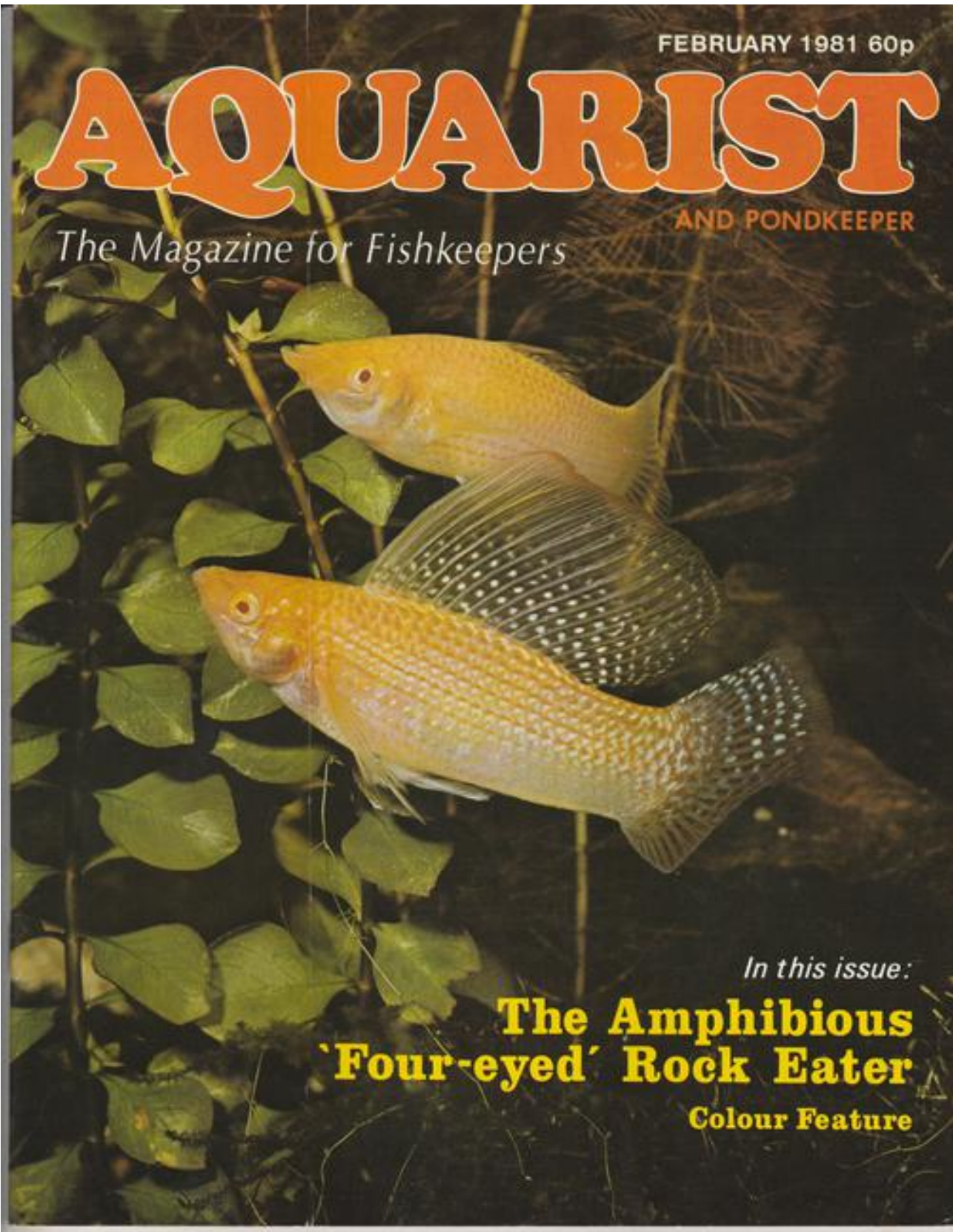


FEBRUARY 1981 60p

# AQUARIST

AND PONDKEEPER

*The Magazine for Fishkeepers*



*In this issue:*

**The Amphibious  
'Four-eyed' Rock Eater**

**Colour Feature**



# THE AQUARIST

AND PONDKEEPER

Britain's Leading Magazine for Fishkeeping

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The Editor accepts no responsibility for views expressed  
by contributors.



# What is Your Opinion?



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

IN THE August issue I published a letter from Mrs. D. E. Harris, of Pets Corner, 14 High Street, Minster, Sheerness, Kent. In another letter Mrs. Harris thanks me for printing her first letter and says that it was a surprise for her husband because she had not told him about her having written the letter. Mrs. Harris continues her story by telling us how she and her husband got into the aquarium trade after the war. "My husband had first learnt from his own father, when he was a child, about breeding fish in his own ponds at home. Then when he came out of the navy after the war, jobs were hard to get; and we had just moved into our own home.

"When my husband was approached by a lady whom he had known before he went into the navy, and asked by her if he would clean out her lake because it had become over-crowded with too many fish, he agreed; and was back into fish again. He sold them all around the London area to a lot of pet shops, carrying them in two cans strapped to his auto-bike. Some of the fish were gold and a lot were uncoloured goldfish. In those days few fish were coming in from abroad, so my husband's fish were soon sold. After a time he thought about breeding a few fancy shubunkins; so he got a few tanks from a friend we knew and was able to get some fish to breed from. When we had got them to breeding condition my husband had a bright idea that he would go to a lake he knew in his fishing days and get some *Nitella* from the lake. That was our first bad mistake.

"We bred the shubunkins, spawning them in this lovely *Nitella*—as we thought. The eggs hatched out

and the babies became free-swimming; but what we had not seen were the many hydra in the plants; and the hydra ate all the baby fish. So, that was one lesson we learned; not to spawn fish in a plant without cleaning it first.

"One day my husband came home saying that he wanted to try to breed tropical fish, the first being angels. Bear in mind that at that time angels were selling at £1.00 each—as were many tropicals. We turned our small bedroom into a fish 'house'. Down the road from where he lived there was a factory manufacturing heaters and thermostats and run by a Mr. Izzard, so we were able to get those quite cheaply. Our first pair of angels we got from a Mrs. Meadows, whom my husband knew in his childhood days. The pair of angels cost him £10.00—which was a lot of money in those days. Mrs. Meadows was soon to become a national fish judge. We lost the male fish of the pair so we had to look around for a replacement. My husband found a school friend of his, Johnny Fushia (*sic*), who was breeding angels and managed to get a male from him. So we had another go.

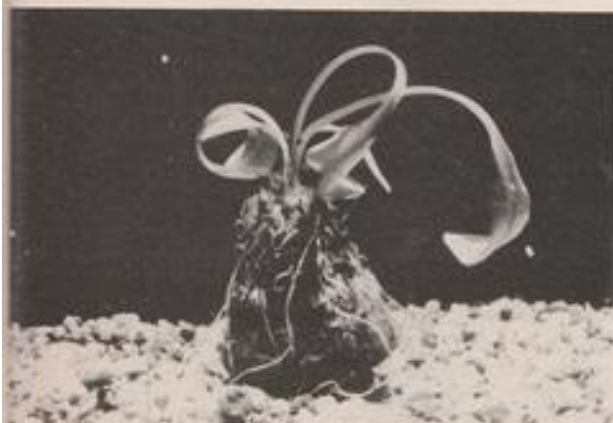
"A few months after trying different ways of breeding these fish we got them off. The problem at that time was small live food for rearing them because in those days there weren't any brine shrimp eggs to hatch out. Mrs. Meadows was using her own infusoria, which she raised in a big, stone bowl; but my husband, looking around some of our local ponds, found a pond with rotifers and *Daphnia* in it. That is how he started with *Daphnia*. He asked around the pet shops and found that there was an open market for somebody to deliver *Daphnia* to the shops.

"Then we started breeding a few different kinds of tropical fish. As he was delivering his *Daphnia* around the shops he also asked the owners to try one tropical tank just to see how it went with them. In some cases he set up the tank for them. Soon the shops were increasing their tropical fish sales and we were able to sell all the fish we were breeding; but of course the market by then had increased and fish prices had dropped from about £1.00 to 2/- (10p) or 2/6 (12½p)." (What about tropical plant sales in those days, Mrs. Harris? Were aeration and filtration popular? B.W.)

The strange looking object in photograph 1 is the *Aponogeton ulacicus* plant that I've made mention of on a number of occasions in my monthly feature. Despite my having had it for a considerable time now, and despite my efforts, it remains in a sort of state of suspended animation. Anyone care to suggest why it just refuses to grow? Any (respectable) suggestions as to what I might do with it could make interesting reading!

## Reptiles & amphibians

In last July's feature I asked about the keeping of reptiles and amphibians. Mr. Kim Leaver is 23 years of age and writes from Nowers Nurseries, Wellington, Somerset. "As I am at the present time (August) sitting around with a broken ankle I thought I would take this



*Aponogelton uvaceus* plant

chance to put down on paper some of my experiences with these interesting animals. My collection at the moment consists of a royal python (*Python regius*), named Percy by my sister, a Californian king snake (*Lampropeltis getulus californica*), a green bush snake (*Philothamnus irregularis batesii*), two garter snakes (*Thamnophis sirtalis*), two fire-bellied newts (*Triturus pyrrhogaster*) and last but not least a fire salamander (*Salamandra salamandra*). As you can probably guess, my main interest is in keeping snakes, although all types of reptiles and amphibians interest me.

"Feeding these animals is not too difficult as they need to be fed only once per week. The python and king snake both eat dead mice, which I breed and which probably cost more to feed than all my other animals put together. The bush snake and garter snakes all eat fish but have to be fed differently as the bush snake will eat only live, moving fish. I say 'moving' because as long as the fish remain motionless the snake will not under any circumstances feed on them. On the other hand the garter snakes feed mainly by smell and will avidly take strips of mackerel either from a saucer put in their tank, or from the hand. My salamander and newts all eat worms and small, grey slugs.

"Probably the hardest of the above to keep in captivity is the bush snake. Originally I bought a pair of these snakes in April 1979 without fully understanding anything about the way they should be kept. I think this is a big mistake a lot of people make when buying these creatures. When I got my pair home I put them into a vivarium measuring approximately 30in. wide  $\times$  26in. broad  $\times$  36in. high. At the time I was under the mistaken impression that this was escape-proof. The snakes, which are about 30in. in length and  $\frac{1}{2}$ in. in diameter, are a beautiful emerald green in colour on the upper scales, with cream ventral scales. The drawbacks with these snakes are that in speed of movement they try to

rival Sebastian Coe, which makes them almost impossible to catch once they are in their tank. The other thing that these snakes excel in is escapology, which, due to their thinness, they manage with ease.

#### Lost

"As all my vivariums are in my bedroom I spent most of my first days, after introducing the snakes to their new home, in looking under the bed as one of other of the pair always seemed to be finding a new way out of their own home and proceeding to curl up and have forty winks under my bed. Eventually the male snake completely disappeared and after a thorough search by both my mother and myself I gave up all hope of ever seeing him again, as the weather at that time was quite cold and bush snakes come from East Africa and need to be kept at a temperature in the range of 85°F.

#### —and found

"However, five weeks later—May—when the weather was much warmer, I got an urgent phone call at work, from my mother, asking if the green snakes were poisonous as my father had been bitten by one of them. After telling her that they were not in any way harmful, I rushed home to find out what had happened. Apparently the male snake had turned up in the hall and was sunning itself in the light coming through the glass of the front door. My mother found him in this position and called my sister—who will usually handle my python. On seeing which snake she was being asked to pick up my sister said something such as 'No chance!' At this point my father was called in to deal with the situation. As he had never handled any of the snakes before, he picked it up by the part of its body that came to hand and carried it into my room; whereupon it bit him on the finger, causing him to drop it with a yell. My mother, who had been opening the cage for him, turned round and said: 'Don't drop it; you might hurt it!' Father's reply is unprintable!

"My father, with blood flowing from two small teeth marks in the top of his finger, picked up the snake again and promptly got bitten on the thumb as well.

"When I got home the snake was safely in with its mate and my father was wearing a nice pair of sticking plasters. The interesting thing about the bites was that the snake's head is no larger than  $\frac{3}{4}$ in. long and  $\frac{1}{2}$ in. wide, yet it still managed to bite my father's finger, which has a diameter of at least 1 in. The episode ended happily enough as we could all see the funny side of it afterwards.

"I still have the male snake, fourteen months after the above incident; unfortunately the female died last Christmas day from a chill which she caught. If anyone keeping any types of reptiles or amphibians would like to write to me I would be very pleased to write back as, like most people, I love writing or talking about my favourite hobby. I would like to congratulate you on your fine article, which I have been reading now for nearly ten



years: it has always been interesting, and sometimes amusing, reading."

#### Liver & flukes

Mr. Ray Holmes resides at number 5 Keals Croft, Lynton, Devon. He writes: "What next? Guppies with glanders? Mastitis in mollies? We may even see the introduction of compulsory tropical fish dipping in scab outbreak areas. You don't seem to be a gullible type, but the liver letter from Lawrence Belshaw (November, 1980) must surely be a hoax. If the writer was serious, he cannot have done much to enhance his reputation as 'one of the country's leading experts on diseases in these fish.' I have read his letter several times with the intention of writing a constructive criticism, but I still don't know where to start.

"I do share his condemnation of liver as a regular fish food; not because it is infested with flukes—change your butcher, Mr. Belshaw!—but because it is a dirty food, polluting aquarium water more quickly than almost anything else. May I suggest that Mr. Belshaw conduct another feeding experiment? Set up two similar tanks, but stock only one. Give the fish a massive feed of raw, unwashed liver. Go on, shovel in as much as you can afford and let 'em gorge on it! Transfer the fish to the clean tank, and change the water in the dirty one. Now feed the fish with liver, and transfer them to the clean tank. Continue to do this, feeding only liver, until the fish die. I'll bet you'll have to wait a long time to examine them, post mortem, and your examinations will reveal that the subjects died of old age.

"Mr. Belshaw actually began this experiment when he moved the ailing fish into a separate tank and found that they recovered—despite the Dettol treatment! Were I able to ask my fish, I believe they would tell me that immersion in a solution of Dettol, far from alleviating pain, is rather painful.

"I am interested to learn the reasoning behind the advice that I should starve my fish for fourteen days every year. And, please, may we find out how the flukes moved so fast, the feeding method, and if they can breed or whether they drown? Sorry, Mr. Whiteside, but I still suspect that the letter is a hoax; admittedly a successful one, since the writer did provoke you and me into responding."

I sent Mr. Holmes a personal reply to his letter so I'll try to give a fairly brief response here. I assume most people do not consider themselves to be gullible. I do not think I am "a gullible type"; indeed, I should describe myself as a professional cynic. As I stated in the November, 1980, feature, Mr. Belshaw is an occasional contributor to this feature. Having read Mr. Belshaw's previous letter—and published some of them—I had and have no reason to believe that his last letter, his printed card or the newspaper article accompanying them was any kind of spoof or hoax. I do not wish to publish my reasons; but I have retained the original items. I'll leave readers to make up their own minds. I'll make the point that I make occasionally

in my monthly feature: I do not necessarily agree with the comments made by contributors to this feature, nor do I accept any responsibility for the views expressed. However, I feel that readers should be free to express their own opinions—even if I disagree with them and, on occasions, know that some of the 'facts' that they contain are incorrect. In cases of the latter I usually include a brief remark of my own to correct the facts. Occasionally I also like to remind readers that I do not claim to be an expert—so I certainly do not know all the answers despite having kept fish continuously since the 'forties. Frequently I'll make a postulation about something and ask readers to correct me if I'm wrong. I should be pleased to receive any other readers' comments about Mr. Belshaw's letter.

The mention of "spoof" and "hoax" leads me onto another letter that I received. I should certainly like to receive readers' opinions on this one—which may or may not be a spoof.

#### Plurals

The letter states: "In 'What is your opinion' in the September issue the schoolmaster chided one of his correspondents for supposing that the plural of gourami would be gourami's. He's right, it's wrong. Dare I suggest that the schoolmaster's gouramies is equally open to criticism? It's potatoes, not tomatoes. It's tomatoes, not tomatoes. Surely the plural of gourami is gouramis? Please accept this as a friendly (if pedantic) comment which requires no acknowledgement, public or private."

Well, there it is. I've typed the letter exactly as written—although I should point out that the author had put a stroke through the optional letter 'e' in acknowledgement/acknowledgment. Had he chosen, the author could have opted to use the word 'chid' instead of 'chided'; I understand that either is correct—although the latter is more often used. As the schoolmaster in question I must admit to being totally confused by this letter—which I suspect may be a spoof. The author states that he requires no acknowledgement, public or private, so I won't disclose his name or address. I'll retain the spelling 'gouramies' because that is how the word is spelt/spelled in my reference books. I'm left wondering about 'potatoes' and 'tomatos'. Are the words spelt/spelled thus in America? I don't know. I find it difficult enough to cope with conventional English spelling. Incidentally, the author of the letter sent it to me from Enfield, Middlesex.

#### Kribensis

Let's call the whole thing off and move on rapidly to the next letter—written to me by Mr. Stephen Croft, of 29 Smithy Parade, Thornhill, Dewsbury, West Yorks. He says: "After reading Mr. Robinson's letter (October, 1980) about his breeding of kribensis (I should like to say that) these were the first cichlids I bred and I found that if the fish were kept in normal tap water 90% females were produced. On placing a piece of bogwood in





Three-banded Pencilfish

the tank, which turned the water acidic, I found the result was 90% males produced. Maybe if he tried to keep his fish in neutral to alkaline water he would produce females. In closing, may I ask if anyone in my locality knows where I can get a pair of *Nanochromis nudiiceps*? (Incidentally, my main reference book gives the spelling as *Nanochromis nudiiceps*—the Congo dwarf cichlid. I assume my book is correct. I'm rather disappointed that no one else has so far attempted to refute or support my postulations as to why Mr. P. J. Robinson's baby kibris nearly all turned out to be males. Why has no one else taken my bait? B.W.)

Photograph 2 shows three dead *Nannostomus trifasciatus*, the three-banded pencilfish. I bought four healthy-looking young fish and placed them in a tank containing a few guppies. Two days later three of the four pencilfish suddenly died. None showed any signs of disease; and the survivor and the guppies remained and continue to remain healthy. Anyone care to suggest any possible causes of death?

Mr. John Gordon's home is at 6 Roanshead Road, Easthouses, Dalkeith, Midlothian, Scotland. He tells us: "I have successfully hybridized a female guppy to a male molly. The fry are now about six weeks old and approaching 1 in. in length. They are grey in colour, with pale bellies. They grew very fast, considering the tank was crowded. They show vigour and are hyperactive. Their eyes are black in colour."

From No. 76 Bevisland, Swindon SN3 6AN, came the following letter, written by Mr. R. King. "I bought my first *Aquarist* for some time and was pleased to find that a lot of the contents was devoted to marines. I hope you will continue to give this side of the hobby its fair share. In answer to your query concerning the Hawaiian pink striped wrasse, *Pseudochelinus octotaenia*, I haven't kept this particular fish but have kept the six-lined wrasse, *P. hexataenia*, a close relative. When I first put it in my tank containing a maroon clown, a butterfly fish, a dusky angel, a powder blue, and an anemone, it was chased around the aquarium by the powder blue until it found a piece of coral to hide in. It moved about the branches of the coral easily, darting out at meal times for food. After a week the other fish had accepted it and it spent more time swimming in the open. It ate well,

preferring flake, frozen mysis and brine shrimps. Unfortunately, after a couple of months it disappeared completely. The only clue to its fate was that the anemone looked very bright.

"The basic food for my fish is marine flake. I supplement this with a variety of frozen food. Their favourite appears to be adult brine shrimp, although the maroon clown does like the occasional piece of raw liver, preferring to eat it himself rather than give it to its (*sic*) anemone." (I'm always pleased to receive letters from marine enthusiasts—even though I've never kept tropical marines myself. B.W.)

#### Killifish

"Knowing how much you like typed letters I am trying to please you," states 16 years old Master Roger Grimshaw, of Post Office Stores, High Road, Newton, Wisbech, Cambs. Roger continues: "Thank you very much for the Java moss. It was a nice surprise for me when I came home from boarding school. It is with this in mind that I am typing. The moss went straight into a tank with my newly-purchased prizes: a trio of Ceylon panchax, *Aptochelilus dayi*. They were bought on the spur of the moment because I knew that it was very rare for any dealer around here ever to have any variety of killifish. In a spare 18 in. x 10 in. x 10 in. tank of moderately hard water, pH 7.0, and some floating plants, they were okay. Unfortunately they were obviously not going to perform for me. The Java moss was put in and it was an instant hit. The male kept trying to lure the female into it. Within the hour he had succeeded. The quivering pair of 'S' shaped fish was my sign to rejoice.

"That was 15 days ago. Now, after collecting the eggs and putting them into a margarine tub, all are showing little black eyes; and six have hatched. The famed Java moss triumphs again! I would never have guessed that this was my trouble because I was told that these fish spawned in the upper aquarium plants. Fishkeeping wouldn't be interesting if something didn't turn up with a surprise. As a request, I would like to ask if anyone has any lists of killifish or killifish eggs as I have found it very difficult to get even a relatively common species. Obviously, all costs will be refunded. All the best."

I must point out that Roger got his Java moss and

Clown Loach—*Bolia macracanthus*





wrote his letter some months ago; and as I've just cleared out all my spare Java moss and sent it to an aquarist friend I regret that I have none to give away at the moment—so please don't write to ask for some. Incidentally, although I like to receive typed letters I am always fascinated by beautiful writing; however, I'm happy to receive any type of written communication—as long as it's legible.

To compensate for the disappointing sagas associated with the fish and plant in the first two photographs I've selected a shot of a clown loach for the third photograph. I bought a pair of these fish, *Botia macracanthus*, at the same time as the three-banded pencilfish. The clowns were rather expensive young fish; but I must say that they have given me a considerable amount of pleasure. They are beautifully coloured and are always on the move, eating food from the surface, from mid-water and from the gravel. One of the pair spends a lot of its time carrying around a Malayan sand snail which it appears to suck, carry around and then spit out; after which the process is begun again. I've no idea why the fish does this—but it's interesting to watch its playful antics. The clowns share their 30 in. × 15 in. × 15 in. planted tanks with *Corydoras* species, a pair of half-grown angels and a variety of gouramis. The clowns are peaceful fish and I can certainly recommend them to anyone who has not had the pleasure of keeping them. I should imagine that a dozen of them in a large, planted tank would make a beautiful sight. Have you kept clowns?

In the September, 1980, feature I included a letter about kribensis—*P. pulcher*—written by Mrs. Jean and Mr. George Goodfield, of 26 Kimberley Close, Downend, Bristol, Avon. On behalf of her husband and herself, Mrs. Goodfield sent me the following postscript. "... You hope that all our fish are thriving. Indeed they are, and colouring up nicely. Some of the males, in particular, are developing well, and showing that delicate golden colour along the dorsals, together with some spots on the caudal already. All have the very definite stripes.

"After a few weeks the parents appeared to be wanting to 'nest' again, and found all those young, previously so pampered, to be rather a nuisance—as can be the case with 'adolescents'. Anyway, we gave these young ones their own tank and left mum and dad to it again. Sure enough, about seven weeks afterwards we were delighted to see another brood, much larger than the last one; at least twice as many. And at the time of writing (July, 1980) they in turn have their own tank. Father has dug out a deep trench in their slate house, leaving the pile of debris outside the door, so it looks very much as though a third spawning will occur shortly.

"Also, another pair of adults, with no 'track record' of young, have at last got down to it. We are pretty sure there are eggs in their house. He did a lot of cleaning beforehand and they are spending a great deal of time in and around their house. Yes, it does rather sound as though we shall run out of tanks, because it is such a prolific business. This second lot of parents is hived off, in a section of the tank where the first lot of young are, with one of those useful plastic tank partings. How-

ever, we have had a lot of trouble with the young fish getting through, so we have had to put two of these dividers in, close together. Finally, we are hoping this second pair will prove to be as good parents as the first pair."

#### Fewer & better

Mr. Ray Holmes, whose address appears earlier in this month's feature, also has the following to say. "It is New Year resolution time again. Having subscribed to *The Aquarist* for as many years as yourself, I have often been amazed by the tank-stocking details described by writers, either by writers to this feature or to the experts with a query. Obviously I cannot quote actual examples, but the type of letter to which I refer reads: 'I have a 24 in. × 12 in. × 12 in. aquarium with two angels, four gouramis, five neons, a sucking loach, two *Corydoras*, four guppies, three platies, two kribensis etc. Would it be all right to add a red-tailed black shark?'

"I would like to suggest, as we enter 1981, a New Year resolution for many of your less-experienced readers. Resolve not to keep as many fish as possible, but to keep a few fish in the best possible conditions. Give half of your fish away and watch the progress of those you keep. If you want to be really daring, set up a 36 in. × 15 in. × 15 in. tank and stock it with just two or three small angels. They will swim into 1982 bigger than coffee saucers, and be more interesting and a greater source of pride to you than those in your crowded community tank—which are unlikely ever to exceed the size of the 50p coin you paid for them.

"For interest, try keeping just four keyhole cichlids or two pairs of dwarf cichlids, again in a 36 in. tank. Half-a-dozen Harrison's pencilfish in a well-planted 24 in. tank will eventually produce a small shoal; though egg-layers and, presumably, egg-eaters, they never seem to find all of their eggs or fry, so a few will survive—which certainly wouldn't in the usual community. For visual impact, put six tiger barbs into a 36 in. tank. You would not believe they could grow so large or colourful until you have tried it. These are some ideas of your pre-Christmas stocking. Other readers who dislike keeping a mini-maelstrom of undersized fishes will probably suggest many more. Do try one; I am certain the results won't disappoint you."

I should be pleased to receive your opinions on any of the following: (a) different types of aquarium heaters and thermostats, and combined heaters/stats; (b) the cultivation of the more expensive aquarium plants, i.e., those costing more than 50p each; (c) the sale of cuttings, etc. of house plants and garden plants for use in tropical aquaria; (d) your choice of fish suitable for an attractive and interesting 24 in. community tank; and (e) live foods: are they really essential for health fish? I should also like to receive readers' opinions on any aspect of marine fishkeeping. Please send your letters (12p stamp) to me c/o *The Aquarist & Pondkeeper*, The Butts, Half Acre, Brentford, Middlesex TW8 8BN. Goodbye until next month.

# Commentary

by

**ROY PINKS**

THE POWER AND influence of the aquatic press are remarkable. Hardly had the clatter of the September issue of the *Aquarist* died away after negotiating my letter box, when the telephone summoned me from my breakfast. It never occurred to me that this would relate in any way to my *cri de coeur* for supplies of minnows and Bitterling mussels, and even if it had done, I would have laid a fair bet that it would have concerned the one or the other, but hardly both. However, in the style of the true entrepreneur, Barry James of Everglades Aquatic Nurseries came to the rescue once again and revealed that he could supply both. I brightened visibly after the shock of the disturbed breakfast and made arrangements to collect these creatures.

Some Bitterling evidently bred at Everglades this season in the company of these mussels, yet Mr. James believed that they were Swan mussels (*Onodonta* sp) rather than Bitterling mussels (*Unio* sp). I have always understood that the one was compatible, whilst the other was not, though I have never discovered why. The sources of information on the breeding of these fish are few and far between, and I am beginning to wonder whether there is more than one compatible mussel for this fish. I have had one or two other possible sources for the mussels, and I will acquire a small selection, aiming to initiate a breeding exercise in the spring of next year.

## Minnows

When I visited Everglades I was delighted to see a tank of very lively minnows, too, and the largest ten of them accompanied me back home several hours later. The quest for these had occupied Mr. James and his staff for much of the Saturday forenoon, armed with a variety of nets, traps, *et al.* The devastation wreaked on their ponds and on their peace of mind during the chase was in no way made good by the reasonable asking price for these fine specimens, and I am looking forward very much to seeing them at their best next April. I was completely taken aback by the lightning movement of the minnows once they were released, and appreciate all the more the efforts made to round them up.

I am very grateful to all concerned for their help, and hope that the end results will have made the attempt

worthwhile. At the same time I hope that enthusiasts for native pond and river fish will make their voices heard through this magazine, to the extent that others in the trade will realise that there are such alternatives to the overdone and demanding koi, greatly appealing though these may be to the eye.

With the recurring history of pond leaks behind me (see the POND SAGA), I live in something of a neurosis that some day they will all drain away, leaving me with decaying plants and expiring fish. The study of the pond water level has been furthered by an exceptionally dry spell in this area, lasting for over two months. Whilst northern readers may be excused from reading on (for this summer at least), I am bound to comment on the telling effect which drying winds have on the contents of a pond. In this area successive days of such winds have been interspersed by light showers or hot sun. The negligible rainfall was always over-assessed, especially by the cricket lovers, and it masked the growing deficiency of moisture—some 3 or 4 inches less than the previous year.

## Water level

Watching the water level from day to day as I did, believing that the rapid evaporation was perhaps not what it seemed, I was forced to make comparisons with other water around the garden. The 2 in. deep bird baths dried up in 2 days, and the other ponds were losing their contents quicker than on first look because plant growth near the water's edge obscured the actual level. Having preached so often about the desirability of keeping water levels maintained, I took a leaf from my own book and for the first time ever positioned a hose permanently by the pools, with the firm intention that I would top up at least once a week.

Quite apart from the superior appearance this attention gives to any pool, the area of travel of the waterline is restricted to a minimum, and in the case of plastic pools this is an important factor in reducing weathering. At the height of summer aphids begin to infest water lily leaves, and it is simplicity itself to dislodge them with a broadside from the garden hose. Having it handy by the pool ensures that this job gets done—few are conscientious enough to struggle with a hose for this purpose alone. It should also be remembered that under drying conditions the bog plants take a fearful hammering and many never recover. The drought of several years ago seems to have been forgotten by so many gardeners and pondkeepers, and its lessons ignored. But thorough soaking of the plants round the pool will underwrite their survival for next year's display. In my case a very successful spring sowing of bogside primulas was planted out during the wet part of the summer, and it would have come sadly unstuck during the past month if I had not sprayed it vigorously and regularly with the hose after carrying out the other operations mentioned above.

One word of caution! Please supervise your topping up and turn off the hose water when the job is done. Overflowing ponds waste valuable water and may cause your fish to escape at the same time.



# STUDYING YOUR POND PESTS

*A bonus to your Fishkeeping*

by L. E. Perkins

A WEED, it is said, is a plant in the wrong place and by the same token, a predator is a creature in the wrong place like the heron which we can all admire in its wild state but whose presence beside our fishpond is not welcome.

Books covering the upkeep of garden ponds always contain a chapter on pests and predatory creatures likely to threaten the well being of our ornamental fish and the reader is encouraged, rightly, to remove all such harmful trespassers. However, many of these uninvited visitors to our ponds are aquatic insects and are worthy of more than summary execution upon their discovery and if, instead, they can be housed in small aquaria not in use at the time, a great deal of interest can be obtained from observing their behaviour. If the interest in the subject develops it may be necessary to seek some specimens in wild waters for some are unlikely to be introduced to the garden pond by means other than the ill-advised collection of underwater plants from natural ponds.

One insect which may arrive of its own volition is the great diving beetle (*Dytiscus marginalis*) which is a clumsy but efficient aeronaut which flies from one pond to another, feeding on underwater prey, mating under water and depositing eggs in submerged plant stems. An inch and a quarter in length, this beetle is exclusively carnivorous and is able to tackle prey of its own size or larger, fully grown sticklebacks or part grown fry of other fish species forming part of its diet.

Needing atmospheric oxygen for respiration, it has to make periodic trips to the water surface to collect air supplies and this is accomplished by breaking the surface with its posterior end. A quick sweep of the net on such occasions is the best way to effect a capture of this otherwise elusive swimmer.

Sex is determined by the elytra or wing cases, smooth in the male and ribbed, longitudinally, in the female. The male has a further distinguishing feature in the form of discoid pads on the forelegs with which he grips the female during amplexus.

The larva is two inches long and segmented, tapering from the wedge-shaped flat head to a slender tail. Its

mouthparts comprise a pair of sickle-shaped mandibles which can overlap after being thrust into the prey's tissues. Once the victim has been thus impaled, a pre-digesting fluid is pumped down these hollow mandibles rendering the prey's tissues into a liquid which can be sucked up for consumption. The pumping action involved can be observed quite clearly through the transparent skin of

Underside of *Dytiscus marginalis* male showing enlarged tarsus of foreleg forming a disc-shaped pad.





Head of Dytiscus larva showing the mandibles sunk into the flesh of a water shrimp (*Gammarus*).

the larva. Both larva and imago insect are voracious feeders but the larva exceeds the adult in its greed for as growth ceases at pupation, the larva must feed throughout its existence for the ultimate beetle to conform to its optimum size.

Our two native water scorpions are bugs equipped with sucking mouth-parts instead of mandibles common to beetles. *Nepa cinerea* is a flat, dead-leaf coloured insect of around an inch in length. Its forelegs are like two pocket-knives, the fore segments being able to fold back into the hind ones. These are used to capture and hold prey while being eaten. At the posterior end *Nepa* has a pair of grooved filaments which, when brought together, look rather like a sting but which are used to thrust above the water surface to make contact with atmospheric air for replenishing air supplies used while the insect is submerged and lurking among underwater plants in wait for passing prey comprising tadpoles, water-slaters and insect larvae.

Our other water scorpion (*Ranatra linearis*) is also, and more aptly, known as the water stick-insect but is another bug with similar tastes in prey to those of *Nepa*.

The water boatman is well named for it has a keeled dorsal surface and with its extra long, hair-fringed hind legs, it swims like a rowed boat, on its back obtaining air supplies by frequent visits to the water surface where it pushes its latter end into the atmosphere. A bug, it sucks its nourishment from small prey through a beak-like mouth capable of inflicting a quite painful, but temporary, wound to the careless handler.

Dragonflies are common and colourful visitors to the garden pond where they hawk over the water catching flying insects while in flight. Male and female can often be seen flying in tandem, mating on the wing, the female later detaching herself to lay her eggs in the water or on

floating plants, according to her species. From these hatch the dragon-like larvae which will spend a year or more leading a completely aquatic existence. They have no need to make use of atmospheric oxygen as their respiration system can abstract oxygen from the water taken in at the tail, passed through an internal gill system and passed out again at the tail with such force, when necessary, that the larva is jet-propelled and more elusive to other predators. Normally a slow moving creature, the dragonfly larva awaits the passing of prey, suddenly shooting out a shovel-like appendage from under the mouthparts. With a hook at each side, this so-called mask seizes prey and retracts, bringing the victim within reach of the jaws for subsequent consumption.

Marginal pond plants should be closely inspected every morning and with luck dragonfly nymphs will be found which have crawled up the iris leaves and stems of rushes. Some will be no more than husks, empty cases complete

Dytiscus larva suspended from the water surface while taking in a supply of oxygen.







*Nepa cinerea* at water surface showing air tube lifting the meniscus as it is about to obtain atmospheric oxygen.

Water boatman at the surface collecting air supplies and showing keeled back and long rowing hind legs.



Dragonfly larva showing formation of wings which will expand after emergence of the adult insect from the nymphal case.

down to the tiny claws on the feet, from which the dragonfly has emerged. Some will be undergoing the last stages of metamorphosis and the lucky watcher will be able to witness the transformation from the dun-coloured ugly denizen of the depths to the gauzy-winged flying gem embarking on its brief aerial existence of a few weeks.

Feeding these different insects presents no problems as they are by no means fussy. Garden worms, earwigs, woodlice, etc., are all relished but if they are kept in other than solitary confinement (apart from mating pairs) they will prey upon each other.

A pair of water beetles should be kept in a container with a perforated lid. *Lagratiphon major* is a suitable plant to furnish the tank and if mating takes place, the female will be able to make incisions in the stems and insert her sausage shaped eggs.

Photographing the various dramas enacted in this small volume of water can be absorbing as a pastime and excellent practice for fish photographers for exactitude in focusing to record the tiny details is of paramount importance as is the overcoming of the problem of supplying enough illumination in the right place.



THE AQUARIST

# Further notes on the crayfish, *Machrobrachium rosenbergi*

by M. I. Davey

## General

My specimens are now between 8-9cm body length, this figure can be increased to 11-12cm if the claws are also taken into account. The colour is a deep reddish brown with many orange protrusions mainly confined to the first set of appendages with a few on the thoracic carapace.

## Head/Thorax

The thoracic carapace is composed of four chitinous plates fused together. These plates are reddish brown in colour with orange/white pimple-like protrusions of about 0.5mm diameter. There are also a multitude of smaller (0.25mm dia.) black spots, the purpose of which I cannot deduce. They do not change shape under any condition and under close scrutiny with a magnifying glass show themselves to be very slightly raised and of a solid glossy composition, ruling out in my opinion pores or a secondary means of respiration. There are two 3mm diameter depressions in the carapace, one either side of the body. These look as if they consist of a softer membrane perhaps sensitive to vibration much the same as our eardrums.

The eyes protrude from the front/top of the head/thorax on cartilaginous stalks 3mm long which allow limited movement of the eye. The eye itself appears as a small black sphere of 1mm diameter surrounded by a sphere of transparent grey membrane 2mm in diameter. Their eyesight does not appear to be very advanced, but they will respond to large objects moving outside the tank, smaller objects (white card 2cm diameter) produces no effect.

Six antennae protrude from the front of the head and consist of: one true pair 9cm long and one pair of forked double antennae 1.5cm long. These are all composed in much the same way as human hair, i.e. a series of axially joined cylindrical scales and are liberally covered with very fine short tan coloured hairs which when viewed with the naked eye give the antennae an "out of focus" blurred outline. I have no doubt that these are sensory organs in both the vibratory and olfactory modes. I also believe them to be used as a means of communication over short ranges, the longer pair used as receivers for vibrations transmitted by the forked pairs of antennae which tend to "twitch" violently

and in regular patterns during close confrontations between the pair of crayfish living in the same tank.

The mouthparts situated at the front underside of the head/thorax consist of one pair of hairy pointed mandibles and two pairs of plate like jaws (maxillae). When feeding the food is picked up by one of the claw terminations of the first three pairs of legs passed to the mandibles and from them fed to the maxillae for mastication.

Above the mouthparts are three pairs of feathery appendages, these seem to be gills but I have observed another use for them. When feeding small live food such as *daphnia* the crayfish will move to the densest area of *daphnia* and wave these three sets of feathery appendages in such a way as to set up a flow of *daphnia* laden water past its mouth-parts catching the *daphnia* with its mandibles as they pass. The underside of the thorax, where not hidden by the limb attachments, is covered with fine white hair.

## Abdomen

The abdominal segments, of which there are five, are darker than the rest of the carapace being almost black but edged with a beautiful red. The sides of these chitinous segments have a fringe of short (2mm long) tan bristles. Underneath the abdomen are the creamy white soft body parts and mounted on these are the gills. The gills are in three pairs, each single muscular base branching into two feathery stems about 5mm long. There are also two appendages joined to the first segment and carried in the forward direction to which I can ascribe no function. They are about 20mm long, pointed, covered in hairs and jointed three times.

## Telson

The telson, as it is scientifically known, is the fan-shaped appendage to the abdomen. This differs from the rest of the abdominal carapace in that it consists of a double skin of chitin enclosing soft body parts. The telson is the same reddish brown as the thorax and is composed of nine movable plates, rimmed on their outer edge with 2mm long tan bristles. Crayfish use the telson for "swimming", this is done by rapidly curling the abdomen whilst the telson is fully fanned out thus catapulting the fish backwards, a





A side elevation intended to give a general impression of relative dimensions and carapace construction. The attitude I have tried to portray is the creature's stance at rest when both chelae

would rest on the substrate and whilst moving in which case the chelae are carried in the position of the left one in the diagram.

method of locomotion used mainly as a means of escape, though I have observed them using it as an alternative means of reaching the layer of floating plants in order to feed at the surface.

#### Limbs

The limbs are each composed of six sections, jointed in such a way as to allow movement in one plane only, (the only joint possible with an exoskeleton). This obvious difficulty is overcome by having two joints very close together and operating in planes set 90 degrees apart, thus giving a universal joint effect, this can be seen most clearly at the first and second joints from the thorax. All the limbs with the exception of the "nippers" (chelae) have small bristles greatly increasing in number towards the claws, these are most certainly sensitive to vibration and also perhaps smell. I have observed that when feeding, a limb only has to come into close proximity of food for the crayfish to sense it and seize the food in a flurry of grasping claws. During these actions the antennae appear to be otherwise occupied, also one of my crayfish having lost an antenna in a difference of opinion with another one had no difficulty in locating food. The first three pairs of appendages terminate in pincers; these are used for gathering food and also as a means of grasping the terrain when climbing. The formidable pair of nippers on the first pair of legs is seldom used for climbing or foraging, but frequently in self defence and territorial warning displays; I also feel that they may play a part in the mating ritual (as per

the scorpion) but I have not witnessed this. When not in use they are allowed to rest on the substrate in front thus relieving the creature of its heavy load, though I imagine that there are air filled cavities inside to reduce their weight in water. Along the upper surface of the chelae are a series of projections not unlike the teeth of a saw and it would appear that these come into play in a purely aggressive role. When a dispute is enacted the contenders use these projections to force away the opponent's chelae still leaving its own free for use.

The remaining two pairs of legs terminate in sharp pointed claws used for obtaining a grip on slightly rough or porous surfaces such as rocks.

#### Feeding

When it comes to feeding, these creatures can only be regarded as the aquarist's dream, they will greedily accept anything offered to them in manageable quantities. Presenting a varied diet is no problem and mine will accept greenstuffs in the form of frozen peas, beans etc or if I am not careful, much treasured aquatic plants! Raw and cooked meat is guaranteed to send them into a frenzy as is live *ubifex*, and in the absence of these they do an admirable job of keeping down the population of ramshorn snails. Another of their tastes, though not one for the squeamish, is their culling of any sickly fish and disposal of any unnoticed fatalities. Needless to say, I keep a very watchful eye on the condition of my prized fish and remove them to "sick bay" at the first signs of distress. In addition to this they

accept all proprietary brands of flake food and the usual freeze-dried, and frozen foods.

#### Tank Maintenance

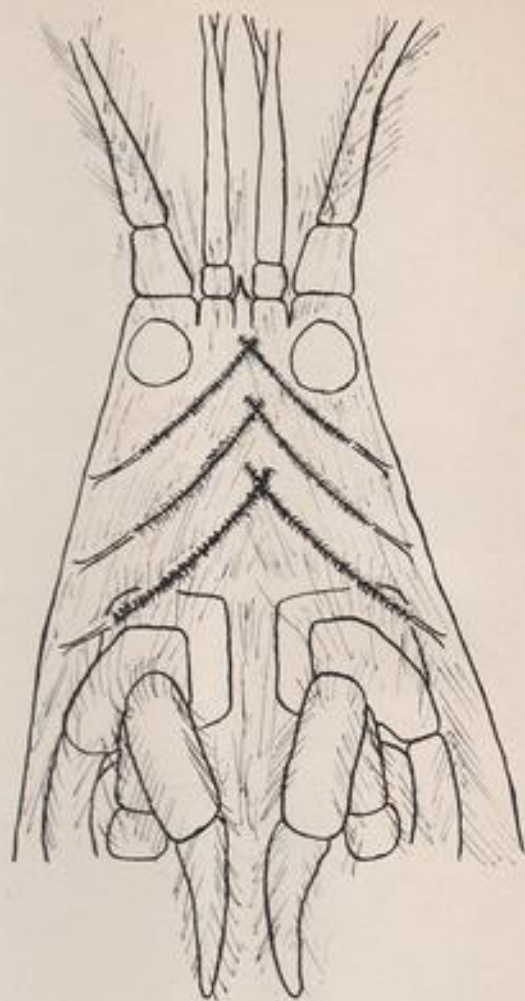
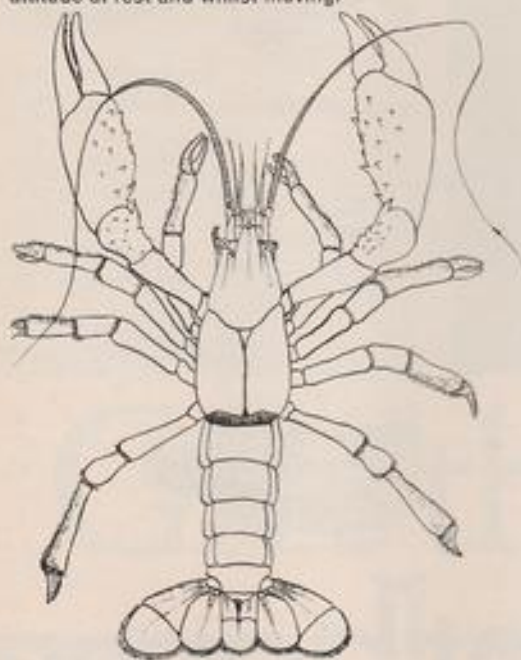
This presents very few problems; if a tank is devoted entirely to crayfish and other decapods (I keep fresh water prawns in the same tank) it is merely a matter of siphoning the detritus from the substrate once every two-three weeks. The only extraordinary task to be carried out is the removal of the discarded exoskeleton if you so desire; I tend to leave them in the aquarium as the crayfish always consume them within one or two days. This I feel sure benefits the fish by replacing vital elements and also contributes to my aim providing that most elusive of targets—a balanced aquarium.

Before I am shot down in flames for my statement about replacing vital elements, I should like to say that I am aware that insects absorb a great deal of the composite matter from their exoskeleton prior to shedding it. I have no doubt that this also happens with aquatic decapods but without allowing them to eat their own carapace I can see no sure way of providing the necessary material building blocks vital to an acceptable lifestyle: (the claws and other heavily armoured skeletal parts slowly dissolve until they become manageable to the crayfish).

#### Summary

I find these creatures a pleasure to keep, they are undemanding, requiring little maintenance and no special

A plan view, again showing carapace construction, attitude at rest and whilst moving.



A close-up of the mouth parts showing the mandibles, maxillae and gill-like appendages. The whole of this area is liberally covered in fine white hair.

equipment (apart from a close fitting tank hood!). Their antics are an endless source of amusement to my wife and I, and as a conversation piece when entertaining friends they are unrivalled—who else keeps "lobsters" in their living room?!

Since my last article I have returned to Hampshire on leave and have seen freshwater crayfish for sale in my home town; they were retailing at £2.50 each, a small price to pay if you have a tank to spare and an eye for the unusual, but be warned, they grow at an alarming rate and have an appetite to match (especially for your plants).



## Product News and Views

hw-MARINEMIX is manufactured in the Federal Republic of Germany in the laboratories of H. Wiegandt, of 415 Krefeld 1. The U.K. distributors are Wingate & Golding Ltd., Barton Stacey, Winchester, Hants. SO21 3QL; telephone number Sutton Scotney 792 & 793. hw-Marinemix is available in four sizes: the 2 kilo pack makes 13 gallons and costs £3.76; the 4 kilo pack, 26 gallons and costs £6.45; the 20 kilo pack, 130 gallons and costs £28.74; and the 40 kilo pack makes 260 gallons and costs £51.89—all inclusive of VAT.

hw-Marinemix is a synthetic seawater salt mixture claimed to be ideally suited "for the serious marine aquarist" and containing "no less than 62 trace elements." It is said to create "a balanced marine environment suitable for delicate life forms such as anemones and live corals as well as fish."

The information on the pack informs us: "The first synthetic seawater to contain Bio-elements and protective colloids. hw-Marinemix has been formulated by modern scientific techniques under skilled marine biologists, and contains—all necessary and positively acting trace elements, bio-elements and protective colloids in concentrations found in nature. hw-Marinemix is free from highly poisonous substances such as beryllium, osmium and thallium. hw-Marinemix is eminently suitable for the maintenance and breeding of all marine life." The ingredients of the mixture are mechanically mixed so thoroughly that if only part of a packet is used the resultant water is "of constant quality."

A supplied leaflet giving directions states: "Dissolve the salt in an aquarium or any other non-corrosive container. Use at least 1½ gallons of water per pound of salt so that all components are completely dissolved. Next aerate the solution thoroughly and bring to the desired level of salinity by adding more fresh water as required. The salt water should be aerated and filtered for at least 24 hours before use. The correct pH level will then be attained. If only a partial change of aquarium water is to take place it is sufficient to aerate and filter for only two to three hours in advance." The label on the packet tells us: "Fresh seawater should never be ozonised as such treatment of sterile seawater will inevitably lead to an alternation (*sic*) (I assume the word 'alteration' was intended B.W.) of the chemical composition."

The following information, taken from a packet, may assist those who still adhere to imperial units. The second sized pack contains 8 lbs. 13 oz., net. 4 kgs., for 26 imperial gallons at a specific gravity of 1.022.

The guarantee leaflet supplied with the sample pack states: "We guarantee that the composition of hw-Marinemix is identical to that of genuine seawater; and that only the purest compounds are used in its production. We guarantee that all trace elements in hw-Marinemix are in exactly the same quantities as found in natural seawater; and that seawater made with hw-Marinemix is as good as natural seawater, and in many cases better due to

the excessive pollution now found in coastal and deep seawaters. We also guarantee that the formula of hw-Marinemix corresponds to the latest scientific information, and are sure that you will have your best results ever with hw-Marinemix." The guarantee concludes by listing the 62 trace elements that this salt mixture contains. Other information in a leaflet supplied states: "One pound yields approximately three imperial gallons, at a salinity (S.G.) of 1.022, or 13.5 litres." Apparently hw-Marinemix now claims over 70% of the European market.

B. WHITESIDE.



### European Union of Aquarium Curators

In reply to Dr. David Ford's letter in the December 1980 issue of the *Aquarist and Pondkeeper*, both Mr. Quentin Bloxam, Curator of Reptiles at Jersey Wildlife Preservation Trust and myself attended the most recent meeting of the European Union of Aquarium Curators (EUAC) in Antwerp although admittedly we were there more for the reptiles than the fishes (reptile house curators are also heartily welcomed as members). Incidentally Mr. Bloxam and Dr. H. Gwynne Vevers, of the Zoological Society of London have been members of the EUAC for some time and I was elected as a member at the last meeting, thus bringing the total British membership to three.

Whilst writing, may I emphasise the value of closer co-operation with our colleagues in Europe, we have much to learn from them in the acuaristic as well as in the herpetological fields—the latter with which I have had the most experience.

At the European Herpetological Symposium (organised by the Cotswold Wild Life Park and the Association for the Study of Reptilia and Amphibia) held last year in Oxford, an International strategy was formulated to help conserve the European herpetofauna. As co-ordinator of this strategy I will be interested to hear comments from any individual interested in the conservation of our herpetofauna.

JOHN COBORN  
(Chairman ASRA)  
Curator  
Cotswold Wild Life Park.



Close-up of *D. fuscus* crawling on a rock. Note the "prismatic" eye.

# The Amph 'Four- Rock

By Katherine  
John K. Steve

The creature moved quickly to the water's edge to prepare for the dive. The sun had gone behind the clouds and the waves crashed over the black lava rock.

His blue eyes glistened behind their clear prismatic mask as they scanned the feeding area. I held my breath as they gazed at me, unafraid.

He began to pump down, to hyperventilate rapidly as he approached the edge of the water. He would need as much as twenty minutes of oxygen during his feeding dive. He was ready; his tail curved around in a semi-circle, and he arched his back. In a millisecond he whipped his tail around and propelled his tiny body into its dive through the Galapagos surf—into the air from the sea.

IN THE GALAPAGOS ISLANDS, the variety and large number of animals has led to very keen competition for food. This becomes especially apparent in the tidal pools, where ecological niches are small and overcrowding is the rule. In August of 1976, we studied a small fish endemic to the Galapagos, who overcame many of his evolutionary

handicaps and carved out his own niche by becoming amphibian: *Dialommus fuscus* of the Clinidae family—better known to the scientific community as the Four-eyed Fish. His name, The Four-eyed fish, was mistakenly given to him in 1939 when two scientists, Breder and Gresser, obtained preserved specimens from an expedition to the Islands. The specimen's cornea had been altered somewhat by the preservative, and they thought that the beast had four eyes. Actually, the fish has two single eyes, but each has two separate and absolutely flat corneal windows. We went to the Galapagos to study the optics and the function of this strange eyeball as well as to learn more about *D. fuscus* himself.

*Dialommus fuscus* measures approximately 12 cm. to 15 cm. maximum. His body colour ranges from golden to black, depending on his location and activity. The prismatic eyes are very beautiful: two corneal faces at an angle of 110 degrees, with a brilliant iris of blue, black and red. Since he lacks a swim bladder, he maintains his position in the water with his tail and his fins. He also uses his tail and fins to pull himself out of the water.

The fish spends up to 50% of his time totally out of the water, feeding in the splash zone. A wave might wash him up on a lava boulder, he would curl into a small crevice and feed off of the tiny shrimp and crustacea that the surf carries in. Despite *D. fuscus'* small size, we could often locate him by the pecking noises he made as he snapped at



# ibious eyed' Eater

E. Parsons and  
ans, Ph.D.



Fish on the rocks

his prey against the rock. With his extremely mobile head and body he would "fish" for his food out of tiny pools of water in the rock no larger than a few millimeters in diameter. To the casual observer it actually appears that *D. fuscus* eats the rock itself. Because of this characteristic feeding behaviour, the native name for him is "Chupa Piedra"—or the Rock Eater.

To feed, *D. fuscus* would leave his tidal pool by first "hyperventilating" (takes several deep breaths) at the water's edge, curl his tail around, and then propel himself like a rocket out of the water. His pelvic and pectoral fins work together with the tail to move his body rapidly over the rocks. He leaps into the air to escape aerial and

terrestrial predators such as Lava Herons, carnivorous crabs, etc.—or he surfs across the tidal pool to another rock. We often observed *D. fuscus* out of the water for twenty minutes or more and during these terrestrial sojourns he would keep his gills clamped shut—the same way we hold our breath underwater. *Dialommus* often engaged in territorial play: one fish would "claim" his rock and another would emerge from the water to chase him off it.

One of the reasons why *D. fuscus* had not been adequately studied is that he is extremely difficult to catch. We anticipated this problem by taking a variety of nets with us. John practiced with the throw net for hours—to his great glee—but the fish merely swam through the netting. We finally resorted to a little hand net used in home aquariums. On a good day we could, with some effort, catch four or five fish, but usually we were lucky to catch even one.

We set up an aquarium in the research station so that we could observe the fish more closely, and they adapted to their new home very well. Naturally, we placed a very tight lid on the top, otherwise within a few minutes all our friends would be hopping around on the floor. We solved the food problem by training them to take bits of crab meat

*Continued on page 40*



Fish in the hand. Note that the eye is dark in contrast to the beautiful blue in top left-hand picture



Tommy Sutton (Sen.) and Tommy Sutton (Jnr.).

## Meet the Aquarist - No. 6 T. G. and T. J. Sutton

Frank W. Orme

KNOWN TO FELLOW goldfish enthusiasts as the "Two Tommy's" are the father and son team of Messrs. T. G. and T. J. Sutton. Both are members of the Association of Midland Goldfish Keepers, a society which has reaped the benefit of the elder Mr. Sutton's many years of experience in breeding fancy goldfish.

It was back in 1925, at the age of fourteen years, that T. G. Sutton first became interested in goldfish. He recounts that having acquired two goldfish, from a 'rag-and-bone' man, he wondered whether he could breed them. In a cheap booklet he read of the differences in the sexual characteristics of the male and female goldfish. The booklet also explained how to breed and raise one's own

stock. He realised that he was fortunate in that his fish were a true pair. Within a short time he had conditioned them ready for spawning, so he gathered a number of plants from a local pond; the plants were placed into the tank ready to receive the eggs. A few days later the fish were chasing and, he believed, spawning. A culture of *infusoria* was started, and the plants removed to another container for the eggs to hatch. After a time he was pleased to discover small creatures hanging from the plants and he commenced to feed the *infusoria* to the fry. As the fry grew they developed strange filaments around their gills—which were not evident in the booklet's illustration of goldfish fry—but he continued to feed



them. Eventually, of course, he found that he had reared a batch of newts; however, he was not dismayed and resolved to succeed in breeding his goldfish—which he subsequently did.

Ten years later, he was married and living in a small back-to-back house. Although this house only had a small yard, measuring 12 feet square, he nevertheless built a 7 ft. x 6 ft. fish-house in which to pursue his interest. Two years earlier he had started to enter his fish in local shows and with some success. Now, with the extra facilities of his fish-house, he was able to set about really improving the quality of his stock by selective line-breeding. The results soon became evident on the show bench.

At the age of 27 years he began acting as a judge of fancy goldfish and quickly became recognised in that capacity.

Some years later he moved to Marston Green, on the outskirts of Birmingham, where a number of fish-houses came and went—each being larger than the previous one. His reputation as a breeder, exhibitor and judge of fancy goldfish was by now well established.

During the last war he began raising tropical fish, and successfully bred many of the more difficult species. In fact, he was so successful in raising large numbers of the hard-to-come-by tropical fishes that he was able to supply some of the larger stores on a regular basis until, eventually, he lost interest and returned to his first love—the fancy goldfish.

Over the years the senior Mr. Sutton has bred most of the fancy goldfish varieties. He has judged and exhibited at most of the major shows and gained a great many 'First place' awards. He was also well known for his lectures to societies on the fancy goldfish.

The younger Tommy Sutton did not share his father's interest in fancy goldfish for some years, although when he was sixteen years old he did become mildly interested. He and his brother decided to breed fancy goldfish—but they refused to seek their father's advice, and made many mistakes.

It was during a *daphnia* collecting expedition that his interest was aroused. He had accompanied his father to a pond where he noticed a waving, reddish mass at the

muddy edge. It was, of course, *tubifex*, a community of worms. These were gathered and taken home, where, having been shown how to clean them, he fed some to his father's young fishes. He was intrigued to see how avidly the small fish ate the worms and how the food bulged and altered their body shapes—from that moment he was hooked. He was then in his twenty-fifth year.

A pair of pearlscales were obtained and, with the help of his parents, T. J. Sutton spawned and raised his own young fishes. The father became the son's mentor, as the young Mr. Sutton absorbed his father's knowledge. Between them they began to produce so many young fancy goldfish that the younger Tommy decided they needed more space.

After looking around for some time he found an older type property with a long back garden which he purchased. The day after he moved in he began excavating the foundations for his first fish-house. That was seven years ago; since then the father and son have given much time and hard work to erecting two large fish-houses, plus one of more modest dimensions, and numerous holding pools. More recently they have purchased the rear halves of the two adjoining back gardens and, on this additional land, have built more large holding pools—another small fish-house is also being erected.

While this work has been going on, these two aquarists have still managed to produce large numbers of young fancy goldfish in many different varieties.

The fish-houses contain large, glass fronted, concrete tanks in which numerous varieties of young fancy goldfish were produced during the current season. In the outdoor pools were specimens ranging from one-year olds to adult fish of three and four years old. In evidence were some very nice Bristol shubunkins, nacreous and metallic veiltails and orandas, moors, lionheads of both scale groups, pearlscales, bubble-eyes, fantails and other varieties. All appeared to be well-grown and in a good healthy condition.

Both of these gentlemen are firm believers in live-foods. Mr. Sutton senior is prepared to go to a great deal of trouble every day, irrespective of the weather, to gather the vast amounts of *daphnia* and *tubifex* that are needed to satisfy the demands of the many fishes. As he remarked, "Being retired allows more time to be devoted to gathering food and looking after our fishes."

They offered the following advice to the beginner: try to obtain your stock from someone who is known to breed the particular variety of fancy goldfish in which you are interested. Learn by visiting as many of the specialist fancy goldfish shows as possible; study the fishes and do not be afraid to ask questions. Never delay, or put off, any job that needs doing, and never be satisfied with any season's results—always try to do better next time. Finally, always remember that in fishkeeping "Cleanliness is next to Godliness." The beginner who keeps that in mind should have few problems for the health and condition of the fishes is controlled by the aquarist—and dirty conditions will not be to the benefit of the aquarium or its inmates.

Interior of the fish-house.





Early and unsuccessful effort to capture *D. fuscus* using a casting net

Continued from page 37

from forceps; all we had to do was tap the forceps against their feeding rock, and they would instantly spring out of the water to grab their food. They were aggressive, voracious feeders, reminding one more of hungry sharks than small fish. They anticipated their mid-day feed by leaping onto the rock, and would become very excited if we merely showed the forceps to them through the glass.

When we heard from a nature guide that *Dialommus fuscus* might inhabit other islands besides Santa Cruz, we persuaded three fishermen (the others refused because of the rough seas that time of year) named Bernardo, Fermin and Manuel Gutierrez, to take us to Hood Island and Floreana Island. On Hood, the only place that we located the fish was on the south side, by the blow-hole. We were astonished to find them in small pools on the ledges well above the tidal line—pools that they could only have reached by being propelled up through the blow-hole, under several hundred pounds of water pressure.

On Floreana, where there is much less surf action, we found only a few in Post Office Bay. Bernardo, Fermin and Manuel were skilled fishermen, catching the fish with their hats and their bare hands, while we struggled with the nets. For some strange reason, *Dialommus* seemed neither as amphibious nor as hardy (two died after an hour in our collection bucket) as the fish on Hood and Santa Cruz.

*Dialommus fuscus* blended cleverly into the background, whether under or above water. For instance, the fish on Hood were a deep golden colour, like the algae peculiar to the tidal pools there; the ones on Santa Cruz were green, brown and tan, to blend with the Academy Bay tidal pools. In our observations on our aquarium fish, we suspect that they could slowly change colour—over a period of a week—depending upon the colour of the rocks, etc, in the tank. When the fish left the water, however, they clearly changed colour within a matter of minutes to a deep black to match the lava rocks.

We were most surprised to discover that the fish had evolved the use of "variable density sunglasses." Normally the iris was a brilliant blue, but when he was exposed to bright sunlight, the iris and the fluid in the anterior chamber of his eye turned into a deep black like the rest of his body.

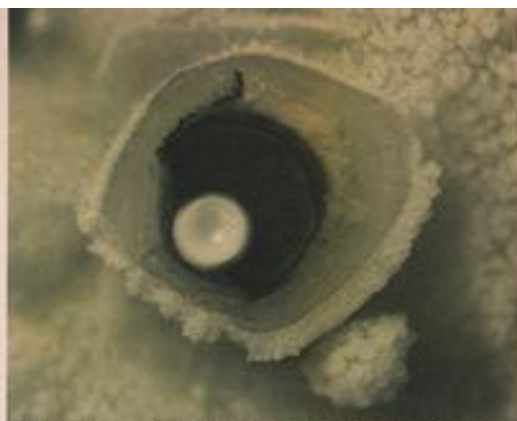
Since he lacks a constricting iris like ours, this change would presumably protect his retina from the bright equatorial sun.

Our scientific investigation centered around the reconstruction of the optical system of *D. fuscus*' eye. First, we refracted his eye *in vivo* with a conventional ophthalmoscope. We then withdrew tiny samples of fluid from the anterior and posterior chambers of the eye, and measured the refractive indices of the aqueous and vitreous humours



The famous blow-hole on Hood Island. The area around the blow-hole was a veritable haven for *D. fuscus* since few, if any predators, could or would be willing to make the same journey





One of a series of photographs showing cross-sections through the eye and showing prismatic shape of cornea (front) and position of lens

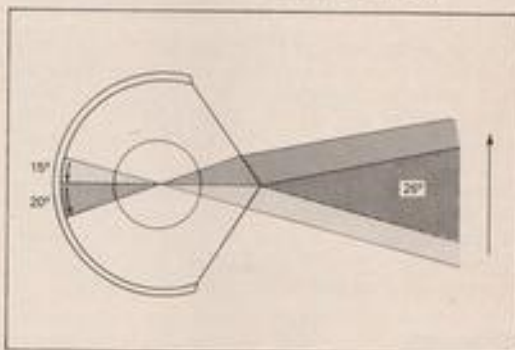
using a small portable Abbe refractometer. To measure the focal length of the fish's eye, we developed a new method using a helium-neon laser. The lens was removed from the eye and placed in a solution of a known index of refraction. The laser was then shone through both solution and lens, and a photographic time exposure was used to record the focal point. Since the laser produces absolutely parallel light this focal point corresponds to the focal length of the lens. This technique proved to be extremely accurate and had the advantage that it required only an inexpensive laser. Finally, we rapidly froze a series of complete eyes (using freon), and cut them into 40 micron-thick serial sections. Photographs taken from these serial sections were used in the States to reconstruct the entire



Computer reconstruction using the serial cross-sections, one of which is shown in picture F. Yellow represents the lens, orange the eyeball and pink the iris. Note the two flat corneal surfaces

eye on a computer. All of this information taken together made it possible to model the optics of the entire eye.

Then we found that the refractive index of the fluids in the fish's eye approximated that of sea water. Consequently, it was clear that as others had suggested before, *D. fuscus* had evolved a face mask which enabled him to see both in the air and under water. Just as we need an air space in front of our eyes to see underwater, so *D. fuscus* needs a "mask" of "sea water" to focus in the air.



Cross-section of the eye. Circle in centre is the lens. The two flat corneas take a 26° region of the real world and project it twice onto separate regions of the retina. Thus, the single large arrow would be seen as two separate arrows by the fish

The mask consists of two flat corneal windows at an angle of 110 degrees very similar to a glass prism. Our model suggests that underwater, this prismatic eye should pose no problem, since it matches the refractive index of the water. However, when *Dialommus* comes above water to feed, and he looks directly at an object (through the centre of the "prism"), our analysis shows that there should be a 20 degree field over which he perceives the object twice! *Dialommus* should have binocular, monocular vision. We later confirmed empirically that this double image does occur through our photographs of the fish. When we examined a photograph of the eye taken at a sharp angle we could see his iris twice. This photograph directly demonstrates, therefore, that the cornea is indeed a prism when *D. fuscus* is above water. Also as our analysis predicts that this prism effect should vanish underwater. Consistent with this prediction no such double image was seen in any of our underwater photographs. This is extremely exciting scientifically since it means the fish may actually have monocular depth perception—a truly unique evolutionary accomplishment. In other words, since *D. fuscus* sees everything twice above water he can make use of the visual disparity cues we obtain from our two eyes, with only a single eye. This possibility must be explored in more detail in future trips.

At times we were uncertain as to whether we were two scientists studying a four-eyed fish, or whether the two-eyed "Chupa Piedra" was studying four scientists.

UNNATURAL HISTORY WILL probably never live down the sensationalism in the shark film, "Jaws." Headlining a piranha story "High Jump for Jaws," a popular tabloid recently referred to "the flesh-eating pet" which leapt from its tank and "savaged" a 17 months old child, "trying to make a meal of baby Catherine." Apparently it bit her finger. "The skin was gashed and she lost a nail." But we don't know if the child tried to pick it up, or if it leapt out because the tank was too small or uncovered. All we were told was "Jaws had already tossed his mate out of the tank."

As Bill Simms mentioned years ago, the piranha's habit of taking lumps out of any living thing in the water has been somewhat exaggerated. It depends also upon whether the fish are well fed. Don't offer cat-food with your fingers. We don't know which of 4 commoner kinds of piranha bit the Rotherham child, but all should be treated with caution. The tank should be covered, as they are all good jumpers. Floating plants can be used for this purpose, but a green or silvery mesh is safest. These characins are stimulated by the scent of blood in the water, like their related tiger-fish of African waters.

#### The Hottie's

No sooner had I written about the exotic fishlife in "The Hotties" stretch of the St Helens Church Street Canal in Lancashire last month (and in previous years) than the Water Authority with the aid of local anglers decided to net them out and give them to dealers. They will restock the water with natural roach and, in the still warmed Todd's stretch, mirror-carp. Less cooling water was being pumped in by the adjoining glass-works and it was thought that the tropicals wouldn't continue to survive the winters. Thus the fish follow the temporary pattern of the foreign waterweed colonies in SE Lancashire canals and mill-lodges warmed with cooling water. As the pumping of warm water declined, these exotic water-plants ceased flowering, and sometimes died out. It's an unfortunate end to many years' history of The Hotties. One would like to have seen how long cichlids and guppies could have survived if the cooling waters had been well-stocked with pondweed to keep the water from going too cold. But the anglers preferred conventional fishing, for if they didn't hook something quickly at The Hotties, it bit off their tackle!

#### The Solent

100 species of fish are listed in the new 100-page publication from the Natural Environmental Research Council, *The Solent Estuary System*, a collection of papers by different authorities on geology, sedimentation, hydrology, pollution, micro-organisms, seaweeds, marine life and birds of this famous southern water. These fish include 7 rays, 6 pipefish, 5 sand-eels, 7 gobies, 3 gurnards, and 3 grey mullets, as well as garfish, trigger-fish and dragonet a very rich variety. Juvenile golden grey mullet (*Liza auratus*) are very common in Langstone harbour.

Here began the historic evolution of the troublesome



## From a Naturalist's Notebook

by Eric Hardy

*Spartina anglica* cordgrass a weed around most of Britain's muddy estuaries, but now suffering a die-back disease in The Solent, with 3 species of *Penicillium* fungus infecting its roots. Since first found at Bembridge Ledges in 1973, the large brown Japanese seaweed *Sargassum muticum* has become well established and with it came foreign *Spirorbid* worms. As well as the 4-sided New Zealand or Australian barnacle *Elminius modestus* which came here on the bottom of wartime convoy vessels and has since spread around Britain's coasts, the tropical barnacle *Balanus amphitrite* was found in the Solent in 1976. The American quahog shellfish *Merconaria mercenaria* was established here by introduction. In Stanswood Bay, American slipper limpets are common. The ascidian (sea-squirt) *Stryela clava* was introduced from the Far East.

The Solent is mainly a muddy estuary with gravels and pebbles. Its only truly rocky shores lie at Bembridge, St Helens, Shanklin and Freshwater Bay with sands too. It has the only authentic British record of the seaweed *Callophyllis flabellata*, and the only recent record of *Cylindrocarpus microscopicus*, while other new British seaweeds like *Fosliella limitata* were found here. These are among its major interests, attracting seaweed-collectors for



over 130 years, particularly along the shores of the Isle of Wight. Sea-anemones and other marine aquarium interests occupy the ledges at Bembridge. The Solent is apparently the only south coast haunt of the rarer northern whelk, *Neptomesa antiqua*.

The Institute of Terrestrial Ecology's 154-page 1979 Report (L5) covers a wide field of research. They found that low levels of the aquatic herbicide, cyanatryn, reduced egg-production by pondsnails and affected *Daphnia* and frog-tadpoles, as well as the habitat and food of the pondsnails, which subsequently declined also. Flowering numbers and time, and seed-production, by the marsh-gentian increased the soil-temperature; but close proximity of heather caused marked suppression of flowering. Tests with Eulan WA New, an insecticide substitute now replacing more harmful dieldrin, show it could affect the feeding and development of aquatic animals. Concentrations of 1 mg/l checked the development of tadpoles' hindlegs and even 0.0 mg/l delayed their metamorphosis a few days. The only abnormality it induced was more frequently kinked tails than in natural tadpoles. Competition for food was found to account for widely different growth-rates in toad-tadpoles. They developed more rapidly on lightly boiled lettuce and mixed foods, least on washed *Spirogyra* algae, even slower with yeast. They probably rely much upon bacteria and other micro-organisms on the algae. Freshwater organisations like tadpoles rely for food upon micro-organisms attached to detritus, rather than the detritus itself.

#### Fish-farming

"Fish-farming" will benefit from the Government's new Fisheries Bill still at draft stage at the time of writing. It plans to extend protection of shellfish-beds and floating or suspended structures like rafts and cages. For instance, the common green shore-crab has been found to be the greatest predator upon estuarine mussels and in the Conway estuary it has been thwarted by growing the mussel-spat in cages in the sea. The Bill also empowers grants towards capital expenditure on fish-farms when such availability is necessary for EEC grants. The government is to undertake further research, and provide advice. Fish-farmers will be exempt from a range of fishing restrictions. The Bill will also prohibit whaling by any UK-registered vessel anywhere in the world and prohibit the taking of even common porpoises and dolphins. These could no longer be caught in British water for sea-aquaria, unless the Bill provides exempting licenses. Alterations in minimum net-mesh and fish-sizes should help conservation.

#### Marine reserves

New legislation by the Department of the Environment, maybe before this article appears, is expected to establish Britain's first marine nature-reserves, like those already existing under voluntary agreement: Lundy Island, Skomer Island (South Wales) and Kimmeridge Bay (Dorset). The seas around Bardsey Island and The Scillies are expected to be declared reserves.

#### Fishing bat

Occasionally one receives claims from over-enthusiastic nature-watchers that they've seen a bat catching fish. They've probably seen it drink in flight, or more likely catch a struggling insect from the surface. But in tropical Ecuador you might see a fishing bat. The hare-lipped bat, *Noctilio leporinus* with a peculiarly folded upper lip, strikes the streams to capture minute shrimps, and even captures small fish from ponds in aviaries in tropical South and Central America. Its echo-location signals were not thought to penetrate below water, but the fish might rise to the surface at night. It flies along the surface, immersing its remarkably long hind-legs, which have large claws which impale the fish.

All pond-keepers are aware of the difficulties in identifying willows, for there are so many of them, as well as their frequent habit of hybridising. Recently receiving the new £40, 4th volume in the new 8th edition of what has been the standard textbook on *Trees & Shrubs Hardy in the British Isles* for nearly 70 years, W. J. Bean's classic work, I find one can take a choice between the various authorities as to whether there are 500 species or 300 of their genus, *Salix*. From stately timber trees to tiny shrubs, most of them abhor dry roots. The Russians are the great authorities on their classification. Kew has a fine specimen of musk-willow while the best halberd-leaved willow is in the garden at Broadwell, Moreton-in-the-Marsh. The greatest bay willows are at Wakehurst Place, Sussex and University Parks, Oxford.

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TRADE ENQUIRIES INVITED

# The most popular water fern in the aquarium—*Ceratopteris*

by Karel Rataj, illustrated by Rudolph Zukal

A NUMBER OF water ferns are kept and grown by aquarists and they belong to a variety of families. Some are floating plants (*Azolla*, *Salvinia*) and some are only rarely used plants which take root in the base medium of the tank (*Isoetes*, *Marsilea*, *Pilularia*). The larger species are represented by *Microsorium pteropus*, which has now become quite widespread, and *Bolbitis huadelotti* which is less commonly seen in aquaria. *Ceratopteris* remains the classic water fern which has been popular and grown in the aquarium for the greatest period of time.

The genus *Ceratopteris* belongs to the family Parkeriaceae. This family is composed, in fact of, the single genus *Ceratopteris*. The family name arose from the generic name *Parkeria*, because the longest-known species was described as *Parkeria pteroides* before being included in the genus *Ceratopteris*.

In aquarist literature one often comes across the assertion that all specimens of the plant grown in the aquarium are only forms or varieties of one species. That is to say, *C. thalictroides*. The basic form with broad leaf-blades is usually considered to be *C. thalictroides* var. *thalictroides*, the fine-leaved form to be *C. thalictroides* var. *javanicus* and floating plants are most often described as *C. thalictroides* f. *cornuta*. This nomenclature is quite incorrect.

The genus *Ceratopteris* has five species in all. In all their forms the different species are very variable and they can only be reliably identified by means of the carpels containing the spores. There are two typical floating plants, *C. cornuta* from Africa (rarely seen in aquaria) and *C. pteroides* from tropical Asia. The latter is the well-known floating variety. Also familiar is *C. deltoides* which is found in the U.S.A. (Florida, Louisiana) and in Puerto Rico. Its submerged leaves are up to 65 cm. long in the natural state, floating or emergent leaves are 15-45 cm. in length. The species has 16 spores (seed capsules) and I doubt whether it is propagated in aquaria. The following two species are typical of species which take root in the floor of the tank. They can grow submerged or out of the water but do not form a fully developed floating form. They are *Ceratopteris thalictroides* (L.) Brongn., which grows in tropical America and Asia and *Ceratopteris siliquosa* (L.) Copel, which is found in Indonesia and possibly on the continent of Asia as well. Both species are widely kept in aquaria. The leaf blades of broad-leaved *C. thalictroides* are divided by deep cuts and are odd-pinnate. Fine-leaved *C. siliquosa* has leaves

divided into more slender and numerous segments which are also odd-pinnate. These characteristics are retained in both the submerged and emergent forms.

The lower leaves of *Ceratopteris thalictroides* (L.) Brongn. are 20-80 cm. in length. The leaf stalk is three to seven times shorter than the leaf blade, is green in colour, often flat and very fragile. The leaf blades are



*Ceratopteris thalictroides* has broad leaves divided into a number of different segments. It resembles an oak leaf





*Ceratopteris siliquosa* has doubly odd-pinnate leaves made up of narrow segments. It resembles the leaves of carrots or parsley

divided into segments and the central vein is 0.5 to 2 cm. in width. The gaps between the segments do not reach the leaf stalk and vary in length and so the leaves are not typically odd-pinnate. The segments of the leaves so formed are themselves lobed, more or less deeply, and so are also odd-pinnate, attaining a breadth of 2-8 cm. The shape of the leaf is rather reminiscent of an oak leaf. Young leaves are turned inwards in a spiral fashion, which is characteristic of ferns.

The lower leaves of *Ceratopteris siliquosa* (L.) Copel are 20-100 cm. in length. The leaf stalk is usually three to four times shorter than the leaf blade, mostly narrower than the preceding species and runs clearly through the middle of the whole leaf, which is typically odd-pinnate. Individual segments of the leaf grow on the stalk, in pairs which are opposite and are again odd-pinnate. So we are talking about a leaf which is doubly odd-pinnate. The leaves of this species are more finely divided. The individual segments are relatively slender (only 1-6 mm.). The species is incorrectly described in aquarist literature as *C. thalictroides* var. *javanicus*.

In the natural state both species grow most often as submerged plants. They are found predominantly in shaded, but sometimes exposed, still or very gently flowing waters which have a low pH reading. That is, most often in acid waters. Because of rapid vegetative reproduction they can constitute troublesome weed growth in rice fields and irrigation channels. The rate of growth is enormous. Neither of the species forms stable floating forms. Both species, however, readily grow out of shallow water and develop emergent leaves. In such cases sporangia (spore capsules) appear on the underside of the leaves which bear a product of sexual reproduction—that is, the spores. In marshes with a low level of water both species will grow readily, also in emergent forms,

providing there is not too little water and 90% relative humidity.

In artificial conditions sporulation rarely takes place. Consequently, both species are reproduced vegetatively. On the leaf-margins young plantlets form. At first a single small leaf with a root is noticeable. Later the plantlets develop 3-5 leaves with roots which finally detach themselves and are capable of growing independently. Vegetative reproduction occurs most often on old, yellowed leaves. On a single leaf 5-40 plantlets may develop. In the aquarium one separates them when they have three to four 5-7 cm. long leaves. Young plants which have detached themselves naturally float on the water surface. They do not develop into floating plants. The middle of the plant is always below the surface and they usually die off if, after a period of time (2-8 weeks), they do not find themselves in conditions suitable for them to take root.

Both of these *Ceratopteris* species are suited to an aquarium which has rather acid water (pH 5.5-5.5) and does not receive too much light. Because of their bright green colour and intricate leaves they are an excellent supplement to *Cryptocorynes*. They have a relatively sparse root system and it is most likely that they are adapted to taking in most of their nutrients through the leaf surfaces. A planting medium of coarse sand is, therefore, sufficient.

If one wants to keep them in top condition throughout the year, they must be given additional illumination for twelve hours during the day. Otherwise the leaves turn yellow during the winter, detach themselves and quite often the plants die off completely. Usually, however, the young plantlets survive and from these the growth can be renewed in the spring. The leaves are extremely delicate and fragile and wafer-thin. They are a very welcome diet for snails. During periods of slower growth (mainly in winter) one should reduce the number of any snails present and only smaller ones should be left in the tank (1-1.5 cm.).

The floating horn fern is most often described as a form of the plant which takes root at the bottom of the water (*Ceratopteris thalictroides*). This is not necessarily correct and in most cases is certainly incorrect. In fact, two floating species were described originally. Firstly *Parkeria pteroides* Hook. et Grev., which has already been mentioned, and which was later incorporated in the genus *Ceratopteris* as *C. pteroides* (Hook. et Grev.) Hieron. This species comes from southern tropical Asia and tropical America. Secondly, the floating plant *Ceratopteris cornuta* P. Beauv was described, which was later regarded merely as a variety of another species and thus bears the name *Ceratopteris thalictroides* forma *cornuta* (P. Beauv) Leprieur. It comes from Africa only and today is again presented as a species in its own right.

These floating plants come from either Africa or tropical Asia or America and can be distinguished only by the sexual organs which develop only rarely. As long as there are no leaves with spores available the only possibility of identifying them positively is provided by their



In its emergent form *C. siliquosa* has even narrower leaf segments, which give it an almost striate appearance

geographic origin. In this connection it should be remembered that imports from Africa are very rare and so the floating horn fern in our tanks comes mostly from Asia or America. It is, therefore, highly probable that the correct name for our plants is *Ceratopteris pteroides*.

One plant forms a rosette of four to six floating leaves. These are flat, green, 3-6 cm. in length and 2-10 cm. broad, forming a lance or heart shape. Sometimes they are almost entire leaves, broadest at the base, more often they are lobed and closely resemble oak leaves. On the leaf-margins or directly on the veins in the middle of the leaves, plantlets develop which at first appear as single leaves growing at an angle and which then acquire additional leaves until a new miniature rosette is formed. After they have developed their own root system the new plants detach themselves and start a new colony on the surface of the water.

The roots are richly branched and constitute an ideal hiding place for a wide variety of live-bearers. They also provide a suitable spawning place for a large number of aquarium fish and often serve as a support for the nest-building of labyrinth fishes. The floating horn fern is a typical tropical plant and is quite happy in the high temperatures which are necessary to breed many species of fish. It is propagated mainly by vegetative reproduction. Sexual reproduction is rather rare in natural conditions too, especially in the case of floating

plant forms, which do not form cushion-shaped leaves standing out of the water. In fact, sporulation takes place on the under-side of leaves which stand right out of the water. This type of growth is more common in species and forms which take root at the bottom of the water. In other words, *C. thalictroides* and *C. siliquosa*. Here sporulation is more frequent.

*Ceratopteris cornuta* and *Ceratopteris pteroides* are grown on the surface of large tanks containing slightly acid, soft water which is given a certain degree of shade. They are also useful in breeding tanks. They will reproduce more extensively and more quickly in conditions of high humidity, so the tank should be covered with a sheet of glass. They need a temperature above 18°C, preferably one between 25-30°C. Sometimes the plants reproduce too quickly, but their growth is slowed by removing some of the plants. Similar problems which often occur with duckweed (*Lemma*) or fairy moss (*Azolla*)—which often grow to the point of choking the aquarium—do not present themselves.

The floating horn fern can not survive in hard or alkaline water. So it can not be used to provide shade in the aquarium, by means of natural means, in which plants of the genera *Vallisneria*, *Elodea* and many species of the genus *Echinodorus* have been planted. In such cases it must be replaced by other plants. For example, *Salvinia* or frogbit (*Linnobium*).

The floating *Ceratopteris pteroides* is a separate species



THE AQUARIST





## GOLDWATER Queries

by Arthur Boarder

**You always recommend that a pond should be cleaned out twice a year. I find that if I clean mine out in the spring, the water soon turns green, so why is it necessary?**

I have never recommended that a garden pond should be cleaned out twice a year. Once is enough unless the water has become very foul at other times. In late autumn when leaves have fallen and much of the water plant life has died down, is the best time for cleaning out the pond. This applies to small and medium sized ponds.

**I have a four foot concrete butt in the garden in which I have kept Sticklebacks. Can I breed goldfish in it and what plants shall I use?**

You are not likely to have much success at breeding goldfish in the butt. One should have other containers in which to hatch and rear the fry. Otherwise they are sure to be eaten by the parent fish. Deep butts are not very good for fishkeeping as the area of water exposed to the air is not large enough in proportion to the depth. I have found that the best oxygenating water plant for deep water is Hornwort, *Ceratophyllum demersum*.

**I live in the country and have two ponds in the garden. There is often aerial crop spraying going on not far away. Do you think that this could harm the fish in the ponds?**

If the spray is blown into the ponds I think that it could do considerable harm. I do not know what you can do to prevent this from happening when the wind is blowing in your direction. If you are aware of it happening, I suggest that you put the end of a hose well down into the pond and run in fresh water. This will cause the top layer to run over, carrying with it, I hope, any poisonous spray which may have settled on the top.

**I have difficulty rearing goldfish fry. I have collected some from the pond on several occasions and put them in a 18 in. x 12 in. x 12 in. tank, fed on Liquifry and then on dried food but always lose them. What am I doing wrong?**

The first thing which comes to mind is that the rearing tank is very small. Although very small fry can be kept in rather crowded conditions, they must have plenty of swimming space once they get about an inch long. If you

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have had too many in your tank, as appears from your letter, this is the main cause of losses. The fry should be fed on liquid food for a few days but as they grow they need extra in the form of powder-fine dried food, which is usually available at pet shops. As the fry grow, some live foods can be added in the form of mashed garden worms or white worms. Sieve the mashed garden worms and give the large pieces to the adults and only the fine to the fry. Also it is a great advantage to be able to warm the rearing tank water to about 70°F., as this promotes vigorous growth. The rate of growth can be trebled by increasing the temperature of the water by 10 to 15 degrees, F. A fairly frequent partial change of water also tends to increase the feeding possibilities of the fry.

**I have kept coldwater fishes for years but have never bred any. I now have two tanks, each 48 in. x 15 in. x 15 in., and have four 5 in. Tench in one and four 3½ in. Rudd in the other. Shall I need extra tanks? How can I sex them? How old do they have to be before they will breed and when do they do so in the year?**

I hope that you have some success but I have to warn you that it is not at all easy to breed either of these fishes in tanks. You would have to have extra tanks in which to hatch and rear the eggs, or the parent fish would eat them. Tench are easy to sex as the male fish has thickened ribs at the edges of the pelvic fins. This gives the fin a slight spoon-shape. The female is rather fatter in the body in the breeding season. The male Rudd show the small white tubercles on the gill plates when in breeding condition and the female is fatter in the body as is the case with most spawning females. I have bred green Tench, (*Tinca tinca*) on many occasions but in a pond, and have never had them spawn before early July. Rudd, (*Scardinius erythrophthalmus*) should breed earlier than the Tench, in early April. Both are very strenuous spawners and the chasing is very vigorous which means that the fish need plenty of swimming space. The eggs are adhesive and stick to water plants. Rudd are very prolific and Mr. H. Tisbury told me that when his Rudd were spawning, they sprayed thousands of eggs on vegetation on the banks of his Rudd pond. When the fish spawn in the tank you will have to remove plants with eggs or else remove the parent fish to another tank. Both fishes could spawn at two years of age.



## TROPICAL Queries

by Dr. C. Andrews

I have recently purchased a 30 x 15 x 12 inch aquarium, and installed an undergravel filter plus a 20 watt Grolox tube for overhead lighting. I have tried to keep various fish, but more have died than have survived. Even my plants soon turn pale and die. Can you offer any help?

I receive a number of letters along these lines, and you will be pleased to know that it shouldn't be too difficult to sort out your problems. To begin with I suggest you obtain a good reasonably priced book from your local pet shop on aquarium fishkeeping: "Aquariums" by A. Evans (Foyles, £1.25), "Tropical Fish" by B. Ward (Macdonald Educational, £1.45) or "Tropical Fish" by H. R. Axelrod (T.F.H.K.-W Series, £1.00) are all very good, and there is, of course, the Tetra "Beginners Aquarium Digest" at £0.50. Having gained a little more background knowledge on setting up and maintaining an aquarium (and it really is quite simple!), I suggest that you give some thought to the following points.

In order to improve your plant growth, I suggest that you add a 20 watt (white) fluorescent tube to your Grolox tube, and leave both on for about 8-10 hours per day. Your plant growth may have been adversely affected by your undergravel filtration, so you should consider doing away with this, and perhaps install one poly-foam cartridge filter in each corner of the tank. If you chose a reliable make, they will carry out really effective mechanical and biological filtration, with a minimum of fuss and maintenance. In fact, if you do remove the U/G filter, I recommend that you put a layer of aquarium peat mixed with a little garden soil under your two inches of gravel. You should have no problems growing plants then: try *Bacopa*, *Echinodorus*, *Hygrophila*, *Vallisneria* and perhaps *Elodea* and *Sagittaria*. By the way, if you find that you are getting rather a lot of algal growth, cut back on the duration of the lighting; if the plants do not grow very well and look a little pale, increase the hours of lighting and add a little aquatic plant fertilizer to the water.

Having got the tank set-up, and filters and lights functioning for about a week you can then start thinking about increasing your stocking density from the few survivors you have left. Over a period of about two months you can take your stocking level up to about 40 "inches of fish" (total length excluding tail fins). Your local aquarium shop (or the above mentioned books) will be able to recommend suitable (compatible) species.

With reference to routine maintenance, the two most important aspects are probably: feed a good mixed diet, but do not overfeed; and carry out regular partial water changes of 25% of the aquarium volume every couple of weeks. Always top-up with dechlorinated tap water, brought to the correct temperature with a little boiling water from a kettle. If you have any further problems, do write.

**Can you give me any information on piranha keeping?**

I have sent you a copy of an information sheet on keeping piranha. These fish can be kept in the home aquarium, although they are not as hardy or robust as their reputation might suggest. They (quite obviously) are a fish for a non-species tank. Single piranha can be kept in a 15-20 gallon tank, although a shoal of four or five individuals would require a much larger aquarium. The water should be kept at around 78°F (about 26-27°C), and you will probably require a good power filter. The tank itself can be quite bare: perhaps one or two plastic plants and a smooth rock. Nervous piranhas have damaged themselves on sharp rocks, and even broken heater-thermostats!

When small, piranha may be fed on all manner of live food and lean, scraped, raw meat. As they grow older they can be accustomed to a diet of lean raw meat and raw fish. Uneaten food should be removed immediately, and about once a week, 25% of the water should be removed and replaced with fresh. A final point: piranha's do bite—so watch out!

**My enquiry concerns feeding tropical freshwater aquarium fish. I am keen to use various live foods, although I am concerned about introducing disease organisms. Can you make any comments?**

Live foods of aquatic origin (eg. *Tubifex*, *Daphnia*, etc) are a potential source of disease organisms, and I do not recommend their use, except when absolutely unavoidable. Other live foods (of non-aquatic origin such as chopped earthworms, white-worms, etc) and brineshrimp are a much safer alternative. Obtaining, storing and/or culturing these can be inconvenient, time consuming and messy. Therefore most aquarists prefer to use good quality flaked foods as a staple diet, providing "safe" live foods as a treat (perhaps once or twice a week). In fact, the vast majority of aquarium fish can be successfully maintained on a diet of nothing but prepared foods. The better quality brands are a complete, balanced diet, with specific foods for improving coloration and breeding success, increasing resistance to disease, aiding growth, etc.

**Can you give me the address of my local aquarist society?**

I have sent you a list of the major aquatic society federations (and specialist clubs) in the U.K. I suggest that you contact Dick Mills of the Federation of British Aquarist Societies, c/o 70, Lee Road, Perivale, Middlesex UB6 7DB (enclosing a stamped addressed envelope). You will get some idea of the activities of various societies from society pages in the "Aquarist".





## MARINE Queries

by Graham Cox

COULD you please answer me three questions?

- (1) In my 48 in. x 18 in. x 12 in. tank, which has been running for six months without loss, I have two U/G filter plates each with two 1 in. uprisers, one at either end and two in the middle. Would it be possible to do away with the middle two risers, leaving one airlift per U/G filter? This is purely for cosmetic reasons.
- (2) The thing that worries me about my marines is, am I feeding them too much or not enough? The tank contains the following:
  - (a) Birdmouth wrasse.
  - (b) Pearl Scale Butterfly.
  - (c) Cleaner wrasse.
  - (d) Common clown and anemone.
  - (e) Domino damsel.
  - (f) Two Yellow-tail Blue Damsels.
  - (g) One other anemone and two feather Dusters.At the present I feed two level mustard spoonfuls of dry food and the same of frozen irradiated foods, per day. Is that enough?
- (3) In the last 8 weeks my two Yellow-tailed Blue Damsels have spawned at the beginning of every week and by the end of the week have eaten the eggs. Is there anything I can do to rear the eggs? As I write this letter they are again going through their courtship display.

### (1) Filtration

Now that your filterbed is obviously bacterially well-matured, as evidenced by the wide range of corallines and invertebrates which you are successfully keeping, the seawater turnover resulting from just the outer two airlifts should be adequate to prevent the re-appearance of toxic nitrites. A 1 in. diameter airlift in 12 in. vertical depth of water will, if provided with an adequate air supply,

give a turnover rate of 50-70 gallons of water per hour, depending on the vertical distance from the water level in the tank to the lower edge of the open mouth of the airlift. Thus two such airlifts will provide a turnover at least 100 gallons per hour which, since your aquarium contains only about 32 gallons of seawater (i.e. allowing 5 gallons for water displaced by your filterbed, rockwork and shells), will give you a specific turnover period (STP — the time taken for all the water in the system to pass through the filter bed once) of approximately 20 minutes. Indeed, in view of the presence of the filter-feeding feather-worms (*Sabellastarte indica*), I would suggest that you either permanently reduce the STP slightly to about 40 minutes or completely turn off the air pumps which feed the airlifts for about 10-15 minutes after adding the liquidised invertebrate food (e.g. "Invertfood"), leaving only the wooden micro-diffuser to create water movement and keep the food particles in suspension during this period.

### (2) Feeding

I was greatly encouraged to read in your letter that you fed so little food to your fishes. That is to say that if your understanding of how small a mustard spoon is, is the same as mine, i.e. 5mm. diameter, then your feeding regime is a magnificent example to all marine aquarists—and, incidentally the main reason why I decided to print this letter. You cannot begin to imagine how depressing it is to receive continually letters along the lines of—"I have left half a squid in my marine tank for the last three days and as yet I haven't seen my Mandarin dragonet go anywhere near it". One would imagine that even a five year old marine aquarist would realise that short of issuing the Mandarin with a chemical-warfare face-protection mask, the poor fish wouldn't be likely to go near such a lethally rotten chunk of meat—even apart from the fact that the only materials which a Mandarin recognises as food anyway are small, living crustaceans such as harpacticid copepods and newly-hatched *Artemia* nauplii.

For the benefit of any beginners who may not have your instinctively good feeding habits, here are the golden rules for feeding in all types of aquaria, and particularly in marine aquaria where, due to several special factors, organic fouling due to bad feeding methods proves so swiftly lethal:

- (1) Feed the bare minimum weight of food each day which you can get away with without producing a body weight decrease in your fishes. This amount of food will obviously have to be determined experimentally over a period of time and will vary from fish to fish. Should you be feeding in too miserly a fashion, (and I never yet met a beginner who did), a decline in body weight will first become evident in the wasting of the dorsal musculature above and behind the eyes to produce a pinched appearance in that area. This statement presupposes, of course, that the fishes are not infested with internal parasites since these would cause weight loss no matter how good the feeding regimen.

- (2) Never allow even one uneaten morsel of food to reach the bottom of the aquarium **UNLESS** you are specifically catering for bottom-feeders such as goatfish, catfish (*Plotosus*), scooter gobies, etc., when particles of uneaten food should be removed from the coralsand after 5 minutes using a dip-tube or syphon.
- (3) Make the food particle size match the mouth size of the fish being fed. It is no earthly use to offer a whole irradiated Mysis shrimp to a juvenile  $\frac{1}{4}$  in. (2cm.) clownfish. Even if he boldly tried to tackle the shrimp, the clownfish couldn't swallow it. Similarly a 5mm. whiteworm or similar-sized chunk of earthworm wouldn't overexcite a large predator such as a 12 in. (30cm.) lionfish or grouper.
- (4) Always use the regular partial water change as an opportunity to remove as much sea-humus (the fawney-grey, non-biodegradable component of fish excretion) as possible from the top 2 in. of coral sand. This is easily done by stirring up the top 2 in. layer of coralsand with the fingertips to loosen all the sea-humus into suspension before starting the syphon to run off the 25%-33% old "tired" seawater and the sea-humus to waste.

It seems to me that either by instinct, good sense or experience you have found out that it is almost impossible to starve healthy coralfishes to death, and your Scrooge-like fish-feeding habits are a fine example to all marine aquarists. My own Company imports up to 2,000 coralfishes per week from all over the World and so I know full well that a healthy coralfish, particularly when it is hand-tame, would feed 50 or more times a day if you were silly enough to feed it that often. Indeed, this pattern of incessant picking and pecking at food throughout the entire 12 hours of tropical daylight would seem to be the normal behaviour for all coralfishes (except the predators) in their natural environment on the reef. However, what we must appreciate as aquarists is that there is no way in which we can indulge this tendency towards non-stop feeding amongst aquarium creatures **UNLESS** we are prepared to effect at least two 25% partial water changes each day.

Since the average hobbyist seems unwilling to carry out a 25% change more than once a fortnight, our feeding regimes must in effect be geared to keep the coralfishes in our charge permanently slightly hungry.

In this way we shall not achieve a growth rate comparable to that of wild fishes on the reef **BUT** we shall maintain healthy seawater and therefore healthy fishes.

### (3) Spawning

The only two ways in which you are likely to rear some coralfish fry are as follows:

- (i) Transfer the parents to a separate, large (at least 48 in. x 18 in. x 18 in.) spawning/rearing tank which contains lots of rockwork, (preferably well-matured tufts rather than living rock to eliminate all possibility of predation on the fry), but no filtration of any kind. The only concession to

water management is that this tank should contain a wooden diffuser. In other words you transfer the fishes to a large, fallow *natural system* aquarium, from where the parents are removed as soon as hatching is complete. By subjecting this spawning/rearing tank to a 24 hour photoperiod you may create a sufficiently high plankton count to enable you to rear a few fry.

- (ii) Remove the parent fishes to a separate small spawning tank (24 in. x 15 in. x 15 in. is adequate) as soon as hatching commences. Since most of these demersal-spawned eggs seem to hatch between 3 a.m. and 5 a.m. this involves losing quite a lot of sleep! As soon as the fry yolk sac is absorbed you should commence feeding the fry with phytoplankton-fattened zooplankton. In 1977/1978 my Company undertook an extensive coral fish breeding project during which we found that the best zooplanktonic first food was the rotifer *Brachionus plicatilis*, which had been previously heavily fed on the cultures of the three phytoplankton species: *Dunaliella tertiolecta*, *Phaeodactylum tricornutum* and *Isochrysis galbana*. However, I feel it only fair to warn you that if you decide to opt for this second method you will need at least a 500 sq. feet fully equipped microbiology laboratory just to culture the rotifers and phytoplankters.

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# Beginning with Tropicals (8)

by Roy Pinks

BEFORE DISCUSSING IN detail some of the more trouble-free species of fish, I would like to cover one or two broad and important issues. You will not acquire this sort of advice from books in print, partly because certain points are too topical, partly because they are too controversial.

If you study most of the books for beginners they will, I am sure, point fairly uniformly in favour of trying some of the livebearers before taking on more difficult tasks. What many of the writers had in mind at the time was the guppy, which was both cheap and virtually indestructible. It produced its young regularly and without difficulty, and because of the immense range of individual characteristics, there was always pleasure and surprise when the male fish grew up, as their colour and form were hardly ever predictable. Over the years the attention paid to the guppy by specialist breeders has resulted in fish which are almost unrecognisable from the wild type. Whilst this has been great fun for the breeders and the trade at large we cannot pretend that what we now have compares in hardiness with the old time guppy, hence we must be cautious as to real suitability for the beginner. The same may be said for most of the other commonly kept livebearers, though some livebearers which have escaped the attentions of the commercials are as good as ever they were, and if you can get hold of them they will not disappoint.

## Imported livebearers

A current difficulty with livebearers imported from the Far East seems to be that they tend to keel over after a few weeks in this country, for not very apparent reasons. I understand that this is due to very serious—and almost incredible—differences in water quality as between the ponds of wholesalers abroad and that normally available in this country: the former is reported as being highly saline, and the abrupt change of circumstances is more than most of the fish can tolerate. Urgent discussions are, I understand, going on with a view to putting things right, but one may well ask how it is that they ever got wrong. Or as wrong as this: no breeder worthy of his salt would ever allow this to happen.

So, for the present, it would be well for the beginner to leave most of the livebearers to those whose experience might enable them to cope with this temporary state of affairs. However, my next point is closely related to this group of fish, even though others are certainly involved.

I have mentioned above the very great qualities of the early guppy, itself greatly improved over the wild type, but still identifiable as a guppy. Its toughness was incredible, and I have recollections of keeping and breeding them at about 50°F and of not losing them a few degrees above freezing point! The modern guppy will not do these things, even if they were desirable, but because it is so highly bred its attractions like colour and often absurdly overgrown tails are counterbalanced by a certain fragility and proneness to disease. Now, I am not victimising the guppy, but I am drawing the attention of intending buyers to the inbuilt lack of hardiness on the part of all fish which are more than a few steps removed from the wild types. You will sometimes see fish advertised as wild caught—do remember what a high proportion are commercially bred today—and it will be immediately evident that what they may lack in high colour they more than compensate by way of general condition and vivacity. There are indeed some exceptions. Colour variants are generally fairly reliable: it is usually where changes of form are involved that the rot sets in. Nobody could fairly claim that all the effort taken to meddle with the angelfish has produced any worthwhile results, and the wild type remains the model of all that a fish should be. Whilst one or two of the colour variations are tolerable, the degraded tiger droop tails, monuments to man's poor taste, are as morally defensible as some of the more outlandish fancy goldfish. On the whole, and this covers a vast range of fish, it is as well to avoid fish with long and flowing tails unless you really know what you are buying. These appendages are nearly always vulnerable to disease, and they are often clues to the fact that their owners are pretty artificial things.

## Wait and see

A final point on things to watch. You will often see a newly arrived batch of fish in a dealer's tank, ostensibly fit as a fiddle. This is a very tempting moment to add to your collection, and yet it can be a very dangerous one. It is best to let the fish settle and to see whether any disease breaks out before parting with your money. Few dealers take the trouble to quarantine nowadays, and many would argue that it is pointless anyway, so it is best not to subject them to two water changes within the span of a day or so. It is true that by the time you judge it is safe to buy them, they have all gone. But who is to say how they went? In preparation for buying expeditions it is most advisable to have by you a suitably insulated carrying container, and these are usually home made. A wooden box with a carrying handle should be lined completely with inch thick expanded polystyrene sheeting, and should be of a size capable of taking two to four standard sized plastic bags filled with water. They will enable temperatures to be maintained during the journey home, and will prevent the bags being accidentally pierced. From the point of view of the fish the darkness is to a degree restful, and disturbance is minimised—there are few things more vulnerable and plain clumsy than a water-filled plastic bag in the midst of weekend shopping!

# Aquarium Photography for Beginners

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

MANY AQUARISTS are also amateur photographers and occasions frequently arise when they wish to photograph their own or other aquarists' fishes and aquaria. Unfortunately photographing fishes in an aquarium is a fairly specialised technique; and many of the results produced by beginners are disappointing. The main problem results from the fact that fishes have to be photographed through a layer of air, glass and water; and when light strikes glass the resulting reflections can easily spoil what would otherwise have been an acceptable photograph. Another problem faced by the fish photographer is the fact that most aquarium fishes are fairly small and fast moving—which means that the camera has to be moved in very close to the subject to produce a close-up shot that will fill a large proportion of the film frame.

When working in close up the depth of field is fairly critical and careful focusing is essential: when the subject is constantly on the move, the flick of a tail or fin can throw the subject out of focus in a split second—or move part or all of it out of the frame while the shutter is being depressed. For these reasons it is almost essential to use a single lens reflex camera so that one can see, through the viewfinder, exactly what should appear on the film. A built-in exposure meter is useful for some types of shot; a fully-automatic diaphragm lens is virtually essential as the photographer has to react very quickly when the fish to be photographed comes into sharp focus; hence, focusing at full aperture—with the lens diaphragm fully open—can be said to be a necessity.

Although supplementary lenses are suitable for obtaining close-up shots of fishes, I prefer to use extension tubes on my Praktica MTL3 camera. Its f/2.8 Tessar lens was chosen because it is particularly suitable for such photography; and used alone it can focus down close enough to fill the 35mm. frame with relatively large fishes or sections of a planted, decorative aquarium; the addition of one or two extension tubes caters for medium-sized or small fishes.

Photoflood lamps placed above an aquarium can provide sufficient light for some types of aquarium photography, e.g. photographing a whole tank, a section of a planted tank, or a single plant; however, the use of photofloods can present some problems. As these lamps give off a lot of heat they can over-heat the upper layers of the aquarium water; while in some planted tanks numbers of leaves at the water surface can cut down the amount of light reaching the lower regions of the tank—sometimes leading to patches of shadow. Photograph 1 shows an attractive, underwater garden of aquatic plants photographed using two No. 1 photoflood lamps; but do notice

that the fish cannot easily be seen. This shot required an exposure of about  $\frac{1}{2}$  second, and during this relatively long period moving fishes can cause 'trails' of light across the photograph and can spoil such a photograph of plants. To avoid this problem I usually place the photoflood lamps in the aquarium hood, set up the camera on a tripod, set the delayed-action timer, focus the camera, select a shutter speed of about a  $\frac{1}{2}$  second and a suitable f/stop (say f/16) using the camera's exposure meter with the lamps lit, and then switch off the lamps and all the other lights in the room so that the fishes, left in total darkness, will fall asleep. I also switch off the filter to avoid moving plant leaves, sediment and air bubbles.

I return about an hour later, switch on the lights and quickly activate the delayed-action timer before the fishes have time to awaken and begin to move around quickly. The delayed-action timer and the tripod are essential if camera shake is to be avoided during such a relatively long exposure. A cable release may be used carefully if the camera is not fitted with a timer. The cover glass should be removed from the tank before the lamps are fitted because the heat can crack the glass. Do ensure that the hood won't fall into the aquarium. This is very important because of the danger that can result when water and electricity make contact.

I find that two electronic flash units, fitted with extension leads, set on the glass cover of the aquarium under the hood, give more satisfactory and problem-free lighting either for colour or monochrome photography of whole aquaria when one wants to include fishes in the picture. With the shutter set for flash one can obtain photographs such as shot number 2. The brief duration of the flash 'freezes' the movement of the fishes, allows the use of a high f/number to obtain good depth of field, and does not cause problems by over-heating the water.

I find flash most convenient for photographing single fishes. The flash unit, on an extension lead, may be placed on the cover glass of the aquarium. When a fish swims under the flash one can quickly focus the camera and press the shutter. With this method one can either hand hold the camera or place it on a tripod. The former method is the simpler in that one can follow the fish with the lens and, if necessary, move the camera closer to or farther away from the moving subject to ensure sharp focusing. It should be remembered that when using extension tubes, even with a high f/number setting, the depth of field will be only a fraction of an inch.

In my opinion the most convenient position for the flash when taking close-up shots of a small fish, using extension tubes, is on top of the camera; but if the flash





Aquarium lit by two No. 1 photofloods.

is mounted in the conventional way reflections of the flash from the aquarium's front glass usually spoil the resulting print. To overcome this problem one must mount the flash on top of the camera using one of the little tilting brackets obtainable from most photographic dealers. If the flash unit is pointed down so that the light strikes the glass at an angle of 45° the majority of the resulting photographs should be free from disturbing reflections. Even when care is taken to hold the camera parallel to the front glass of the aquarium one can sometimes pick up annoying flash reflections—or even reflections of the camera lens in the glass front of the tank. A lens hood can help; and some people point the camera lens through a sheet of black paper, with a hole cut in it, held in front of the tank.

In all cases it is essential to ensure that the front glass of the aquarium, both inside and outside, is spotlessly clean: even tiny water marks or unnoticed fingerprints can appear in sharp detail when lit by a bright flash at close quarters. Tiny specks of dirt in the aquarium water can also show up clearly in a finished print or slide; so ensure that both glass and water are as clean as possible before taking any shots. Digging catfish should be excluded from a photography tank unless they are to be the subjects of the photograph.

Unfortunately, when working so close to the subject through air, glass and water, there is no simple way to calculate exposures required when a particular lens,

Aquarium lit by two flash units.



February, 1981

flash unit, film and extension tube combination is being used; hence one has to begin by trial and error. When photographed in close up a pale or white-coloured fish (photograph 3) may need one or two stops less exposure than would, say, a darker-coloured specimen; while a black fish (photograph 4) may require one or two stops extra.

To obtain a reasonable guide to exposures required, one should load the camera with an appropriate black-white film—I prefer FP4—and fit an appropriate extension tube between camera and lens, the size of tube depending upon the length of the fish to be photographed. The discus—see photograph 5—makes a useful test subject because its colours are neither too bright nor too dark—and the fish frequently stays stationary for relatively long periods, thus permitting one to focus without too much trouble. The flash unit is then mounted on the camera, using the bracket, and angled down at 45° to the vertical glass of the aquarium front. The shutter speed is set for flash. A series of shots of the fish is then taken starting at, say, f/5.6, and moving by full stops up to f/22. A



Golden "Ram" *Apistogramma ramirezi*.

careful record should be kept in a notebook or on a cassette tape so that film frame numbers and f/stops can be identified exactly and paired when the film has been developed. The remainder of the film may be used up repeating the series for a light-coloured fish, such as an albino barb, and for a dark-coloured fish, such as a black molly.

Probably the specimen being photographed will move around the aquarium as the series of shots progresses. If possible take each shot in a given series with a similar background and with the fish approximately the same distance above the gravel base of the tank. This should lead to more consistent results as light reflected from the gravel will illuminate the belly of the fish.

When the film has been developed and printed one can, using one's written or taped notes ("Albino barb, frame 4, f/11") select those f/stops that have given the most acceptable exposures and use them for future reference. When using my own particular camera and flash unit I get best results with FP4 film for monochrome prints, and Agfacolor CT21 film for slides. The speed of each is quite similar. Using one extension tube, with the camera shutter set for

flash, I find I get ideal exposures at  $f/16$  or  $f/22$ —and these high numbers give the essential depth of field. With the flash mounted on the camera and the camera focused on the selected fish one can follow the fish along the front glass of the aquarium, viewing it through the viewfinder, and move the camera towards or away from the fish to keep it in focus. When the fish is suitably framed and in focus one can release the shutter and hope that all will be well. To improve one's chances of taking at least one good photograph of a given fish it is wise to shoot the fish two or three times—possibly at the same  $f$ /stop, or at one above and one below the original setting. A stop either way isn't critical when one is using black-and-white film; but correct exposure is more important when using slide film.

If it is found that one's flash unit is rather stronger than is required for such close-up work one can substitute a slower film. Simple backgrounds are best in photographs of single fishes; they are particularly important in monochrome where confusing backgrounds can distract the eye from the fish itself because both are rendered in black,



Black female Guppy *Poecilia reticulatus*.

grey and white and tend to merge. The problem is greatly lessened when colour is used because one is dealing with colours and not tones. For this reason it is probably easier to take a good coloured slide than a good monochrome photograph.

Fishes in an aquarium are not easy to photograph successfully principally because of problems associated with lighting, reflections, movement of the subject, limited depth of field and distracting backgrounds. The problem of movement can be partly solved by inserting a sheet of glass into the aquarium so that the subject is trapped between the inserted pane and the glass front of the tank. The sheet of glass, which will become invisible under water if it is clean, should be placed such that the fish has a little space in which to swim and is not squashed or damaged. I would certainly not support those who would advocate that a fish should be squashed between the two sheets of glass in order to enable a good photograph to be taken—even if those who use such a technique take very much better photographs than I do.



Discus.

The technique using an additional sheet of glass is appropriate for an aquarium in one's home where one can keep and use a piece of glass of the correct size; however, it is impractical when one wishes to photograph fishes in friends' tanks or in public aquaria. Personally I don't bother with such sheets of glass.

With practice, using black-and-white film, one can develop a technique that can guarantee a reasonable number of very acceptable photographs of one's fishes, plants and aquaria; and these can provide useful references long after specific fishes have died or aquascapes have been changed. The techniques of aquarium photography are not easy to acquire without assistance—and the cost of films, chemicals and printing paper (or processing) continues to soar—but it is well worth the effort involved to be able to make a permanent record of one's most beautiful fishes and most appealing aquascapes; and it's an interesting challenge to the aquarist who has already

**Black Widow.** Fish is quite clear but again the background is rather distracting.





mastered the more common branches of the art of photography.

Give the methods I have outlined a try. Many cameras are being offered at very reasonable prices at the moment so it's as good a time as any to launch into aquarium photography—particularly during the long winter nights; and photography can enhance many other hobbies as well by enabling one to make permanent records of visual experiences. If you have a suitable camera and are considering the purchase of a flash gun, look for the type that can be swivelled for use either vertically or horizontally. The horizontal position is usually most suitable when photographing single fishes. My flash unit is a Photax 241 model.

Aquarists who are also interested in tape recording could take and compile a collection of suitable coloured slides and then record, on cassette tape, a suitable running commentary. Obviously a script would have to be prepared beforehand. Each slide could be numbered, and the 'ping' of a fingernail on a wineglass could be used to indicate when one slide should be switched to the next to synchronize speech and pictures. Ensure that you leave enough time after each 'ping' for the projector operator to change to the next slide. Such audio-visual 'talks' are popular at aquarium club nights.

Should you wish to attempt to take photographs in public places—such as shops, zoos or public aquaria—always obtain the prior permission of the owner or keeper, especially if you wish to use flash. Understandably, some people aren't very keen to have flash units flashing when customers or visitors are present; and some are unhappy about the prospect of their fishes being subjected to sudden bursts of bright light. I have never observed a fish showing overt signs of being excessively disturbed by a few flashes from an electronic flash unit.

The fish in the last photograph (No. 6) is a black widow. This species often stays relatively stationary for extended periods and makes a good subject for the fish photographer. It was shot using the tilted flash, as outlined above, with one extension tube fitted between camera and lens. Note the distracting background.

I should be pleased to see some of your best photographs of aquaria, fishes and plants. Send them to me, together with a s.a.e. etc. for their return, c/o *Aquarist & Pondkeeper*, The Butts, Half Acre, Brentford, Middlesex. You'll find it useful to print, *lightly*, on the back of each monochrome photograph, details of the subject, and the exposure used—as well as your name and address. Ensure that your name appears on the mount of each slide. Perhaps our Editor—one of the leading experts in aquarium photography—will consider publishing some of the best shots. Postcard-sized prints are perfectly adequate for publication. Black-and-white photographs with a glossy finish, and coloured slides, are much more suitable for magazine reproduction than are coloured prints.

One final warning must be given—and I speak from experience: plastic-framed tanks should not be subjected to the heat from photoflood lamps for other than very brief periods or they will begin to melt.

## Book Review

*Frogs*. By Gerald Donaldson. Published by Windward, W.H.S. Distributors, Euston Street, Freeman's Common, Leicester LE2 7SS. £5.95.

This is one of the most original of the non-scientific or pseudo-scientific books on frogs to come my way. The illustrations—packs of them in black and white and colour—are as varied in treatment and style as they are good. Not a few of them are reminiscent of the work of poor demented Louis Wain—the celebrated portrayer of crazy or curious cats (at his best); some are delicately delineated in a few lines scratched by the bamboo pen of some talented Japanese artist: all, however, are a joy to behold.

Mr. Donaldson's book shows us the frog of the workaday world (and of the enthusiastic herpetologist) as well as the frog of fantasy or fairy tale. He has researched his work well and cast his net wide. Indeed, this tall book of 128 pages is a veritable pot-pourri of the species *Rana* to be met with in literature, gastronomy (unfortunately Mrs. Beeton conceived a non-erotic passion for frogs' legs), advertising, exploration, romance, science (too horrendous to dwell upon), as a living barometer, as chief participant in races (here we are given a four-page account of a frog race as set down by the inimitable Leslie Thomas in *Virgin Soldiers*). There are references to frogs dating back to the times of Moses and the wicked Pharaoh whose self-inflicted plague of frogs gave rise to an awful stink. Indeed, there appears to be no end to the frog as the inspiration of the literati. Writers as eminent as the late Hilaire Belloc, Emily Dickinson and many more wrote about it. Carl von Linné, the famous Swedish naturalist, observed that, the voices of some frogs banished mournful thoughts. On the other hand, he was of the opinion that, the voices of some frogs put the listener into a state of deep depression.

The author of this irresistible book admits to being an avid and devoted frogophile. It is a book for the bedside table; a book to laugh at or go to for some piece of elusive or unusual information; more, it is a book for young or old or both; a book for all who love frogs.

Jack Hems

### Buyer's Guide

(Published Quarterly)

Next insertion March 1981

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## Another success story for the B.K.K.S.

DURING 1980, The British Koi-Keepers' Society celebrated its tenth anniversary and the occasion was well and truly marked with a week-end Seminar and Dinner Dance held at the Centre Hotel, Leicester, towards the end of the year.

Koi keepers arrived from all parts of the country with the anticipation of some meeting for the first time, but many to renew old friendships. The Seminar included a series of very interesting and informative lectures with slides and were given by:

Mr. J. Templeton, Severn and Trent Water Authority, on fish husbandry.

Mr. R. Burns and Mr. Lynd, James Beresford & Son Ltd., on water pumps.

Dr. C. Andrews, Tetra Information Centre, on fish diseases.

Mr. P. Stratford, B.P. Nutrition (U.K.) Ltd., on feeding fish.

Each lecture was followed by its own discussion period when the numerous questions were answered with the expertise and confidence of subjects well known. It was difficult to keep to the time schedule but between lectures a break was made for a welcome buffet lunch when the large anniversary cake in the shape of the figures 10 and beautifully decorated with the Society's Koi logo was ceremoniously cut by Mrs. Hilda Allen.

After a later break for tea, Mr. Roland Seal, Chairman, concluded the Seminar with two of his own films on Koi keeping and appreciation.

An evening reception, when everyone was introduced to the Officers of the Society, preceded the excellent dinner after which brief and amusing speeches were made by the President, Mr. Eric Allen, and Mr. R. Seal. As a token of the consistent and hard work done for the Society through past years, bouquets were presented by Mr. R. Talbot, P.R.O., to the wives of the President, Chairman, and Treasurer, namely, Hilda Allen, Pauline Seal, and Elizabeth Waumsley. A congratulatory telegram was read out from Mr. and Mrs. G. Mullins of Basildon, who were unable to attend.

Music and vocal entertainment was supplied by a local band and the dance progressed with much enjoyment and remarkably vigorous participation until about 1.00 a.m.

Many hardy members still continued talking until the small hours before dragging themselves away to go home or to their hotel beds. Over 100 happy people breakfasted together the next morning knowing they would long remember the event, and considered that such a successful get-together should take place every year in future to further unite members in a deeper bond of friendship and understanding than ever before.

The British Koi-Keepers' Society now has well over 1,400 members and details of membership, subscriptions, local sections, etc., are obtainable from the Membership Secretary, Mrs. C. Mullins, Woodlands, South Avenue, Langdon Hills, Basildon, Essex SS16 6JG.

RAY TALBOT, P.R.O.



From left to right: Roland and Pauline Seal, Eric and Hilda Allen, Malcolm and Elizabeth Waumsley



The Society's 10th Anniversary Cake



Mr. John Templeton of the Severn and Trent Water Authority



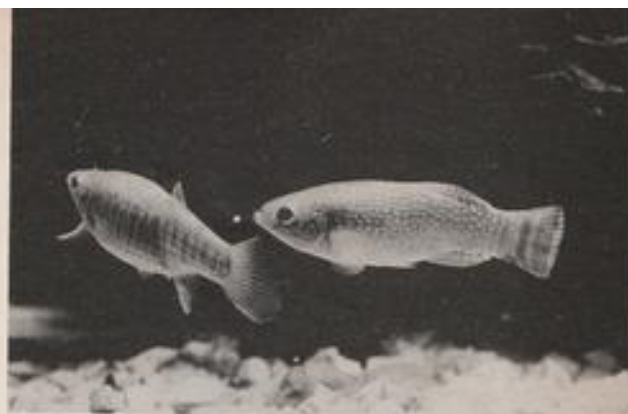
# Spawning *Aphanius dispar* by William Ross

Photography by Peter W. Stroud

*Aphanius dispar* (Ruppel 1828) is known as the Arabian Killifish but I feel it would be more appropriate to call it the Middle East Killifish as its distribution ranges from Northern India, around the Arabian peninsula, both sides of the Red Sea and it has found its way via the Suez Canal into the Mediterranean Sea. *Aphanius dispar richardsoni* (Boulenger 1907) is the name given to a population living in a spring at Ulm in the neighbourhood of the Dead Sea. This cyprinodontid is extremely tolerant with respect to salinity and temperature, found in the cooler sea, brackish water of the estuaries and in freshwater springs of the interior of Saudi Arabia, the water in these springs is in the lower 90° F. The springs are artesian arising from aquifers approximately 600 feet underground; the water has a high mineral content therefore being very hard. The tap water in this district comes via wells from these same aquifers and I would ask readers to remember this when I refer to using tap water.

My earlier experience of spawning the Arabian Killifish was with wild caught fish from various locations in Saudi Arabia's Eastern Province. I am now in the fortunate position to be breeding from some of my own aquarium-produced fish. The basic rule for breeding any fish is that one must have a true pair and it is not a very difficult problem to ascertain the sex of these fish. Females are greyish green with numerous dark verticle bars on their flanks; dorsal fin is small, fins and tail are usually colourless. Males are much more colourful being bluish brown with numerous iridescent bluish white spots on their flanks. Dorsal fin is large flowing with stripes and spots similar to the body; anal and pelvic fins yellowish; tail has 5-6 transverse bars, the terminal bar being yellow and the remaining bars alternating dark and light blue.

Left to themselves these fish spawn readily. I have left two pairs in an aquarium filled with tap water at a temperature of 80-82° F. The aquarium was heavily decorated with *Ceratophyllum demersum* (Hornwort), some of this plant left floating and some in bunches weighted down with strips of lead. The gravel I use is fairly large. Over a number of months the population in this aquarium steadily increased until there were fish at varying degrees of maturity from fry through to mature adults. The spawning act under these conditions is very interesting to observe. The male selects the female and swims round her, finally laying himself over her and forcing her down onto the gravel; with his large dorsal fin wrapped over her they quiver together releasing their



*Aphanius dispar*, male on right.

products of reproduction simultaneously. In most of the literature I have read on *Aphanius dispar* they are said to spawn on soft-leaved plants or synthetic spawning mops but I have found given the choice, they lay their non-adherent eggs on the gravel. My gravel being large the eggs fall between the spaces, remaining reasonably safe from being devoured. During the spawning act if another fish approaches the pair the male will display with all his fins erect and if the approaching fish is another male, both will assume this displaying attitude and chase each other in circles until one flees with fins clamped to its body. I have observed this behaviour amongst wild fish in their natural habitat as well as in the aquarium. This behaviour I have seen described as the nuptial display of the male but I am convinced this is purely aggressive behaviour as I have never witnessed it being used to attract a female, only to chase another fish away. The eggs hatch in approximately 10 days and the fry grow rapidly on a varied diet of live food and proprietary baby fish food. They start to become sexable at approximately 3 months of age. I have spawned some at 5½ months and am positive they would have spawned earlier if given the right conditions.

For spawning selected pairs I separate the males and females for 10 days, feeding them on a varied diet. Two days prior to the intended spawning day I prepare a 40 × 25 × 25 cms aquarium with large gravel, tap water at 80-82° F and bunches of Hornwort weighted down with lead strips. I place the selected pair in the aquarium at the same time leaving them there for 10-12 days. The first fry usually appear about 48 hours after the removal of the parents and continue to increase in numbers over the next 9-10 days.

On occasions I have used the previous method with a larger aquarium and using 3-4 males with double the number of females. This method produces numerous fry and one can make all the observations I have mentioned with my two pair system. I find this the most interesting method of breeding these fish especially when I wanted to take some photographs of them spawning.

For a beginner at breeding egg layers I can recommend *Aphanius dispar*. I believe its simplicity and readiness to spawn makes it a strong rival to the beginner's old favourite, the Zebra Danio (*Brachydanio rerio*).



When sexually mature the male's drawn out dorsal fin distinguishes him from the female

## *Puntius filamentosus*

Written and illustrated by Rudolph Zukal

IN THE SUMMER of 1972 eight of these slim Barbs, which grow quite large, were included in our permanent exhibition of aquaria in Brno. Although they were imported to Europe as early as 1950 from their habitat in the western part of Southern India, the above-mentioned summer marked the first occasion upon which they reached our republic. They were obtained in Prague as 5 cm specimens with attractive lateral bands, which resembled *Capoeta tetrazona* in their coloration but were much more similar to *Capoeta unia* in their body shape. They grew quite quickly in a 100 litre tank and to our surprise gradually lost their lateral stripes. They retained the silvery, shading into silvery-green coloration, with the back keeping a darker hue. In addition the fish kept their slight iridescence of colours of the rainbow, with a large, dark spot on each flank above the anal fin. The sexes were clearly differentiated. The male possesses a dorsal fin which has extended rays, which are partly a dark violet colour. The female remains more robust, without the extended fin-rays.

The Barbs attain a size of almost 15 cm. Those pictured were 11 cm in size. They do not have barbels. According to Sterba they resemble *Barbus mahoeola* very closely. However, the latter have a pair of barbels on the upper part of the mouth, so that the two species can be easily distinguished.

Upon noticing the fish spawning, I chose a pair out of the group and placed the two fish by themselves in an 80 litre tank. I let the water, which was from the mains, stand for several days. The temperature was 24°C. The fish were very shy and kept themselves anxiously pressed against the tank floor in a corner. They only appeared more comfortable when I placed a few largish stones at the back of the tank where they could hide. For a number of days I did not see them. They remained hidden behind the stones, or disappeared there when I came near. Through patient and careful feeding at the same spot I won their confidence, to a certain extent, of these very shy Barbs which are very swift and agile swimmers and leapers. The *Tubifex* offered to them were quickly picked up, blown out again and eaten individually. This surprised me, for, although the fish are so large, I never observed the fish eating a larger amount of food at one go. For variety they were given Tetramin and vegetable food. After three weeks my patience, which I had kept until then, ran out and I separated the fish. On the following day I noticed a few small fish swimming in the background without being eaten by the adult fish. I could count nine of them. Then I realised what had happened. The fish had been spawning in my absence, although I was convinced that spawning was out of the question, for in my mistaken opinion the female



was not 'full' enough. After a further ten days I put the pair together again, although the female's stomach was still barely filled out. Nevertheless, I was able to photograph the violent spawning action two days later. Mating resembles that of all Barbs except *Capoeta semifasciolata*. After vigorous chasing and harrying which came to nothing, the female swam to the prepared Java moss and the fish pressed against each other. The male wrapped his dorsal fin over the body of the female and when they parted the eggs fell to the bottom. After four hours I removed the breeding pair and although many eggs were covered in fungus (unfertilised), I was able to raise over 400 young fish without difficulty. These were generously supplied with live powder foods although they also accepted dried foods. I am, however, conservative as an aquarist and maintain that no food can fully replace natural foodstuffs. But this is only my personal view. At all events I would recommend this splendid, extremely peaceable fish to any aquarist without any reservations—if he has enough large tanks. No creature is faultless, man included, and these Barbs occasionally

The pair spawning, male's caudal wrapped around female



February, 1981



Young specimens

damage delicate plants or uproot them as a result of their high-speed swimming. This can be prevented by planting the hardier plant varieties and supplying the fish with a certain amount of vegetable food. In this way this undesirable characteristic can be eliminated.

# *Pachypanchax playfairi*

written and illustrated by Rudolph Zukal

THESE FISH BELONG to the popular egg-laying Tooth Carps. They were imported to Europe from their natural habitat in tropical East Africa, Madagascar, Zanzibar and the Seychelles as early as 1924. They owe their name to the man who discovered them, R. L. Playfair. The species was described scientifically as early as 1866 and given the name *Haplochilus*.

The forepart of the body is rather squat, rounded off, and flattened at the top. The body has a rather flattened form at the root of the tail. The whole body shape resembles the *Rivulus* species. It attains the considerably large size of 10 cm, with the female remaining smaller. The wide mouth is curved, the dorsal fin set rather far back as with all Killifish. The back is dark brown, the abdomen tinged with yellow. The sides of the body have an emerald green sheen when caught by the light. On the head and flanks are rows of red dots. The fins other than the tail are yellow, bordered with bright yellow and decorated with rows of red dots. The female has a less intensive coloration, the yellow fins do not have the rows of dots, but the dorsal fin bears a black spot.

These fish should be kept in a tank with water which is not very deep but has a relatively large surface area. The fish are at home if the tank is well planted and furnished with a number of hiding places, with a temperature of 20-22°C. A few floating plants should be placed on the surface. They are happy with ordinary tap water to which a little salt has been added (1 tea-spoon of salt per 10 litres of water). Occasionally they can be rather pugnacious and inclined to

nip, including amongst themselves. Otherwise, in company consisting of fish which are not smaller, they can be called peaceable. They are omnivorous.

Breeding does not pose any particular problems. The fish find a small breeding tank sufficient, with a capacity of about 10 litres. At a temperature of 22-24°C the fish will readily spawn amongst plants which have fine leaves. During spawning, the spawning site is changed continually and they spawn not only amongst the plants but on the sand and amongst the roots of the floating plants. The eggs are usually extruded individually. It is advisable to collect the eggs together every day with the aid of a glass rod and house them in a separate rearing tank. The fish will spawn several days in succession. Care must be taken when collecting the eggs, for those of older specimens (by which fish which are more than a year old is meant) have a soft covering, when they emerge from the female's abdomen, which does not harden into a membrane until about six hours later. The eggs are kept in a tank containing the same water as the breeding tank. Although the fish are not particularly inclined to eat eggs, it is advisable to remove them every day and put them into another spawning tank or, as has already been said, to take out the eggs. The young hatch after about 12 days and, as they are 4-5 mm in size, feeding does not present any great problems. One further point. After a few weeks the young must be sorted according to size, as an individual which is older or larger may well attack its siblings and cannibalism thus occurs amongst the young fish. Yet another tip. The eggs should be lightly coloured with Tripaflavin.

The pair (female above) in search of a spawning site



The pair—the act of spawning





# News from Aquarists' Societies

Monthly reports from Secretaries of aquarists societies for inclusion on this page should reach the Editor by 3rd of the month preceding the month of publication.

## SOUTH EAST



**Aylesbury A.S.** are now meeting at the "Hop Pole" Bicester Road, Aylesbury. New members welcome. Phone 2409. P. Wheeler, 141 Wendover Road, Aylesbury, for 1981 season.

A MEETING was held at St. Augustine's Hall, Rush Green, Romford on 26th November to form the association of Essex and East of London A.S. It was decided to form a steering committee as follows: chairman, Jim Carney; secretary, Bernard Meech; treasurer, Ted Wood; and one representative from each of the following societies: E.L.A.P. Walthamstow, Ilford, Newham, Southend, Havlow, Dagenham. (Witham and Romford already having a seat on the committee through the officers). Any other society in Essex or the East of London will be most welcome to contact Bernard Meech on Brainelee (0378) 25158.

**Deal and District A.S.** meet regularly on the second Wednesday of the month at 7.30 p.m. at the Conservative Office, High Street, Deal. Activities include table shows, lectures and displays, and sections of surplus fish.

AT the Newham Aquarist's and Reptile Society a.g.m., a new committee was formed and the officers are as follows: Chairman, F. W. Chapman; secretary, N. Johnson; treasurer, Mrs. J. Johnson; P.R.A.S. delegate and P.R.O., Mrs. A. E. Chapman. Meetings are held on the 1st and 3rd Wednesdays each month at Windsor Terrace School, Manor Way, East Ham, London E.6. at 8 p.m. Talks, slide shows and table shows. New members and visitors always welcome. For further information please contact Norman Johnson, 54 Leigh Road, East Ham, London E.6.

THE Bexleyheath and District A.S. newly elected officials are: chairman, D. Smith; vice-chairman, M. Balcombe; treasurer, M. Harris; P.R.O., D. Barnett; club secretary, B. Dixon; 54, Lonsdale Crescent, Dartford, Kent; show secretary, D. Goodwin; assistant show secretary, H. Johnson; librarian, R. Mitchell; social secretary, S. Kennell; visitor committee, Keith Sewell; floor members, R. Liddell, M. Carter. The society meet every other Thursday at 8.00 pm at The Commodities Room, A.R.C. Cine Bowl, Broadway, Bexleyheath, Kent. New members are always especially welcome.

AT the December meeting of the Mid Sussex A.S., Mr. N. Short gave a very interesting talk and demonstration on making Show Tanks. Members were reminded of the forthcoming a.g.m. to be held in February, and also of the annual dinner dance/picnicking. The recently judged Home Aquaria competition cards were presented to the following winners: 1 and 2, L. Pacey; 3, B. Hardy; 4, S. Warner. Junior: 1, J. Pali; 2, D. Daniels; 3, E. Gladwell. Slides taken of various Home Aquaria tanks formed were also shown at the meeting. The table show was judged by Mr. Colin Parnell of Hastings, and cards were awarded as follows: Furnished Aquaria: 1, P. Levine. Novices: 1 and 3,

5, Smith; 2, A and J. Ferris; 4, Y. Perzin. Fish of Year: 1 and 4, P. Levine; 2, B. Ferris; 3, B. and T. Troner. The 50 club draw winners for the month of December were: J. Birch, J. Bartles and M. Young.

Meetings are held on the second Thursday of each month from 8 p.m. at Oakley Lodge, Oakley Lane, Keymer. Further information from the Secretary, Mr. John Birch, 16 Redwood Drive, Haywards Heath—(Tel: H. Heath 50585).

THE East Dulwich A.S. meet at Dulwich Baths Reception Hall, Crystal Palace Road, London SE22. Meetings now start at the earlier time of 8.00 p.m. and new members are always welcome. For further details write to Dave Winder or phone 01-699 3122.

## SOUTH WEST



A NEW Committee for Weymouth A.S. Chairman, John West; vice-chairman, John Allen; secretary, Stephen Harding; treasurer, Jack Pacey; editor and show secretary, Stephen Cox; trophy secretary, John Cox. They were elected at the a.g.m. in December. They are the first club to hold a 'Home Aquarist Competition' making use of a V.C.R. The film was recorded by vice-chairman, John Allen, and narrated by chairman John West.

## MIDLANDS AND WALES



RESULTS of the 1980 four way Inter-Club competition held between the **Abertillery A.S.** and **Merthyr A.S.**: A.A.S. 50 points, M.A.S. 30 points. This result is a reversal of the 1979 result. Trophies awarded to highest individual points: Myrthyr: 1, Elywn Morgan; 2, Paul Willis; 3, Ron Morgan. Abertillery: 1, Peter Mason; 2, Gwyn Davies; 3, Anthony Taylor.

A NEW society has been formed and is called **Forest Town Show Society**. Anyone wishing to become a member of this society must be interested in showing fish, and should contact Secretary: Terry Down, 17 Chestone Road West, Forest Town, Nr. Mansfield, Notts. (Tel: Mans 20800), or M. Johnson (Treasurer) 18 Forth Avenue, Forest Town, Nr. Mansfield, Notts.

FOR their "introduced" topic for 1980-81, **Evesham Fish Keepers Society** invited a former member to lecture at their November meeting. Gordon V. Ludlow, of Gloucestershire Bottle Collectors, exhibited his fascinating collection of antique bottles and organised a very informative Bottle Quiz.

Dr. David Ford's Slide Tapes show "International Aquaria", was featured at the December meeting. The Table Show for Christmas was won by Mrs. J. R. Baker, and the first round of The Fish of the Year contest was won by F. G. Thornton. The Society meets on the first Wednesday of every month at 8.00 p.m. at Church House Meeting Rooms, The Gateway, Market Hall Square, Bretenham, Worcs. Visitors and new members welcome. Secretary: Edna M. Thornton, 41 Crooks Lane, Studley, Worcs. (Tel: Studley 7125).

ON 6th December the M.K.A. held its a.g.m. when the committee was elected as follows: Roger A. Gleave, chairman; Stephen Gery, secretary; Roy Hamer, vice-chairman; Frank Johnson, treasurer; Peter Nordberry, newsletter editor; Tony Walsh, librarian; and Joyce Lloyd, Dennis Wells and Bryan Wilson, committee. The 1981 meetings will be held at the Peleshill Community Centre, Peleshill Road (A446), Coventry, at 8.30 p.m. on the first Saturday of every month. A speaker usually gives a talk on aspects of Kit keeping. Any enquiries should be addressed to the Secretary, 49 Conway Avenue, Tile Hill Village, Coventry CV4 9JA.

## EAST



THE final East Anglian Federated Aquarists' show of 1980 was held at the Community Centre, Diss on 30th September. The show was hosted by the Great Yarmouth society and the following member clubs took part: Bury (B), Cambridge (C), Diss (D), Great Yarmouth (GY), Ipswich (I), King's Lynn (KL), and Tostford (T). The Best Tropical Fish in Show award was presented to C. Newman, of Ipswich, for his *Berberis aeneus* and the equivalent coldwater award was won by A. Moughton of Diss, for his *Pantail Goldfish*. Awards for the classes were: Berberis: 1, C. Newman (I); 2, G. Drewry (GY); 3, A. Jennings (J); 4, D. Newman (I). Characins: 1 and 2, N. Cobb (D); 3, B. and S. Byrnoth (I); 4, T. Williams (B). Goldfish: 1, A. Beagrie (T); 2, 3 and 4, B. and S. Byrnoth; Dwarf Goldfish: 1 and 4, N. Cobb (D); 2, S. Byrnoth; 3, P. Smith (GY). Ambostrids: 1, C. Newman; 2, B. and D. Byrnoth (I); 3, A. Jennings; 4, N. Cobb. Kill Valley Goldfish: 1, N. Cobb. Fighters: 1, D. Newman; Tooth-corns: 1 and 4, N. Hume (D); 2 and 3, E. Anfluff (I). Catfish: 1 and 3, D. Beethoven (I); 2, D. Newman; 4, P. Smith (GY). Corydoras: 1, L. Bird (GY); 2, A. Beagrie (T); 3, R. Westley (I); 4, A. Copping (B). Harbors: 1 and 4, D. Beethoven; 2, B. and S. Byrnoth; 3, D. Newman. Danios and WCMM: 1, D. Newman (I); 2 and 4, A. Jennings (I); 3, B. and S. Byrnoth (I). Loaches: 1, D. Knights (GY). AOV Tropical: 1, D. Newman. Labors: 1, D. Knights (GY). Fairy Egg-layers: 1, L. Bird (GY); 2, A. Beagrie (T); 3, T. Williams; 4, P. Smith (GY). Fairy Livebearers: 1, S. Forrest (B). Guppies: 1, A. Beagrie; 2, R. Westley (I); 3, B. and D. Byrnoth.

Swordtails: 1, G. Dreyer (GV); 2, G. Dreyer (GV); 3, D. Knights (GV); 4, L. Bird. Plaques: 1, D. Newman (I); 2, B. and D. Bysouth; 3, N. Cook. Molias: 1, P. Smith. AOV/Liverbearers: 1, N. Home (D); Singtail: Goldfish: 1, A. Moughton (D); 2, V. R. Good (T); 3, J. Good (T); 4, D. Wood (T). Twinstail: Goldfish: 1, 2 and 3, A. Moughton (D); 4, A. Wood (T). Breeders Eggbeaters: 1, P. Smith (GV); 2 and 3, L. Bird (GV); 4, D. G. Knights (GV). AOV Goldwater: 1, G. Home; 2 and 4, R. Westley (I); 3, V. R. Good. Junior Tropical: 1 and 2, Miss S. Bysouth (I); 3, Miss D. Thorpe (GV); 4, Nicholas Home. Junior Goldwater: 1, V. Wood (T); 2, Miss A. Cobb (D); 3, V. Wood (T); 4, Miss A. Cobb (D).

FOLLOWING the November a.g.m. and more changes in December, Corby and District A.S. now has the following committee: chairman, J. Short; vice-chairman, N. Campbell; secretary, S. Elliott; treasurer, G. Dainy; open show Secretary, R. Wilson; editor, P. Foerth; publicity officer, R. Davies; table show secretary, P. O'Brien; Junior representative, G. McConnell; others, D. McAllister, A. Giles, R. Piggis, and J. Cook. R. Wilson who has been the very able secretary for some years now becomes open show sec. He feels the change is a new challenge. We wish him well with Corby open show in March. Date to be confirmed shortly.

## NORTH



Sheaf Valley A.S. open show to be held on 15th February at the Dormer Twist Drill? Schedules available from Mr. D. Golland. Phone: Sheffield 746046.

AT the St. Helens A.S. a.g.m. the main item was the election of a new committee, and as usual, the task gets more difficult as each year passes. The chairman remains the same as last year, John Dean, 48 Cleveland Street, Sutton, St. Helens. The secretary from last year fancied a change of job this time. He has been secretary for a couple of years now, and felt he could offer more to the club in some other task. He agreed to become treasurer and was duly elected. He is Rob Jones, 47 Gray Avenue, Haydock, St. Helens. The job of secretary went to Mrs. H. Steadman, Lynwood, 70 Ribbles Avenue, Rainhill, Nr. Liverpool L33 9NJ, with E. W. Carter as assistant secretary. Show secretary this year is again T. L. Penny, 19 Hawkhead Road, Burtonwood, Nr. Warrington, with J. McCarthy as assistant show secretary. The open show this year is on Sunday, 28th June at Rainhill Village Hall, and plans are already under way to make it bigger and better than ever. Show schedules will be available from the show secretary nearer the show date.

AT the a.g.m. of the Northwich & District A.S. the following officers were elected: President, P. Hyland; chairman, H. Buckley; hon. secretary, S. Gallimore; 39 Lydyett Lane, Barnston Northwich CW8 4JL. (Tel: Northwich 78844); treasurer, L. Bradley; social secretary, M. Rowe; open show secretary, D. Valentine; B.F. organiser, L. Thomas; table show secretary, J. Buckley; assistant table show secretary, A. Thorne; librarian, A. Myers. The venue for the monthly meetings held on every third Wednesday of the month has been booked for the next 12 months at the Winnings & Castle Old Friends Club, off Butkers Lane, Queens Gate, Castle Northwich.

Doncaster & District A.S. Committee for 1981: chairman, H. Arkovod; secretary, A. D. Cooke, 85 Cranthe Road, Doncaster (Tel: 62170); treasurer, S. D. Copley; show secretary, G. Fijnt, 37 Copley Crescent, Scawby, Doncaster (Tel: 28094).

AT the recent a.g.m. of Whitby and District A.S. the officers elected were: Club secretary, T. Wilson; show secretary, Mrs. A. Forbes; treasurer, S. Burgess; chairman, J. Bowman.

THE December meeting of Ayrington and District A.S. consisted mainly of a most interesting and informative lecture by Barry Durham, of Longridge. There were a great number of slides of the various species, both common and the rarer ones. The usual table show contained nearly double the average number of entries and was judged by Mr. Durham. Best in show was won by Mr. C. Whitley, who also won breeders.

Hull A.S. a.g.m. was held on 7th January and the following were elected to the committee: Secretary, K. F. Taylor; assistant secretary, J. Porter; show secretary, G. Andrews; assistant show secretary, J. Todd; president, R. Williams; vice-president, C. Taylor; chairman, T. Douglas; vice-chairman, E. Morton; treasurer, G. Hatch; librarian, K. F. Taylor; committee, P. Cress, E. Tyler, and H. Davis.

## SCOTLAND



Berwick & District A.S. held their first open show on 16th November at Prior Park School. Results: Goulding Trophy: Sm. Barb, T. Opden (Felling); Thompson Trophy: Chrasin, D. Smith (Caer Uria); Fairsill Trophy: Lgt. Cichlids, G. Hunt (Norw); Dairy Crest Trophy: Dwarf Cichlid, E. Fish (Berwick); G. and E. Marshall Trophy: Labryinth, T. Affeck (S. Shields); Murray Trophy: Pearl Gourami, T. Affeck; Marshall Race Trophy: A.O.V. Carfish, P. Wright (Caer Uria); Presidential Trophy: Corydoras and Brochis, J. Cross (Norw); Gardens Trophy: Louch, S. Murray (Berwick); Holmes Trophy: Guppy, D. Parker (Amble); Bryson Trophy: Swordtail, M. and G. Paskin (Berwick); Morgan Trophy: Flary, J. Kelly (S. Shields); Cochrane Trophy: Molly, P. Kelly (Throckley); Murray Sport Trophy: Goldfish, I. Affeck (S. Shields); Junior Trophy: Atz species, C. Smith (Caer Uria); Revolutoluna Trophy: Best exhibitor, P. Fry (S. Shields); Cannon Trophy: Best in Show, J. Cross (Norw) Aquaria Gold Pin. Many thanks must be given to all the sponsors who donated shields and cups for this and future events.

# Dates for the diary

A monthly information column to keep you up to date on forthcoming events.

## FEBRUARY

6th February: Corby and District A.S. practical demonstration of setting up aquaria. 8 p.m. The Labour Club, Stuart Road, Corby, Northants.  
7th February: East Dulwich A.S. and South East London A.S. buffet disco dance at 141 Greenwich High Road, Greenwich, London SE10. at 8 p.m. Details from Dave Winder, 32 Eddystone Road, Brockley, London SE4 2DE.  
12th February: Weymouth A.S. talk and video illustration on Community Fish.  
15th February: Sheaf Valley A.S. open show, schedules from D. Golland (Tel: Sheffield 746046).  
22nd February: Wrexham and District A.S. open show at Lady Margaret Hall, Holbeck (on A60 Workop to Marsfield Road, 3 miles south of Workop). Judging to YAA5 standards. Batching 12-2 p.m.

## MARCH

1st March: Knaithly A.S. open show at Victoria Hall, Knaithly, Yorks.  
12th March: Weymouth A.S. tape and slide show on Tetras or Guppies.  
14th March at 2 p.m. sharp at the Meeting Rooms of the Zoological Society of London, Regent's Park, N.W.1. The British Aquarist Study Society present "The Sharks". A series of illustrated talks on marine and freshwater ocean and aquarium sharks by members of the Fish Section of the British Museum Natural History and members of the London Zoo Aquarium. Tickets, available in advance from: W. E. Goodwin, 14 Dawlish Drive, Devon Park, Bedford, or at the door.

## APRIL

5th April: Reading and District A.S. annual open show at St. Peter's School, Ertigh Road, Earley, Reading.

12th April: Kettering A.S. open show at the McKinley Theatre, St. Mary's Road, Kettering. Show schedules from Mr. R. Vickers, 141 St. John's Road, Kettering (Tel: Kettering 519284).

12th April: Taunton & District A.S. open show at Corfield Hall, Taunton.

12th April: Nelson A.S. open show at the Civic Theatre, Stanley Street, Nelson. Details from S. McKenna (Hon. Show Secretary), 52, Bath Street, Nelson, Lancs BB9 0NP (Tel: Nelson 69146).

26th April: Yeovil & District A.S. open show at Parish Hall, Martock. Details and show schedules (S.A.E. please) from T. C. Perry, 314 St. Michael's Avenue, Yeovil, Somerset BA21 4NF.

26th April: Merseyside A.S. open show at the Rainhill Village Hall, Rainhill, Lancs.

26th April: Stanley A.S. 7th open show at Stanley Youth Centre. Information and schedules from Frank Bell, 9 King Terrace, South Moor, Stanley, Co. Durham (Tel: 0207-39633). Club meetings every 2nd and 4th Wednesday 8 p.m. at Church Hall.

## MAY

19th May: The 3 Counties annual closed show will be held at Easthampton Community Centre, Restory Lane, Blacknall. Show secretary, Peter Abbott, 24 Haleswood, Blacknall. (Tel: Blacknall 55289) for information.

16th May: Port Talbot A.S. open show at the Talbot County Centre, Margam Road, Port Talbot, West Glam. Schedules early March from Show Secretary, A.E.B. Poussey, 3 Cross Street, Velindre, Port Talbot, West Glamorgan SA13 1AZ.

17th May: Midway A.S. Open Show at the Snow Hill, Tunbury Avenue, Walsbridge, Chatham, Kent. Full details from: Mr. G. Carpenter, 46 Tenyson Road, Gillingham, Kent (Phone 0834 374424).

17th May: Bournemouth A.S. open show at Kinson Community Centre, Pelicans Park, Kinson, Bournemouth. Details and schedules (s.a.e. please) from Jack Jeffery, 30 Brammar Avenue, Bournemouth BH16 4JT, Dorset after 1st April.

21st May: Sutton and District A.S. first open show.

21st May: Mid-Sussex A.S. first Open Show, at the Sidney West Sports Centre, Leylands Road, Burgess Hill, W. Sussex. Information from Mr. T. Treter, 19 Cypress Road, Burgess Hill, W. Sussex RH15 8DX (phone: B. Hill 43252) or Mr. L. Pinney, 53 Burdocks Drive, Burgess Hill, W. Sussex (phone: B. Hill 47129).

21st May: North Avon A.S. 2nd open show in "The Hut" on the A38 (near "New Inn") at Patchway, Bristol.



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## MY QUEST FOR THE BEST

by Max Gibbs

Clown Knife Fish, Red Snakeheads, Lion Head Gobies, Tinfoil Barbs, Pink Tail Sharks. What do these diverse species have in common? They are all delicious to eat when prepared by the expert cooks of Thailand. Not, perhaps, the correct sentiment for an aquarist to express, but in sizes far too large for the average aquarium, these species are regarded as important food fish in the Far East and during a trip to Hong Kong, Bangkok, and Singapore last month, I enjoyed many meals including these fish.

My main reason for being East, however, was to ensure maintenance of the high standard of stocks for The Goldfish Bowl in Oxford. An important item was to ensure supplies of very healthy Chinese Goldfish. Without exposure to the "Italian Disease" scourge, now so common from supply points throughout the world, and being completely free of fish lice and anchor worms, these hardy fish will be eagerly welcomed in Europe. So in 1981 The Goldfish Bowl will have common Goldfish, Orandas, Red Fantails, Black Moors, Sealheads, Lionheads, Celestials, Bubble Eyes, Calico Fantails and other varieties in better condition than has been possible for several years. High quality specimen Fancy Goldfish will also be available as a result of special arrangements. Some interesting Chinese reptiles and Amphibians will be available from the Spring time.

In Thailand I found a superb water plant nursery set among mountains up-country from Bangkok. In this beautiful setting a meticulously clean and landscaped area is intensively used to grow a large variety of water plants, with many species of a quality incomparable with anything I have seen elsewhere.

Examining the required standard of large breeding size fancy goldfish to my Hong Kong based agent.



Examining breeding size near dwarf gouramis at the breeders premises where my stock is taken from in Singapore.

Most plants are propagated but some native stocks of *Cryptocorynes* are collected wild and planted down in the nursery for about one month. In this time the coarse wild leaf is replaced by supple, clean new leaves. These plants must be regarded as something special!

Back in the heat of crowded Bangkok I was shown a new Discus hatchery which was most impressive. There were many, many magnificent breeding fish and at least twenty aquariums contained pairs of fish surrounded by clusters of babies pecking away at the food provided by the parent's bodies. Also bred here were Triangle Cichlids and Texas Cichlids. This hatchery is connected to a depot where many hundreds of thousands of Thai fish are stored and well cared for pending shipment. Seeing Red Tailed Black Sharks, Tiger Scats, Harlequins, Phantom



The extensive aquatic plant farm up-country from Bangkok, many of my "special" plants come from here.

Glass Catfish, Ruby Sharks, Male Bettas, etc., in thousands is quite breathtaking and the vast stocks are almost entirely fed on live foods!

Singapore continues to be the busy supply point for the vast majority of the fish and plants coming into Britain each week. Here it is necessary to make my best possible arrangements with an efficient exporter in order to have the best of what is available in the market. As my agent he needs to understand about the varieties and sizes I require and what is readily saleable in my market. He will probably be doing the same service for clients in Germany, Holland, France, Sweden, Switzerland, Japan and elsewhere, so he needs to be versatile.

Whatever I buy from anywhere in the world I am insistent that the best possible quality is the foremost requirement and I hope that you can see the results of my efforts in the stocks offered at The Goldfish Bowl, 118-122 Magdalen Road, Oxford.