish are quite prone to Dropsy.

SUDDENLY one of my Zebra Danios became fat, so I isolated it in a 24 inch tank. I noticed that its scales were rising. These symptoms fitted exactly with the signs of dropsy which I read in a book.

The fish was alright for three weeks. Then I came home one day to find it dead. When I fished it out a lot of eggs squirted out.

I destroyed these in case they were infected with disease. Can you tell me what happened?

Michael Higgins, Corbridge, Northumberland.

Your Zebra certainly did have

dropsy and was also a female heavy with roe.

Dropsy (Ascites) is a sign of illness which may or may not be specific. Often, dropsy is due to heart failure or kidney disease.

Freshwater fish are continuously drowning in their water and only by efficient excretion do they prevent their bodies becoming waterlogged.

Any illness that reduces the efficiency of this excretion leads to water swelling the body—dropsy—or the eyes—pop-eye.

There is no way of diagnosing the original disease, of course, and you did right to destroy the fish and eggs.

Coldwater lights

I WANT to set up a six foot community coldwater tank. What lighting do you suggest and would two outside filters be sufficient? If this is unobtainable what layout would you suggest?—A. Jones, Warley, W. Midlands.

A six foot by two foot tank needs a bank of three 30 Watt 35 inch fluorescent tubes or 60 Watt tungsten bulbs spaced about 12 inch intervals.

Another good system is to have an open top with cover glass and beam cool-burning spot lights into the tank from ceiling or wall mountings. The light used in shop window displays are ideal.

Filtration is really up to you. One large, or two smaller units will prove efficient if the tank is understocked.

If the tank is crowded the filters will need more frequent cleaning according to their size. But remember that nothing replaces regular water changes. Enough of these and filtration in a coldwater tank is unnecessary.

PRACTICAL FISHKEEPING

Two peaceful Cichlids make top tank fish

I WOULD appreciate any information you can give on the breeding habits of the Cichlid species *Lamprologus brichardi* and *Nannacara anomala* and any hints on raising their young.—Janice Purath, Whittlesford, Cambridge.

Nannacara anomala is a popular Cichlid because, being a prolific breeder, plenty of fish are available.

They breed in a plant pot and the young can be raised on brine shrimp nauplii, microworm and ground flake foods.

They are considered good community fish and their common name is Golden-eyed Dwarf Cichlid.

Note that the smaller female can become aggressive and actually kill the much larger male.

The female will reach 1½ inches and the male three inches in your 45 inch tank.

Lamprologus brichardi is a fish from Lake Tanganyika and is peaceful and hence a good aquarium fish.

They are microfeeders in the wild and so need to be fed on a carnivore flake food. They may reach three inches in your tank.

They breed among rock rubble and form a communal nursery. The young can be raised on a similar diet to the *Nannacara anomala*.



Golden-eyed Dwarf Cichlid—an excellent peaceful Cichlid.

Beating Goldfish fin rot



Stone Loach—one of the coldwater species not affected by this fin rot outbreak.

I HOPE you can solve a problem which I have been trying to solve for about two months now. It started about two months ago when I thoroughly cleaned out my 36 x 12 x 15 coldwater tank.

After leaving the tank to stand for a day I replaced ornaments and fish. Three days later my fancy Goldfish all had fin rot. I have since tried cures. But none of them worked.

So in desperation I put them in a weak table salt solution while I looked for something else that might work. It appeared to be working. Two weeks later I put the fish back into the tank, next morning there it was again.

So out they came again and went back into the salt. This time I put a water disinfectant in the tank before putting them back. Next morning they had it again. This happened four times.

Is there anything you can suggest without my having to clean the tank out again as I really don't have time.

Other occupants of the tank are Catfish, Stone loach, Tench and Koi. They have all lived peacefully together for a long

time.—Miss J. Mackie, Bognor Regis, Sussex.

The first thing you did wrong was to "thoroughly clean out" the aquarium. A tank should never be left until it is so dirty such a drastic scrub-out is required.

We assume this included throwing away all the matured water, the replacement water being of such different chemistry the fish would go into shock and develop diseases.

The next mistake was to treat Fin Rot with Fungus Cures—the two diseases are quite different. Your third mistake to mix different cures, the cocktail of chemicals will stress the fish even more than the original disease.

Your fourth mistake was to use the table salt, this contains Magnesium Carbonate (to help it pour) and often Potassium Iodide to supply iodine for humans, which are unsuitable for fish. You should use rock or sea salt.

We recommend continuing the salt-water dips if the problem recurs—meantime the raw water should be maturing and the fish should settle down again. Keep the tank clean by partial water changes only.

Green Puffers can't be trusted

CAN you give me information on *Scotophagus argus* in a freshwater aquarium as I have just bought one but can find little about it?

I would like to know:-

- Does it have any special food requirements?
- Should it have a companion Scat?
- Would it be possible to breed Scats?
- Would you treat a Green Pufferfish with a large angel?—Peter Bird (11), Fleetwood, Lancs.

Scotophagus argus is a brack-

ish water fish, peaceful, attractive and will accept all foods, especially worms and vegetable matter.

It is best kept in salty water, however. One teaspoon of marine salt for each ten litres is the correct mixture.

It can be kept alone or with other Scats. No-one has reported successful breeding of these or related species as far as I am aware.

I would not recommend adding a Pufferfish to the Angel's tank. Puffers are generally very aggressive and territorial.

Mystery snail



Do you recognise this sketch of the mystery snails?

A FEW weeks ago I noticed a strange cone-shaped snail in my aquarium. At first I noticed one lying on the gravel. The next thing I knew there were dozens of them.

They do not touch the plants at all and the fish take no notice of them. I find them fascinating to watch as they roll over the small stones, draining the gravel and removing debris.

They disappeared one night recently but were back again the next morning. They appear to be doing a marvelous job of loosening up the gravel and cleaning it. The water has been crystal clear since they arrived

on the scene.

Could you tell me what these snails are? I have enclosed a sketch to give you more information.—P. Wallis, Ipswich, Suffolk.

You have a colony of Melayan Snails (*Melania tuberculata*). They are nocturnal and will emerge in ever increasing numbers at night. You will eventually have a problem with too many of them.

If you require to remove them the only sure method is a complete breakdown of the tank, boiling water sterilisation and sifting of the sand or gravel.



Bloated Danio is normal

ONE of our two small Leopard Danios is rather bloated and has been new for about two months. I would be grateful if you could give me any information about this fish as to whether and how to treat it. —G. Mearns, Bedford, Notts.

The Leopard Danio is *Brachydanio frankei*, a peaceful but active fish that prefers to swim in schools.

There is a large difference in size between males and the fat-bellied females because the female can lay up to 1,000 eggs over several days spawning.

Your "bloated" Danio is probably a ripe female which is perfectly normal.



Leopard Danios—the bloated fish is probably full of eggs.

Puffers that don't mix



Flag Cichlids—they should be slight with the smaller Puffers.

IN addition to my 24 inch community tank I would like to set up a 36 inch tank for slightly larger fish.

I thought about freshwater Pufferfish. Could you give me some information on these? Would they mix with Flag Cichlids or Rams? What other fish would be suitable and what heating and lighting would be suitable? —David Hindess, Godalming, Surrey.

The freshwater Pufferfish or Common Pufferfish is found in fresh and brackish waters in the Far East.

Most are species of the genus

Tetraodon. The species *T. cutcutia* is very aggressive and is not suitable for your Cichlid or community tank.

T. mbu is a purely freshwater Puffer but not usually available because it is so large at 75 cm.

T. plebangensis is probably your best choice, being smaller and less aggressive than the others. But it still needs territory to establish and defend.

You may have problems with territorial Cichlids but the Flag and Ram Cichlids should be OK.

Lighting, filtration etc are the same as for your usual aquarium.

Treating a parasite infection

IN my four foot aquarium I have a variety of coldwater fish including Goldfish, Comets, Moors, Cife and Koi.

Two small Koi and a Goldfish appear to be rubbing themselves against rockwork. I know this sounds like a parasite, but why are only those fish affected? If it is a parasite will it spread? And what could it be?

How long will a Sucking Loach live in a coldwater aquarium and will they be eaten by a six inch Comet?

I bought a Calico Fantail but it died after being floated in a bag in the tank and then being released.

Do you know why it could have died?

Can you hatch Brine Shrimp in salt water under a 30 Watt Gro-lux tube? —Kevin Isham, Burton-on-Trent, Staffs.

Parasites can affect any one or all of the fish in an aquarium. Rubbing or flicking is a sure sign of their presence and indicates body fluke of the *Gyrodactylus* species.

The best treatment is two drops per gallon of Formalin—available from most chemists—repeated after three days.

The Sucking Loach (*Gyrinocheilus aymonieri*) comes from tropical waters of Thailand and so is not suitable for adding to your coldwater tank.

The Calico Fantail may have died from a heart attack from the stress of being netted, bagged, transported and then floated and released into a strange tank.

Yes, brine shrimp will hatch in salt water under the Gro-lux. A bright light may increase the percentage hatch.



Coldwater species like these Calicos should be kept clean.

All about Marines

Research by Dr David Ford.

Wrasse make good community fish

I WOULD be grateful for some advice on our newly set up tropical marine aquarium. The tank is 50 x 18 x 18 and is lit for 14 hours a day by two four foot fluorescent tubes—a Gro-lux and a Truelite. Is this enough light for invertebrates and will it promote good stage growth?

My dealer tells me not to introduce anemones unless we intend to keep only Clown Fish as he says they blister the fish's skin by sending stinging cells into the water. Is this true?

We have no fish yet as the filter bed is not matured (present nitrate level is 18ppm). When is it safe to introduce fish and which species do you recommend starting with?

What is the ultimate stocking ration of our tank? As we eventually want to keep Butterflyfish, which species are easiest to start with?

Please advise on the suitability of a Green Parrot Wrasse and a Chocolate Rainbow Wrasse. —Karen Davies, Hereford.

Your tank and lighting should be satisfactory for marine fish and invertebrates.

It is OK to keep anemones even without Clowns although some species of fish may blunder into them and be eaten. The popular anemones will not poison the water.

The nitrite level must be zero before you start stocking the tank.

Your choice of Damsel Fish is ideal for the first species as they are so hard. Butterflyfish are less hard but they are a good second choice.

The Copper Banded is a very timid fish and difficult to feed, choose a specimen that is feeding well in the show tank. The Yellow Long Nose is also delicate and care must be taken when choosing a specimen.

Other Butterflyfish are harder—for instance the Common Butterflyfish (Chaetodon ocellatus).

Basically all the Wrasse are good community marine fish. The Cleaner Wrasse (Labroides dimidiatus) is a good choice.



Wrasse like this specimen should live with other Marine species.

Switching to Marines



Regal Tang—is this a suitable species for my tank?

I AM planning to convert my 36 x 15 x 12 glass freshwater aquarium into a marine system.

As there will only be about 20 gallons of actual seawater I will be limited to keeping four or five small to medium sized fish.

I plan to stock a Domino Damsel, a Fire Clown, a Black Clown and a Regal Tang.

Are these fish compatible and is there any particular order in which I should introduce them?

What sort of anemone should I buy for the Clowns I have already mentioned? —David Knock, Newcastle-under-Lyme, Staffs.

A 36 inch tank is probably the smallest size for a beginner to use for marine fishkeeping. Your choice of fish looks fine, but they are best added together to prevent trouble from territorial disputes.

However, you need to build the nitrite for maturing the system and the Dominoes are a hardy fish for this, so add this species first.

The anemone choice depends more on availability than requirements but a good species is *Radianthus*.

Vital differences in the aquarium

I READ that there are differences between tropical freshwater fish and their habitat and marine fish and their habitat. What are these?

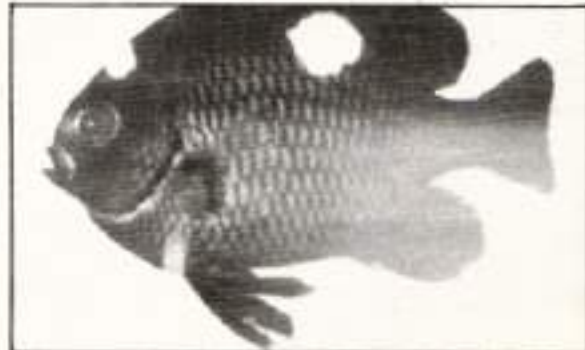
In my marine aquarium I want an Electric Blue Damsel and a Domino Damsel. I intend to set the aquarium around these two species and I would like to know what other fish and plants will go with them? —Rodney Joyce, Hopeman, Moray, Scotland.

The major difference between tropical and marine fish is that the latter need to continuously

drink water to replace body fluids lost by osmosis—hence marine fish are much more sensitive to water quality and a marine tank needs continuous biological filtration to prevent poisons killing the fish.

The Damsels are good fish for beginners and many compatible species are available which your aquarists shop will advise you on.

There are a few plants available for marine tanks—*Caulerpa* for example. But I recommend using plastic seaweed until you are more experienced.



Domino Damsel—an excellent first fish and very hardy.



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.

Below: Golden Barbs—one of the early species I stocked in my new tank.



A fresh start

Dr. Christopher Andrews with new tank tips for beginners and experts.

I RECENTLY set-up a tropical freshwater aquarium at my home in Leeds, and I hope that my experiences may prove interesting to fellow aquarists.

Before buying an aquarium some thought has to be given to its location. Our lounge is a long, rather narrow room that incorporates a dining area at one end. Taking into consideration the likely "through traffic" (and especially the antics of a likely two year old child), we decided to situate the tank against a wall, on a sturdy wooden bookcase.

A bookcase (rather than an aquarium stand) was chosen because of its availability, along with the fact that it blended in nicely with the rest of the furniture in the room. Nonetheless, account had to be taken of its likely weight that this bookcase would have to safely support—one gallon (or 4.5 litres) of water weighs about 10 pounds!

The spot chosen for the tank was, of course, away from room heaters and possible draughts. However, because of its location, the tank does not receive very much natural daylight.

Having made preparations to receive the tank at home, I set out one Saturday afternoon to purchase the necessary equipment. The shopping list read as follows:

- Aquarium (39 x 12 x 18 inches)
- Hood
- 26 Kg gravel
- Two hand nets
- Algae scraper
- Air line and in-line connectors

Internal box filter

Filter wool

Aquarium peat

Air pump

Heater—thermostat (200 watts) plus holder

Thermometer

Two 30 watt fluorescent tubes and lighting units

Three-pin plugs (with 3 amp fuse)

Aquarium backcloth

The aquarist shop was out of condensation trays, so this was later made out of a piece of thin perspex, cut to size.

This equipment was all brought home, and the tank thoroughly cleaned with warm water and a soft cloth. Four polystyrene ceiling tiles were placed in a row on top of the bookcase.

These would later form a firm cushion for the aquarium to sit upon. This can be quite important in supporting the weight of a tank evenly, especially since some modern furniture never seems to be quite square!

The backcloth was stuck to the back of the tank using double sided adhesive tape, and the tank placed on top of the ceiling tiles. These tiles were then trimmed to fit the tank base perfectly.

With the tank in position it was time to wash the gravel. This rather time consuming operation is worth doing well. I half filled a large bucket with gravel and ran cold water through it, decanting the "dirty" water regularly. This was repeated on separate patches of the gravel until sufficient was washed for my needs.

Before going any further some last checks were made concerning the positioning of the tank, for once it is filled it can be extremely difficult (and hazardous) to attempt to move it. In fact aquaria that are full of water should never be moved—but at least half emptied first. Thus, I checked that the tank was sat squarely upon the ceiling tile base and in the correct position, and that sufficient access behind the tank was available.

An inch layer of aquarium peat was spread over the back half of the floor of the tank and washed gravel carefully laid over this. The gravel depth was one inch at the front of the tank, rising to three inches at the rear.

(What? No undergravel filtration? Then read on!)

A couple of small sandstone (ie, fairly inert) rocks were placed firmly on the gravel, and two half flower-pots partially buried to form small caves. Things were definitely taking shape!

To prevent undue disturbance of the gravel whilst filling the tank, a clean polythene sheet was laid over the floor of the tank, and cold tap water gently added from a hose until the tank was about $\frac{3}{4}$ full.

Whilst the tank was filling, I connected up the heater-thermostat, air-pump and lighting units to the junction box (which was wired to a three-pin plug), and put the light tubes in the tank hood.

In full agreement with all that has been said recently about the use of aquarium

junction boxes for tidying up wiring—I can say that they really are a worthwhile piece of equipment. I purchased one which allows the lighting and air-pump to be turned off independently.

With the tank three-quarters full I turned off the water, and installed the heater-thermostat on the rear glass of the tank (about one-third the way up). The filters were then connected to the air pump. I had purchased a small internal box filter, which was filled with an aquarium wool and a little gravel added to make it sink. This filter was placed in one rear corner of the tank. In the other rear corner I installed a Tetra Brilliant poly-foam filter, and the thermometer was stuck to the front glass in an easy to read position.

Before topping up the tank, I always prefer to try out all the electrical equipment, and filters. Rearrangement (or whatever) is easier in a tank that is not quite brimful with water. With a wife looking over your shoulder, mess is also a major consideration! Therefore the junction box was plugged in and, apart from an adjustment of the air supply to each filter, everything seemed to be working. Whilst the tank was gently filling to its limit, I did a quick calculation on the capacity of the tank. It is vital to know this for subsequent addition of care or remedy products. The circulation goes as follows.

Internal dimensions of tank: length 30 inches, height 18 inches, width 12 inches.

$$\text{Capacity in cubic feet} = \frac{(30 \times 18) \times 12}{1728}$$

$= 4.9$ cubic feet
To convert cubic feet to gallons, multiply by 6.25, which in my tank is (4.9×6.25) 30.6 gallons

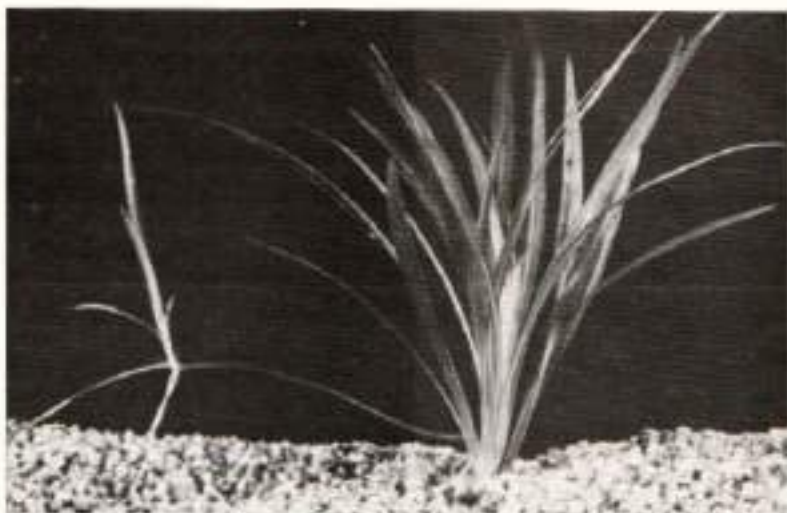
To convert gallons to litres, multiply by 4.6, which in my tank is (30.6×4.6) 140.8 litres.

Subtract 10% for gravel, rocks, etc.



Adding the Blackwater Extract to help condition the water.

PRACTICAL FISHKEEPING



Echinodorus—an excellent plant to start with.

Effective capacity of my tank is 127 litres.

This capacity I noted (using waterproof marker) on the outside glass of one side of the tank. Its very easy to forget the capacity if it is not written down!

Time was getting on now. I placed the air pump, junction box and light units on a convenient shelf above the tank, disguising them with potted plants.

All the equipment was then left on until the following morning. By this time the temperature had stabilised at 25°C, and the filters removed much of the slight initial water cloudiness. The pH, General Hardness and Carbonate Hardness of the tank water were measured, and found to be 7.5, 4dH and 3°dH respectively (a slightly alkaline and quite soft).

I am perhaps fortunate to live in a part of the country which has easy access to the beautiful Yorkshire Dales, and where water comes out of the tap with a General Hardness of less than 5°dH!

During the following week the temperature was checked regularly. A selection of *Myriophyllum*, straight and twisted *Vallisneria*, and *Cabomba* were planted, along with an *Echinodorus* and a Dwarf Sedge (*Acorus*). The plants were used to disguise the filters and heater-thermostat, and produce a pleasing appearance within the tank.

A large bunch of *Cabomba* formed a particularly nice centre-piece to the set-up. I decided to begin by leaving the lights on for 12 hours per day, and so far (six weeks after setting up the tank) this has proved quite successful in stimulating healthy plant growth, without too much algae.

A week after filling the tank, I could wait no longer to introduce some fish. A full dose of AquaSafe and Blackwater Extract was added to the tank. Although any chlorine from the tap water would have been dissipated by now a combination of these two products is extremely valuable in acclimatising new fish.

Eager to stock the tank, but at the same time wary of stocking too many fish, too soon, I purchased the following from a local shop.

- Five Golden Barbs
- Five Glowlight Tetras
- One Spotted Catfish
- One Sucking Loach

These were brought home as quickly as possible, and floated (within their polythene bags) in the tank for about 20 minutes to prevent temperature shock. The fish were released into their new home, and within the hour were all feeding well.

The nitrite content of the water at this time was 0.05mg/l (as N).

The following morning one of the Glowlight Tetras was dead, and the body too decomposed to be of any value in a post-mortem examination. Consequently, the cause of death could not be investigated, although the remaining fish appeared healthy and in good condition.

The Sucking Loach was already attacking the slight algal growth on the front of the tank with some vigour!



Myriophyllum—another old favourite for the community tank.

Write to:

Letters

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

Club talks

WITH reference to the letters which I see in print from various aquarist societies bemoaning the fact that society evenings are becoming difficult to fill due to the scarcity or availability of suitable lecturers.

I have been giving talks to clubs and societies both in this country and in America, where I lived for two years, over the past nine years and have built up a varied programme.

Anyone who wishes to contact me with regard to any of the talks I could give to their Club or Society should write to me at the address below. My calendar is certainly not full, particularly towards the end of the year. — Dr Peter A. Lewis, 'Milesgarth', Cawcliffe Road, Brighouse, Yorkshire, HP6 2HP.

Bubble nests



Gouramies beneath a bubble nest.

I WRITE after reading your article on bubble nest breeders. My experience with these fish is fascinating.

I acquired a pair of Thick-tipped Gouramies to add to my species tank. I could see that the female was about to spawn, give or take a day or two, unfortunately, my second tank 18 x 15 x 12 hadn't been set up, so quickly filling up to a level of 8in high I scooped out most of the Ricca fluitans from my small breeding tank and a few stalks of Cabomba.

Placed it all in the tank, settled the temperature around 78°F, I hoped now the tank was ready as I hadn't time to fit a proper u/g filter, I used a sponge type which was kept switched off. So with no gravel and very few plants I hoped for the best!

I then netted both fish, and placed the male in first, then the female, half an hour later. I kept my fingers crossed. On May 10 the male turned to a very deep chocolate brown, and started building the nest over half the area of the tank.

At this time I removed the hood and placed paper over the



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.

tank to retain the heat and left them to it. Seven hours later I was able to witness the true magnificence of the bubble breeder in the spawning embrace.

I noticed that the female didn't turn over completely as most photographs show. She seemed to be parallel with the water line and remained exhausted for five to 10 seconds until darting away from the nest. Gradually the time lapses became longer.

To my surprise the female began to attack the bubble nest, so I managed to lure the female away and eventually out of the tank, leaving the male to guard the nest.

After two days I managed to catch the male and waited for developments. The result being that at nearly a month later I have 199 fry flying around the tank, still as it was. I've added extra plants but there's still no gravel.

Obviously, there are lots of things I did or didn't do, more likely, and mistakes have been made, but for the aquarist whose pocket isn't very deep the rewards are there for all to see and enjoy.

At the moment I've notes on the development of the fry from small silver pinheads to 1cm long and if necessary I will follow this letter up with another one on the growth and development. Hare fish, will breed seems to be my motto as I've bred most livebearers successfully, so here's hoping with bubble breeders. — B. W. Cotman, Goldings, Northampton.

Growing Cryptocorynes.

FIRSTLY, may I say how much I enjoy reading your magazine. I have been following David Shields series on plants, with considerable interest in the March article on growing Cryptocoryne species.

Perhaps your readers would be interested in my own experiences with three varieties of these attractive groups.

I have a 30 x 16 x 12 stainless steel framed tank planted with *C. balansae*, *C. wilbisi* and *C. affinis* and containing a collection of Cardinal, Neon, Glow-light, Emperor and Rummy Nose Tetras.

Well weathered York stone and bog wood are based in the 'aquascaping'.

The tank has been set up for about six years and it has been completely stripped and cleaned twice in that time. Lighting is provided by two 40 Watt tungsten lamps for up to 15 hours per day and a well known make of power filter is used during daylight hours only. The pH is usually around 7.4 and carbonate hardness 7° to 8° DH, and a bucketful of water is changed once a week for one straight from the taps and heated to the same temperature of the tank before adding.

The growth of all three species is such that usually once a year considerable thinning of the plants is required. When a complete clean out is undertaken, the tank is filled with heated tap water and replanted immediately.

Tablets are also added to prevent the growth of blue-green algae which has, in the past,

proved a problem within the first few weeks. The fish are returned 48 hours later.

All the plants are descendants of plants bought many years ago and I have been led to conclude that over a period of years, plants will adapt to local water conditions and also that a well matured gravel bed is helpful.

Returning to filters, I have found in the past that u/g filters stunt plant growth generally. In the middle of last year, a second all glass 39 x 18 x 12 tank was set up using new gravel, bog wood and a variety of popular plants, plus a few cypripes taken from the tank described previously.

Filtration is again by external power filter. This tank contains Congo and Bleeding Heart Tetras, Clown Loach and Flying Fox.

To date growth of plants has been disappointing and in the past month lighting has been changed from 1 x 40 Watt Grolux and 1 x 40 Watt white to the Grolux plus 1 x 40 Watt Trulite.

The growth of certain plants have shown some improvement. pH and carbonate hardness are similar to the first tank.

One last point, Cardinal Tetras, Congo Tetras and Emperor Tetras have been able to spawn in the tanks, but with the exception of two young Emperors raised to maturity, no fry have been observed and no doubt due to a combination of the presence of the other fish and the unfavourable water conditions. — D. W. Kilby, Teddington, Middlesex.



Glowlight Tetras make a perfect show with Crypts.

EHEIM aqua- diagnosis

a breakthrough in test kits



Single pack test kits.



One of four comparator sets available.

WHY USE A TEST KIT?

The correct composition of the water in your aquarium is essential for the welfare of the fish it contains. Biological and chemical influences, such as impurities caused by food remains and waste matter, are continually changing the state of the water in your tank. Whereas outdoors, nature ensures a healthy balance, these natural conditions must be simulated in your aquarium artificially. EHEIM aqua diagnosis test kits will ensure that the water in your aquarium is just right.

WHAT IS EHEIM AQUA-DIAGNOSIS?

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.

In contrast to the usual tests, only a very small sample of 1,2 ml is required. This means the dosing syringe supplied can be used to take the water sample. There is no longer any need for the immersion of chemical measuring containers, a process which is complicated and at times dangerous.

Each set, in addition to the appropriate reagents, includes two measuring tubes, the dosing syringe and rotatable colour value disc.

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Right: Once inside Sea World you can visit several exhibits. Here palm trees surround the marine aquarium.



Below: This is Sea World—the entrance to this incredible aquarium.



This is Sea World...

Dr. David Ford visits California to sample the American style of aquaria



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.

This month he stops at San Diego, California and in October he will be hopping across the Channel to Nancy in France.



You are left in no doubt that Americans are proud of Sea World by this tower and huge Stars and Stripes flag.

THIS is Sea World... that's how the Americans introduce you to one of the best aquariums in a country which boasts a string of superb exhibitions.

Americans seem to have a fascination for the sea and their public aquaria certainly back this up.

I had heard of the reputation of Sea World and when I visited during my tour of the world's major aquaria I wasn't disappointed.

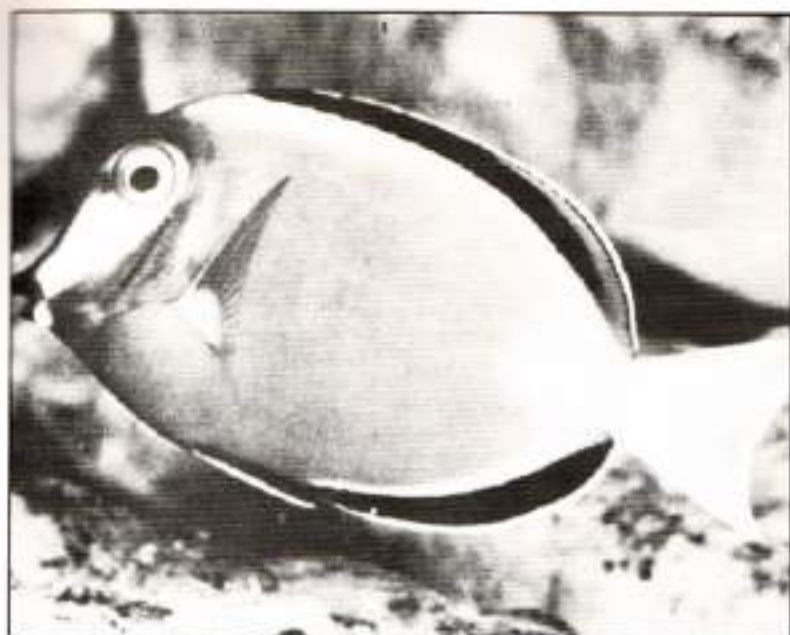
Sea World has three exhibition centres in the USA, at San Diego, California, Orlando, Florida and Aurora, Ohio. Each unit is devoted to entertainment via education in sea life. The motto of the group is: "Sea World is the place where man meets the sea".

The project started in San Diego, California in 1964 and has grown to be the world's largest oceanarium. The three units boast over 5,000,000 visitors yearly.

A publicly owned corporation, the organisation carries out research and educational programmes. The Sea World Institute at the San Diego unit works closely with Scripps Institute and the University of California. All three parks collaborate, even having their own house newspaper called "SeaWorld Scene" with articles on staff activities. Sea World also publish leaflets, articles and posters on all aspects of sea life.

I visited the San Diego unit one usual sunny Californian day in 1976—and was so impressed I returned in 1978. The 40 acre park is in Mission Bay approached by taking the Sea World Drive from Interstate 5. Parking is free and the unit is open every day of the year. Entrance fee was \$6, half price for children and free for infants.

Guided tours are available and annual passes. You can even hire the place at night for a private party!



Left: A Surgeon—one of the many marine fish exhibits at Sea World.

Right: a Lionfish—always a magnificent sight. This one is perfect.

Far Right: Another selection of invertebrate life.

Wandering around the Park revealed the usual shows: "Shamu" the Killer Whale, performing Dolphins, Seal and Penguin Shows, a Japanese village where Ama girls dive for pearl-bearing oysters for you, even a Hawaiian village.

The grounds connecting these shows are magnificently landscaped with the largest collection of waterfowl in America. Very attractive was the Water Fantasy Show where a thousand fountains lit by changing colours perform a dance of the "Four seasons".

However, my main interest was the aquarium which contained not only seawater fish, but freshwater specimens too. I was privileged to be taken around the aquarium including behind the scenes, by the Curator and spent an interesting few hours comparing notes on methods and techniques.

The staff include veterinarians with fully equipped laboratories to maintain the animals in good health. Ocean-going boats collect specimens for the park and include the sophisticated gear necessary for handling whales and dolphins.

Education and research are considered important in Sea World's programme. Each year, thousands of school children visit outdoor classrooms to learn about the sea and its life. They call the students' research programme "Exploration Breach".

The aquarium remained the main point of interest for me. The specimens on display include all the usual coral fish and invertebrates as well as some popular tropicals, but also indigenous USA species.

The largest tank holds 200,000 gallons of seawater and contains many sea creatures including a girl diver who wears a diver's helmet and a bikini!

PRACTICAL FISHKEEPING

Below: Marine crabs—some of the more interesting invertebrates on show.



One of the Grouper collection at Sea World.

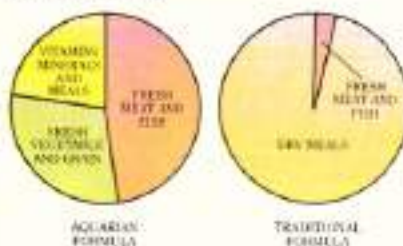
Dr David Ford is a specialist in fish nutrition and head of the Research Team at the Aqualab of the Animal Studies Centre, Melton Mowbray. His team of Veterinary Surgeons, Biologists, Nutritionists and Technicians, using the facilities of the Centre, which is Europe's largest Pet Care Study Unit, have completed more than five years of research and trials into modern fish food. The result of their labour has been Aquarian fish food, 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.

WHY ARE FRESH INGREDIENTS BETTER FOR MY FISH?

The fresh ingredients in every container of Aquarian tropical fish food have all the vital elements of vitamins, proteins and amino acids to make your fish bigger, brighter and more full bodied. The majority of the world's fish foods simply cannot match the quality Aquarian provides in these areas due to the fact that they are cereal or meal based. Fish prefer the Aquarian freshness because it's closest to the food they would choose in the wild. And as there are dangers of infection in indiscriminately feeding fresh food, feeding Aquarian is the safest way to give fish a more natural diet. Because of all this, Aquarian can truly be said to be the fresh approach to flaked fish food.

HAVEN'T ALL FISH FOODS FRESH INGREDIENTS?



No! In fact, the conclusive evidence of many years testing proves that most of the world's brands of fish foods are, in fact, not fresh based at all. They're either cereal or meat and fish meal or

some such substitute. None of them have the food value or taste that fish find so enjoyable in Aquarian.

HOW CAN IT BE A FRESH FOOD IF IT'S A DRY FLAKE?

Because the great and unnecessary bulk of fresh food, as far as fish are concerned, is water, we simply cook it off. In a gentle simmering action we turn fresh ingredients into easy-to-feed flakes which have equal nutritional value to raw food and an appetising attractiveness to all fish. You can sense the freshness of Aquarian the second you lift the lid and it's a freshness your fish will eagerly recognise.

WON'T THAT FRESH CONTENT DECOMPOSE FAST?

Immediately after cooking the food for Aquarian, we seal it in its airtight container and to keep it fresh throughout its use we supply a replaceable secure lid. The drums and plastic pots that ordinary fish foods are in are not satisfactory for the fresh content of Aquarian and indicate just how dry and unattractive they are.

WHY IS IT IN FLAKE FORM?

When it comes to feeding different types of fish and matching their very different feeding habits, flakes are ideal. They float for surface feeders, suspend for middle feeders and sink down intact for bottom feeders. With Aquarian, we've made the flakes large enough to attract big fish and yet delicate enough for the smaller species to nibble happily away at.

CAN I REALLY FEED ALL TROPICAL FISH ON AQUARIAN?

The short answer is yes. Trials at the Animal Studies Centre have shown that even the live feeding Piranha will not only accept Aquarian as an exclusive diet, but will actually thrive upon it! Aquarian's fresh food flavour is the favourite for every species kept in the modern aquarium.

MY FISH ARE O.K. AS THEY ARE. SO WHY SHOULD I CHANGE?

The reasons for changing to Aquarian will become very clear after a remarkably short time. Your fish will be fuller bodied, more colourful, lustrier and lively. The higher quality protein that Aquarian gives means a more balanced diet than be offered by meat and cereal based foods with the excess of lower quality proteins that lead to tank polluting residues. Aquarian is a food that is more easily digested and creates less waste product to cloud the water. Not only will your fish look better from feeding Aquarian—you'll be able to see the difference!



"The fresh flaked f



CRACKED
 CORNMEAL
 CRACKLE
 EGG &
 VEGETABLE
 PROTEIN
 FRESH
 LIVER
 FRESH
 FRODO CUT
 WHEAT
 FRESH
 VEGETABLE
 FRESH FISH
 & CEREAL
 FRESH
 WHITE &
 OILY FISH
 VITAMINS &
 TRACE
 ELEMENTS

WHY ARE THERE SO MANY DIFFERENT COLOURS?

The colours of flakes in a container of Aquarian tropical fish food identify the eight formulae, each a type of food in itself, that are balanced for a perfect diet. Because different fish have different tastes but no single food could hope to satisfy, Aquarian gives you the opportunity to keep all your fish happy. That's from carnivores, right through the feeding spectrum, to the most fussy herbivores.

IT SOUNDS EXPENSIVE STUFF - IS IT?

Because Aquarian contains fresh ingredients, scientifically researched for a nutritionally balanced

diet, and because it's been found by professional breeders and top enthusiasts alike to be the one food all fish thrive upon, you might expect it to be very expensive indeed. In fact, Aquarian is no more expensive than other fish foods and that's a fact.

DO AQUARIAN ONLY MAKE TROPICAL FISH FOOD?

Certainly not! There are 13 different varieties of food, ranging from Gold Fish and Guppy foods to Fry foods and colour enhancing foods. Plus there are seven ailment remedies and water treatments. So you can see, Aquarian really are the specialists in everything for the fishkeeper.

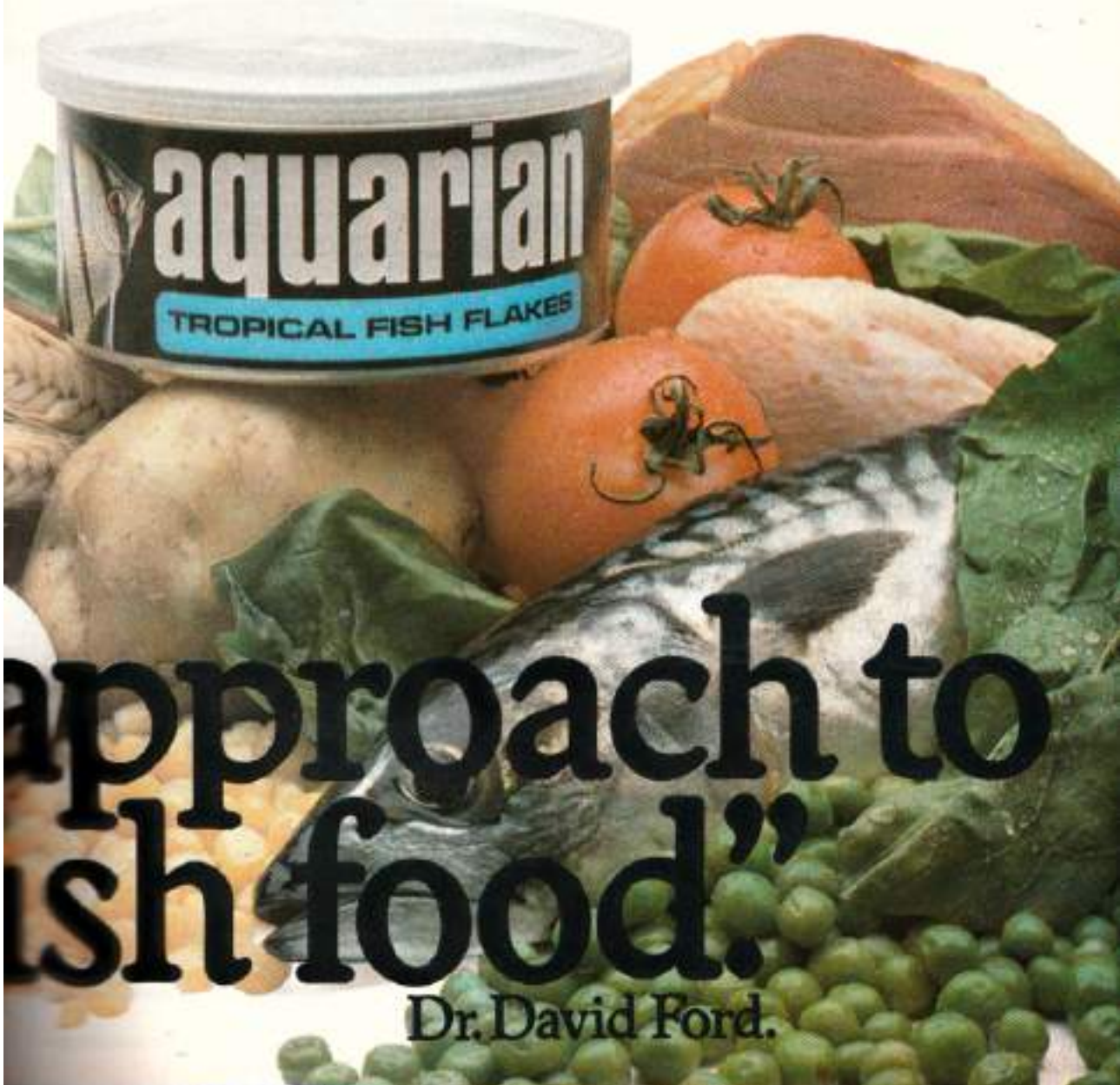
IF I'VE ANY MORE QUESTIONS, CAN I CONTACT YOU?

Yes. Whatever questions or problems you have you can ask my personal advice free. I would be interested in any matters you raise, so write to me:-

Dr. D.M. FORD
 at the Animal Studies Centre,
 Freeby Lane, Waltham on the Wolds,
 Melton Mowbray,
 Leicestershire LE14 4RT.

And meanwhile, I wish you successful and enjoyable fishkeeping.

aquarian



approach to fish food!

Dr. David Ford.



Andrew Stagg and Ken Digby (pictured) are both highly qualified to write about fish diseases.

They both work in the laboratories of New Technology Ltd at the Aquaculture Centre, Hadlow, Kent.

Both are involved in research and development on New Technology's range of fishkeeping products — many of which are tests and cures for diseases.

They also operate a pathology service which diagnoses diseases in both aquarium fish and fish from commercial farms — which is the other side of New Technology's business.

Both are highly qualified scientists academically. But being based at a laboratory attached to an aquarists shop they meet fishkeepers and understand their problems.

Saving your marine fish

By Andrew Stagg and Ken Digby

IT IS an established fact that keeping marine fish is the most difficult and demanding branch of the fishkeeping hobby, but there are ways you can help your marines to avoid disease.

Tropical marine fish in captivity most commonly die from the following causes:

1. **Bad Water conditions.**
2. **Codinium Sp. infection.**
3. **Cryptocaryon irritans infection.**
4. **Bacterial infections (usually by *Vibrio* Sp.).**

Having managed to survive these obstacles they may live quite healthily for some weeks and then rapidly deteriorate and die despite perfect water conditions and careful feeding.

We have examined a number of fish which have died in this way representing a variety of species and have been able to identify possible causes of death as follows:

Infection by digenetic trematodes (intestinal flukes) and nematodes (intestinal worms).

Infection by monogeneic trematodes (gill and skin flukes).

Degeneration of the liver with no direct evidence of infection.

Infection by copepods.

The first four conditions—the more common causes of death—are usually avoidable. An outbreak of Codinium or Cryptocaryon infection is generally a result of poor water conditions—improperly matured water, overcrowding and insufficient quarantine.

Usually, infection by Codinium Sp. is too far advanced before it is recognised for effective treatment to take place and sometimes fish can die from Cryptocaryon infection without visibly manifesting the white spots characteristic of the disease.

Stress placed on a fish by the presence of toxic substances in the water such as ammonia, nitrite, low pH and unsuitable medications gives the ever present bacteria a chance to infect the fish and bring about its rapid demise despite efforts to save it with medications which simply stress the unfortunate animal even further.

Sensible management of the aquarium —



Andrew and Ken's laboratory in Hadlow.



A blow-up shot of a gill fluke in a marine fish. The fluke is the hooked object in the centre.

strict quarantining, careful monitoring of the aquarium water with reputable proprietary test kits and resistance of the temptation to overstock or to stock too quickly should reduce the chances of these infectious agents causing disease and death.

It is also good sense to observe fish which you intend to buy over a period of time in the shop to make sure that they take food and appear healthy although this does not do away with the need for quarantine once the

fish has been bought.

All tropical marine fish sold in this country are caught wild and imported by air from such places as the Philippines, the Caribbean and Sri Lanka.

In the wild state diseases caused by *Oodinium* and *Cryptocaryon* are much less likely to occur simply because of the vast volume of water in which the fishes live which is also constantly changing.

Most wild animals, however, carry some

sort of parasitic burden. These parasites usually infect the digestive tract and sometimes organs such as the liver, heart and lungs as well as the blood stream.

Fish are no exception to this and, having survived the rigours of being caught, starved, confined to a small plastic bag with no water or air change for many hours, released into a strange tank containing artificial seawater and subsequent transport from wholesaler to retailer and into your home it is hardly surprising that the fish finally succumbs to a parasite with which it probably lived quite happily in the wild.

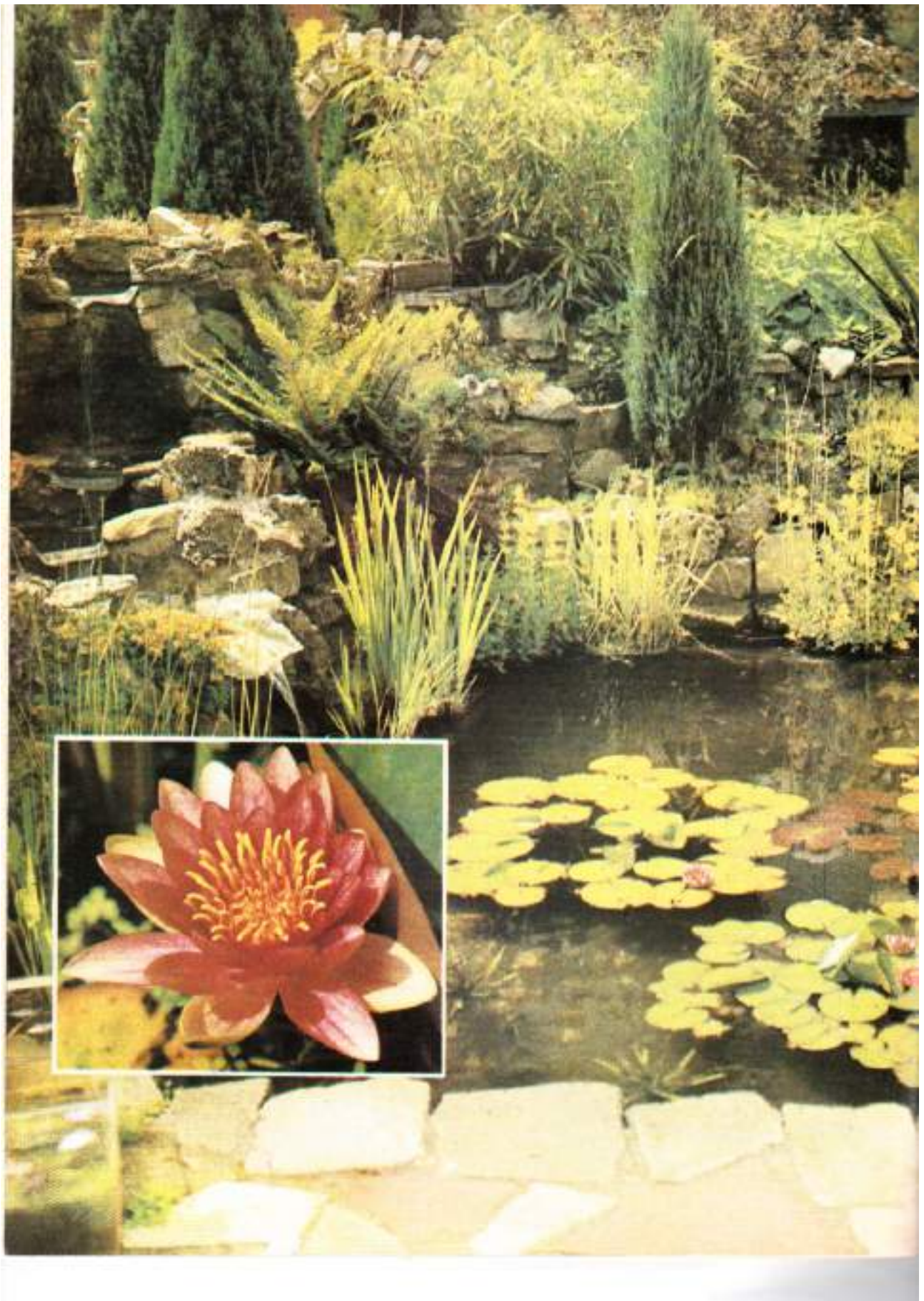
Regardless of the possibilities of infection by microorganisms—parasites, bacterial, viruses and fungi—marine fish kept in an aquarium are almost certainly presented with an unfamiliar diet to add to their unfamiliar surroundings. Some fish never really eat properly in captivity and eventually die of starvation. Others feed well enough but may not be getting a correctly balanced diet and death, due possibly, to being fed the wrong sort of food causing failure of the fishes' digestive system may occur.

It is most important that the aquarist who keeps tropical marine fish learns as much as he possibly can about the species in his aquarium and endeavours to present the fish with as close an approximation to its natural diet as he can.

Since the diagnosis and treatment of marine fish diseases presents many problems it is prudent to give the greatest attention to detail to the fishes' environment and diet.

This, coupled with a sound knowledge of the fish species' habits will enable the aquarist to notice a sick fish quickly so that action can be taken to avoid the spread of disease to other fish in the aquarium.







Tranquil WATER GARDEN

A world of ponds, lilies,
and beautiful Koi



As my shadow fell over the edge of the pool, Koi began to appear from nowhere. They darted out from shady corners and effortlessly patrolled the water at my feet like brightly coloured submarines.

The fish rolled and played in a multi-coloured shoal as they waited for their daily feed of trout pellets.

Then the surface erupted in an explosion of reds, oranges, blues, golds and whites as the first handful of pellets hit the pond.

This is a show which is put on daily at the Waveney Water Garden Centre at Diss in Norfolk during the summer.

And a visit to the centre showed just what can be achieved with a garden pond, some imagination, plants and of course some of those beautiful Koi.

The centre is a haven of peace and tranquility as you move through the flower beds and lawn into a world of aquatic excellence.

Each of the four ponds in the garden features its own brand of beauty. All types of water fall, fountain and aquatic highlight can be seen.

There's a windmill, a rustic bridge and a Japanese Garden complete with Pagoda style summer house.

(Continued overpage)

The Waveney fish in the main Koi pool are really tame and a superb mixture of colours as they swirl up to take their pellet feed.

Main picture: This beautiful pond at the Waveney Water Garden Centre shows just what can be achieved with lilies, rocks and imagination.

Inset: A close-up of one of the many varieties of lily available to the water gardener. Delicate and subtly coloured it boosts any pool.

WATER GARDEN

The centre aims to show just what can be done by the pond keeper. Of course the centre sells all the fish, equipment, special effects and aquatic rockery plants you need to build your own water garden.

The water gardens are open from Easter to September but the Waveney Fish Farm itself is open all year.

This offers the facilities of a small garden centre and of a big aquarist centre.

There are tropical freshwater and coldwater rooms plus a new marine fish room.

Koi are an important part of the fish life at the centre and fish are imported from Japan and a home breeding project has begun.

But it is the beautiful landscaping in the water garden with plants, shrubs, and rockeries that sets the scene for a visit that will delight the aquarist.

Glas is a sleepy little Norfolk town. The Waveney Fish Farm is in Park Road on the outskirts.



Another charming pond in the Waveney Fish Farm gardens, this features smaller Koi.

Story by Norman Wright
Pictures by Clive Nicholls



The Japanese Garden—a beautiful haven of peace.

Inset: Clowns in the centre's new marine room.



John Mitchell

Holiday special

Join Practical Fishkeeping's trip
to get a fish's eye view of a Red Sea coral reef

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.

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.

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.

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, for rooms, or £150 single.

We shall be staying at the Hotel Laromme 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.



Moray Eel pictured at Eilat.

PROVISIONAL ITINERY

Departure 24th January, 1980 from Gatwick Airport

Hotel Laromme

Almost a resort in itself, this well-appointed hotel is just across the road from the beach about 15 minutes by taxi from Eilat's centre. There's a large pool where you can also play water-polo, extensive gardens, terraces and a bar. Facilities include six shops, a games room, sauna and disco.

Cost

£270.00 per person in twin room
£298.00 per person in single room
Extra week — £122.00 per person in twin room
£150.00 per person in single room

Cost includes

- * Special flights Gatwick/Eilat/Gatwick
- * In flight catering
- * Accommodation in twin or single rooms is reserved at Hotel Laromme
- * Meals — dinner and breakfast
- * Service of Practical Fishkeeping representative
- * Entrance to Eilat Aquarium

Cost does not include

- * Holiday insurance (strongly recommended)
Premium: £7.20 - 1 week
£9.80 - 2 weeks
 - * Israel airport tax - payable locally
- This holiday is operated in conjunction with Red Sea Holidays ATOL 3048

Booking Form

TO: Practical Fishkeeping Holiday - Abbeygate Travel Limited, Apex House, Oundle 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 (£9.80 for 2 weeks duration) and accept the normal booking conditions of Abbeygate Travel.* / Red Sea Holidays. Cheques to be made payable to Abbeygate Travel Limited.

Signature:

Date:

* Copy available on request.

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NICK Fletcher is a regular writer in PRACTICAL FISHKEEPING. He is a full-time journalist with Angling Times and as well as catching 'em Nick is a fanatical fishkeeper. He has kept many species and bred many successfully.

Nick (29) is still expanding his fish set-up. He lives near Peterborough, Cambs.

THE discus has been the focus of more dogma than any other freshwater tropical fish. To hear some fans talking, you would believe that keeping them required a degree in water chemistry, while actually breeding them needed the possession of magical powers.

Not so. The discus is a cichlid, after all, and while its needs are more specialised than most, there is no reason why it cannot be successfully kept, or even bred, by the average aquarist.

The pH and degree of hardness of the water in the discus aquarium can cause unnecessary headaches. If you live in an area of hard water you can take steps to remove temporary hardness, but sooner or later the DH readings will creep up again. In any case, it is highly unlikely that you will be able to duplicate the quality of the water in your dealer's tanks, and his tank water in turn was probably different to that of the breeder or wholesaler. So, heresy it may be, but forget the composition of your water until you want your fish to spawn.

Instead, concentrate on setting up a tank that will fulfil your fishes' other needs. The first essential is complete cleanliness. The tank—which should not really be less than a four-footer—must be scooped with disinfectant like Dettol, then rinsed and rinsed again until it is completely sterile. The same goes for the gravel. When you buy it, wash it under a running tap until all suspended dirt is removed and then, if you wish, boil it or oven bake it in the oven.

Discus do not like turbulent water, neither do they like an accumulation of mulm on the bottom of the aquarium—two good reasons for doing away with an undergravel filter and substituting a box, or corner filter. If you wish, you can add to this an external filter.

Plants in the discus tank are not strictly necessary, and when it comes to breeding time, many hobbyists prefer to maintain absolutely sterile conditions by dispensing with them altogether. But when you first buy discus, you should set your sights on keeping them in good health and growing them on. While this is going on, there is every point in making the aquarium look as attractive as possible. So your first discus tank should have a peat bed to encourage plant growth.

Place the peat—which must contain no additives—to a depth of one inch on the tank bottom, then add plenty of gravel. Six inches is the minimum for good plant growth so bear this in mind when you buy your tank and get a good, deep one.

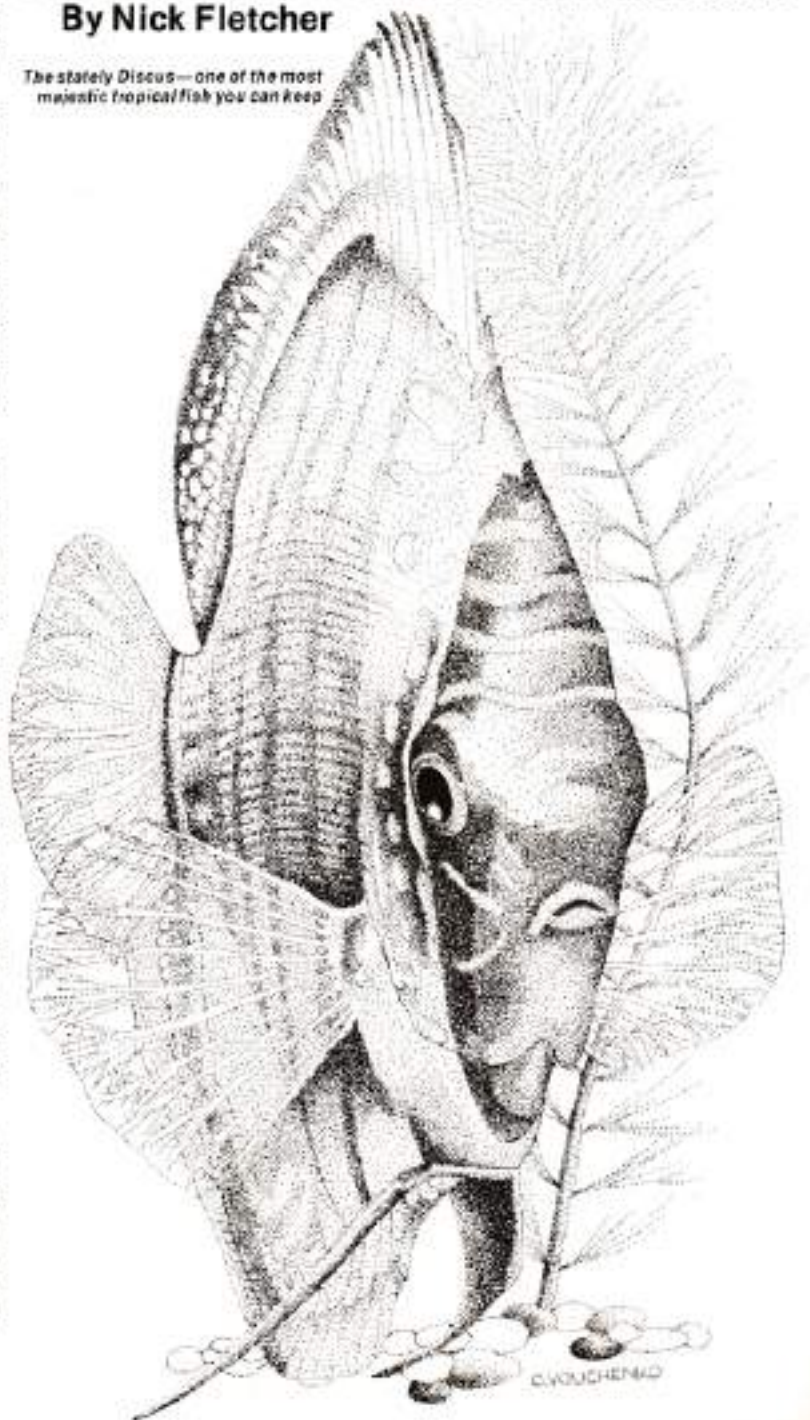
Discus like relatively high temperatures, and for thriving fish you should aim at anything between 80°F and 85°F. At this range, many tropical aquarium plants will not survive, so your choice is limited. Amazon swords should be all right, and most of the Cryptocoryne family. Remember that there are times when it will pay you to bump the temperature right up to 100°F—if your discus contract a disease, or if they suddenly go off their food. Your plants must be able to survive this.

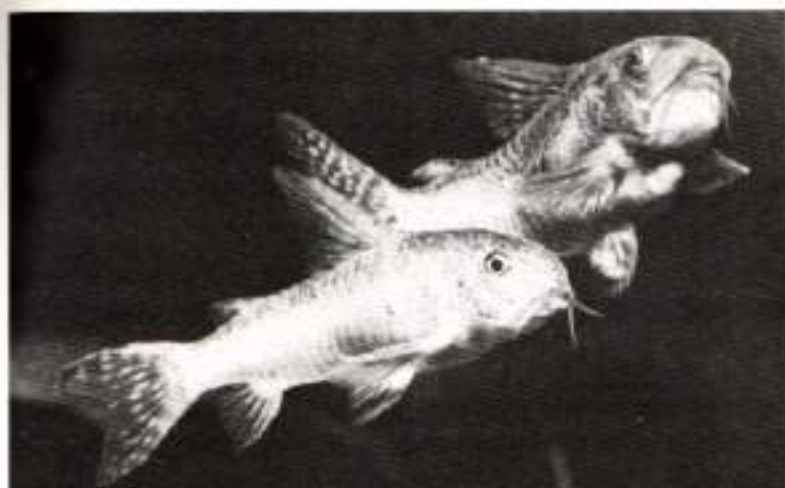
DISCUS

How to keep and breed these beautiful Cichlids

By Nick Fletcher

The stately Discus—one of the most majestic tropical fish you can keep





Corydoras—a suitable species to keep in a Discus aquarium.

If you wish to keep other fish with your discus, aim for peaceful, unobtrusive species like Corydoras or young Plecostomus, which have the added bonus of scavenging up uneaten food.

Discus do not like direct light, so use floating weed as a diffuser, Salvinia or duckweed. The method of lighting the tank is up to you, but one warm white tube and one Grolux is a reliable combination.

Buying your first discus is a confusing business. There are so many alleged colour varieties and fish of all sizes offered for sale that it's hard to know where to start. So buy the cheapest, which is the Brown Discus (*Symphysodon aequifasciata*). Don't consider getting more than two to begin with, until you are confident of your discus husbandry, and don't buy anything under two inches long, however cheap the fish may be. They will not survive.

Once you have kept a pair in good health for a month, you may, if you wish, buy two more. The term "pair", incidentally, should not be taken to mean that discus can be sexed. The only time this is possible is when the fish are actually spawning, when the protruding breeding tube of the male is more pointed than that of the female.

Discus are not bullies, and providing all your fish are the same size there should be no trouble. Like all cichlids, they operate a "pecking order" and once the tank boss is established he will live peacefully on his reputation.

When you first buy discus, stay away from the tank for two days and leave them in peace. Then get them used to a mixed diet, which ideally should include live food. All live food carries the risk of introducing disease if it is fed straight from source, but everything, including Tubifex, can be rendered safe by first soaking it in a mild antiseptic like Dettasol. The discus diet should also include grated ox heart, which the fish love once weaned on to it, plus dried food. Variety stops discus getting "hooked" on one food item.

Your fish should ideally be fed three times a day. Discus are peckers and nibblers, so they may not consume everything put into the tank immediately. But they will come back to it later.

Frequent feeding goes hand in glove with regular water changes. Peterborough dealer and hobbyist Eddie Hoggett, of Price Right

Tropicals, changes up to half the water every day, and certainly at least a quarter. This water can come straight from the tap, but Eddie points out that the chill should be taken off it so that the temperature isn't lowered in the tank. Other hobbyists may find that two partial water changes a week are enough.

Other maintenance includes siphoning off any waste matter from the floor of the tank and removing algal growths if they should form. And Eddie recommends that when you do this, it should be done determinedly so that the fish associate the noise with their owner. Similarly, bang around a bit when feeding them, and the supposedly shy discus will soon get the message and become finger sure.

Let's assume that you have now kept discus successfully for some months and wish to breed them. Even if you obey all the textbook rules, spawnings can be a hit and miss affair and that's why the fish are so expensive—they are not reliable breeders. Still, the odds can be reduced by the application of a few guidelines.

Water quality now becomes more important, for although discus can live in quite hard water they are not going to breed in it. Figures of a pH of 5.5 and a degree of hardness of 6 should be taken as arbitrary, inasmuch as you are unlikely to be able to maintain either "spot on". Better to concentrate on getting the water within a reasonable degree of the two figures.

In hard water areas it is very difficult to maintain a low pH unless you collect rainwater, store it in sterile, uncontaminated containers and add it gradually to the water in your breeding tank. Black Water tonic will bring down pH, but peat won't do it for long. However you tackle your water chemistry, get the water to a state that can be readily maintained, and then see what happens.

The breeding tank itself should be a sterilised system with no rooted plants, indeed no peat or gravel on the floor. But you can still use duckweed or Salvinia to diffuse the light. With a bare tank, any possible source of contamination can be seen and removed straight away.

The only furnishings should be pieces of slate, or large clay flowerpots—something which the discus can feel secure with, and which will provide a good anchorage when

the time comes to lay the eggs. Temperature in the tank, for breeding, should be in the high sixties Fahrenheit and kept constant.

For an account of an actual spawning, the example of Eddie Hoggett's fish is typical, inasmuch as he achieved a degree of success but was not able to rear the young to maturity. Eddie had been retailing discus for a year and felt confident enough to ask his London wholesaler for a large pair of fish when they became available. They duly arrived and were displayed in the shop. But soon they coloured up in typical pre-spawning fashion and began to display evidence of breeding tubes.

At this point the hobbyist got the bottom of the dealer, and Eddie set up a breeding tank at his home and transferred the fish. For a long time, nothing happened, then they began displaying to one another, flapping and "ticking" their fins, cleaned off a site on a piece of slate and after one or two dummy runs, laid and fertilised 3-400 eggs.

They then proceeded to eat them. This often happens with a first brood, and there is nothing that can be done to stop it. The eggs and the fry cannot be separated from the parents, because the young fish rely on secretions from their parents' skins for sustenance.

Eddie waited several months before the next spawning, and this time the eggs hatched after the usual 48-hour incubation period.

But the free-swimming young, of which he counted 16 to begin with, soon went down to 10, and then there were none left.

To minimise the risk of this cannibalism, Eddie suggests keeping the parent fish well fed up to spawning time, and once young fish appear, cutting off all routine maintenance, like water changes. A peaceful environment would seem to be the key to success.

The young discus feed off the parents' mucus, nicknamed "cichlid milk", for as long as the adult fish will allow and can then be weaned on to newly-hatched brine shrimp. Parental care lasts until the adult fish once again get the spawning urge. At this point the initial brood becomes fair game and should be removed to another tank holding water from their original home. As discus have a fairly rapid spawning cycle, this can lead to difficulties.

Whether you breed discus, or merely keep them, the key to success is the prevention, not the cure of disease. When you first buy your fish, look for good bright colouring (never buy a dark or blackish fish for its on the way out); good, red eyes and discus that are plump for their size. Always keep a sharp look out for trouble, for often a discus can go almost imperceptibly downhill without the keeper noticing until it is too late.

Discus are no more or less susceptible to disease than any other fish. The notorious "hole in the head" disease is confined almost entirely to wild fish, and since such fish are likely to cost upwards of £50 apiece, they are outside the scope of the beginner. Other parasites can often be knocked out by raising the tank temperature over a period of days to 100°F, and this can sometimes have the added benefit of restoring the fishes' appetites should they go off their food or become addicted to Tubifex.

Discus aren't easy, but they inspire a fierce loyalty among their fans. That's why whenever Eddie Hoggett sells a fish, he tells the customer: "If anything happens to it in the first few weeks don't tell me about it." He's that attached to them.

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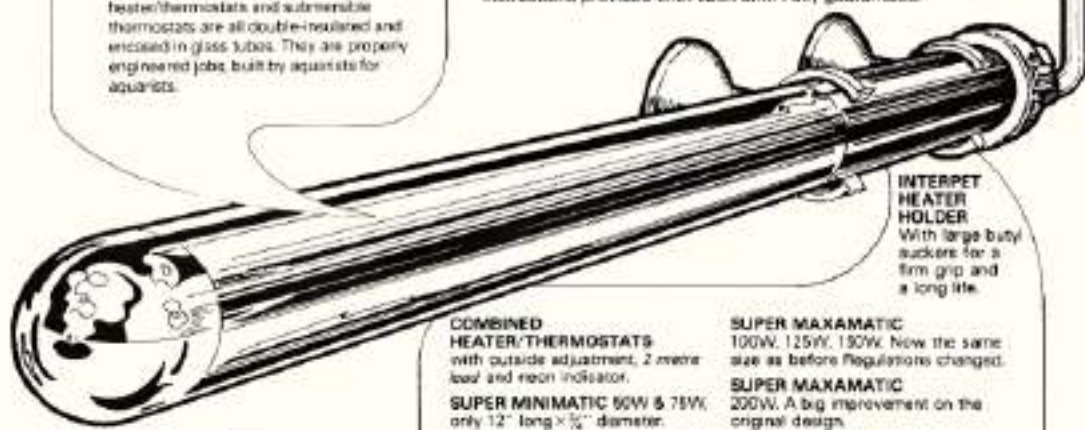
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FOR TROUBLE-FREE FISHKEEPING





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 Midland Koi Society.

ALTHOUGH we have covered many aspects of pool construction, design and pond fish this year, one subject we haven't touched on yet is lighting.

But just as in the aquarium, lighting can enhance even the smallest pond. And this time of year is a good time to consider lighting your water garden.

Time spent now deciding on the types and designing how to use them will allow you to install lights ready for the spring.

September is also an important month to start preparing your pond and its fish for the winter weather.

But we will start with lighting first and move on to those important jobs for September later on.

Pool lighting should be subtle with the lights used to pick out certain features in and around the pond.

Fountains are the obvious choice for consideration and they can be easily illuminated with floating lights.

The pool water may also be lit by simply placing lamps beneath the surface shining through the water forming coloured areas of water. To illuminate the waterfall and rockery, powerful flood lights may be used.

They may be placed either in the pond itself or if there is a fence or tree close to hand the lamp may be fixed to these and directed onto the area required to be lit.

Subtle lighting of certain areas is preferable rather than too many lights, giving an effect rather like Blackpool illumination! That is fine there, but not really in your back garden! It is surprising how even a fairly dull green shrub will benefit from a green floodlight directed onto it. Try to position the lamps so they are not too visible and not directed so as to dazzle an admirer and not onto next door's windows.

There are various types of pool lighting which are simple to install.

Firstly, there are the floating lights which are sold in pairs, together with a transformer to knock down the mains voltage to 12 volts.

These lamps may also be used beneath the surface by weighting down each unit.

Switching on your pond

Roger Cleaver and Peter Bull look at ways of lighting pools and cover jobs to prepare the pond for winter

This spectacularly lit fountain on display at the Stapeley Water Garden Centre, Cheshire, shows what can be achieved.





Draining the pool and giving it a good clean out.

If a more powerful light is required then there are the mains voltage floodlights which are considerably stronger. They can also be submerged.

The colours of the floods are red, green, blue, yellow and normal white. The units are sold separately but provision is made to enable you to plug one unit into another thus avoiding separate leads running to every unit.

One other type of 12 volt system is bought in kit form. It is normally four light units with cable and transformer, reducing the current to 12 volts. These include all the necessary fittings and to make things even more simple, the light units are clipped onto the cable wire, no cutting required, enabling easy movement.

The lights are ideal for pool surround and rockery illumination but are not submersible.

The items mentioned are probably some of the best known types, but we are sure that there are many other units which will give your garden a night-time face lift enabling you to enjoy extra hours outside on warm summer evenings.

One last point to mention when considering lights in the garden and around the pool is to make sure that the mains supply to the pool or garden is totally waterproof.

Adaptors are available but to ensure a water tight joint they must be used with the correct cables. If in doubt you should consult an electrician as to the safest way in which to install electricity in your own particular case.

To continue this month it will probably pay for us to look at what work is required to the pool at the end of the season.

With the weather as changeable as it is there seems to be no definite date for the end of the season, but normally temperatures begin to drop by October and the first frosts are usually with us by November.

At this time of year it is obvious that the plant life is dying off. This in itself is not harmful to fish life, but should the pools freeze then the decaying matter can and will kill fish trapped beneath the ice.



Plants like this are in peak condition during the summer but will need cleaning up during September.



You can store your fish and plants in an old bath while the pool is emptied.

Whilst the weather is still relatively mild it is probably a good idea to give the pool a thorough cleaning.

In smaller pools you can go so far as to empty the pool completely so that all the mud which has collected in the bottom can be removed. The sides of the pool can also be washed down, so that any algae can be cleaned away.

Dead and dying leaves on the plants can be trimmed off and the pool refilled. While you are doing this you have a chance to closely inspect your fish for signs of any damage and if any is found you can take the appropriate steps to treat them.

Once everything has been cleaned out then the fish can be returned to the pool remembering to allow the temperature of the water the fish are in to slowly equalise with that of the pool.

Larger pools also need a clean out, but they are often impractical to totally empty. In this case start by removing all dead and dying leaves and tidying up the marginal plants.

Next use a fine mesh net and remove as much of the mud and debris lying on the bottom. This will not allow you to remove all



Switching on your pond

that much in one go as the movement of the net will stir up quite a bit of the muck.

If the operation is repeated several times over a period of days then the majority of the muck should be removed which will certainly give your fish a greater chance of survival should your pool freeze completely later in the year.

Extra amounts of muck can be removed if some of the water is removed whilst you are waiting for it to resettle after stirring it up.

A pool pump or syphon tube is the easiest way to remove the water, that is if your garden permits water to be pumped or syphoned away.

Otherwise it is a case of carrying buckets backwards and forwards. These changes of water serve another useful purpose other than removing the muck.

Apart from solid matter which obviously builds up during the year, fish add a great deal of minerals and hormones to the water.

Still more minerals are added naturally via the air. These reduce the quality of the water and by changing part or the whole of the pool you are in effect revitalising the water your fish live in.

Apart from the plants within the pool decaying and dying back at this time of year you also have the same in the rest of the garden. You have leaves and piles of plants falling all round. A great deal of this tends to end up in the pool and this is particularly annoying if it happens just after you have finished your autumn clean out.

One way to prevent too many leaves entering the pool is to cover the surface with a plastic net. Many people regard having a net across the pool as a nuisance, but it will prevent a lot of debris entering the pool.

The net often serves another purpose during the autumn. With so many of the



Above left: Remove dead leaves.

Above: Another Stapely lighting special.



Plants in baskets like these will begin to die back at this time of year. Carefully remove dead leaves.

plants roosting the fish are often more exposed. When this happens they are vulnerable to attack from cats and birds. This is obviously prevented if the pool is netted.

As already stated, from now on, close watch should be kept on your fish for any change or disease must be cleaned up before the cold weather sets in or else the fish will have to be brought in, treated, and kept in until next spring.

The things to be looking out for are unusual behaviour, for example sluggishness or constant flipping, growths on the body or any wounds. Most ailments if spotted soon enough should cause no real trouble in treatment.

One word of warning, in identifying trouble, if in any doubt at all consult someone with some experience. Should you be in doubt about a fish carefully net it and place it in a clear polythene bag.

Through the bags most things are magnified so you should be able to spot if there is anything wrong. If you cannot most aquarists shops will be only too willing to offer you their advice so take your fish along in the polythene bag to see if they can help.

Apart from the clean out and keeping an eye on your fishes health, care should be taken in feeding your fish through this period of the year. As with preparing your fish for spawning, getting them into condition for winter depends greatly on correct feeding.

In order for your fish to obtain the resources of fat they need to see them through the bad weather they need a good diet of good quality foods.

Apart from the numerous types of flakes and pellets a variety of other foods should be given during this period. Several types of food, freeze-dried or even frozen foods can be obtained from your local fish shop and these should be used to supplement your fishes diet in order to build up their reserves.

By taking a little care with feeding and pool maintenance your fish should approach the onset of bad weather in the best of condition.

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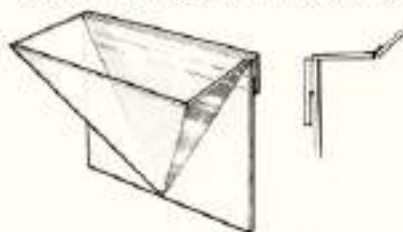
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Shrimps

NEWLY-HATCHED brine shrimp, (*Artemia salina*), have always been highly regarded as a "first-food" for baby fish, and their popularity has in no way been diminished by the improvements in quality and convenience of modern man-made fish foods.

Indeed, the most successful fish breeders see brine shrimp as the only food that will be readily accepted by the most difficult-to-raise species of fish, and the proof can be seen in the low mortality rate coupled with rapid growth.

The high cost of brine shrimp eggs has always been a headache, but over the last decade or so an even greater problem has



All glass hatcher front view and cross section.

been encountered—the industrial pollution of the traditional egg harvesting areas in the U.S.A., resulting in reduced egg fertility levels.

Even more alarming was the unpredictability of the hatching rates, something that could spell disaster when the hatching process took around 48 hours, and the fishkeeper had a tankful of hungry mouth waiting.

That brief history explains the significance of the latest development from **New Technology**, brine shrimp eggs that will hatch out

A Heavy duty rubber bands keep bottles upright.

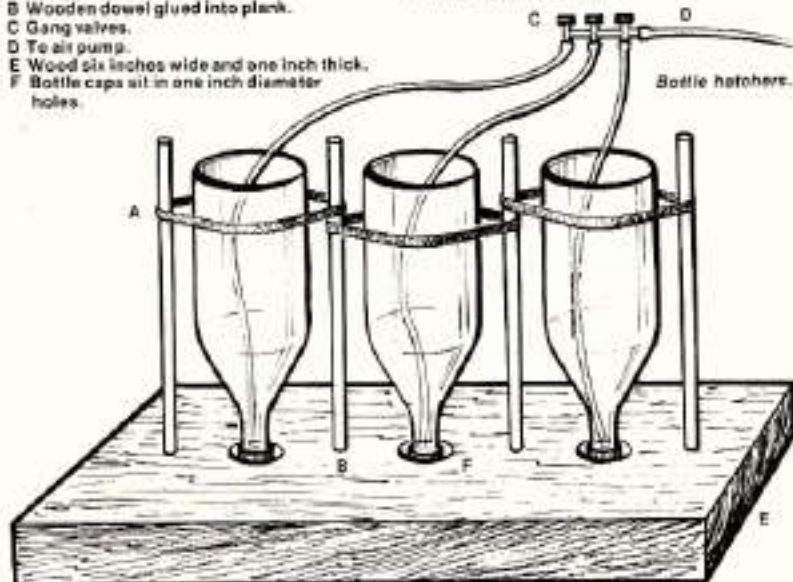
B Wooden dowel glued into plank.

C Gang valves.

D To air pump.

E Wood six inches wide and one inch thick.

F Bottle caps sit in one inch diameter holes.



On File

Equipment reviews by technical writer
Cliff Harrison

in as little as 15 hours, and with a claimed near 100% yield. The "technology" involved is, in fact, not totally new, having first been described in scientific journals about 3 years ago; what is revolutionary is the way the extremely delicate process involved has been successfully moved out of the laboratory into the factory without any loss of precision.

The process involves the dissolving of the eggs' hard outer casing in a mildly corrosive solution, and then immersing them in a protective fluid until they are required for use. The resultant rapid hatching, valuable though that is, is not the only advantage: there are no empty shell-cases for the fish to choke on, the dead eggs, and other debris (which can represent a significant proportion of the contents of some brine shrimp egg vials) are separated out before packing, and the shelf-life of the product is claimed to be good even when partly used.

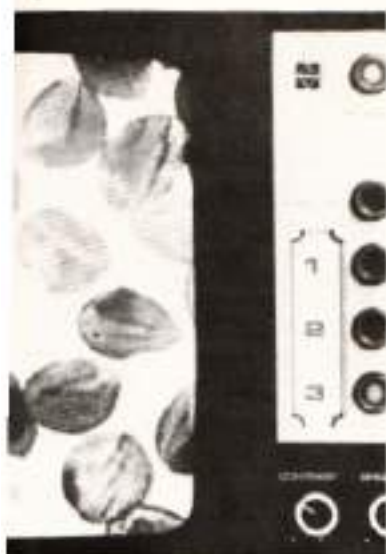
Since the hobbyist can rely on getting a good hatching of shrimp in about one-third of the time of traditional methods, he can more accurately cater for the appetites of his fish, resulting in less wastage of the valuable food whilst reducing fry losses to a minimum. Each drop of the liquid contains around 2,500 nauplii, totally free of any disease that could affect either freshwater or marine species of fish.



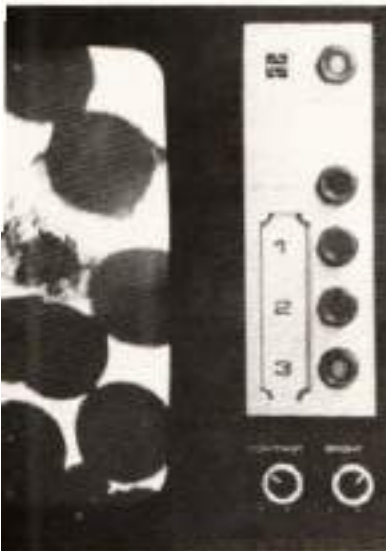
Of course, the hatching method is still very important if you are to maximize the yield from each drop. First, make up a salt solution using a reputable marine mix, to the normal specific gravity (around 1.023), and keep it at a temperature of between 75°-80°F; cooking salt, (NOT table salt), can be used, but the shrimp will have to be used soon after hatching.

Only a small container is needed, one holding around 1 litre is likely to be adequate for about 15,000 eggs (6 drops), but it should be very tall and narrow so that the essential heavy aeration does not leave any "still" areas where the eggs can settle.

New Technology also suggest that, for best results, the eggs should be exposed to fairly bright light—sunlight or artificial—for the first few hours of hatching. After about 12 hours remove the airstone for a few seconds to let the water settle down, then check with a small magnifying lens for any movement by



The shell-less version with little debris and no harmful shells.



Normal brine shrimp eggs showing shells and debris.

the nauplii; repeat the check every hour or two until most are seen to be active, then syphon some of the water and nauplii out, via a length of airline, into a very fine net.

Hold the net under a gently running tap for a few seconds to remove the excess salt, then tip the contents into the tank of young fish. The aim should be to feed the fry little but often, —every few hours, ideally—and a magnifying lens is invaluable to check that their stomachs are kept full at all times.

Newly-hatched brine shrimp are too small for anything other than very young fish, but if we can raise them towards adulthood they make excellent food for any fish. New Technology have created a special micronized food for this purpose, and being cellulose-based is non-polluting.

The shrimp should be transferred to rather roomier quarters, within about 12 hours of hatching, the aeration reduced to a much

steadier level and their feeding started immediately.

The food comes as a liquid suspension and it is suggested that 6 drops be used daily for every 2,500 nauplii, this rate being doubled after the end of the first week: in practice, the aim should be to keep the water just slightly cloudy (with the food) at all times.

After about 14 days the shrimp should be large enough to be accepted by most community fish, though their growth will depend on the temperature and the roominess of their quarters. **New Technology Brine Shrimp cost £2.10 per small plastic bottle, the Brine Shrimp Food £1.45.**

To maximise the hatching rate of brine shrimp, the eggs need to be constantly on the move with the aeration, avoiding still spots where they could settle at the bottom. The best shape container therefore is cone-shaped, with the point downwards and air bubbling up from the bottom.

There are several ways of making such a container, the easiest being to remove the bottom from a plastic or glass soft-drink bottle, (leaving the cap in place), and fabricating a wooden cradle to hold a series of them, (see illustration).

Since each container cannot be individually heated, this method is really only suitable where the unit can be kept in a fish-house or some similar warm place. If you have an all-glass aquarium containing tropical fish, you could find that a home-built hatchery that clips onto the end of your tank is the answer: this design of hatchery utilizes the heat which would otherwise escape from the end of the tank to keep the shrimp eggs warm.

Construction:

The exact dimensions of the glass required will depend on the size aquarium with which it is to be used, but always aim to keep the hatchery a little smaller than the tank and panel.

The following example is suitable for a tank 15in high and 12in wide, but check beforehand that the method of clipping it onto the end of the aquarium is practicable in your case: where a cover is fitted this may present problems.

Cutting list

- 2 pieces 12in x 12in, 3/2oz glass.
- 1 piece 11in x 11in, 1/4in glass.
- 1 piece 11in x 1 1/2in, 1/4in glass.
- 1 piece 12in x 2in, 3/2oz glass.
- 1 piece 12in x 4in, 3/2oz glass.
- 1 tube of silicone-rubber aquarium sealant.

*cut 3/8in off one corner to allow entry of airline tubing.

One of the 12in x 12in pieces forms the backplate for the hatchery, the other should be cut as follows: using an efficient glasscutter, score from a point mid-way along one side to each of the opposite corners.

Break the glass cleanly, and you will have 3 triangular shaped pieces. Assemble these on the backplate to form an inverted pyramid, (see sketch), using the silicone-rubber sealant quite sparingly.

Use adhesive tape if necessary to keep the panels square. After 24 hours, when the adhesive has dried, glue the 12in x 2in strip at the top of the open box, butting up against

the backplate, to give it some rigidity; the 4in strip will be attached to this, using a length of plastic insulation tape to serve as a hinge, to serve as a cover.

The narrow strips of 1/4in glass are to be used to form the "hook" at the back of the baseplate, as shown in the illustration, and plenty of sealant should be used. Once the whole hatchery is assembled and dry, a final bead of sealant should be applied to all the joints of the box to ensure watertightness. Leave for 24 hours, then you can fit it to your aquarium.

Always keep the salt solution at least 2in from the top of the hatchery box, and ensure that the airline really does reach right down into the bottom point. The temperature of the water in the hatchery will be a couple of degrees lower than that in the aquarium itself, but that will merely add a few hours to the normal hatching time.



The new Phillips Vegetable Diet.

VEGETABLE flake is always a valuable food to vary the diet of tropical and coldwater fish. And Phillips have now added a **Vegetable Diet flake** to their already wide range of fish foods.

The food is aimed at all vegetation eating fish and to add variety to the diet of other species as well.

The flakes contain alfalfa, kelp, carrot and spinach as well as fish meal, wheat flour and added vitamins, minerals, amino acids and trace elements.

They come in 40 gram tins and the flakes are medium sized, green and yellow in colour.

I tried out some of the flakes on the fish in my community tank. They fed on it quite readily and the food now constitutes a part of the tank's overall feeding routine.

Phillips are one of the major fish food manufacturers in the country and the addition of this new type adds even more strength to their range.

Phillips Vegetable Diet, Phillips Yeast Products Ltd, 68p for a 40 gram tin.

DIARY DATES

S 1 8 15 22 29
M 2 9 16 23 30
T 3 10 17 24 31
W 4 11 18 25
T 5 12 19 26
F 6 13 20 27
S 7 14 21 28



• RFI to Cod, 1988

MAKE sure your society's meeting or show is in the PRACTICAL FISHKEEPING Diary Dates.

All you have to do is write and tell us about your events... and cash in on the publicity we will give to them.

Simply write to Diary Dates, Practical Fishkeeping, Bretton Court, Bretton, Peterborough. We will do the rest.

Make sure you give the date, the details of the event and the full name of your society. Include addresses or telephone numbers where necessary.

AUGUST

Sunday, August 19: Southern East London AS Open Show at 1st Greenwich High Road, SE 10. Details from Mr S. Jeffrey, 207 Salthouse Road, SE 12.

Sunday, August 18: Longridge and District A.S. Open Show at the Civic Hall, Willows Park Lane, Longridge, Nr. Preston, Lancs. Schedules from Mr. A. Lyons, 52 Hesketh Street, Aughton, Preston, Lancs.

Saturday, August 25, 26 and 27: Leamington and District AS Exhibition and Show at the Royal Pump Rooms, Leamington Spa. Details from M. Burridge, Flat 1, 36 Warwick New Road, Leamington Spa, Warks.

Sunday, August 26: Long Eaton Aquarist Society Open Show at Gregory's Rose Garden, Toton. Details from West, 137 Longmoor Road, Long Eaton, Notts.

Monday, August 27: Peterfield and District AS Second Open Show, at the Town Hall, HATH Road, Peterfield, Hants. Schedules from G. Steady, 5 Highfield Road, Peterfield.

Monday, August 27: Yorkshire Koi Society hold the 2nd Yorkshire Koi Festival, at Harwood House, 4847 Lanes, commencing 2 p.m. Show schedules, Trade Stand information, etc., from Stuart Best, 20 Oakwood Road East, Rotherham.

Monday August 27th - Tuesday 28th August: St Yarnmouth & Dine A. S. Exhibition '79. Tropical & Coldwater Fish plus Society Tables, Hopton Village Hall on A12 between St Yarnmouth and Loxwold.

SEPTEMBER

Saturday, September 8: Bethnal Green Aquarist Society Open Show. Contact Roger Hays, 1 Hartford Street, London E1. (Tel: 01 520 8911 Ext. 1633 for details.)

Saturday, September 8: Bristol AS Jubilee Open Goldwater Show. St Andrew Church Hall, Streetford Road, Withwell, Bristol 8. Schedules from Mr W. G. Ham, 28 Imperial Road, Bristol, BS4 0ED. (Tel: 0272 796694.)

Saturday, September 8: Hingston and District Aquarist Society Open Show at Raynes Park Methodist Church Hall, Weybridge Road, Raynes Park, London, SW22. Details from D. Mackay, 12 Victoria Road, Twickenham.

Sunday, September 9: Koi '79, The British Koi Keepers' Society 4th National Open Koi Show, at Tatton Park, Knutsford, Cheshire. Come and see the latest selection of Japanese fancy carp in the country. Details and entry forms from the Show Chairman, Mr P. Waddington, 1 Avon Drive, Bury, Lancs. Tel: 061-764-0181.

Sunday, September 9: Coventry Pool and Aquarium Society Open Show, St Christophers School, Arbury, Coventry. Details from Show Secretary, R. A. Clews, 45 Lytton Road, Warwick. Tel: Warwick 466224.

Sunday, September 9: Wellingborough & Dist Aquarist Society Show at St Victoria School, 181 Road, Wellingborough. Details from Show Secretary, Mr M. Cox, 20 Salisbury Street, Kettering.

Sunday, September 9: Longridge and District AS Open Show at the Civic Hall, Willows Park Lane, Longridge, Nr. Preston, Lancs. 115 Minutes from M6 and M25.

Sunday, September 9: Leamington & District AS Open Show at Lifington Community Centre, Leamington Spa. Details from M. Burridge, Flat 1, Warwick New Road, Leamington Spa, Warks. This venue replaces Trinity Hall, Trinity Street.

Sunday, September 9: Middleborough AS Open Show at James Finnigan Hall, Eaton Trade Centre, grand auction competition. Details from B. Cook, 18 Garner Street, Middleborough.

Sunday, September 9: Brograve AS Open Show at St. George's Community Centre, Ramsey Way, Little Hulton, Manchester. Details from M. Burgoyne, 15 Parley Road, Farnworth, Bolton, Lancs.

Sunday, September 9: Cosham Fishkeepers' Society's Second Open Show at Cosham High School, Four Pools Road, Swanton, Wicks. Schedules later from E. M. Thorntor, 41 Crooka Lane, Stuckey, Works. Tel: Stuckey 7125.

Sunday, September 9: Zenth Aquarist Society (Southford) 1st annual open show at Charter Hall, Southhope Jubilee to T.A.S.S. standards and rules. Bending 12 noon to 2 p.m. Judging 2.15 p.m. Schedules available from T. Apperson, 27 St John Road, Southhope, DN9 3AU. Tel: Southhope 25245.

Sunday, September 9: Koi '79 The British Koi Keepers' Society's Fourth National Open Koi Show at Eaton Park, Knutsford, Cheshire. Membership details from Mr M. Wainman, 115 Woodside Road, Arnhem, Bucks. HP5 1NR.

Sunday, September 9: British Koi Keepers' Society Fourth National Open Show. Come and see the best selection of Japanese fancy carp in the County at Tatton Park, Knutsford, Cheshire. Details from Show Chairman, Mr P. Waddington, 1 Avon Drive, Bury, Lancs. Tel: 061-764-0181.

Sunday, September 9: Wellingborough & Dist AS Open Show at Victoria Junior School, Mill Road, Wellingborough. Practical Fishkeeping Aquarist Fishfood Test Tank Show. Chance for best in show to win a holiday for two. Bending from 9.30 am to 12 noon. All current F.R.A.A. rules will apply. Details from Show Secretary, Mr H. Cox, 20 Salisbury Street, Kettering. Tel: 521608.

Saturday, September 15: Hounslow & District Aquarist Society Open Show to be held at Hounslow Youth Centre, Cecil Road, Hounslow. Schedules from Show Secretary, Mr T. Edmondson, 2 Hangerwood Drive, Actonville, Surrey. (Tel: Weybridge 44276.)

Saturday, September 15: Plymouth and District Aquarist & Hobbyists Society Open Show at The Trinity United Reformed Church, Torleas, Hattley, Plymouth. Show schedules from Show Secretary, John Runtle, 90 Durham Avenue, St. Jubea, Plymouth, Devon, PL4 3SR.

Sunday, September 16: Barnsley Tropical Fish Society Open Show at Artalee Oaks Youth Centre, Barnsley. Details Secretary, M. Whaley, 85 Clough Road, Hoyland, Nr. Barnsley, S. Yorkshire.

Sunday, September 16: Leamington and District AS Open Show at Trinity Hall, Trinity Street, Leamington Spa. Details from M. Burridge, Flat 1, Warwick New Road, Leamington Spa, Warks.

Sunday, September 16: Midland Aquarist League Open Show & Inter-Society Show, Coventry. Scheduled from F. Underwood, 10 Hyde Road, Kenilworth, CV5 2PD. Tel: 56286.

Sunday, September 16: Leamington & District AS Open Show at Lifington Community Centre, Leamington Spa. Details from M. Burridge, Flat 1, Warwick New Road, Leamington Spa, Warks. This venue replaces Trinity Hall, Trinity Street.

Thursday, September 20: Kent Area Group C.A.G.B. 1st Annual General Meeting at Gull's Hall, St. Princes Church, Waverley Street, Maidstone. Details from J. Gibbon, 1 Highfield Cottages, Lower Haddes, Canterbury. (S.A.E. please.)

Sunday, September 23: Tonbridge and District AS Open Show at Hadlow Village Hall, Williams Field, Hadlow, Tonbridge, Kent. Details from Mrs B. Pritchard, 6 Albert Road, Tonbridge.

Sunday, September 30: Beckley Heath & District Aquarist Society 1st Open Show at T.A.V.R. Centre, Welling Street, Beckley Heath, Kent. Details and schedule from Norman Raven, 30 Mount Pleasant Road, Leyland, London, SE13 8PD. (Tel: 31 650 2554.)

Sunday, September 30: Beckley Heath & District Aquarist Society 1st Open Show at T.A.V.R. Centre, Welling Street, Beckley Heath, Kent. Details and schedule from Mr N. Raven, 30 Mount Pleasant Road, Leyland, London, SE13 8PD. Tel: 01-650-2554. This venue replaces the T.A.V.R. Centre.

OCTOBER

Sunday, October 7: Wolverhampton Aquarist Society Open Show at Oxley Community Centre, Bensing between 12 noon and 2 p.m. Details from Mr L. Crook, Tel: Wolverhampton 83283.

Sunday, October 14: South Leeds Aquarist Society Annual Open Show at Hunslet Boys Club, Hillside Road, Leeds 10. Bending 12 to 2 p.m. 30 classes, annual trophies for section winners. Trophies for all class winners. Schedules from Show Secretary, Mr A. Auerbach, 101 Thorp Road, Middleton, Leeds LS10 4HH.

Saturday, October 20: Ichiban Hanoku 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 longhead goldfish only. Details and schedules from Mr G. Lewis, 51 Beauris Avenue, Hayes, Middlesex. Tel: 01-573-1770.

Friday 18 October - Sunday 21 October: Scottish Aquarium Society's 52nd Annual Open Show at Molehill Gardens, Sauchiehall St, Glasgow. Details from Show Secretary, Mr M. Hamilton, 18 Dunn 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-Liverbear Open Show at St Gabriel's Church Hall, Gillingham Road, Heaton, Newcastle upon Tyne. Details from Mrs J. Heron, 'Halfback House', 146 Chillingham Road, Heaton, Newcastle upon Tyne, NE5 0BY.

Sunday, October 20: Jackson Ranches 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 longhead goldfish only. Details and schedules from Mr G. Lewis, 51 Beauris Avenue, Hayes, Middlesex. Tel: 01-573-1770.

Sunday, October 20: Jackson Ranches 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 longhead goldfish only. Details and schedules from Mr G. Lewis, 51 Beauris Avenue, Hayes, Middlesex. Tel: 01-573-1770.

PRACTICAL FISHKEEPING

news

First show

THE Gaer Ufa A.S. first annual open show was a great success and the results of the event at South Shields, Tyne and Wear are:—

Class Aa, Barbs: 1 A. Spencer, 22½ pts; 2 Mr & Mrs Robinson, 20 pts; 3 M. McQuade, 18½ pts; 4 C. Hulston, 18½ pts.
Class B, Barbs: 1 Mr & Mrs Robinson, 22 pts; 2 Y. Patterson, 22 pts; 3 A. & M. Robinson, 20½ & 20 pts.
Class Ca, Characins: 1 N. Soppit, 24 pts; 2 P. Wright, 23½ pts; 3 M. Gayers, 22 pts; 4 M. Cullinane, 22½ pts.
Class Cb, Characins: 1 M. & Mrs Robinson, 29 pts; 2 R. Kirkup, 28 pts; 3 M. & L. Ruffell, 26 pts; 4 H. Blackburn, 24 pts.
Class Cc, Characins: 1 Mr & Mrs Robinson, 30 pts; 2 Mr & Mrs Talbot, 27 pts; 3 M. Swinney, 27 pts; 4 J. Dixon, 26 pts.

Class Dc, Cichlids: 1 M. McQuade, 37 pts; 2 R. Neworthy, 36 pts; 3 Mr & Mrs Swinney, 34½ pts; 4 J. Gray, 34 pts.
Class Dd, Cichlids: 1 H. Lake, 27 pts; 2 N. Hynd, 24 pts; 3 D. Hulme, 23 pts; 4 C. Gladwell, 22 pts.
Class De, Cichlids: 1 M. Gowers, 24 pts; 2 J. King, 20 pts; 3 C. Gladwell, 19 pts; 4 Mr Summersdale, 18½ pts.
Class Df, Cichlids: 1 G. Hunt, 25 pts; 2 J. Cross, 22 pts; 3 R. Neworthy, 20 pts; 4 H. Lake, 19½ pts.

Class Ea, Betta Splendens: 1 M. Lister, 29 pts; 2 M. Lister, 29 pts; 3 Mr & Mrs Swinney, 26 pts; 4 P. Wright, 26 pts.
Class E, Latescens: 1 P. Moya, 29 pts; 2 J. Gray, 24 pts; 3 J. Mostmann, 22 pts; 4 A. King, 21 pts.
Class Fc, E.L.T.C.: 1 J. Blight, 26 pts; 2 H. Lake, 26 pts; 3 P. Wright, 23 pts; 4 P. Fry, 22 pts.
Class F, E.L.T.C.: 1 J. English, 26 pts; 2 J. Elwell, 24½ pts; 3 Mr & Mrs Hall, 20 pts; 4 R. Kirkup, 20½ pts.
Class Gc, Tropical Catfish: 1 Mr Lathan, 29 pts; 2 J. Aikew, 22 pts; 3 A. Spencer, 21 pts.
Class G, Tropical Catfish: 1 T. Stanfield, 30 pts; 2 A. Robinson, 28 pts; 3 P. Moya, 26 pts; 4 Mr & Mrs Swinney, 21 pts.

Class H, Corydoras & Breckle: 1 & 2, 5 & 6 P. Moya, 28, 28, 24½ & 24 pts; 4 T. Hammon, 24 pts.
Class J, Rasbora: 1 L. Gray, 26 pts; 2 P. Goble, 25 pts; 3 & 4 Mr & Mrs Robinson, 24½ & 24 pts.
Class K, Danios & W.C.M.: 1 Mr Mibum, 20 pts; 2 H. Lake, 19 pts; 3 N. Hynd, 18 pts; 4 Mr & Mrs Robinson, 17½ pts.
Class L, Loach: 1 M. A. Hulme, 28 pts; 2 J. King, 25 pts; 3 C. Oxbire, 24 pts; 4 Mr Gowers, 22 pts.

Class M, Labia: 1 J. Gray, 25 pts; 2 J. Cross, 21 pts; 3 D. Smith, 19½ pts; 4 R. Gwynne, 19 pts.
Class N, A.O.V. Egg-layer: 1 S. Smith, 32 pts; 2 P. Moya, 29 pts; 3 R. Kirkup, 27 pts; 4 H. Gathwade, 26 pts.
Class Nrs, Pairs, Egg-layer: 1 J. English, 25 pts; 2 D. Smith, 23½ pts; 3 Mr & Mrs Roberts, 22½ pts; 4 Mr Mibum, 22 pts.
Class Nrs, Pairs, Livebearer: 1 D. Hulme, 29 pts; 2 J. English, 27 pts; 3 Mr & Mrs Pringle, 25 pts; 4 G. Leary, 24 pts.

Class Oa, Guppy male: 1 P. Fry, 24 pts; 2 Mr & Mrs Emberton, 23 pts; 3 Mr & Mrs Emberton, 22 pts; 4 L. Smith, 20 pts.
Class Oa—Ox Guppy Male: 1 J. Chisholm, 21 pts; 2 P. Fry, 20 pts; 4 M. Robinson, 17 pts.
Class O, Gph. Helost: 1 R. Neworthy, 30 pts; 2 L. Lake, 26 pts; 3 W. Walton, 26 pts; 4 C. Hulston, 27 pts.
Class R, Platy: 1 W. Chambers, 32 pts; 2 J. Cross, 30 pts; 3 P. Wright, 28 pts; 4 D. Russell, 26 pts.
Class S, Molly: 1 P. Wright, 22 pts; 2 A. Campbell, 21½ pts; 3 A. Campbell, 21 pts; 4 T. Cole, 18 pts.
Class T, A.O.V. Livebearer: 1 P. Wright, 30 pts; 2 C. Mitchell, 28 pts; 3 J. English, 24½ pts; 4 H. Blackburn, 24 pts.

Class U, Single Tail Goldfish: 1 L. Aikew, 37 pts; 2 Mr Lathan, 35 pts; 3 & 4 D. Hulme, 35 & 35½ pts.
Class V, Twin tail goldfish: 1 Mr Lathan, 28 pts; 2 R. Coley, 27 pts; 3 Mr & Mrs Leaf, 24 pts; 4 Mr Lathan, 22 pts.
Class W, A.O.V. Goldwater: 1 D. Hunt, 38 pts; 2 Mr & Mrs Robinson, 36 pts; 3 D. Smith, 33½ pts; 4 J. Gallagher, 33 pts.
Class Xns, Breeders, Egg-layer: 1 H. Lake, 29 pts; 2 P. Moya, 28½ pts; 3 M. James, 26 pts; 4 R. Neworthy, 26½ pts.
Class Xns, Breeders, Guppy: 1 Mr & Mrs Emberton, 24 pts; 2 Mr & Mrs Robinson, 22 pts; 3 P. Fry, 21 pts; 4 H. Lake, 20 pts.
Class Y QT, Breeders, Livebearer: 1 R. Kirkup, 29 pts; 2 & 3 P. Wright, 26 & 22 pts; 4 L. Gray, 21 pts.



Growing club

THE North Bucks Aquarist Society held its third annual meeting since its formation with an increased membership.

Sixteen fish were benched for the first round of the 'Irvine Trophy' and they were judged by Mr John Chalmers of 'Hobby Fish Farm'.

The guest speaker for the evening was Mr Dick Mills who gave a talk complete with slides on general fishkeeping.

As a F.B.A.S. official Dick gave many useful hints and tips. He was well appreciated and has promised to return for a further talk to the club.

The North Bucks Aquarist Society meets on the first Tuesday of every month at 8pm at the Small Meeting Place, Stacey Bushes, Milton Keynes. All new members readily welcome.

The committee consist of:— Chairman, J. Irvine; vice chairman, and public relations, Mike Hands; secretary, Carol Stone; treasurer, Helen Morton; show secretary, Bert Ankin; junior rep, Brian King.

Any information regarding the club can be obtained by contacting Mike Hands. (Tel: Milton Keynes 315195).

Cat' special

In an interesting and varied programme 41 members of the Catfish Association of Great Britain saw a slide lecture on 'Loricaridae' species habitat and feeding, followed by a spectacular cine film of the breeding of *Rimofloricaria fallax*, both presented by David Allison.

During the interval some fine Catfish specimens were auctioned. In the second half of the programme another cine film followed a personal account of a fish catching expedition in South America by Peter Penfold of Coral Bazaar.

Meetings are held bi-monthly at York Hall Library, Wye Street, London SW11. Members and guests welcome.

Barbs change

THE class for novices was omitted from the Mid-Sussex A.S. programme and will be included at the October meeting.

'Barbs' will now be in September. Most important, the October meeting will be on the first Thursday (4th).

Congratulations to John and Carole Birch on the birth of their daughter, also to Chris and Sally Corbin on the birth of their daughter.

The table show was judged by Bill Stade and Jim Burtles.

Results: G. Catfish: 1 L. Pinney, 2 & 3 E. & T. Tester, H. Corydonus: 1 L. Pinney, 2 & 3 J. Black, 4 P. Levine, C. Characins: 1 & 2 E. & T. Tester, 3 & 4 L. Pinney.

Meetings are held on the first

Thursday of each month at Ockley Lodge, Ockley Lane, Keymer. Anyone interested is welcome to attend a meeting. Further information from the Secretary, John Birch, 11a Sandrocks Way, Haywards Heath, West Sussex. (Tel: H. Heath 50595.)

Moors secret

A welcome visitor to Bristol A.S. was Les Dodge from Stroud. Speaking from 30 years' experience of keeping Moors he gave as his opinion that males with shorter tails prove the more active when spawning. He also thought that outcrossing with other metallic twintails to improve finnage was a retrograde step.

Midland Koi



Koi in their natural pond environment. Under show conditions their beauty is easier to see.

A HIGH standard of entries marked the Midland Koi Association's fourth annual Open show at Coventry.

Supreme champion was Wolverhampton heating engineer Derek Hughes with a fish imported six months ago from Japan.

Derek is a member of the British Koi Keeper's Association and has been showing for several years.

'I didn't keep fish at all before I saw my first Koi. Then I was completely bitten by the bug and I keep more and more fish.'

'I am absolutely delighted to win at this show,' said Derek. Midland Koi Association

secretary Ron Causser was pleased with the response to the show, including an excellent attendance by the public.

Ron was among a number of MKA members who did well at the show. There was a huge prize list of different classes and categories of members.

Leading prize winners included:— Roger Cleaver, Mrs B Cleaver, Vaughan Owen, Keith Sale, Jerry Lloyd, Ray Coley and Denise Cottrell.

The standard of competition was proved by the lengthy time needed by the judges.

In particular they deliberated long and hard over the best in show award.

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WARNING: If you are a sensitive type, or have a history of heart trouble, or even if you are a nervous wreck, you are strongly advised to read no further. This tale is so painful, so horrendous, you may find yourself one step nearer that great aquarium in the sky. If, on the other hand, you are cold and unfeeling, read on, take heed of the lesson contained therein, and may the ladies have mercy on your soul!

THE WRETCHED SAGA OF MICKEY FINN:

At first sight Mickey Finn was a most fortunate man. Having been left a bounteous fortune by his deceased father, he lived in splendid luxury in his Mayfair penthouse suite. The carpets could conceal a cocker spaniel, the bar was stocked better than the Dorchester's, the walls were decorated with a Matisse, a Renoir and two or three Picassos. In short, Mickey Finn had it made: there was nothing he could possibly lack.

Or was there? Something was missing from his life—some inner spiritual meaning to his existence—but how was he to fill that gap?

One fine day, in his quest for a meaning to life, a seemingly innocuous visit cast a fateful blight on his very soul. He was strolling around a public aquarium, somewhere in Europe, when he saw the most gorgeous Emperor Angel, a full twenty-four inches of glorious technicolour, the most thrilling sight he had ever cast his eyes on in his life. Moved to tears, Mickey knew he would not rest contented until he possessed such beauty for himself.

Having languished in deep despair for so long, all caution and patience was thrown to the winds. A quick trip to Harrods in his Rolls Royce transit, and he sped home with his equipment. He installed a 36 inch aquarium, lined in pure gold of course, spread a few emeralds and rubies over a layer of crushed cockleshell, dropped in a heater, fitted a filter filled with activated charcoal, poured in some water, and he was ready. He chartered Concorde, nipped over to the Philippines, bribed a fisherman with \$1,000, and returned home with his acquisition—if anything an even more impressive Emperor Angel. He dropped it into his tank and sat back to enjoy his glittering prize.

And of course, as any marine aquarist will guess, within 50 minutes the poor fish was dead. . . . In a horrendous rage, the wretched Mickey Finn bodily lifted the aquarium, and threw it clean through his triple glazing to hurtle to the street below.

More words cannot describe Mickey Finn's anguish. He had to be sedated—he lay in a coma for ten weeks—he needed four months in a nursing home to recuperate. Finally, exactly one year later, he felt strong enough to start again—nothing had ever previously eluded his possession.

Chastened by his experience, this time he was determined not to repeat his failure. He ordered every book ever to mention Emperor Angels, from the Encyclopaedia Britannica downwards. He summoned every expert to tap their brains. He learned about nitrites and nitrates, about pH and water quality, and verily he comprehended the vastness of his previous ignorance.

This time there would be no mistake. He commissioned a 10 x 4 x 4 feet tank in one inch out glass crystal, he had an all over fitting undergravel filter connected to six power filters. His manservant painstakingly washed 4 cwt of CALCIUM PLUS, fitted a specially made GRAVEL TIDY, and added 4 cwt of coral sand. He installed a massive heating system, guaranteed fail-safe with the use of eight thermostats, and fitted growlux . . . northlights . . . floodlights . . . trulitas . . . warm white tubes . . . light bulbs . . . spot lights . . . floodlights . . . fibre optics . . . laser beams . . . all rigidly computer controlled to produce lighting identical, season by season, to the Pacific Ocean. He meticulously measured his system over six weeks, and then packed his six power filters with 24 POLY FILTERS. He spent \$12,000 on laboratory equipment, which assured him that his pH was precisely 8.3265 ± 0.0001, and that there was absolutely no discernible trace of nitrate or nitrite in his aquarium.

Satisfied at last, he purchased Concorde, repeated his journey to the Philippines, paid the selfsame fisherman \$1,500 (explained by the increase in VAT) and returned to his Mayfair suite. Then he spent three hours gradually acclimatising his fish, poured himself a tumbler of Napoleon brandy, and sat back. This time the fish took two hours to expire. A huge pain lanced through Mickey Finn's brain, and he hurtled himself through his newly repaired triple glazing to the streets below.

Four weeks later, his son Muff Finn, having taken a round the world cruise to sooth his grief at his father's death, installed himself in the penthouse. Not liking to waste the beautiful aquarium, he threw in half a dozen 18 inch Koi Carp, which are thriving to this day.

Poor Mickey Finn had simply forgotten to use marine salt (INSTANT OCEAN only would have been acceptable, of course).

The only marine fish that has, in fact, survived this pitiful tale is something called a red herring.

MORAL: if you wish your fish to die with a smile on their faces, make sure you use CALCIUM PLUS, GRAVEL TIDY and a POLY FILTER, and your aquarium will have a perfect pH, will look good, and be free of nitrites and nitrates. If on the other hand, you actually wish your fish to live with a smile on their faces, use INSTANT OCEAN as well—the salt millionaires would use if they used any at all.

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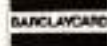
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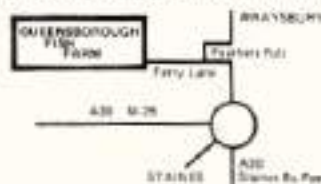
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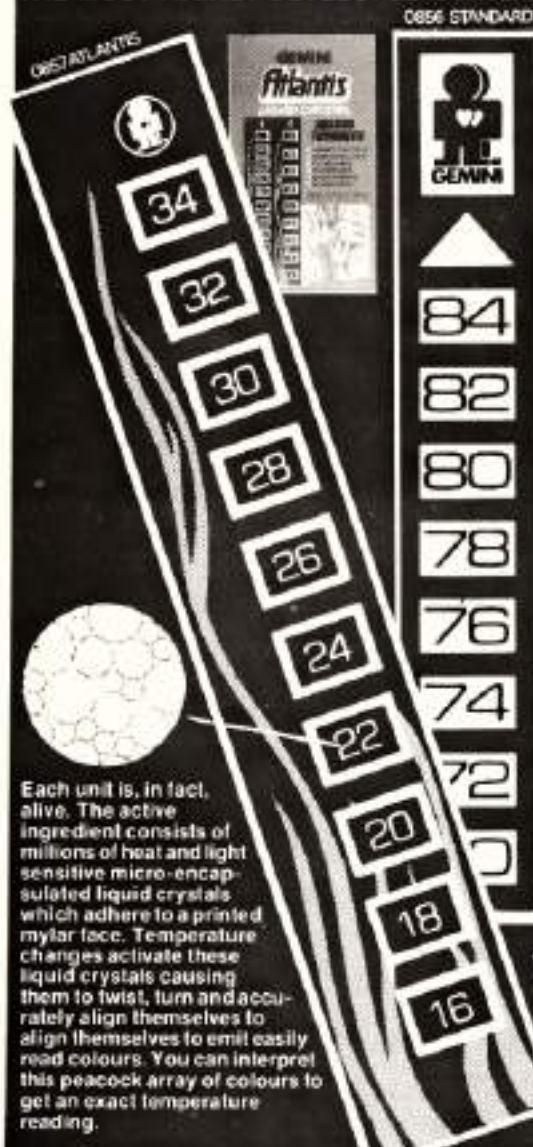
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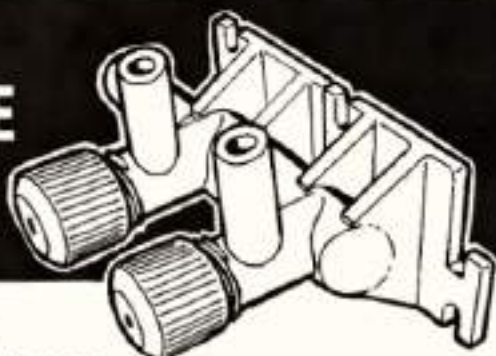
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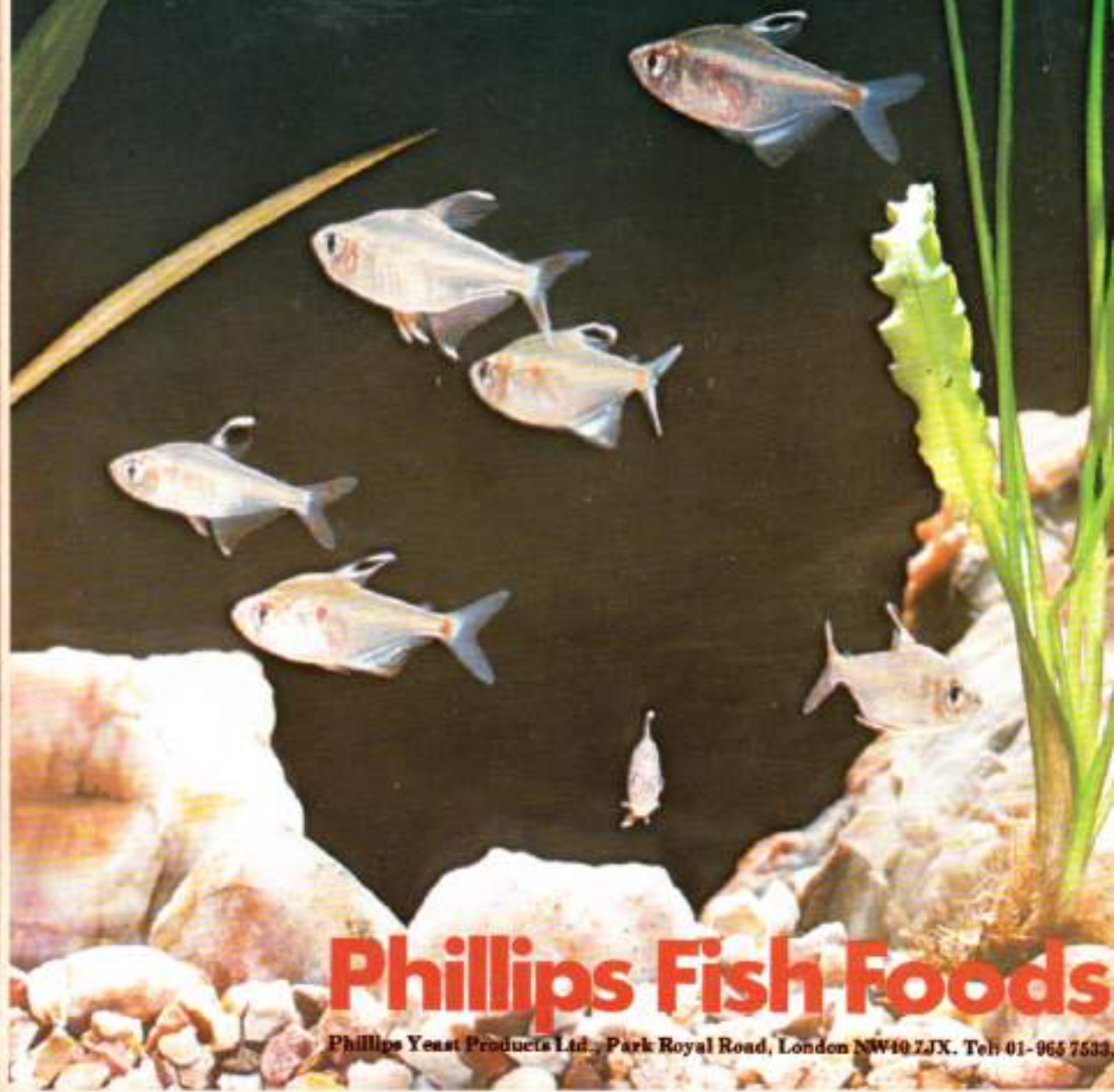
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