

JULY 1986 95p

# AQUARIST

AND PONDKEEPER

**FISHKEEPING AT ITS VERY BEST. ESTABLISHED 1924**

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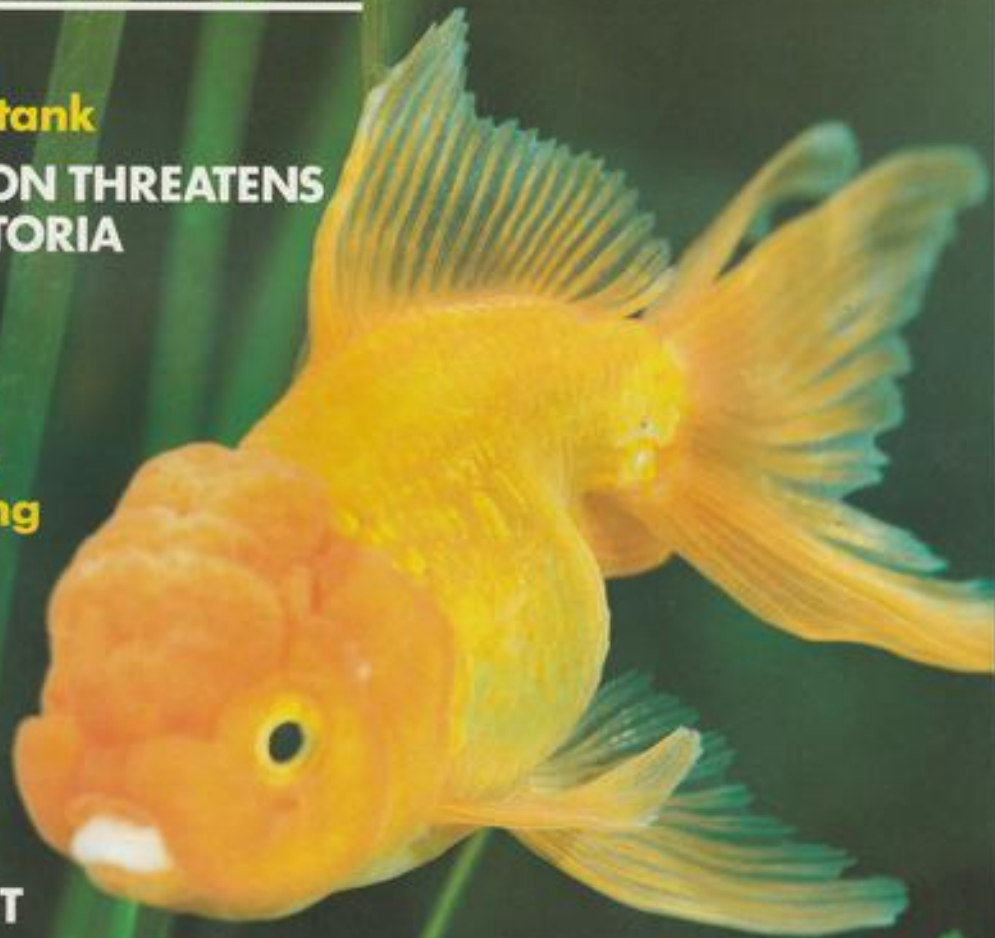
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a marine tank**

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**Basic  
rules of  
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**SPOTLIGHT  
ON THE  
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**Filtration for  
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## Cover Story

Photograph by Michael Gilroy

The Red Oranda is one of the best-known and loved varieties of Fancy Goldfish. Despite its popularity, some people still confuse this fish with the Lionhead, owing to the raspberry-like head growth that mature specimens of both varieties exhibit. There are, however, at least two easily detectable, foolproof characteristics which can be used to separate them. All Orandas possess a dorsal fin while Lionheads (and the closely related Ranchus) have 'naked' backs. In addition, Orandas have long, flowing Veiltail-like caudal fins while Lionheads and Ranchus have short, Fantail-like tails. All three varieties are, of course, members of the same species as the Common Goldfish (*Carassius auratus*) and will easily interbreed.



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AND PONDKEEPER

JULY 1986 Vol. 51 No. 4

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# BUT THE CAT CAME BACK...

By Amanda Grimes

I live with a cat called Tasman. We share the same flat and each follow our own particular interests. Having bought him, it would be fair to assume that I 'own' him. Tasman, being a cat, doesn't agree. I am 'his' human, providing food and warmth, and any interruption in his supremacy of me is deeply resented. If I am reading, he sits on the book; typing and he'll perch on the typewriter; eating and it's time for a game; talking on the phone and it's grappling hooks out and 'let's climb this human mountain'.

## Uneasy start

You can imagine with what trepidation I introduced fish to this possessive relationship. Apart from the tales of cats and fish, this new occupation must have presented the ultimate challenge to Tas. Luckily, the first tank to be set up was my sister's and, whilst Tasman engaged in a great deal of gibbering, swiping at the glass and investigating different angles of approach, his challenge to these interlopers was half-hearted. After all, the tank wasn't in my room. Then I started my own tank...

By this time, two things had happened that led me to believe that Tas was willing to live with fish. Firstly, he had got used to smacks and 'No!' and his journeys up the side of the tank were becoming less frequent. The second was his fascination by one of my sister's fish—a *Pimelodus pictus*. This beautiful silver catfish, with his long, white 'whiskers', was the apple of Tas's eye. He would sit for hours, watching the *Pimelodus* prowl the tank.

Left to my own devices, I finished and stocked the tank. Tasman inspected it,

found it lacking—no *Pimelodus*—and returned to my sister's tank. Perfect, I'd been given the go-ahead.

At this point, I must digress. With the mental picture of a cat hanging over the top of the tank, fishing, we had gone to some lengths to make catproof lids. For my tank, we had made up a solid rectangular frame of wood, which stood on top of the tank, just under the frame. Attached to the top of this was a piece of wood that ran the length of the tank and came halfway towards the front. Under this, on runners, were fitted two sliding lids which, when pushed back, gave access to the tank. These were made of light wood to allow them to slide right to the back. If you are not by now completely bewildered, you might be seeing what I am leading up to...

## Grand plan

While Tasman was fast becoming an authority on the lifestyle of Pim, I settled down to the routine of fish-keeping, unaware of the 'Grand Plan'. My awakening was not only rude but literal. *Crank*—about three in the morning, in pitch black, I shot upright in bed. Reaching for a sidelight, I switched it on just in time to see a blur of black fly under the bed—Tasman's final refuge. On inspecting the tank which, even in the sidelight, I could see was full of ashen fish, I found that he'd jumped from the top of the wardrobe onto the tank lid—at the front. The lighter part of the lid had given way, smashing down onto the lights, and Tas had ended up on the cover glasses. It took half an hour and half a pint of blood—mine—to retrieve the culprit and banish him to the living-room.

This night-time assault on the tank had done little damage. The lights themselves had remained intact and the fittings were easily replaced. The sliding lid was eased back into position and the fish appeared none the worse for the shock. The effect on Tasman, however, was ironic. He seemed to have got the idea that the tank had attacked him and steered clear of it for weeks.

## Settled down

In the intervening years, cat and fish have settled down well together. When my sister sold her tank, I took on the *Pimelodus* to keep Tas happy, and his love of 'catfish' has been broadened to include various purchases, including *Synodontis*, *Bunocephalus bicolor*, 'Plecostomus' and *Ancistrus dolichopterus*. Of all these fish, Tasman has now become most attached to the *Ancistrus*, mainly because we've been breeding them for two years. The joy of lying beside a four-foot tank, busy with young *Ancistrus*—and sometimes the father with a new batch of eggs—has only been surpassed, for Tas, by the fevered catching, counting and bagging of hundreds of juveniles for dispatch to shops.

Tasman has also found a novel way of keeping a close eye on the community tank without upsetting the fish or me. In an effort to insulate the tank against the increased need for heating in colder winters, a couple of years ago we invested in a roll of polystyrene, which we used to cover the back and sides of the community tank. While moving this to my new flat, a small piece of the insulation was torn on the side. It is only in the last few months that Tas has noticed this and, much to our amusement, he now spends hours on end, gazing intently at his own, unobtrusive peep-show.

His acceptance of the fish can best be illustrated by something that happened last year. Tas was going through one of his 'nobody loves me' periods and I decided to cheer him up with a treat. So I bought him some Whitebait. He stared long and hard at these silver fish in his bowl, then turned baleful eyes on me. I tried to encourage him, taking one out of the bowl and putting it on the floor at his feet. Very carefully, with claws sheathed, he picked it up and put it back in the bowl. Then he turned his sorrowful eyes on me again. Putting it down to the probability that I had a cat who doesn't like the taste of fish, I threw the Whitebait away and gave him tinned food.

A few weeks later, a male Swordtail escaped from the tank. Tasman found it but didn't attempt to eat it. Other escapees have been treated in the same way. Tinned fish is accepted with relish, provided it is well mashed up. Anything that looks as if it belongs in the tanks is refused. So was the concern caused by the Whitebait the belief that I'd killed some of my fish for his supper, or did he think I was serving him up the remnants of a tank that went wrong?

# Language of fishes

## The Myth About Scavengers

John A. Dawes

Everyone has heard of scavengers. We are always told that we must include scavengers in our aquaria and ponds if we want to create a balanced set-up. In the freshwater tropical hobby, the most commonly recommended scavenging species are those belonging to the Catfish genus *Corydoras* while, on the coldwater front (particularly where ponds are concerned), Tench (*Tinca tinca*), both Green and Golden varieties, always come top of the 'scavenging' list.

This situation has gone virtually unquestioned for so long that, to many fishkeepers, *Corydoras* and Tench are indeed scavengers. If so, what criteria actually identify them as such?

With slight variations, dictionaries define scavengers as 'animals that feed on garbage or carrion'. Carrion, itself, is defined as 'dead, putrefying flesh'.

If we apply this information to *Corydoras* and *Tinca*, we straightaway find ourselves in difficulties.

It's not that these fish do not feed on dead, putrefying flesh—they do. However, they feed on all sorts of other things too—and not all of them dead by any means! Just watch your Bronze Catfish next time you feed *Tubifex*, Bloodworms or even *Daphnia* to your other fish.

If, in spite of this, you feel that the term 'scavenger' is appropriate, how do you reconcile this conclusion with the fact that Guppies, Gouramis, Siamese Fighters, Angels and nearly any other species you care to mention will also feed on dead, putrefying flesh given the chance? Must we, then, regard all species as scavengers? Of course not—that would be unrealistic... wouldn't it?

Equally unrealistic, in my view, is the application of the 'scavenger' label to *Corydoras* and *Tinca*. Further, the sooner we stop thinking of these fish, particularly the former, as scavengers, the better. The reason for saying this is that the term 'scavenger' has certain 'left-over' connotations which have led numerous new aquarists to believe that Bronze Catfish and their relatives are specially adapted to survive on whatever bits of food are left over once the other tank

inhabitants have eaten.

Although it is impossible to quantify exactly how much effect this approach has had on unsuspecting *Corydoras* Cats over the years, we can safely say that it has been very considerable.

Who knows how many *Corydoras* have starved to death in aquaria where all the other fish have always had their fair share of food? If these Cats were true scavengers, they would be able to survive on the wastes produced by the digestive



*Corydoras aeneus*, the 'Classic Scavenger' is often a victim of its own unfortunate reputation.

processes of their well-fed tankmates, plus the bits and pieces of dead vegetable and animal matter, snails (and their eggs), etc., that are found in many aquaria. The fact that they don't survive well, if at all, under such circumstances demonstrates the myth of the scavenging label.

Some of the anatomical features that have often been associated with so-called scavengers are a downward-pointing mouth (frequently adorned with barbels), a bottom-dwelling way of life and the lack of a swim bladder (or a significant reduction in its size).

If we examine these characteristics closely, we come to the realisation that the messages they convey have very little, if anything, to do with genuine scavenging. All they tell us is that the fish in question are bottom dwellers, bottom feeders and have a well-developed sense of smell and/or taste. Dead organisms end up sooner or later on the bottom—and they smell! Therefore, bottom dwellers are well equipped to deal with this situation—and they do just that.

The 'language' of a downwardly-

directed mouth is obvious—it means that any fish which possesses such a mouth feeds from above, whether it be off the substrate itself or directly off actual pieces of edible material. The important thing is that the food must be below the fish's body. (This applies even to the Upside-down Catfish, *Synodontis nigriventris*, if you think about it!).

Applying this notion more widely, even if we restrict it to species that are kept in aquaria, we end up with quite an impressive list. For example, all the 'true' Loaches fall into this category, e.g. *Botia*, *Acanthophragmus*, *Noemacheilus* and *Misgurnus*. So do many Catfish—in addition to *Corydoras*, there are quite a few other popular genera, such as *Brochis*, *Ancistrus*, *Otocinclus*, *Panaque* and *Hypostomus*. Then there is the Sucking Loach, *Gyrinocheilus aymonieri*. Even some of the Elephant Noses (family *Mormyridae*) have downward-pointing mouths.

Yet, going through the list, how many could be regarded as scavengers? The fact is that they all scavenge to a greater or lesser extent, if what we mean by the term is 'rooting about on the bottom'.

But, as I said at the beginning, scavenging involves feeding on dead matter. How many of the above 'qualify' then if we use this criterion? Again, the answer is most, if not all.

For all their considerable plant-eating reputation, Sucking Loaches, *Otocinclus* and Plecos (*Hypostomus*) will think nothing of diving in, sometimes almost literally(!) and having a go at anything that dies in an aquarium. Their apparent partiality to this habit is such that they can sometimes act as more efficient scavengers than most other species dubiously 'honoured' with that label.

As mentioned earlier, many 'scavengers' have their downwardly-directed mouths adorned with barbels. Is this an exclusive characteristic of the language of the scavenging habit? No, of course not. The possession of barbels says several things about the habits or attributes of a species but it does not necessarily identify it as a scavenger.

Barbels are sensitive structures liberally



The Tench is often sold as a scavenger, but how correct is this label?

supplied with nerve endings associated with touch and taste. This arrangement is, obviously, very useful in environments where clarity is poor, e.g. muddy water, dark recesses, etc. The barbels of fish that live in such habitats are, therefore, used partly as feelers and, not surprisingly, are often long and capable (as a result of their distribution around a fish's mouth and/or their manoeuvrability) of 'feeling' in every direction. While this will allow a fish to find its way about, it does not necessarily tell the fish whether the objects being touched are edible or not. For this, 'taste-buds' are required. Since barbels possess these in abundance, it is possible for the owner not only to mount a search for food in poor-visibility conditions, but to know when it has actually found some.

Species which hunt in this way are not usually regarded as scavengers but as active predators. Some of the medium-sized and large Catfish, such as *Myxus* and *Phractocephalus*, fall within this category. Incidentally, these fish do not have downward-pointing mouths—their lifestyle does not 'dictate' that this be so.

Therefore, although downwardly-directed mouths and barbels often go together, they don't always do. It just depends on the fish's diet and way of life.

Among the bottom feeders (in addition to *Corydoras*, *Botia*, etc.), we find a fascinating range of adaptations.

For example, Goutfish or Red Mullet (*Mullus* spp.) have two highly mobile long 'feelers' on their chin which they probe into mud or sand in their search for food. Drums (family *Sciaenidae*) have a whole row of small barbels stretching back almost to the posterior edge of their lower jaw. These are used for the same purpose as in the Mullet, *Corydoras* or *Botia*, i.e. to locate food that lies under the surface and is, consequently, hidden from view.

As far as the reduced swim bladder, or its absence, is concerned, we find that we cannot exclusively link even this characteristic with a scavenging way of life. All we can do is identify the fish concerned as bottom dwellers which would be at a tremendous disadvantage if they had fully developed swim bladders with their corresponding buoyant qualities.

Fish, and their characteristics, evolve in response to pressures exerted by the environment through a process collectively referred to as Natural Selection. It is this that leads to the gradual emergence of those features which I refer to in this series as 'The Language of Fishes'.

Where we go wrong in our interpretation is when we get a bee in our bonnet about a particular, artificial concept, such as the mythical notion of the 'scavenger' and then apply it without detailed consideration. For instance, to link down-

ward-pointing mouths exclusively with the scavenging habit is, clearly, incorrect. To link a combination of characteristics, such as barbels, swim bladders and mouths, in this way is even more absurd.

As you have gathered (!), I am not too fond of the term 'scavenger' where aquarium fish are concerned. If we define it correctly, i.e. referring to feeding on garbage and carrion (dead, putrefying flesh), there are no aquarium species that will accurately or exclusively fit the description. If we define it loosely, i.e. referring to rooting about on the bottom, then all sorts of inconsistencies creep in, so much so, that if we are not careful, then all 'bottom-rooting' fish, including such clear non-scavengers as those beautiful, interesting members of the Cichlid bottom-sifting genus, *Geophagus*, would become scavengers! Now, how correct would that be?



Like other Loaches, *Botia sidthimunki*, will scavenge, given the chance

# Your questions answered

Having problems? Send your queries to our panel of experts who will be pleased to be of service. Every query receives a personal answer and, in addition, we will publish a selection of the most interesting questions and responses each month. Please indicate clearly on the top left hand corner of your envelope the name of the expert to whom your query should be directed. All letters must be accompanied by a S.A.E. and addressed to:

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## Marine

### Flukes on Butterflies

*I have been keeping tropical marine fish for about two years, and I cannot keep Butterflyfish for longer than 1 or 2 months—they always appear to succumb to fluke infections. Why does this happen?*

These beautiful fishes, like the closely related marine Angelfishes, all have large, relatively 'loosely fixed' scales and for this reason, when an aquarium becomes infested with flukes, (ie. monogenetic trematodes), it is usually the Butterflyfishes and Angelfishes which suffer first and suffer most acutely if not quickly treated.

The classic symptoms of fluke infestation are:

1. Persistent 'flashing' against rocks, corals, shells, etc.
2. 'Ticking' of the dorsal and pelvic fins against the body.
3. The appearance of small, ie, 0.5 to 0.75mm diameter off-white/grey spots having a vague outline and irregular shape.

These spots are most easily seen in the semi-transparent tissue connecting the fin-rays together. Nine aquarists out of ten think that their fishes are suffering from an outbreak of true White Spot disease caused by the parasitic protozoan *Cryptocaryon irritans* and treat the condition with a copper-based medication. However, since

these remedies are intended for the treatment of protozoan and fungal parasites, these metazoan flukes simply go from strength to strength. The correct treatment is a proprietary remedy formulated specifically to deal with metazoan parasites such as flukes.

Always remember that the spots which occur on coral-fishes when the disease is true White Spot disease, ie. caused by the protozoan parasites *Cryptocaryon irritans*, are distinguished from flukes spots as follows:

1. *Cryptocaryon* spots are pure, vivid, enamel white in colour;
2. *Cryptocaryon* spots are about 1mm in diameter and are slightly raised above the body of finnage outline;
3. *Cryptocaryon* spots are perfect geometric circles with a crisp sharply-edged outline.

## Coldwater

### Enlarged eye

*We have a Moor that has developed an enlarged eye which appears to be clouding over. It spends a lot of time lying motionless on the bottom of the tank, then swims up to the surface and back down again. We have been told that this could be the result of old age.*

It is not unusual for a fish with telescopic eyes to have one eye suddenly grow larger

than the other eye, so in that respect your fish will not necessarily be diseased. However, Moors are prone to cataracts and poor water quality seems to encourage this type of eye problem.

If steps are taken at the beginning when this disease is just starting then it can be cleared. Gently swab the eye with a piece of cotton wool with one part iodine to nine parts glycerine, while holding the fish in a damp cloth.

The fact that this fish is spending much of its time lying at the bottom of the tank then swimming up to the surface and back down again seems to indicate that it is suffering from swim-bladder problems. If this is so then it almost certainly has nothing to do with old age. You do not say at what temperature your fish is kept but some individuals are prone to this disability at low temperatures. There are several causes: chills, too much dried foods and individual weaknesses.

Bladder disorder brought on by chills or incorrect feeding can often be cured by giving some warmth (increasing the water temperature), lowering the water level to about six inches, and withholding feeding for a few days, then offering livefoods such as *Daphnia*.

### Growths on Dace

*We have three Dace in our aquarium, all of which have developed a bubble-like growth*

*on their bottom lips. They all look healthy otherwise, and are feeding normally.*

The growth which has appeared on your Dace could be breeding tubercles which develop during the breeding season on the male fish.

The spawning season commences in February, lasting until the end of May, though March and April seem to be most favoured. The male becomes sexually mature at about one year of age, but the female is usually at least two years old before she will breed. The eggs, which are a pale orange colour, are laid on gravel which does a fine job of camouflaging them.

## Tropical

### Tank repairs

*I came home one day to find the carpet soaked, my tank empty, and the fish all dead. What I would like to know is could I buy a piece of glass big enough to fit the bottom of the tank (as this is cracked right across), place the glass in, and seal it all round the bottom, as it seems a waste of money to get rid of the tank? The dealer informed me that he has never had a tank break like this before. So the only thing I can do is try to repair the tank myself. Would it be worth trying to repair the tank without removing the bottom?*

Would clear plastic do or, perhaps, heavy duty P.V.C. pond liner?

When a base cracks like this it usually means the tank was not level on its base. If possible, use a layer of polystyrene tiles under the base to take up any inequalities.

Yes, you can repair the tank without stripping down all the glass joints—have a new base cut (from 5mm or more) glass to fit snugly inside the tank. Bed it down on a few (thin) blobs of silicone sealer and then seal all the edges with a good ribbon of silicone sealer pressed into place with your thumb (wet your thumb and run quickly along the sealer). The glass must be clean and dry of course.

Do not use plastic; silicone sealer will not adhere to plastic.

## Koi

### Breeding Koi

*I have several 15 in. Koi and would like to breed with them. Could you tell me how to sex males and females and how to go about breeding them?*

Sexing Koi is not an easy task for the beginner. Even experienced Koi-keepers make mistakes at times. Male Koi, when viewed from above, appear to have a slender body with a relatively large head whereas females have a much faster appearance, especially around the abdomen. Dr. Kuroki in Japan has said that male Koi in breeding con-



Koi can be a bit difficult to sex, but keeping them in a shoal should ensure a good mix of males and females. (Photo: Hilda Allen)

dition have white spots on the pectoral fins. Others state that the anal opening is different between the sexes.

The sure way is to see your fish spawn and to observe which is chased and which chases. The best way for a beginner to start breeding Koi is to group-spawn the fish. By this I mean put several Koi together in a pond set up for breeding. In any group of more than six fish you would be very unlucky not to have both sexes.

In your particular collection, I feel sure you will have both males and females so you should have no problems in obtaining a spawning if the fish are in good condition.

The simplest way to breed Koi is to place some form of spawning material into your pond on which your fish can deposit eggs. This can then be removed and the eggs hatched elsewhere. Several types of spawning mats are available but any soft stringy material could be used. Koi which are in breeding condition can often be triggered

into spawning by running fresh water into the pond.

Ideally a spawning pond should be set up. This can be a temporary set-up, providing it is at least 18 in. deep and about 6 ft. or more square. Again, spawning material is added. The breeding stock are then moved into the pond when they have been brought into condition. The change of water is then all that is usually needed to trigger a spawning. After spawning, the adults are returned to the original pool and the eggs are left to hatch.

Koi eggs can take up to a week to hatch, depending on temperature, but all the time they take to hatch every effort should be taken to maintain the water temperature as constant as possible. Many people like to add malachite green or some other fungicide to the water with the eggs to prevent fungus attacking the eggs.

Once hatched the fry become free-swimming in two days and should then be fed on *Daphnia*.

## Plants

### Aquatic bulbs

*I would like to grow plants such as Aponogeton in my tanks and would be grateful for information on the treatment of aquatic bulbs in general.*

The most important thing with bulbs is that they must be freshly imported when purchased. Basically, they live off their stored reserves for the first season so you must fertilize them well to allow them to build up enough food reserves for the following growing period. All bulbs need a rest period of at least three months either in cooler water or stored in damp sand at the end of their growing cycle. Frankly, it is cheaper to buy new plants than mess about with old ones.

### Thanks Arthur

Owing to failing eyesight, Arthur Boarder, one of our longest-serving contributors, has, unfortunately (and reluctantly), had to give up his invaluable advisory service to our readers. We are profoundly grateful to him for everything he has done for *A & P* over the years. Arthur has deservedly enjoyed the respect of *A & P* readers both at home and abroad, having established an enviable reputation for dependability, expert knowledge, sensible advice and extreme courteousness towards the thousands of aquarists who have written to him via our magazine. We wish Arthur Boarder a long, happy and thoroughly deserved retirement.

His place on our Panel of Experts is taken up by Pauline Hodgkinson, a prominent member of the Northern Goldfish & Pondkeepers Society, a well-known breeder of Fancy Goldfish and the author of regular features on the subject in *A & P* and overseas publications. Pauline is also an N.G.P.S. 'First Class Judge', a position that requires a minimum of 10 years of breeding success with, at least, three varieties of Goldfish, plus several years of regular major awards at regional and national Shows. We welcome Pauline to our team and look forward to a long and happy association.

## Next month

- Enter our **Tetra Competition** and win a trip for two, all expenses paid, to Tetra's West Aquarium in the Hartz Mountains of West Germany.
  - **August is Koi month at A & P.** Our colourful supplement includes articles from:  
**John Cuvelier** on good Koi 'housekeeping';  
**Roger Cleaver** on his six favourite Koi varieties;  
and **Dr. Peter Miller** on how Koi and Carp grow.
  - **David Armitage** has just obtained some very rare Anabantoids. Don't miss his special feature, the first-ever UK article to include a photograph of a living specimen of this secretive fish.
  - Our ever-popular regulars, plus specially commissioned articles, complete an impressive August line-up.
- Be sure to order your copy early!**

## SHOW REPORT



The winning tableau from Larkhall A.S.

# Good start to the 'big' festivals season

The 14th Scottish Aquarist Festival, organised by the Federation of Scottish Aquarist Societies and sponsored by the *Aquarist & Pondkeeper*, took place at the Civic Centre, Motherwell, on 17 and 18 May.

As veterans of the Show circuit know only too well, organising any Festival is a major feat, requiring innumerable hours of patient planning, discussion, and sheer hard, physical work. Our sincere thanks must, therefore, go to the S.A.F. committee for their tremendous efforts in providing us with the first of the 'big' Festivals of the season.

This highlight of the fishkeeping calendar was, once again, graced by an exhibition of top quality fish, colourful tableaux and characteristically excellent hospitality.

Several thousand people visit S.A.F. every year. Some, in fact, have been doing so from the very beginning and they, almost as much as the Festival itself, have become a welcome and pleasant annual 'expectation' in many people's diaries.

Pete Moye's Supreme Champion  
*Pimelodus albifasciatus*



S.A.F. is many things to many people—it acts as an eagerly awaited meeting place where old friendships are renewed and new ones are formed, where old rivals (showing wise) compete, where new products, fish and books are viewed and bought (often at special Show rates), and much, much more.

On the showing side, competition for the top prizes was as keen as ever this year with 24 tableaux and a total of 550 fish entries. In addition, there were the annual furnished aquaria and schools aquatic art competitions. Away from the competitive arena, there were eleven trade stands doing good business (especially on the Sunday), a lecture from David Pool of Tetra, and stands from the Anabantoid Association of Great Britain, the British Cichlid Association, the Catfish Association of Great Britain and S.L.A.G.—UK.

The dates for next year's S.A.F. have already been fixed: they are the 16 and 17 May. Make a note in your diary—we'll see you there.

### RESULTS

#### Tableaux (TetraMin Trophy)

1. Larkhall (Tank);
2. S.L.A.G. (Robot);
3. Scorpion (Organ);
4. Aberdeen (Oil Rig);
5. Dunfermline (Sweetie Box).

**Supreme Champion** (LMB Trophy and Hospitality Trophy)—Pete Moye (Basingstoke)—*Pimelodus albifasciatus*.

**Best Fish in Show** (Bobby Wood Trophy)—Jim Makin (Grangemouth)—*Corydoras robinae*.

**Furnished Aquarium—Society** (NEL Trophy)—Larkhall.

**Furnished Aquarium—Individual** (FNAS Trophy)—Keith Todd (Ayrshire).

**Best Schools Aquatic Art** (Bell Thompson Trophy)—Lanark Primary.

**Best Coldwater** (Edinburgh Pondkeepers Trophy)—B. O'Neill (Workington).

**Best Guppy** (Earl of Motherwell Trophy)—J. Marnoch (Aberdeen).

**Best Molly** (George Henderson Trophy)—Colin Hendry (Dunfermline).

**Best Platy** (Dunfermline Silver Jubilee Trophy)—John Wells (Dunfermline).

**Best Swordtail** (Basingstoke Friendship Trophy)—John Wells (Dunfermline).

**Best A.O.V. Livebearer** (Scotia Aquatics Trophy)—H. Smith (S.L.A.G.).

**Best Livebearer Pairs** (Aquarama Trophy)—D. Cooper (Lanarkshire).

**Best Pair of Guppies** (Hutchings Trophy)—George Anderson (Paisley).

**Best Barb** (Stan Taylor Trophy)—Henry Hoey (Dunfermline).

**Best Characin** (Woodcock Trophy)—Mr. & Mrs. Hodges (Scorpion).

**Best Rasbora** (Bob Ferguson Trophy)—Peter Meldrum (Livingston).

**Best Danio, Tropical Minnow** (Friendship Trophy)—John Wells (Dunfermline).

**Best Egg-laying Toothcarp** (B.K.A. Trophy)—Derek Long (Dunfermline).

**Best Siamese Fighter** (Belle Vue Trophy)—David Dobbie (Dunfermline).

**Best Gourami** (Muirhouse Trophy)—J. Norwood (Grangemouth).

**Best Rift Valley Cichlid** (Rift Valley Trophy)—Bill McFarquar (Aberdeen).

**Best Dwarf Cichlid** (Fotheringham Trophy)—W. Renton (Dunfermline).

**Best Large Cichlid** (Frisby Trophy)—W. Weighand (Stirling).

**Best Catfish 'A'** (Mark Aitken Trophy)—Jim Makin (Grangemouth).

**Best Catfish 'B'** (Ayrshire Trophy)—Mr. & Mrs. Robinson (Scorpion).

**Best Shark** (Aquarian Trophy)—John Wells (Dunfermline).

**Best Loach** (Hartlepool Trophy)—K. Fowler (Workington).

**Best A.O.S. Egglayer** (Aberdeen Trophy)—Mr. & Mrs. T. Groom (A.A.G.B.).

**Best Aquarium Plant** (Duncan Fotheringham Trophy)—Norman Hearty (Livingston).

**Best Pair of Egglayers** (M & M Trophy)—K. Buchan (A.A.G.B.).

**Best Breeders (Livebearers)** (Lanarkshire Trophy)—D. Leroy (Larkhall).

**Best Breeders (Egglayers)** (Alloa Trophy)—D. Cook (Larkhall).

**Tableaux with Highest Points** (*Aquarist* Trophy)—Dunfermline.

**F.S.A.S. Open Show League** (D. & G. Trophies)—

Single Fish—H. Hoey (Dunfermline).

Breeders (Egglayers)—D. Meredith (Kirkcaldy).

Breeders (Livebearers)—D. Crawford (Kirkcaldy).



# Naturalist's notebook

by Eric Hardy

## Conservation Publicity

Aquarist and naturalist societies are nowadays more publicity conscious. Most have a Press Secretary seizing upon gimmicks more likely to gain attention in the local media. We now have bird-spotting races, nature-trails, 'I Love Bats' stickers, National Pond-Saving Year (when Ford, the sponsors, filled-in the moat of uncommon pond-weeds around Lancashire's oldest dwelling, the Old Hutte, despite our pleas, when they built their factory at Halewood).

In assessing results of 'Save a Toad Campaign' one must bear in mind that the decline of toads and frogs has been much greater in the south, especially around London, than the north. 768 wild-caught Common Toads, 250 Grass-snakes, 152 Newts, 67 Common Frogs and 37 Slow-worms were estimated to have been sold last year by Greater London pet shops without a licence. Conservation trusts took up the idea of Easter's warning notices at favourite toad-migration crossings this year, but while a list of 221 such crossings sent to me had 58 in East Anglia, 46 in the south-east, and 63 in the Midlands, none was in Lancashire, only one in Cheshire and 11 in Yorkshire.

As I mentioned on BBC radio at the time, these couldn't be seen by fast motorists at night when most toads used the crossings. Much more helpful to frogs and toads in the northwest is the preservation and creation of more breeding ponds, and keeping dykes and ditches free from fly-dumping of rubble and rubbish. Every year the drainage ditch along gardens at the back of Overchurch Road in Upton, Birkenhead, is full of frogspawn. Several people with surplus spawn distribute it to ponds around Hale, near Liverpool, with more effective conservation. But this doesn't attract popular headlines so easily as Toad Crossing signs.

## Natterjacks (and Sand Lizards)

Despite delays from our coldest April for years, the liberation of many home-bred Sand Lizards on Ainsdale (Southport) dunes by my friend Keith Corbett of the British Herpetological Society was an admirable idea to boost the conservation of their northernmost British haunt. He it was, again with World Wildlife Fund help, who shocked the Nature Conservancy into the real needs of Ainsdale's Natterjack Toads by taking the law into his own hands by bringing a bulldozer on to the drying dunes some years ago and excavating breeding pools. The NCC learned its lesson and excavated more pools, with great benefit to the Natterjack,



A male Natterjack Toad, marked by its yellow dorsal-line, distends its throat in its spring mating cry. Once common on brackish English estuaries, it has few haunts left

which this May appeared on a new 34p stamp. Incidentally, a new subspecies of the Sand-Lizard, *Lacerta agilis garzoni*, is described from the Pyrenees.

Natterjacks are conditioned to great ups and downs in their populations according to the weather, succeeding most in wet seasons when nearly 1,000 strings of spawn may be counted on the Formby-Southport dunes; but in dry summers the toadlets desiccate before they reach maturity. It may be necessary to remove frogspawn from slacks favoured by Natterjacks if these are to succeed. The water fungus *Saprolegnia* sometimes destroys Natterjack spawn here and tadpoles lose their tails where Sticklebacks are common. Hundreds of toadlets are trampled to death by summer visitors to the National Trust dunes (including car park) at Formby.

The NCC monitors 44 breeding colonies of some 20,000 Natterjacks in Britain: 6 eastern ones from Saltfleetby in Lincs to Woolmer, 1 in the Midlands (Cannock), 1 in Cheshire (Hoylake shore Red Rocks marsh), 5 on the Hightown-Birkdale dunes, of South Lancashire, 28 on the Cumbrian coast including Sellafield, and 3 in Scotland, on the north Solway, their northern limit. One is on Jersey.

Roads aren't the problem with Cheshire's only Natterjack colony. The local County Trust complained that though they have plenty of ambitious openers and closers of public meetings, they cannot find volunteers to warden their toad-reserve at weekends when I see kids in the marsh collecting them; and loose dogs there too.

Egg-strings are first noticed in the Northwest from 18-21 April, finishing early in June according to the weather (they want it warmer than Common Toads), as early as 13th April in East Anglia, at 12.9°C (water-surface) and 11.2°C (air). Reeds, rushes and *Sphagnum* moss have to be encouraged in some haunts for tadpole-refuge from desiccating sun or predatory blackbirds and lapwings. *Dytiscus* and other Water-beetles, Dragon-fly-nymphs, Water-bugs and Grass-snakes are other predators; in one case even hedgehogs. Crows also prey on adult Natterjacks. Too much reed, as at Hoylake Red Rocks, has to be reduced for open water. Water-levels may sometimes be too high for spawning, and spawn is more sensitive than tadpoles to water becoming too acid (ie) less than pH6. Many toads at Formby were too senile at 10 years or more (mean length 60 mm instead of the 35-55 mm of breeders) and lacked sufficient recruitment survival of tadpoles.

Differentiating Common and Natterjack tadpoles by the gap in the second upper row of teeth is much more difficult than textbooks imply. Late tadpoles may be in some pools to October. Toadlets 20-30 mm long have a better chance of surviving winter hibernation in the ground than those not grown so much. They breed in their 4th year; males with visible thumb-pads. Tidal inundations of more than 15% sea-water drive them from their pools. Tadpoles will eat late spawn of their own kind; and even the desiccated remains of other tadpoles.

PHOTO: DENNIS GREEN

# SUCCESSFUL FISHKEEPING— A QUESTION OF BALANCE

Fish are like babies. They can let you know when they are ill but they are not very good at describing their symptoms, as David Monk of Wildwoods demonstrates



**W**hy have my fish died?" —As fish consultant at a busy watergarden centre I am asked that question more than any other.

Unfortunately, all too often, my reply is that it is the enquirer who is at fault. "Gasp! But I love my fish" comes the indignant retort, and, of course, it's true; yet I imagine that if an ailing fish could speak, its dying words might be—"My owner doesn't understand me". So, if you have lost fish that could have been saved, or if you are new to the hobby and don't want to join the band of well-meaning assassins, then read on.

First let me start by exploding the myth that all fish diseases are caused by some rampant blight that must have been introduced to your stock by an outside agent; this is not the case. It is true that some parasitic organisms will actively attack healthy fish, although not as quickly or as critically as they would a weak fish; consequently the stronger fish's chances of survival through its own natural defences are that much higher. This is significant when you consider that throughout their lives most fish carry with them, and are surrounded by, potential disease-causing organisms. In the wild there exists a constant state of equilibrium, a natural balance between the fish, its environment, and potential pathogens (organisms that cause disease). In captivity, however, the environment is limited and, therefore, this essential balance is far more delicate and any adverse fluctuation will have an immediate effect, tipping the scales in favour of the pathogen.

Stress is the decisive factor that can transform a healthy fish into one that is

susceptible to disease. You may wonder how a fish can suffer from stress. It doesn't have to worry about paying the mortgage or making ends meet; its problems are much more fundamental. Stress in relation to fish is usually expressed in terms of the environment and can best be defined as the result of changes in the normal conditions a fish is used to beyond a level it can tolerate. This could be caused by such things as bad handling, lack of oxygen, too acidic or alkaline water, extremes of temperature, chemical toxicity or physical damage. If the adjustment required to cope with any departure from optimum conditions is too great, then the fish will die from that alone; if not, it automatically becomes predisposed to infectious diseases. This explains why the keeping of marine fish and invertebrates is so exacting. Since they come from probably the most stable environment on earth they have not needed to develop the ability to adapt to the sort of fluctuations they are likely to encounter when confined to an aquarium and can, therefore, perish as a result.

The fishkeeper's art is in establishing and maintaining an environment that comes close enough to natural conditions to ensure a healthy existence. If you or I become cold we can put on a coat; if a room becomes smoky we can walk out the door. Our fish aren't so lucky—they are restricted to one small area, and the furnishings and life support systems within that area are down to us.

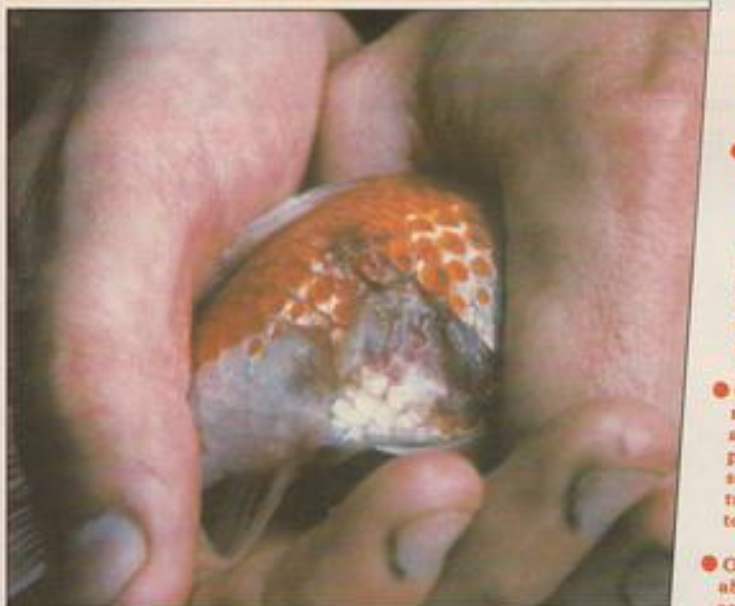
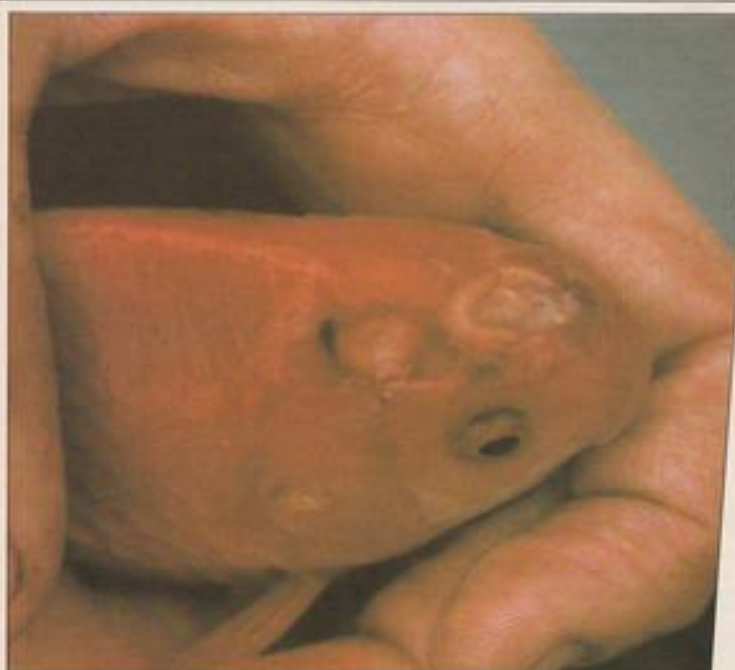
The approach to fishkeeping on the Continent is to be admired. It's not 'Auf Wiedersehen Pet' for the Germans. They concentrate more on providing the equipment necessary to keep the fish well

instead of skimping on the technology and eventually spending more on replenishing the stock. Happily, the more sophisticated equipment is now becoming available to the British aquarist.

Don't misunderstand me—I am not saying that the equipment makes the aquarist. Far from it, I am merely suggesting where our priorities should lie. The true key to successful fishkeeping is good husbandry.

Despite this, it is inevitable that sooner or later even the most accomplished aquarist will be faced with a fish health problem. It may be due to some failing on his/her part or to circumstances entirely beyond control. Whatever the reason, the fish's chances of survival rest on three things—the early recognition that a problem exists, accurate diagnosis of that problem, and then the correct treatment. This is where rule 6—'Observe your fish'—becomes important. Obviously, not everyone can be an expert on fish ailments. Don't worry if you can't diagnose the exact nature of the problem—there is usually someone who can. Consult the dealer who sold you the fish, he should be able to help; if not, perhaps your local vet takes an interest in fish problems.

So, how do you know when your fish are becoming ill? That may seem like a stupid question. Some conditions such as acute poisoning or attack by larger parasites are immediately obvious, but often the first indications are more subtle,



Bacterial lesions/ulcers in pond fish often result from poor water management

Here are what I consider to be the six cardinal rules of good husbandry:

- Establish the individual requirements of the fish in terms of water conditions, habitat, and compatibility with other specimens **BEFORE** you acquire them.
- Don't overstock. Allow sufficient room for growth and don't introduce large numbers of fish at one time. Any new addition will create a temporary imbalance by increasing the loading on biological systems, whether natural or man-made. Quarantining before addition to existing stock is always a good idea (it should be considered essential).
- Provide an adequate diet but **DON'T OVERFEED**. The feeding of coldwater fish should be directly related to water temperature. Individual species will require varying amounts of protein, fat, carbohydrates, minerals and vitamins. Conveniently, most proprietary brands of fish foods offer a balanced diet, although the supplementary use of clean livefoods is accepted as being beneficial. Specially treated frozen foods offer nutritional value equal to that of livefoods without running the risk of introducing disease.
- Protect your fish's environment. Keep a regular check on water conditions; it is necessary to change a measured percentage on a regular basis. Don't allow organic matter (e.g. uneaten food, plant debris) to accumulate. In aquariums, and often in ponds, it will be necessary to employ a filter system to remove solid and liquid waste.
- Gradually acclimatise fish when moving them from one location to another, both in terms of temperature and water chemistry. Ensure gentle handling during capture, in transit, and on introduction to a new habitat.
- Observe your fish closely. Any abnormal behaviour may be an early sign of a problem developing prior to the manifestation of physical symptoms.

in the form of changes in the fish's normal pattern of behaviour. These changes can be divided into stages; first there is an alarm reaction, followed by a period of resistance and adaptation to the stress that has occurred, and lastly, if the stress is too severe or long-lasting, exhaustion, inevitably followed by death. A fish that is developing White Spot (Ichthyophthiriasis) for instance will become nervous

and twitchy before the tell-tale white spots are clearly visible, and then, as the disease progresses and the fish becomes weaker, it will hang near the surface showing fast, exaggerated gill movements with the fins clamped closely to the body. There is a good chance of recovery if the disease is detected and treated correctly before the fish lapses into a state of exhaustion. So, you see, you can play an important part in

determining your fish's health purely by observation.

There can be few sights more enchanting or therapeutic than a community of fish living in harmonious accord with their environment. By understanding and satisfying their needs you will be able to enhance their lives and your enjoyment of this fascinating and rewarding hobby.

# Lake Victoria Cichlids face extinction

Time is running out for the cichlids of Lake Victoria. John Dawes reports on the distressing effects caused by the introduction of a non-native species on the Lake's delicately balanced cichlid community

**L**ake Victoria cichlids are facing extinction. Some species may, in fact, already be extinct. This alarming piece of news is made all the more significant by the fact that there are (or were!) between 200 and 300 species of cichlids known to be endemic to the Lake, i.e. not found anywhere else in the world.

George Turner of the University College of North Wales at Bangor reports that most of the remaining species will probably become extinct within the next two to three years. A desperate last-minute rescue operation is, therefore, essential if something is to be salvaged from this monumental disaster.

The cause of the catastrophe is the Nile Perch (*Lates niloticus*) which was introduced into the Lake against well-informed advice from leading ichthyologists who know only too well the potential effects of disrupting an existing delicate natural balance.

## Background details

The story goes back to the 1950s when a suggestion was made that the Nile Perch should be introduced as a food fish into the Lake. Despite objections from scientists, the idea was pursued by supporters of the project and, in 1960, some Nile Perch finally managed to find their way into Lake Victoria, apparently from surrounding culture ponds. Some time after this, further stocks of the Perch were intentionally introduced. Since then, *Lates* has spread to such an extent that it has virtually eliminated the native fish. A measure of the devastation can be gauged by the fact that hauls numbering several hundred thousand cichlids were collected by research teams from the University of Leiden in the 1960s while their present-day catches number only a few individual specimens at the most.

## The unbalanced equation

We don't have to look very far to find a reason for the above figures. The vast majority of the Lake Victoria cichlids are *Haplochromis* species averaging between 4-6 inches (c. 10-15 cm.) in total length. A mature Nile Perch can weigh in at over 200 Kg and measure 2 metres in length!

You don't need to be a mathematician to work out this particular equation. Suffice it to say that, during its growing period of several years, one single Nile Perch will munch its way through thousands of haplochromines.



Nile Perch (*Lates niloticus*)

*Lates*, of course, is totally blameless. It is just doing what comes naturally to a large, beautifully designed, magnificent predatory fish.

We cannot, therefore, hate the fish for what it is doing. Yet everyone agrees that the situation is deplorable and that something has to be done about it.

As George Turner says, "Unless something is done soon, most of the species will be extinct before they have even been discovered."

## The finality of extinction

The pressure that the endemic cichlids are being subjected to is immense, and they are surely losing ground in a battle that they just cannot afford to lose. There is no coming back from extinction—the ticket is strictly one-way.

Latest reports demonstrate that the pressure has recently become even more intense than it was just a year ago when an international and influential team of some of the world's leading ichthyologists (including such well-respected people as Geoffrey Fryer, Humphry Greenwood, Ethelwyn Trewavas, A. J. Ribbink, R. H. Lowe-McConnell and C. D. N. Barel) published a highly disturbing paper describing the problem in *Nature* ('Destruction of fisheries in Africa's lakes—*Nature*, Vol. 315, No. 6014, 2nd May 1985).

## The final irony

One of the most ironic aspects of the whole affair is that the introduction of the Nile Perch has proved a failure from the fisheries' point of view. To quote George Turner again: "Most local fishermen do not have the equipment necessary to catch the Nile Perch. The local people prefer to eat the native species and so the market price for Nile Perch is low. In addition, the oily flesh means that it cannot be sun dried and has to be smoked, which wastes valuable firewood".

This waste is, in fact, leading to the deforestation of some of the islands

found in Lake Victoria. The problem (as is so often the case) is thus spreading its influence into other areas and into the ecological downward spiral leading to possible irreversible, unforeseen tragedies elsewhere.

## Conservation measures

The question facing all those concerned about the survival of Lake Victoria species is what to do. Reducing the numbers of Nile Perch is a major task which would take many years to have any appreciable effect. Complete eradication is considered to be totally impossible.

George Turner believes that a captive breeding programme has much to commend it—and this idea may well gain support over the coming months. "Lake Victoria species have the same maintenance requirements as Lake Malawi species, and all (as far as is known) are maternal mouthbrooders. This (captive breeding) is where aquarists and aquarium product manufacturers could play a vital role. With a moderate sized single-species breeding tank and a few fry-rearing tanks, an individual aquarist could breed enough young to ensure the survival of a whole species". George would be glad to hear from any experienced conscientious aquarists and from manufacturers interested in sponsoring this project or in contributing ideas for such a campaign.

The whole Nile Perch issue is gradually getting some publicity at last, having been featured by the British Cichlid Association in their Newsletter (No. 102—May 1986) and by the BBC in an uncharacteristically unclear item in the series 'Nature' on 26th May. Further airings for the topic will take place during the Fish Behaviour Conference at Bangor between 14th-17th July and during a lecture given by Geoffrey Fryer at the Freshwater Biological Association AGM on 9th July. Dr. Chris Andrews of the London Zoo Aquarium would also like to mount a display to highlight the problems faced by the Lake Victoria cichlids should specimens become available for such an exhibition to take place.

We hope that this feature will contribute to the Lake Victoria rescue operation by bringing the issues involved to the notice of our readers, inviting them to contact George Turner if they can offer him any assistance. The address to write to is School of Animal Biology, University College of North Wales, Bangor, Gwynedd, LL57 2UW.



Tropical marine fish in their natural environment experience virtually constant conditions all year round. (Photo courtesy of The Coral World, Eilat)

# STOCKING A MARINE TANK

Dave Keeley of Underworld Products highlights the dangers of unwise stocking and shows how they can be avoided

In any one month I expect to receive a minimum of 50 letters from marine aquarists or prospective marine aquarists. Broadly speaking, these can be divided into two classifications—either the writer is intending to start up in the hobby, and wants advice on the purchase of equipment and/or livestock, or secondly, the writer has already started the tank, has already bought some fish and/or invertebrates, and is writing because all is not well. This inevitably means that fish are dying or dead. If everything is successful, then rarely do I receive any letters telling me the fact.

In nearly every case where problems have arisen, it is clear to me from the writer's letter that a major contributory factor has been over-stocking, either in the sense that the aquarist has simply put more fish in the aquarium than it will hold, or has stocked the system more quickly than is prudent. Occasionally, the problem is not caused so much by over-stocking, as by *unwise* stocking—an imprudent mix of fish or invertebrates. In either of the first two cases, the quality

of equipment cannot be ignored—it is obvious that the more sophisticated the filtration, or the greater the water changes, for instance, the greater the tolerance of the system for abuse.

This article, however, is going to concentrate on why there is a need for a stocking rule in the first place, what that rule should be, and how to apply it to your own particular circumstances. In other words it will deal with the quantity of fish advised for any particular aquarium.

There are three factors which govern the need for a limit of stock in an aquarium, and I will deal with each of them in turn. They are:

- 1) water quality and oxygen levels,
- 2) disease problems, and
- 3) territory/room.

## 1) Water quality

In order to understand the need for a stocking limit, it is worth considering a typical marine fish in its natural

environment—the sea. Most readers will know that the world's oceans are the most stable environment on earth. If you look at a Common Clown Fish, for instance, in the Pacific Ocean, you can safely say that it is swimming in an environment where the temperature does not fluctuate more than the odd degree, winter or summer, noon or midnight, where the pH. never changes, where the salinity is constant, where the light levels are constant, only changing gradually from day to night and at different depths, and where nitrite, nitrate, etc. are unknown, and where pollution is still comparatively rare. In fact, the fish is cushioned in its environment and has nothing to fear from it—it is unlikely to boil or freeze, to be poisoned or to dehydrate, or whatever. That is not to say that the fish has no problems in just living, but the point is that the actual sea itself will rarely be responsible for the demise of its inhabitants.

Translate this into a captive environment and it is soon apparent why a tropical marine fish can find it so difficult to adapt to an aquarium. There is simply no built-in natural mechanism in any tropical marine fish to deal with fluctuations in temperature, pH., or salinity, or to deal with any levels of nitrite, ammonia, or other poisons. Now, it is fairly obvious that the reasons for the seas' stability is their sheer size—pollutions do occur, but they are usually fairly localised, and the sea is of sufficient volume to absorb most of what man can so far dump into it. An aquarium, however, is just the opposite, and what are tiny amounts of water, say 20-100 gallons of water, are very easily unbalanced, and can become very quickly not capable of sustaining aquatic life.

Figure 2 is four graphs showing respectively how different parameters are so much more constant in the sea, but may vary greatly in an aquarium. a) In any one given location in the sea, the pH. will not change more than 0.1 degree from month to month. However, in many aquaria, the pH. is always falling, boosted upwards every month by water changes which are often insufficient. b) The temperature fluctuation in the sea can be as little as 1-2 degrees over the year, whereas in an aquarium it often fluctuates 3-4 degrees even without a careless introduction of the wrong temperature water. c) The salinity in any non-coastal area is exceedingly stable, but at home tight fitting cover glasses and difficult-to-read hydrometers combine to create hazardous fluctuations. d) Finally, in many oceans, nitrate is either non-existent or negligible, whereas in aquaria it is constant, ever-increasing, and ever more dangerous.

Just by applying simple logic, one can easily see that an aquarium of X gallons is not going to be as stable, all other things being equal, as an aquarium containing 2X gallons. Furthermore, an aquarium of X gallons containing Y inches of fish is far less likely to be polluted than the same aquarium containing 2Y inches of fish, if for no other reasons than 2 fish

are going to consume twice as much oxygen as one fish, and produce twice as much waste material as one. But it is even more complicated even than that—if twice as much waste matter is dropped, then twice as many nitrifying bacteria are needed to process the waste. Since nitrifying bacteria use up maybe 90% of available oxygen in a tank, then there has to be far more free oxygen to sustain the bacteria, otherwise the waste products will not be processed, and nitrites will appear.

## 2) Disease

The more fish in an aquarium, the more likelihood of disease. Every wild-caught fish that you have purchased is likely to be a disease carrier. Putting it in human terms, if the fish has cancer or heart trouble, then at least the fish will only kill itself so to speak, but if the fish has flu or measles, then the real problems start to occur. Communicable fish diseases, such as White Spot or Gill Flukes, nearly all spread in a similar fashion. The cyst living on the body of the fish periodically falls to the seabed, where it produces eggs; when these hatch, thousands of 'baby' flukes or whatever swim about looking for another fish on which to cling. If they are not quickly successful, they die without a host. It is fairly easy to see that in the sea the odds are stacked against a successful landing, but as one looks into an aquarium, the smaller the tank, and the greater the number of fish, the easier it becomes for the 'bug' to find a home.

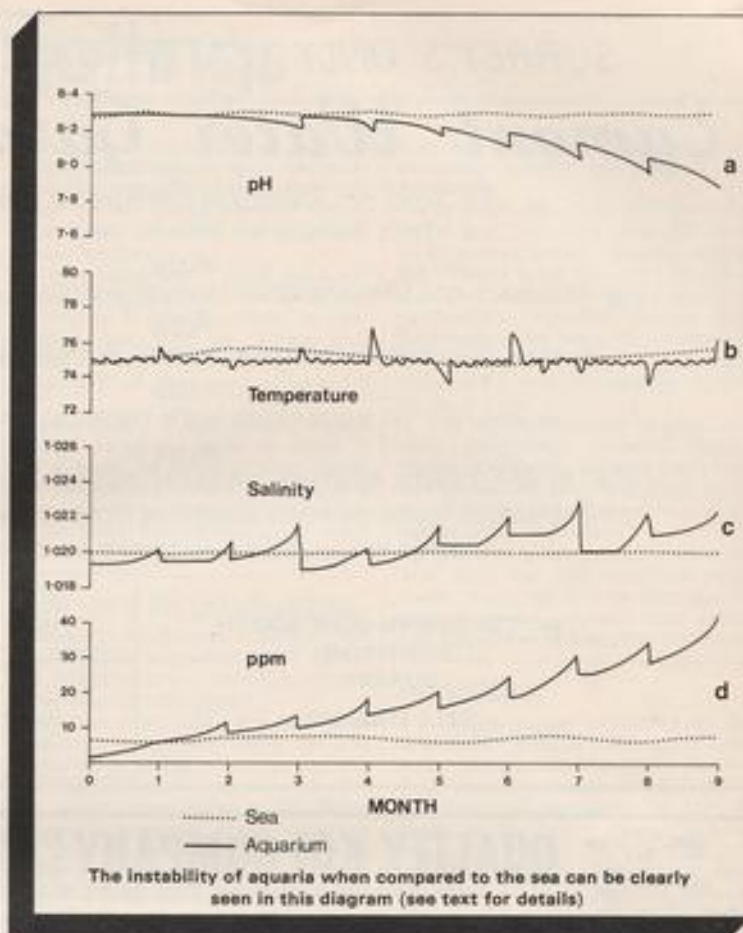
## 3) Territory

As I wrote earlier, fish have little to fear from their environment, but, nevertheless, they have three major concerns:

- looking for their next meal,
- ensuring that they are not part of some other fish's meal,
- breeding.

All these three points involve territory—if an area is overcrowded, then food is going to be hard won; if there are lots of similar fish in an area, then the pickings are easier for any predator; and even a fish needs some privacy, or at least a chance to mate uninterrupted. For these reasons, it is not surprising that most marine fish are fairly territorial, and, in a home environment, this territorial aggression is always a problem, and one of the hardest points for a beginner to master. So it is clear that as a general rule, the fewer the fish in a given space, the lower the stress on the fish there, and so the less the likelihood of trouble.

From the three points above, it is clear that there is a far greater chance of success, the lower the number of fish. But the problem is where to draw the line—one 2 in. fish in a 100 gallon tank may be perfectly happy and remarkably healthy, but is not a practical proposition from the aquarist's point of view. In other words, a sensible compromise has to be reached,



and judging that compromise is a matter of contention and subjective opinion.

## Stocking rule

Many years ago, Graham Cox published a stocking rule as follows: **During the first six months (after setting up an aquarium) stock up to a maximum of one inch of fish for every four gallons of water, and, thereafter, gradually increase the stocking up to a maximum of one inch of fish to every two gallons of water.** The above is only a rule-of-thumb and needs plenty of qualifications and explanations, but I have not yet found a better alternative, so I continue to bow to Mr. Cox's judgment on this matter. I have seen this rule in print literally dozens of times in the last few years, and I have repeated it myself *ad nauseam*. It is still constantly ignored or overlooked, and I cannot see a time when it will not be necessary to repeat it at least once every month.

The stocking rule depends on the following:

a) It assumes good biological filtration (by whatever means), a reasonable level of chemical filtration, either by a protein

skimmer or a Poly Filter, and a surfeit of aeration.

b) Water changes of at least an average of 25% per month.

c) A steady increase in the number of fish.

d) An allowance for growth—some fish grow far more rapidly in captivity than others.

e) A reasonable level of decoration in order to allow fish to maintain their semblance of territories.

f) A commonsense application as to what is one inch. It is fairly obvious that it is ridiculous to count as equals a three-inch Batfish and a three-inch Cleaner Wrasse—the body weight of the latter could be a quarter of the former. As a general rule, use Angels as a fairly middling guide.

## Summary:

- 1) One inch of fish for every four gallons in the first six months.
- 2) Up to a maximum of one inch of fish for every two gallons thereafter.
- 3) Stock slowly and gradually.
- 4) Allow for growth.
- 5) Allow for local conditions.

# Coldwater jottings



Stephen J. Smith

## Splashing out on ponds

I am constantly and pleasantly amazed by the numbers of people who keep fish in ponds to add life and colour to their garden. It would seem that the standard of gardening at home is improving rapidly, and judging from sales of ponds, ancillary equipment and stock, just about every other garden has a water feature.

According to John Cooke, who runs Shirley Aquatics in the West Midlands, pond sales have more than doubled in the past three years. "People have more leisure time and are turning to the home and garden for their recreation," said John.

Ancillary products such as waterfalls, fountains and ornaments have also shown a significant increase in popularity. "Plants are playing a bigger part in the aquatic scene also," explained John. "People have a better understanding and appreciation of aquatic plants than they used to, while the variety now available means that they can have flowering plants in the pond from March through to October."

## Safety

My own collection of ponds (which I use for rearing Fancy Goldfish) draws a great deal of fascination from the majority of my visitors. However, those with parental responsibilities often show concern about the dangers of children falling in. "We'd like to have a pond when the children are bigger," is the usual remark. I have two active youngsters myself so I fully appreciate their predicament. But it seems such a shame that children should miss out on a slice of natural history in their own back garden—and at a time when they will

probably appreciate it most.

Children are without doubt fascinated by water; especially if their pond has 'bugs' flitting through it and richly-coloured fish gracefully patrolling their aquatic 'territory'.

I have found that a raised pond will reduce the risk of children falling in: the surface is brought closer to their attention and they can satisfy their natural curiosity without danger.

And after all, they aren't going to fall up!

Alternatively, if the thought of the children being too close to water is still a cause for concern, plant shrubs and low conifers around the wall in a narrow border so that access is restricted, at the same time presenting a scenic environment for your own enjoyment.

## New view for pondkeepers

Coventry Koi-keepers Christine and Dennis Morris have added a new dimension to their hobby—by installing windows in the sides of their ponds!

Although traditionally Koi have been bred for viewing from above, the idea has proved to be a great success, enabling the couple to view their favourite Gin Rin Kohaku even when at five feet—the pond's maximum depth. The idea is a must for my planned goldfish pond which is to accommodate round-bodied Fancy varieties bred especially for viewing from the side.

Chris is a fanatical animal-lover—her 'menagerie' includes an aviary with cockatoos and doves. She and her husband Dennis have been keeping fish for over five years, having started with a collection of Goldfish before turning to

Koi; and has since become an active committee member of Midland Koi Association.

The pond started at only four feet square and has been extended twice to its present format. Dennis installed the windows using two sheets of 1/2-inch plate glass bedded in putty and supported by brackets. Although recessed from the outside of the pond, the windows are flush inside; rendering to the inside of the pond is completed after the windows are in position.

"The double thickness of glass is a safety precaution," explained Dennis. "A line of aquarium sealant is sandwiched between the two panes and if one breaks there is no risk to the fish—as there might well be with a single sheet".

No breakages have occurred since the 'new' pond was built two years ago—despite the severe winters, although the outsides of the windows were packed with polystyrene as a sensible precaution.

## Addendum

A further society to add to the list of coldwater societies published in Coldwater Jottings, March, is the Scottish Goldfish Group (branch of G.S.G.B.).

Secretary of the group is Mrs. P. Smith of 22 Cullien Court, Hallglen, Falkirk.

Scottish Goldfish Group hold their eighth annual Open Show on Saturday 30th August at Davidson Mains Parish Church Hall, Quality Street, Edinburgh. Entries close on 15th August so if you wish to participate get in touch with Show Secretary Charles Didcock as soon as possible at 12 Greenbank Drive, Edinburgh. (Telephone: 031 447 1698).



A new view of pond fish is provided by this idea from Christine and Dennis Morris—a must for Fancy Goldfish keepers, whose fish are best viewed from the side

## Break-in at Kent Koi

Thieves broke into the Kent Koi Ko premises at Polhill Garden Centre recently and made off with several thousand pounds worth of goods, including a pair of Samari Swords, a Murakami MS100 Gram Balance Set, and 20th Anniversary Arinkai 'Nishikigoi & Ponds'. The proprietors are, obviously, very keen for the authorities to secure a conviction, particularly in view of the fact that several other break-ins have recently been reported elsewhere. Some of these have

resulted in the loss of very expensive pedigree Koi owned by hobbyists. Police are currently investigating these thefts.

Kent Koi are offering a reward for information leading to a successful conviction and urge anyone offered any of the above-mentioned items to contact them or the Sevenoaks police. If you wish to contact Kent Koi Ko, do so at Polhill Garden Centre, Badger's Mount, Sevenoaks, Kent. Tel: (0959) 33567.

## First international fish competition and exhibition for commercial breeders and exporters

The first Dr. Herbert R. Axelrod Fish Competition will take place at the Baltimore Convention Centre in Maryland between 7th-10th August, 1986.

Open only to professional fish breeders and exporters worldwide, the competition will include the following Classes: Goldfish and Koi; Livebearers; Barbs and Characins; Anabantoids; Cichlids; Wild-caught Fishes; Miscellaneous Fishes; and Aquatic Plants.

Approximately 1,000 wholesalers, buyers, importers and retailers are expected to attend the show which is claimed to be unique in its format and target audience.

American trade shows are well-known as the 'launching pads' for many new varieties of fish which very soon afterwards become widely available to the trade and hobbyists. This particular exhibition could, therefore, result in a fresh influx of fish types over the next twelve months.

Any U.K.-based breeder or importer wishing to take part (or attend) has very little time left—the closing date for entries is 15th July. For full details contact: T.F.H. Publications, P.O. Box 427, Neptune, New Jersey, 07753. Telex 132468 T.F.H. Books. Telephone: (201) 988-8400, Ext. 223.

## Norwood now selling Clear-Seal range

In an important deal struck with aquarium manufacturers, Clear-Seal of Bordesley Green, Birmingham, wholesalers Norwood Aquarium have agreed to carry the entire Clear-Seal range of over 50 items. In addition to a choice of aquarium and

cabinets, there are table stands, metal frame stands, condensation trays and hoods. Among recently introduced products are large and small bow-fronted tanks constructed in glass, a corner-fitting tank with two-door stand, and a mini-aquarium twin-pack.

The two tanks in the twin-pack come complete with plastic hoods, and are available in sizes 12 x 8 x 8 in., 14 x 8 x 8 in., 16 x 8 x 8 in., 24 x 8 x 8 in., and 18 x 10 x 10 in. Possible uses include isolation, breeding and as an aquarium for goldfish.

Contact: Norwood Aquarium Ltd., 631 Limpfield Road, Warringham, Surrey CR3 9DY. Tel: (08832) 5454.

## Holder for Eheim Internal Power Filters 2007 and 2009

Eheim 2007 and 2009 Internal Power Filters have four small, protruding knobs on to which the suckers which hold the filters in place underwater are fitted. Cleaning these filters has, up to now, involved the removal of the whole unit from the tank—not always an easy task owing to the efficiency of the suckers.

The new holder overcomes this problem and makes removal of the filter canister a very quick and easy job. The simplicity of the operation, plus the fact that the suckers remain permanently in position and are not subjected to constant handling prolongs their life and reduces the time required for cleaning out the filters.

Recommended Retail Price of Holder:—£1.10 (inc. V.A.T.).

Part No. (for ordering purposes):—7475350.

For further details contact John Allan Aquariums Ltd., Eastern Way Industrial Estate, Bury St. Edmunds, Suffolk IP32 7AB. Tel: (0284) 5051-2-3.



Viewed from inside the tank welders work on the giant sloping front of the aquarium

## New giant Sea Life aquarium

Sea Life Ltd., have recently taken delivery of a giant 7 metres long x 4 metres high aquarium, built by Colmer & Co. (Fabrications) Ltd., capable of holding 150,000 litres of water for their Sea Life Centre Complex at Southsea Castle. It is claimed that the six-sided tank has the largest single span of glass front of any aquarium in the U.K. The glass itself is 40 mm. in thickness, contains a plastic membrane and is designed to withstand the colossal pressures which will exist in the aquarium. Sea Life hope to use this display to accommodate a selection of marine life from the English Channel, including full-sized Conger Eels. For further information, ring John Slade on (0703) 420176.

## Koi food from Cyprio

Over the last 12 months, Cyprio Ltd., in conjunction with one of the country's leading manufacturers of commercial trout and carp feeds, have developed a range of Koi foods specifically formulated for year-round feeding of Koi and other coldwater fish in the U.K. climate.

Extensive trials carried out by Cyprio have shown that the new food gives enhanced growth, good colour development and excellent digestibility. In addition, water quality analysis made throughout the trials showed that the low dust content of the food and the balance of animal and vegetable protein contained in the diet, reduced the loading on biological filters, thereby increasing the efficiency of filtration.

The food is available in three particle sizes: crumbs, medium (3 mm.) and large (8 mm.), and in two formulations, staple and colour.

Initially, the food is only available in the medium size staple diet, direct from Cyprio and from selected retailers, packed in 10 Kg. and 5 Kg. bags and 2 Kg. tubs. Other formulations and sizes will be introduced later.

Prices as follows: 10 Kg.—£19.50; 5 Kg.—£12.50; 2 Kg.—£6.25 (p & p inc.). (Samples sent on request.)

Full details from Cyprio Ltd., 133 Eastgate, Deeping St. James, Peterborough. Tel: (0778) 344502.



# FILTRATION FOR KOI

**P**ossibly the most frequently asked question by the newcomer to Koi-keeping is a double-barrelled effort along the lines of: "Why is it necessary to filter my pond, and how do filters work?" The following article will hopefully answer both and at the same time remove some of the mystique surrounding the subject. I have been blessed with a head start on most of the Koi-keeping fraternity, thanks to my many years spent working in the water industry in both the 'clean' and 'dirty' disciplines and have been able to apply much collected knowledge to the hobby.

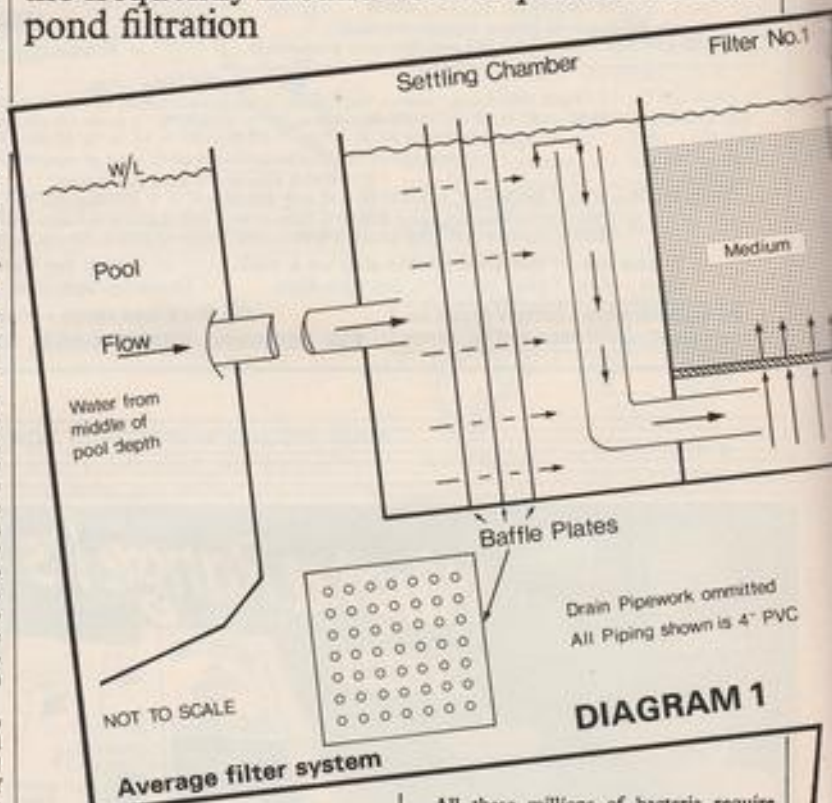
Of course it is not necessary to filter your Koi pool, provided you have no objection to only catching an occasional glimpse of your Koi when they come to the surface at feeding time, and you have no objection to only keeping a much smaller number of Koi in the size of pool available to you. Koi have been bred with the sole intention of providing their owners with an ever-changing display of colour which can only be appreciated when viewed through clean, clear water as opposed to the murky pea soup contained for much of the year in the average garden pool.

Another aspect concerning the necessity or not of filtration is the delicate matter of waste products issuing from your Koi, in very considerable quantities during the Summer, I might add. The larger the Koi, the greater the output! A large percentage of these waste products is acidic in nature and unless removed by filtration, the concentration will build up to the point at which the inbuilt defences of the fish will come into play and stop further growth and may even kill. There is also an increased likelihood of spontaneous outbreaks of various diseases as a result of the poor water conditions.

The ideal filter will return water to your pool which is both **CLEAR** and **CLEAN**. Yes, there is a difference! It is all too easy to achieve water of exceptional clarity but which is absolutely toxic to fish! Lesson number one to learn is, **CLEAR** means you can see through it right down to the bottom of your pool. **CLEAN** means that all undesirable chemical compounds have been removed, in other words, 'Chemically Stripped'. Therefore, your filter must be capable of performing both functions i.e. to clear and to clean, **IN THAT ORDER!**

Let's take the first part and look at diagram (1), a schematic of an average filter system. Nothing very complicated about it, is there? The water from the pool enters the first chamber by gravity, where the majority of the larger solids will settle to the bottom (settling chamber). The baffle boards in this chamber slow down any turbulence, thus

John Cuvelier offers sound, expert advice on the frequently misunderstood question of Koi-pond filtration



reducing 'carryover' into the next stage. If space permits it is advisable to have two settling stages for reasons which will become clear. This then is stage one, a crude form of mechanical filtration.

For the next and subsequent stages we have to rely on many millions of unseen allies in the form of aerobic bacteria which, once established in a filter, break down and consume all those previously mentioned undesirable chemical compounds. What the bacteria cannot do, is to remove heavy solids, hence the need for a settling area, without which the bacterial colonised filter will quickly become blocked. What we have in effect is a miniature sewage treatment plant, to use the term in the nicest possible way!

All these millions of bacteria require somewhere to live in order to perform their essential function, so we provide their living quarters merely by filling the remaining chambers in the system with some type of medium which the 'bugs' can hang on to with one hand, using the other hand to catch their food supply, the stuff we wish to get rid of! This is where the job gets a little confused because of the many differing theories postulated over the past few years. What is the preferred medium?

We need to strike a happy medium (sorry!) between maximum surface area (of the medium, not the container) and minimum restriction offered to the flow through it. Sand or very fine gravel will make an excellent filter medium but will

quickly block with waste products long before any bacteria have become established. Other types of gravel including 'pea', granite chippings, pebbles, and the type known as Canterbury Spar have all been used with varying degrees of success. All suffer with the common faults of eventual blockage and the effort required in digging them out for cleaning when it happens!

Various types of man-made materials have appeared on the market in recent years, some of them made from ash residue or expanded clays, etc., and all can perform a useful function under certain conditions. However, the pioneering work performed by the water treatment

industry in the treatment of sewage has now come to the aid of the Koi-keeper in the form of the so-called 'ring medium'. As the title suggests, this consists of short lengths of what looks like plastic piping. These offer very large surface areas for bacterial colonisation without the draw-

back of reducing flow rates.

One amusing spin-off from this relatively new approach to filtration techniques is the availability in bulk of the common 'hair roller' for use in filtration. As one wag was heard to say, "They're marvellous, and give your water a permanent wave!"

Seriously, they are excellent, combining as they do, the tubular format with holes and spikes around the circumference giving a colossal surface area. Diagram (2) shows an enlarged view of one chamber with media installed.

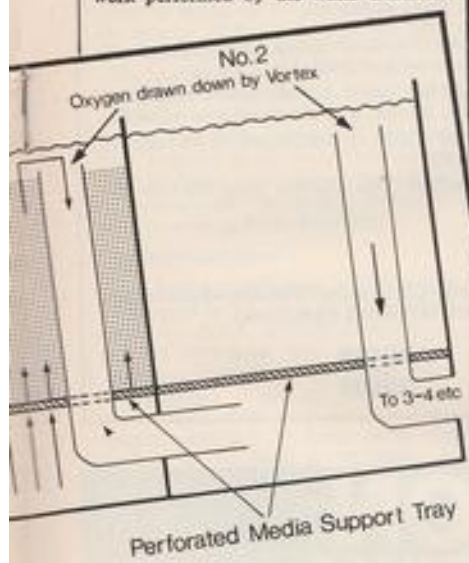
The final chamber in any string should contain one of the finer media in order to give a 'polish' to the water before it returns to the pool. One option for this important duty could be some of the open cell foam now available.

Many newcomers to the art of filter construction make the mistake of thinking that the faster the water is pushed through a filter, the more effective will be the result. Not so! For the bacteria to do their job, the water must be in contact long enough. This 'dwell' or retention time is only arrived at through

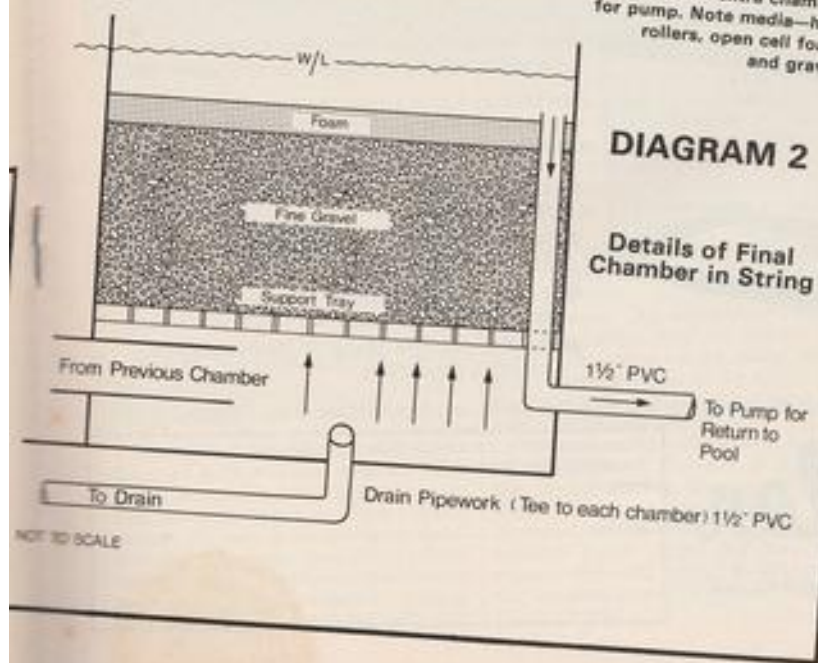
the procedure of trial and error over a period of time, a commodity the Koi-keeper has in plenty as it can take many weeks for a filter to reach maturity. Any attempt to hurry the process can only lead to frustration and possible disaster!

One final point. As their name implies, aerobic bacteria require oxygen to live and multiply. Careful design of your filter system should ensure sufficient oxygen is transported from chamber to chamber. There is another type of bacteria which hopefully you will never come across. Anaerobic bacteria survive without oxygen in conditions of filth and decay. Should your filter suddenly give off a dreadful stench, drastic and fast action is required if your fish are to survive. The sole cause of an event such as this is the failure of some aspect of filter design. When in doubt, ask!

**Next month is Koi month  
in A & P.  
Turn to page 10  
for details.**



**Above:** Modular four chamber filter with extra chamber for pump. Note media—hair rollers, open cell foam and gravel



**DIAGRAM 2**  
**Details of Final Chamber in String**

NOT TO SCALE

# On the test bench

by Ian C. Sellick

## Atlantis

If you set out to produce an all-embracing range of products for the fishkeeper, the approach cannot be skimped. The project requires a drive and foresightedness that, in the case of Atlantis, seems to have worked. With the benefits of the backing of the giant multinational Mars, Atlantis does provide fairly exceptional cover of the market in the form of pumps, heaters, filters and a wide range of accessories.

Many are familiar items that have long been available under other trade names (such as Sisco), although the claim is for an improvement in quality control to give the aquarist better reliability.

### Underground filter

So, how comprehensive is the range? I attempted to set up a 48 in. aquarium using as many Atlantis products as possible. Filtration was no problem. There is a comprehensive range of under-gravel filters. Made of white plastic with a lattice of fine holes, the base slopes slightly, ostensibly to bring mulm and detritus to the front of the tank. In practice of course, covered with 2 to 3 inches of gravel, this benefit is lost. I could, however, see a slight advantage in that more suction pressure would be applied to the front of the filter bed, possibly making the overall flow through the gravel better. The best feature of the undergravel filter, though, is the telescopic uplift, which means that the outlet can be at the water level for maximum output and aeration.

### Power and pumps

In my exercise, I decided to go for power heads. By removing a cut-out in the casing of the pump, a conical adaptor supplied with the pump can be added to connect to any tube diameter of under-gravel filter. These pumps are the same as those that power the Atlantis internal power filter range, with rated turnovers unloaded from 240 to 600 litres per hour. The performance was more than adequate to give the necessary flow through the undergravel.

### Power filter

In addition, a small external power filter, the X150, was used to give a polish to the water. Complete with spray bar, inlet tube and strainer, an elbow and four suckers, the unit is reasonably powerful. With a 150 litre per hour (30+ gallons) turnover, the non-encapsulated motor drives via the usual magnetic coupling, meaning that flow diminishes with load.

The pump head locks to the body by means of a sort of bayonet system with a locking ring that I must admit I found a pain to use, but which is reasonably positive in its seal. Inlet and outlet are in the pump head, allowing the unit to be used in quite a small space alongside the tank with the minimum of tubing. The impeller cover is held by two stainless self-tapping screws—care would be needed if the cover needs to be removed frequently for cleaning. The pump head, as with all air cooled pumps, tends to collect dust and fluff around the cooling fan just under the cover. The top cover looks rather a clip-on afterthought, and is certainly easy to remove. The pump cover is held by two non-stainless self-tapping screws. It is a pity that the motor, unlike the other Atlantis power filters, isn't encased in resin, but nonetheless, quite a good little power filter.

### Aerators, air operated filters, bits and pieces

Although for this exercise I did not use an air pump, there are four in the range; two small single outlet models, one twin and a four outlet one. Both small pumps have the same diaphragm. They are reasonably quiet, pump noise being less than the bubbles from a filter in the tank situated alongside. The four outlet model has electronic flow control (of all four channels simultaneously, unfortunately).

Four small internal air-operated filters are of familiar Far East design; nothing new here. To join these, or the under-gravel filters, to a pump, you can use green Atlantis air tube, and a range of T, Y and X pieces, together with valves and clamps, are available. The clamps are not of the G type which I always find prone to bend and break if screwed up too tight, but a 'saddle' type, going right over the tube, and thereby exerting a much more even pressure. An anti-siphon valve, a very neat affair, completes the air line range. The arrow on the casing points in the wrong direction to my mind; it is confusing to have it pointing towards the pump, rather than with the flow.

The tank was completed with a range of plastic plants. Available in 6, 9, 12 and 15 inch lengths, quite a convincing display can be achieved. I wasn't over-impressed with the other range of brightly coloured plastic 'ferns', but they were popular with the young fishkeepers of the neighbourhood to adorn various goldfish bowls.

One of the small internal pumps



### Heater-stats, media, tank and accessories

The range of heater-thermostats is excellent; sand-filled in the best tradition. I have found those that I have used to be extremely good, almost on a par with the German Jaeger models.

Filter media include a rather poor carbon, filter wool, and a high surface area ceramic medium. This last item is particularly useful for power filters as it gives a good trap for coarse particles, but more importantly, provides a substrate for bacteria that convert nitrites and ammonia into nitrates, thus making the power filter a biological as well as a mechanical one.

Three magnetic glass cleaners, a selection of nets and liquid crystal thermometers complete the range. These thermometers can, unlike some others I've tried, be removed with care from the glass and re-used elsewhere.

Everything bar the tank, lid, lights, gravel and fish was supplied from the Atlantis range, and had I wanted to put the goldfish in a 5-gallon tank on a pedestal in brown, white, blue, red or green, I could have used Atlantis for this as well. As it is, the bright orange model supplied for review did find temporary use as a herbarium. Although not to my personal taste, these tanks are quite popular, again often with children, for goldfish, or even tiny collections of tropicals.

Finally, the tank was completed by using a photo-background from a choice of two, one predominantly plants, the other rocks. Both high quality photos, printed on a plastic material, look rather gaudy out of the aquarium context, but fine behind 12 or 15 inches of water.

### In conclusion . . .

All in all, I was quite impressed with the scope of the range, and I am sure many retailers, especially smaller pet shops rather than specialist aquatic stores, welcome the ability to go to one supplier for nearly all their aquatic needs.

More detailed reviews of selected Atlantis products will be found in the coming months in *A&P* when the format of this column changes, to review groups of products; all heaters, or all power filters, for example. Look out for the first review, of pond accessories, coming up soon.

# Tomorrow's aquarist



Mr. John Ratcliffe, Sales Director of Tahiti Aquariums, presenting Paul Wilson, the winner of our under-16 section, with his prize of a 24 in. x 15 in. x 12 in. Marina aquarium, Marina fluorescent hood and modular stand with glass shelf. The presentation was made at City Pets of Liverpool and Mr. Phil Roberts of this family business is also featured



Mr. Jim Gamble of Tahiti Aquariums presenting our over-16 section winner, Bill Gillham, with his prize of a 36 in. x 15 in. x 12 in. Marina aquarium, Marina fluorescent hood and modular stand with glass shelf. Bill was presented with his prize at Fosse Pets, Wigston Magna, Leicester, as Mr. Andrew Ray, the Manager, looked on

## Tahiti winners

In our January issue, we ran a 'fish names' competition, sponsored by Tahiti Aquariums. We asked you to unscramble a list of old and new names—the kind of 'homework' we all have to do to keep up with our aquatic friends' current names!

Snowed under by your entries, we reached for the old, battered hat and piled

the correct solutions into it, for our grand draw on 11th February; enabling us to announce the two section winners in the March T.A. By now our winners will have their new aquariums ticking over happily and we thought you'd like to be kept in the picture... or, in Paul and Bill's case, in the scrapbook.

## Beginners' corner

Welcome back to Jonathan Moss, who, regular readers of this page will know, has contributed some very informative pieces to Tomorrow's Aquarist. Of particular interest to beginners is, we feel, Jonathan's latest question, 'Why not a brackish tank?'

As a keen enthusiast and, like many other first time aquarists, having set up the customary initial community tank and tried my hand at breeding the good, old-fashioned livebearers, I became anxious to branch out into a more specialised concept of fishkeeping.

Having considered all the possibilities, I finally chose to keep those fish which are neither freshwater nor marine but who dwell in the brackish waters of river estuaries.

Although little plant life is available for the brackish tank (Java Fern and Water Wisteria seem to respond reasonably well in these conditions), there are a good many species, not always readily available, which are more than comfortable in salty conditions.

Using seven strips of bark to hide the unseemly pipes of my Sacem SF 240 external filter and three bits of red Yugoslavian rock on top of the gravel, I made the home for my new room-mates: four Malayan Angels (*Monodactylus argenteus*), two Scats (*Scatophagus argus*), one Archer Fish (*Toxotes jaculator*), seven Bumblebee Gobies (Doria's Bumblebee fish, *Brachygobius doriae*) and two Shark Catfish (*Arius seamani*). The above list gave me, in my mind, the perfect aquarium, which represented the best aspects of fishkeeping. The graceful

shooting Malayan Angels, with their beautiful white sheen, have the ability to live in fresh water when young. These elegant fish come from Malaysia, East Africa and the Red Sea. The *Scatophagus argus*, although not attractive in name (in Greek it means Dung Eater) is a most interesting fish to keep. Found in India, Indonesia, Thailand and Vietnam, they will, in fact, eat almost anything. The Archer fish is world renowned—and quite rightly, too. Its incredible above-water sight enables it to shoot down insects in the wild. In my tank at home, when friends come to visit, I dangle pieces of dried shrimp on the top of the open hood and sure enough—with the jets of water—the Archer shoots and hits every time; in some cases sending the bits of shrimp to the other end of the room!

The Bumblebee Gobies live in Borneo and Malaya river mouths and farther upstream. In fast-flowing rivers, they stick to stones to steady themselves. Their incredible likeness to bumblebees and their stressless swimming action make them lively talking points and a pleasure to keep. The Shark Cats are the scavengers of the tank and, although as a rule staying behind the bark, like clockwork after feeding time, they come out and sniff around, burying their noses in the gravel in true catfish style.

The list of species for the brackish tank is more than people suspect; maybe they don't fully realise the vast variety of brackish water regions, from the Middle and Far East through estuaries in Florida and the Caribbean to East Africa. Here are just some of the fish you can keep: Mosquito Fish (*Gambusia affinis*); American Flagfish (*Jordanella floridae*); Molly (*Poecilia latipinna*); Mosquito Fish (*Heterandria formosa*); Bluegill (*Lepomis macrochirus*); Golden Ear Killifish (*Pundulus chrysolus*); Prillfin Goby (*Bathygobius soporator*); Fiddler Crab (species of *Uca*); Spotted Snake Eel (*Ophichthus ophis*); Monodactylid (*Monodactylus sebae*); Australian Rain-bow (*Melanotaenia nigra*); Celebes Sailfish (*Telmatherina ladigeni*); Orange Chromide (*Eitropius maculatus*); Green Puffer (*Tetraodon lineatus*); Indian Glassfish (*Chanda ranga*) and Guppy (*Poecilia reticulata*).

The tending of brackish water fish in this country seems a side of fishkeeping which is little known about and has considerable room for growth, especially on the breeding side. Setting up aquaria such as mine, which I thoroughly recommend, will bring great satisfaction and pleasure to the amateur aquarist.

For his contribution to T.A., Jonathan will shortly be receiving a copy of Dr. Neville Carrington's Book 'The Healthy Aquarium' kindly donated by Interpet.

# News from the societies



One of the award-winning tableaux at last year's Y.A.F.

## Yorkshire Aquarist Festival Preview

The 1986 Yorkshire Aquarist Festival will be held at its usual venue, Doncaster Racecourse, on **Saturday and Sunday, 9-10 August**.

This year's event already looks to be one of the biggest ever with fish and tableau entries coming in from all over the country.

About 12,000 people visited the Festival last year and this number could well be exceeded next month with the introduction of two new features:

- 1 There will be a two-day **Koi Open Show** run by the South Yorkshire Section of the British Koi Keepers' Society. Early signs indicate that there could be over two hundred entries of top quality Koi for this competition.
- 2 There will also be a **School Painting Competition** which, again, is creating quite a stir among schools in and around Doncaster. Judging for this competition (which carries a first prize of £200 of aquatic equipment) will take place on the Saturday afternoon and will be in the hands of TV personality Ronald Magill (Amos Brierley of Emmerdale Farm—who will also open the Festival) and *A & P* Editor John Dawes.

By late May, most of the trade stands—always a spectacle in themselves—had already been taken up. This means that we can expect, at the very least, as much lively activity in the fish/plant/dry goods/books area as we have experienced in the past. Incidentally, the committee would be pleased to hear from any dealers specialising in amphibians and reptiles—there is still some space available for this type of trade stand.

There will also be a number of lectures, which this year will include a demonstration on how to build and furnish an all-glass aquarium and an illustrated hour-long session presented by John Dawes.

The presentation of prizes for the Festival will take place in two stages:

- 1 Tableaux awards will be presented at the traditional Festival dance after.

- 2 Fish awards will be presented on Sunday afternoon in the Lonsdale Bar.

For further details, contact the Show Secretary, **Des Penny, 46 Park Road, Askern, Doncaster DN6 0BA. Tel. (0302) 702917.**

We wish the Y.A.F. committee a most successful Festival.

## Obituary

### East London saddened

It is with much sadness that we report the death of our President, **Mr. Frank Vicker**, who died on **4 April 1986**. Mr. Vicker was a keen member of E.L.A.P.A. for many years. His helpful nature has been gratefully appreciated by a great many members during the decades. He held many positions on the committee during his time with East London. Frank will be greatly missed not only by East London club members but also by many

bobbyists and members of other clubs, and we all send our condolences to Mrs. Vicker.

**Ken Stannard (P.R.O.)  
East London Aquarists and  
Pondkeepers Association**

## Anabantoid Association of Great Britain

There was a good entry for the Show held at the Anabantoid Association's second Member's Weekend at Sheffield University. A talk was given by Otto Roth of the European Anabantoid group, IGL, about collecting in Tanzania, where *Ctenopoma murei* was found. Allan and Barbara Brown also gave a talk on their return to Malaysia where scarce species of *Betta* and *Paraphromenus* occurred. Some offspring of the collected fish were sold at the Auction, along with other rarities. Before their departure, Otto Roth and Heinz Saddey of IGL were presented with a Gourami sculpture.

# Diary dates

## Midland Koi Association

The annual Open Show of the M.K.A. will be held on **6 July** at Bagington Village Hall, Coventry (near Coventry Airport, off the A45).

For further details, contact Mrs. C. K. Martin, 23 Watling Street, Nuneaton, Warwickshire. Tel: (0203) 343008.

## Scarborough & District Aquarist Society

S.D.A.S. will be holding their Open Show at Friarage School, Long Westgate, Scarborough, on **Sunday 6 July**. Free parking available within the school grounds. (Apologies from S.D.A.S. for last year's mix-up). Contact Mrs. J. Jones, 79 Pasture Lane, Seamer, Scarborough, Yorkshire, for further information.

## Potteries Tropical Fish Club

The first Open Show organised by P.T.F.C. will be held at the Chesterton Community Centre, Chesterton, Nr. Newcastle-under-Lyme, Staffs., on **13 July**. For further information contact J. Flackett, 8 Fielding Street, Stoke-on-Trent, Staffs. Tel: Stoke-on-Trent 417083.

## Zoological Society of London

The Zoological Society will be holding a Zoo Month during July. As part of these activities, there will be an Aquarium Week, starting on **14th July**. Among the numerous activities, there will be timed feedings of many fish, including Piranha, Sharks and Paddlefish. Visitors will also be able to meet the Keepers, while the winner of a special competition will have

the opportunity of becoming 'Keeper for the day'. For further details, contact **Dr. Chris Andrews, Assistant Curator of the Aquarium, on 01-722 3333.**

## Reading & District Aquarist Society

The R.D.A.S. Open Show will take place on **13 July**. Please contact C. J. Beasley (Secretary) for further details at 26 Madingley, Birch Hill, Bracknell, Berks.

## Sandgrounders' Aquatic Society

The 16th Annual Open Show and Auction of the above society will be held on **Sunday 20 July** at Meols Cop High School, Meols Cop Road, Southport. Benching: 11.00 a.m.-1.15 p.m. Judging: 1.30 p.m. 52 classes—52 trophies. For schedule send 10 in. x 7 in. s.a.e. to B. Baldwin, 10 Olive Grove, Southport.

## Billingham Aquarist Society

The 1986 Open Show and Auction of the B.A.S. will be held at the Community Centre, The Causeway, Billingham, Cleveland, on **Sunday 20 July**. Booking in for the Show and Auction: 11.00 a.m. to 1.00 p.m. For details and Show Schedule contact the Society Secretary, G. R. McGregor on Stockton 563025 or the Show Secretary, E. Bennison, 8 Cairn Road, Hartlepool.

## Phoenix Aquarium Society, Blackpool

Contact Bill Redman (Show Secretary), 5 Ashworth Court, Queens Park, Layton, Blackpool (Tel: Blackpool 32265), for full details of the 2nd P.A.S.B. Open Show due to be held on **27 July** at St. John Vianney School, Glastonbury Avenue, Blackpool.

## Spotlight

# THE VAGABOND BUTTERFLYFISH *(Chaetodon vagabundus)*

Few species of Butterfly are better suited for a first marine aquarium than the Vagabond, as Gordon Kay of the West Midland Marine Aquarist Group and British Marine Aquarists' Association demonstrates.  
Photograph by David Allison

**A**sk any ten marine hobbyists about their experiences with Butterfly species and it's a fair bet that they will nearly all tell you the same basic story.

The tale will tell of this or that wonderful fish which was bought—on impulse—a month or two after the aquarium was established. The fish was plunged into the wrong environment, to take its chances with aggressive Damsels and Triggers, then slowly starved to death—stumbling from one disease to another (with a few copper overdoses along the way) until it went to that great aquarium in the sky. The hapless fishkeeper probably went through the same torment again and, possibly, a third time until (s)he decided that (s)he couldn't keep Butterflies and swore to keep well away in future.

This is a great pity because, even though Butterflies could never be considered to be 'beginner's fish', there are certain species which can be kept successfully by the aquarist who has spent a few months learning the craft with more hardy fishes. One of these is the Vagabond Butterfly (*Chaetodon vagabundus*).

### Widest range

The Vagabond has one of the widest ranges of all Chaetodons, being found from the Indian Ocean (as far west as the African coast), through the Indo-Malayan Archipelago and Japan and on to Australia. They are seen in all sorts of habitats, in schools, pairs or even as individuals. A member of the subgenus *Radophorus*, this species is a very close relative of the Indian Vagabond (*C. decussatus*) which is found in the Indian Ocean around Sri Lanka and the Maldivian Islands. However, whereas *vagabundus* has a posterior with plenty of yellow, its Indian cousin has no yellow at all except for its tail.

The Vagabond goes through three subtly differing pattern variations during its life. The specimen in our picture is in the middle of these three stages, that is to say it is a sub-adult. As a juvenile, the black area on the rear part of the dorsal fin is in fact an ocellus, or 'eye-spot' and the tail is completely transparent. At around two inches in length, the eye-spot starts to disappear, or rather become the patch that is shown in the picture. The black band also begins to appear on the tail. After this stage the black patch on the dorsal becomes just a stripe, with an edging of turquoise. The soft anal fin looks like a mirror image of the dorsal and the tail develops a further yellow band, edged with black. To complicate matters further, the diver will see another picture when out on night-time expeditions. *Vagabundus* takes on a rather ashen hue and has a rather large dark patch on its flanks.

Very little is known of the breeding habits of Butterflies except that some form much stronger pair bonds than others. *Chaetodon vagabundus* falls into this category. Like all Butterflies they are pelagic spawners, which means that they do not build nests or use spawning sites but release hundreds of eggs into the surrounding water, which then float to the surface. It is thought that the eggs hatch after around eighteen to thirty hours, with the larvae being pelagic for anything from a few weeks to several months.

### Basic rules

This species is not difficult to keep, providing that basic fishkeeping rules are applied. Ammonia and nitrite levels should, of course, be zero. The use of a protein skimmer is, in my opinion, a must in any seawater aquarium and even more so in a tank housing Butterfly species. The skimmer will reduce the

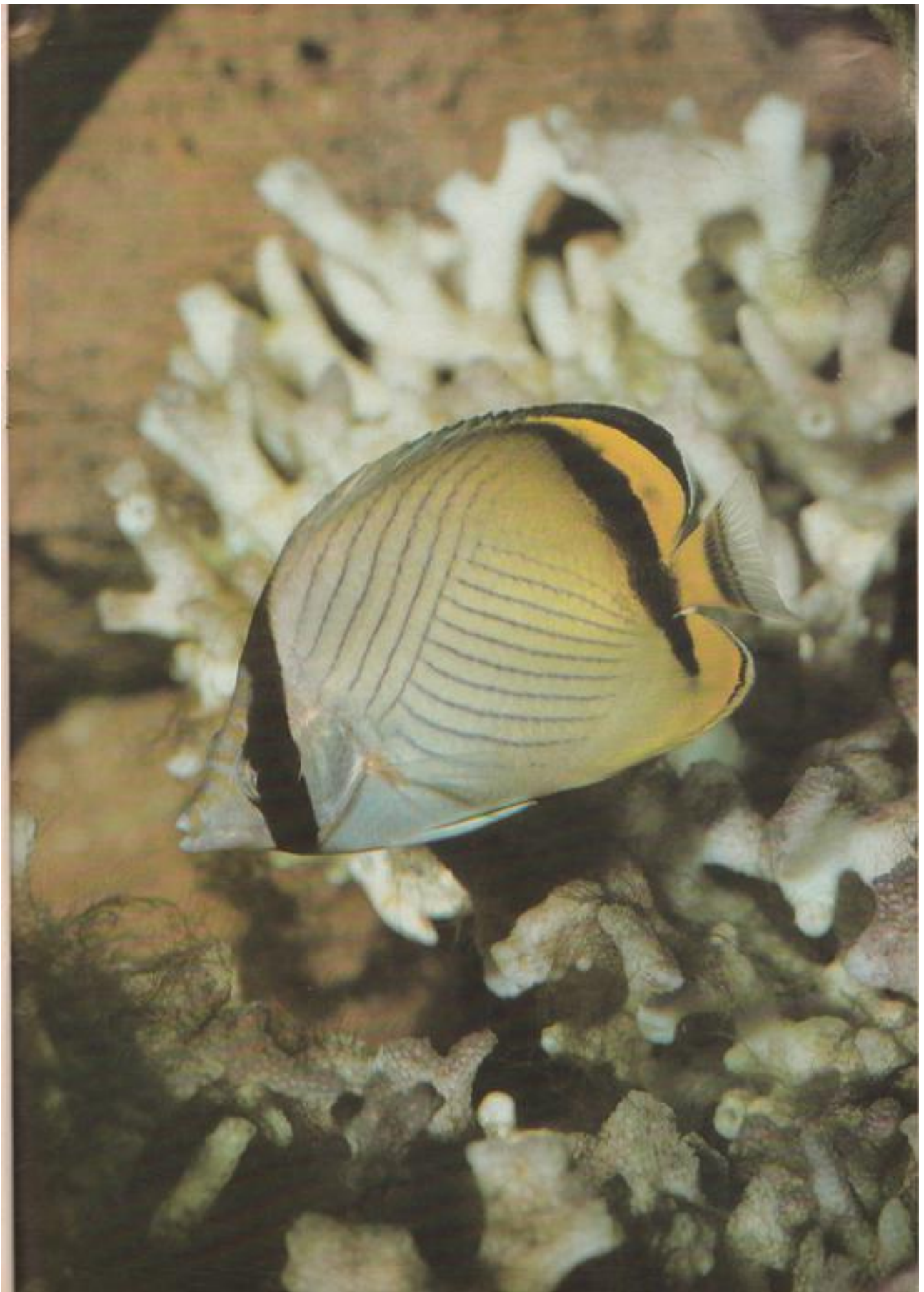
load on the biological filter by removing a good proportion of the organic waste produced by the fishes. The use of a good quality activated charcoal once or twice a month is also to be recommended, to reduce phenols and dyes which turn the water yellow. Very regular partial water changes need to be carried out religiously in order to keep the nitrates in the tank down to a minimum, as Chaetodons just cannot tolerate nitrate levels much about 20 ppm.

Butterflies are delicate, peaceful fishes and their aquarium should reflect this. The Vagabond grows to around seven or eight inches long and so a largish tank is required if your prize is to feel happy. They should never be asked to share their home with bullies or boisterous feeders, as they would never compete for food. As always, overstocking is a mortal sin—so too is overfeeding.

### Eats anything

This species scores well over other Chaetodons in that it will eat almost anything. It should be fed a wide variety of foods, including live and frozen brine shrimp, frozen mussel meat, lobster eggs, *Mysis* and other similar-sized foods. Flake foods should also be given and Vagabonds especially like Tubifex worms. These, however, should be fed in moderation if liver damage is to be avoided and live worms should never be used. Algae make up a large part of this fish's diet and so efforts should be made to cultivate a healthy growth in the aquarium, preferably before the fish is obtained. Remember, overfeeding kills! Little and often is the key.

*C. vagabundus* is THE fish to choose for your first Butterfly. Providing that you are prepared to take the trouble to care for it properly, your Vagabond will repay you with years of fishkeeping pleasure.



# Books

## Knights of the sea examined

### Armoured Knights of the Sea

Helmut Debelius  
Kernen Verlag, £9.95  
ISBN 3-87 401-036-8

Sole Distributor in UK: Tropical Marine Centre Ltd.

"What insects are to the land, so crustacea are to the sea". So says Helmut Debelius in his introduction to this immensely informative and liberally illustrated book.

There are over 30,000 known species of crustacea, only a small fraction of which are available to marine hobbyists. The

author has, therefore, quite wisely restricted his selection to those species and genera which are likely to find their way into aquarists' tanks.

Even this is a formidable task, particularly as the range of crustacea expands every year. It is fair to say, though, that, with the exception of Mantis Shrimps, this book features virtually every other type of crustacean so far imported into the UK. Mantis Shrimps are excluded on the basis that the book deals only with decapods (the Higher Crustacea). Although one can bemoan this exclusion, the criteria used for establishing the dividing line are as valid as any.

There are 11 chapters dedicated to the organisms themselves (one genus per chapter), plus an appendix and a useful, though brief, section entitled 'Some tips for the aquarist'. The idea of using both the common and scientific names of the genera concerned as chapter headings seems to me to be sensible and extremely helpful, while the information itself never fails to grab the reader's attention.

I would have liked fuller discussion of the rather ambiguous issue of what constitutes a shrimp or a prawn, but you can't have everything, can you? We are, nevertheless, told that a prawn's carapace contains around 77% organic material, while shrimps only have 29%.

In spite of this minor personal quibble,



I rate this book very highly indeed. If there is a better one on species of crustacea available to aquarists, I have yet to find it, even though at £9.95 for only 120 pages (including Index) it is not a cheap purchase.

John Dawes

## All about setting up a pond

### Water Gardening

Peter McHoy  
Blandford Press, £3.95  
ISBN 0-7137-1484-0

This is a very useful, colourful book for anyone contemplating setting up a pond. In fact, it goes considerably further than mere pond construction and installation, taking in wider aspects such as the attractions of water gardening, planning and siting a pond, choosing appropriate designs for a variety of settings, planting, introduction of fish, frogs, toads and other animals, pests, problems, diseases, pond maintenance and repair, and several other topics.

The sections I found strongest were those on deep aquatic and marginal plants where the inclusion of a star-rating system provides a quick, easy and informative classification. Submerged and floating aquatics, as well as bog plants, are similarly approached but are not given as comprehensive treatment as they could have received.

There are very few photographs of fish in this book, this probably being a reflection of the author's greater affinity with, and command of, the plant world. The illustrations that are used instead, are not particularly strong and this, coupled with several slip-ups, both in naming and spelling of fish names (including the rather revealing, and repeated, reference to Koi as Koi carp) make the fish section the weakest in the book in my opinion.

Nevertheless, there is a great deal to enjoy and much useful and sensible information in this attractive 128-page volume which, at only £3.95, is a real bargain.

John Dawes

## Attractive manual

### The Aquarium Fish Survival Manual

Brian Ward  
Macdonald (£11.95)

The Aquarium Fish Survival Manual can be considered as another competitor in the race for readers by a number of similar format volumes in recent months.

An immediately attractive book, the asking price is fully justified, as no expense has been spared to achieve the highest quality of artwork and colour photographic production.

The book begins with general basic knowledge on fish themselves, their habits (including breeding to what the appetite further) and physical make-up. The home aquarium is discussed in broad terms with the relevant detailed descriptions being found later in the appropriate 'setting-up' sections.

Each containing its own particular 'setting-up' procedure, there are separate catalogues of suitable tropical freshwater

and tropical marine species together with their feeding, disease control and routine maintenance information. The freshwater section includes aquarium plants whilst this 'deficiency' in the marine section is compensated for by the inclusion of invertebrates. A feature of the species guides is the use of ideograms to convey succinct information on vital matters such as Aquarium Compatibility, Water pH, Food and Habitat (swimming levels).

Unfortunately, the book is marred by occasional contradictory captions, misspelt scientific names and, more seriously, in a misleading description in the otherwise excellently illustrated setting-up sequence in the freshwater aquarium that could result in a dangerous situation; hopefully, sharp-eyed readers will see that it is indeed a power-head being installed and not an airpump as described in the caption! Despite these flaws, any aquarist should be delighted to have a copy of this book on the bookshelf.

Dick Mills





Discus are almost unique in producing body secretions for the fry to feed on  
(Photo courtesy of the British Cichlid Association)

# FISH THAT CARE

**T**his article carries an interesting title. It is a classic case of interpreting instinctive animal behaviour in human terms. However, when you see brilliantly coloured proud-looking parents shepherding their shoal of fry it is difficult not to believe that they are really showing family feeling . . . then territorial instinct takes over again as the family grow and the once doting parents eat the lot!

Why some fish show parental care is due to the very complexity and variability of the species. There are at least 20,000 species—maybe many more—and each has a unique breeding method. This means every conceivable variation is shown: there are shoal spawners and pairing, egglayers and livebearers. Some females incubate eggs and some males incubate them. Eggs are laid in clusters or pouches, some are sticky, while others float, some are laid in caves, nests, plants, or even out of water—20,000 variations on the theme.

Most species show no interest in their offspring other than to treat them as a potential meal. Such fish produce vast numbers of eggs and fry so that, at least, some survive to continue the species. But several hundreds (possibly thousands) do show parental attachment to their eggs and fry, with consequent smaller families owing to their better chances of survival. These can be all the species in a given Class or Order.

There are over 20,000 species of fish, each with its own unique method of reproduction. Dr. David Ford of Aquarian Laboratories reviews some of the most popular examples (and some less well-known ones) involving parental care of eggs or young

Some of the Chondrichthyes or Cartilaginous fishes, eg the Sharks or Rays, can be seen in the oceans with a family of young fish in tow, like a duck with her ducklings. Unfortunately, in several species, mother ignores her family and the young shoal can become fixed on any similarly sized object, such as a small boat or even a diver.

The primitive fishes have some representatives where the parents acerate and guard a nest. Examples are some of the Lungfishes (*Protopterus*) and (*Lepidosteus*) and the Bowfin (*Amia*). The famous Coelacanth has yet to be seen breeding, but it is probably a parental care fish—which may account for its long existence.

Among more familiar Teleosts, the sub order Osteoglossoidei has several families where the males guard the eggs. Examples are Notopteridae (Featherbacks), Osteoglossidae (Arowanas) and Pantomorphidae (Butterfly fish). The eel-like Gymnarchidae also guard nests and even some of the Characidae (well-known to aquarists as Characins) can exhibit parental care.

Members of the Siluriformes (Catfish) have saltwater species which always incubate their eggs orally and freshwater cousins who build guarded nests. The suborder Syngnathoides has two families: the Solenostomidae (Ghost Pipefishes), where the female carries the eggs in a brood pouch and the Syngnathidae where the male carries the eggs, as in the 'normal'

Pipefishes and Seahorses *Hippocampus* spp.

The livebearers, such as Poeciliidae, Goodeniidae, Jenynsiidae and Anablepidae (Mollies, Guppies, *Anableps* etc. are aquarium examples) all have live young but show no parental attachment.

The Cuchia (*Amphipnous cuchia*), the single member of the eel-like Amphipnoidae, blow froth nests and raise young as a pair, but in the most famous bubble-nester, *Betta splendens* (Siamese Fighting Fish), it is only the male that cares for the young.

In rockpools between tide-marks, the Gobiidae (Gobies), Blenniidae (Blennies), Cottidae (Bullheads or Sculpins) and Gobiocottidae (Cling-fishes) can be found guarding eggs in shells, rock crevices or seaweed. It is usually the male that mounts guard. Our Sand Goby (*Gobius minutus*) builds an elaborate house, complete with roof, before searching for a mate to share it with him.

Of all the fishes which show distinct pairing and care for eggs and young, the best-known aquarium species are the African Cichlids. This reflects their territorial life-style where space is at a premium and to survive, a species must stake a claim and raise a family in a small area. The behaviour of these fishes was reviewed by Ian Sellick in his article 'Reproductive Strategies in Cichlids,' December 1985, page 38 of *Aquarist & Pondkeeper*.

Some Cichlids (and the quite unrelated Cardinal fishes—Apogonidae) incubate their eggs in their mouths, mainly the females but also some males. Cichlids that show particular attention to young the Blue Acara (*Aequidens pulcher*) and the Green or Port Acara (*Aequidens portalegrensis*, now regarded by many as *Cichlasoma portalegrensis*). The usually pugnacious Jack Dempseys (*Cichlasoma octofasciatum*) are devoted parents, so too are the Festive Cichlids (*Mesonauta festiva*). On the other hand, one Cichlid that is usually meek and mild, the Fire-mouth (*Cichlasoma meeki*) becomes aggressive when guarding its nest and often vandalises the whole tank.

The various Discus or Pompadours, *Symphysodon* spp., are different in producing a body mucus to feed their young for the first two or three weeks.

#### Species to choose

If you want to breed a fish that shows parental care in the home aquarium there are several species that are ideal. For a mouthbrooder choose the *Geophagus* species such as *G. jurupari*. Many *Tilapia* and *Oreochromis* are mouthbrooders and readily produce young; most, however, are too large for the home aquarium. Probably the best-known mouthbrooder is *Pseudocrenilabrus multicolor* or Egyptian Mouthbrooder. To breed this fish use a 2 foot tank half full (for easy access to surface air) with mature water, and a sandy base. A few plastic plants are ideal for decoration and security. The fish is usually mature when half-grown (1½ inches) and the male is the more



Left, this female South African Mouthbrooder (*Pseudocrenilabrus philander*) is incubating mouthful of eggs, as evidenced by the slight chin (brood) pouch. (Photo: John Dawes)



In many Gouramis, including the Lace/Pearl Gourami (*Trichogaster leeri*) shown here, the male will collect the eggs after each spawning embrace, protect them until they hatch and then guard the fry until they become free-swimming. (Photo: Ruda Zukal)

colourful. Choose similarly sized fish from different families (i.e. not brother and sister) even if this means travelling to different aquarium shops. At 78°F (26°C) the fish soon build a nest by scooping out a hollow in the sand. The eggs are laid in the depression and fertilised by the male, but then the female scoops up the eggs (around 50) and holds them in her mouth for two weeks. The babies are free-swimming as soon as they leave her mouth and need feeding immediately on freshly hatched Brine Shrimp and crushed flake. If the shoal of fry is disturbed, they fight to return to the safety of the female's mouth.

The Egyptian Mouthbrooder is produced on a commercial scale by holding several females in a large shallow trough (tropical zones of course) with just a few males. As each female is seen to be carrying eggs (the jaws expand) she is gently removed to isolation until the young are born, and then she is returned to the breeding shoal. In this way a continuous supply of the fish is farmed for the world's markets.

#### Ideal for beginners

For the absolute beginner the ideal breeding fish among the parental care group is the Kribensis or Dwarf Rainbow Cichlid, *Pelvicachromis pulcher*. Again, choose fish from different sources—the female is more rounded and more colourful than the male. The male is more slender and has one or more black spots on the tail fin. Put the pair on their own in an 18-inch or 2-foot tank and they will produce families almost monthly. So devoted are the fish to their new family that they may eat the previous young to make room for the next lot of fry—so do remove the babies when the female is obviously ripe again. Usually 50 young are raised at a time, but one or even two hundred fry have been reported. Older fish (2 years or more) have fewer young and the breeding frequency drops.

Use a flower pot to give the pair a cave (a clay pot is more natural than a plastic one—but I have seen eggs laid in both types) and raise the water temperature to 80°F (27°C). The eggs are laid on the 'roof' of the cave (so place the pot on its side) and they hatch in three days. Three or four days later the young leave the pot to search for food. They are quite large and can be fed immediately on crushed flake or fry and growth foods.

## Bibliography

If you want to read more about breeding fish, most aquarium books have general information, but for greater detail consult the following.

Pet Library Ltd., of 30 Borough High Street, London SE1 publish paperbacks such as the 'Enjoy' series e.g. *Enjoy Breeding Livebearers* by Richard Haas (around 30 pence) or the 'Know' series e.g. *Know How to Breed Egg-Layers* by Rosario La Corte.

T.F.H. of 4 Kier Park, Ascot, Berkshire, have a huge range of aquatic books including cheap paperbacks i.e. *Spanning Problem Fishes* by Willy Joher, Books 1 and 2; *Fish Breeding Recipes* by Wolfgang Ostermoller; *All About Breeding Tropical Fishes* by Earl Schneider; *Genetics for Aquarists* by J. Schröder.

Larger (more expensive) books include *How to Keep and Breed Tropical Fish* by Dr. C. W. Emmens, and *Breeding Aquarium Fishes* by Dr. Axelrod et al Books 1 to 6. To order these books from the local library quote the number ISBN 0-87666-006-05 for Book 1 (1967), ISBN 0-87666-451-6 (1976) for Book 4, ISBN 0-87666-469-9 (1978) for Book 5 and ISBN 0-98666-536-9 (1980) for Book 6. For some unknown reasons, Books 2 and 3 do not have reference numbers.

Scientific publications are in most University libraries or the British Lending Library, such as *Modes of Reproduction in Fishes* by Charles M. Breder Jr., and Donn Eric Rosen (1966) U.S.A. Library of Congress number 66-14792 (T.F.H.).

# What's your opinion?

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



Welcome to the last edition of WYO. The first letter was written by Mr. M. A. Keene, of 77 Ashley Avenue, Folkestone, Kent. He begins: "You ask for comments about Golden Barbs. I have been breeding them quite regularly for a local shop and find them one of the easiest barbs to breed. If you start with healthy stock they seem to have such an appetite that conditioning presents no problem. I usually spawn two pairs together in an 18 in. x 10 in. x 10 in. tank containing 6 in. of water at 78°F and with a pH of 7.0-7.2. The tank bottom is covered with marbles; the water is filtered by a sponge filter; and one or two clumps of Java Moss are added.

"The water in our part of the country drains through chalk and is extremely hard, but this doesn't seem to affect Golden Barbs, whereas Tiger Barbs, Characins, etc. suffer from low hatching rates. The parents occupy a 36 in. community tank when not spawning and never bother any of the other fish—Characins, Rasboras, etc.

"The fry grow rapidly, reaching 1 in. in six weeks, when they are sexable and saleable. Altogether I consider Golden Barbs to be an ideal community fish, unlike some others—even in singles or pairs."

Our next correspondent resides at 46 Albion Hill, Brighton, and his name looks like Mr. Michael Cheek. (Apologies if I've got your surname wrong, Michael, but I couldn't read it. It's useful to print one's name below a signature because most of us have a scribble that passes for a signature.) Michael says: "I've never written before but would like to say how much I enjoy the magazine. I have never had a lot of success with plants in tropical aquaria so I had to resort to Plantastics. I find that they look nice if planted with a few live ones. I have an artificial Madagascar Lace Plant in with large Oscars, Angels and

Tinfoils which uproot everything else and eat it. However, the point of my letter is to inform you that you can now get in my area real plants that are grown in little pots and these seem to do very well in difficult tanks. They seem to be planted in a sort of sponge. We have a large number of shops—both freshwater and marine—in Brighton."

"I am not going to risk getting your Christian name wrong, but thank you for always spelling my surname correctly. Most people do not," writes young Matthew Bradby, from 91 Knightslow Road, Harborne, Birmingham. He continues: "I would like to highly commend all at A & P for the really improved format. The articles are also much more interesting.

"Water in Birmingham seems the opposite to that in Norwich. Ours has a pH of 6.0 or even less. Tetras, Gouramis, Clown Loaches and Catfish of mine all thrive. Livebearers seem intolerant.

"I greatly envy you your plants, even though mine are doing better. I would like to recommend to others yellow Cabomba. Lighter in colour than the usual variety, it is also tolerant of wider water conditions and is much finer and denser than the green variety.

"Plastic plants? NEVER!

"I have only ever seen *Gussonea* plants in one of the many beautiful Birmingham University gardens. This one has a vast network of ornamental pools with frogs, sticklebacks and newts. It is enclosed by woods and is totally uncharacteristic of Birmingham.

"I love newts and know a secret location in Sussex which has crested and Palmate species. It will remain secret.

P.S. You have only one aquatic shop? In the West Midlands I know of 13—although only a few are really good."

## Green fingers

Mr. F. M. Thick lives at 35 Stapehill Crescent, Stapehill, Wimborne, Dorset. He writes: "I feel that your reply to Mr. Webster (February 1986 issue) was very hard. I have been keeping fish for only a year and in that time have restocked with plants twice and have now turned to plastic plants. They do not look as good as live plants but they do the job—this being somewhere for the fish to hide, etc. This does not mean I do not have green fingers because I do, my work being a head gardener. You use outside filters. Mr. Webster and I use undergravel filters. Water circulating round the roots is not helpful to the well-being of the plants. What is good for one system is not always right for all.

"Mr. Paul Sparks is right. Hard and chalky water is only any good for hard-water fish, and soft water is for soft-water fish. The two do not mix; but I find the aquatic centres will not say so. All they want is to sell the fish."

I find your comments interesting, Mr. Thick. I rather think I was one of the first people to be sent a commercial undergravel filter to try out many years ago. I used to have them in all my tanks but subsequently I abandoned them because I like good plant growth in my tanks. I think I posed a query about undergravel filters and plant growth in my very first WYO column in the Sixties—almost 20 years ago. I don't claim to be an expert—I am not a professional aquarist—but I have kept fish since the forties and have tried most of the various types of equipment that have come onto the market—and, quite often, gone away again because they were useless or silly. I think that real plants in an aquarium are as necessary as real plants in my garden or in my living room or greenhouse. Plants do lots of things in and for an aquarium. They assist the fishes physically and psychologically—if one can apply the latter term to fishes. They are probably just as important to most aquarists. I like all my tanks to look well, as well as to support fish life; indeed, growing aquatic plants is, to me, just as exciting as keeping fish—and, from readers' letters, it would appear that it's a much greater challenge to have flourishing plants than flourishing fishes. You would not want plastic plants in your gardens; or plastic fishes in your aquarium, I'm sure; however, I'll admit that in tanks where live plants cannot be grown, especially because of large, plant-eating fishes, I'd prefer plastic plants to no plants.

Andrew Grainger, of 8 Grove Crescent, Croyley Green, Rickmansworth, Herts., writes: "Just last week I bought two more terrapins. Both are at least 10 cm. in length, but weren't exactly in the best of health. I picked them up for £6 for both; and when you consider that the cheapest price I could find for hatchlings was £2, they were quite a bargain. My two latest acquisitions were kept in a spacious but unheated tank in the shop with a mere 2 in. of water, gravel and a few basking rocks, but with no lighting. I now have seven terrapins, kept in a 24 in. x 12 in. x 15 in. tank. This may seem a small volume in which to keep such a number but the tank is filled until almost overflowing with water. Since terrapins are mainly aquatic reptiles, this is, I find, a good way of maintaining such animals. The tank has no lid but at one end is a piece of plywood jammed

between the tank and the nearby room wall. Above this piece of wood is a 60 watt light bulb providing warmth to this land area. The water is heated by a 150 watt heater-stat to around 75°F and is filtered by a Hagen Elite 801 running a Biofoam filter.

"I feed the seven on whole sprats, ox heart and liver, cooked to avoid polluting the water, plus lettuce leaves. To restrain the terrapins from impersonating a lemming, i.e. jumping from the land area, I pinned up a piece of old, colourful curtain across the wood. I hope to maintain my collection in an outdoor pond this summer, an idea suggested by an article in your excellent magazine, which I find too short as I could easily read more if only I could. I've also been inspired to keep European Lobsters, as mentioned in the back pages.

"If things all go well in the summer I'll be at university next year studying biology. Hopefully I'll be able to maintain all my tanks: I'll have to educate my family on the basics of fishkeeping, I'm afraid, if I want at least one of my animals to survive for a week! I'll be away for long periods of time. P.S. What does B. in your name stand for?"

The 'dead Angels' photograph is probably the saddest one I've included in WYO during the past 19 years. Recently, before going on holiday, I had to fit a brand new heater-stat in one of my Angel tanks on the morning of departure. I checked that it was switching on and off; and set off myself. When I returned a week later I found that the thermostat had stuck in the off position and that my six large Angels were dead. I decided to photograph the corpses, spread out on a copy of *The Sunday Times*, before disposing of them, as a warning to those who may assume that a brand new heater-stat, received direct from the manufacturer, should work properly first time after a quick check. My only consolations are that I had no choice but to change the unit because the one in the tank was, ironically, over-heating; and that two Corydoras Catfish in the tank survived the lowered temperatures and remain healthy and well.

#### And finally . . .

And, finally, another sad occasion has arrived—which must be the case when I start a sentence with 'and'. The new Editor and I have agreed that it is time to end *What's Your Opinion?* after its having appeared monthly since 1967. My sincerest thanks go to the thousands of people who have so kindly responded to my queries by sending me their opinions. I still have many dozens of unused letters left over from the first quarter of the year and I shall endeavour to write a personal 'thank you' to the writers, if time permits. I have got to know many very nice people through almost two decades of correspondence. Some readers I now count amongst my nicest friends—people such as Ron and



Top, probably my saddest photograph ever—victims of a faulty thermostat  
Above, four of the seven Red-eared Terrapins kept by one of my pupils.  
Paul Craig of Belfast

Lily Baldry, of East London, whom I visited years ago for a *Meet the Aquarist* feature and whom I now visit two or three times per year; indeed, when I was stranded in London at Easter, unable to find an empty hotel room, Ron and Lily took me into their home, as always, like a son. I think also of Dick Mills, who so kindly introduced me to Dr. Who and K9; and of my former teenage contributors, some of whom now sport a PhD. and contribute on their own. I'm also most grateful to those on the trade and manufacturing side of the hobby for sending me test and review samples of products; and for contributing to this feature. Perhaps my most regular and most long-standing contributor to WYO has been Dr. Neville Carrington, of Interpet, whom I had the pleasure of meeting once when I visited his Dorking factory to do a write-up about it. I also

wish to thank the many clubs, societies and associations which made me honorary member or sent me regular, monthly club magazines—in particular, the Anabantoid Association of G.B., and the major Koi groups. I will miss your letters, dear readers, because you and your predecessors enabled me, an Ulsterman, to keep in touch with the whole aquarium-keeping scene throughout the United Kingdom even though geography prevented my attending any of the big shows where I might have met you. Thank you for your loyalty, support and companionship.

My best wishes go to John Dawes, the new Editor of *A & P*. Having contributed each month for so long, makes me hope that *A & P* will continue to thrive. John has asked me to pass on the information that he will always be pleased to receive readers' letters.

The last letter I received for WYO came from Neville Carrington of Interpet. It seems an appropriate one with which to end. Neville writes: "Many thanks for your letter explaining that WYO is coming to an end. I must say that of all the regular features, this is one I read consistently. I find the combination of ideas and experiences from practising aquarists to be very stimulating and have really enjoyed the personal touch in your articles . . ."

"Anyway, I always enjoy corresponding with you and hope we can maintain our friendship and keep in touch. Best wishes."

Well, that's just about it. In my opinion your opinions have made interesting reading over two decades. I hope you have enjoyed my articles and photographs, and that you'll get an opportunity to read some of my other articles in the near future; or see some of my video material on television, because a BBC producer has shown interest in some of my videos about birds and fishes.

I'm about to set up my first aquarium—bought in the Forties—again, so that'll keep me busy, together with my five others.

In answer to Andrew Grainger's question: my friends call me Billy, which is what I hope readers will call me if we ever meet. Goodbye—or, to write it in full, God be with you.

#### EDITOR'S NOTE

We would like to extend our most sincere thanks to Billy for his valuable and regular contributions. We also thank him for his good wishes for the future and wish him likewise. As he says in his final paragraphs, we are always pleased to receive your comments, views and opinions on any aquatic matter. So, please keep the letters coming—we will try to publish as many of these as possible every month. We look forward to hearing from you.

John A. Dawes  
(Editor)

## An aquatic one-acre haven just off the Kingston by-pass

Egmont Water Garden Centre celebrated its third anniversary last March—and what a busy three-year period it has proved to be.

From relatively modest beginnings, Tony Woods has built his centre up into a thriving business which is already beginning to 'bulge at the seams' as demand continues to grow at an ever-increasing pace.

One thing which has obviously helped is that Egmont is the only specialist water garden centre in Surrey. There are other places which sell aquatics, of course, but Tony lays claim to owning the only retail outlet in the county given over exclusively to the needs of aquarists, pondkeepers and watergardeners.

The label 'water garden centre' does not, however, present a complete picture because it does not highlight the fact that Egmont also has a fully stocked freshwater tropical, coldwater and marine aquarium section.

While space does not allow Tony Woods to set up large quarantine quarters himself, he overcomes any potential hazards by buying only fully quarantined stocks and installing excellent water treatment systems (such as those designed and manufactured by T.M.C.). Consequently, the quality of his fish, particularly the Koi, is very good indeed.

A pleasant development over recent years has been a marked shift in emphasis in water garden centres, away from regimented rows of empty ponds that give little idea of their true potential to fully laid out, landscaped, 'total' systems.

The approach at Egmont lies very firmly in the latter category, with approxi-



mately one acre of landscaped gardens accommodating a wide range of ponds, plants, fountains and ornaments.

Some of these are set up as complete 'units' to give customers an idea of what certain combinations can look like and how they can be arranged for maximum effect. Each complete system also has a price tag attached to it so, not only can you appreciate what your chosen layout will look like, but you will also know how much it is going to cost.

A simple idea perhaps, but one that is extremely successful and pays rich dividends, as the high demand for these all-inclusive systems demonstrates.

The 'ideas' concept is taken a stage further by having a number of ponds fully kitted out, planted and integrated into an overall garden plan, thus showing how it is possible, with a little thought, to create spectacular, harmonious effects in restricted areas.

All in all, a leisurely walk round the gardens at Egmont is a relaxing, attractive and educational activity.

If you already have an established system, you can still end up with a host of ideas—not all necessarily on the grand scale. For example, a brand new, simple and very popular introduction this season has been Tony's 'mixed-plants' containers in which large (12 in. x 12 in.) pond baskets are planted with three compatible marginals, such as an Iris, a Mimulus and a Water Forget-me-not, and sold as a

Top, part of Egmont's attractive one-acre water garden. Above, this bridge is just one of Egmont's own-brand range of products

'set'. The idea has caught on so dramatically that it could well become one of the great success stories of the season. It's amazing what a little ingenuity can do.

One other aspect of Egmont's services well worth mentioning is a comprehensive consultancy service involving the detailed designing and installation of ponds and whole water gardens down to the construction of custom-built bridges, waterwheels and windmills.

These own-brand products are also available for sale as individual items on the premises, as is the Egmont Universal Filter for small ponds which Tony designed in response to repeated requests from clients for a basic, versatile, effective but inexpensive system.

If you would like further details on any of these products, contact Tony Woods or Mandy, his daughter and P.A., at Egmont Water Garden Centre, 132 Tolworth Rise South, Surbiton, Surrey. Tel. 01-337 9605.

If you are travelling by road, watch out for directions to Tolworth Rise South—you can see the garden centre from the A3 (Kingston by-pass) but need to go 'round the block' to get there.

A few samples from the Egmont waterwheel collection



