

# FISH WORLD



*Magazine*



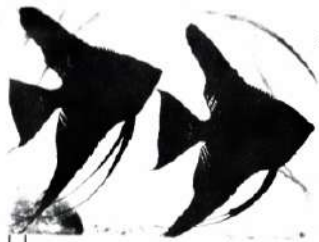
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P. J. PENFOLD M. V. PENFOLD

# Dear Reader

This edition you will note, is in a slightly different format.

You will also note that we have started to introduce colour, which will brighten up many of the pages, highlighting interesting headings and titles.

Make sure you enter the competition for the **Two Free Tickets to the Hampton Court Flower Show & Exhibition.**

We lacked material this month for the **Club and Society News Page.** This item can only appear if you tell me about yourselves and what is happening or about to happen.

You will also note that this issue has a **Bar Code** and we are hoping to increase circulation through retail outlets. Please look in your Newsagents for a copy if you do not see it, please ask if it is available and can they get it for you.

Thank you.

Peter A Furze, EDITOR

Material for the next issue of this magazine should be in by the 17 of July 1992, and sent to: The Editor, Fishworld Magazine, 9 Upton Road, Hounslow, Middlesex TW3 3HP Tel or Fax 081-570 0934

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## AQUARIUM CALCULATIONS

by David Ford

Calculations are given in the form for keying into a calculator.

**Capacity** Measure the internal length, height and breadth in inches:

$$\text{Length} \times \text{height} \times \text{width} = \dots \div 1728 = \text{cubic feet}$$

$$\text{Cubic feet} \times 6.23 = \text{Imperial gallons}$$

$$\text{Imperial gallons} \times 4.55 = \text{Litres}$$

$$\text{Imperial gallons} \times 1.20 = \text{US gallons}$$

$$\text{Litres} \times 1000 = \text{cc (cubic centimetres, also called ml, millilitres)}$$

**Dosing** For calculating dose levels of medicine, subtract 10% from the total capacity to allow for gravel, rocks and equipment, unless this has already been done by the manufacturer of the remedy, check the instructions.

**Heating** A useful tip is to allow 10 watts for every gallon of water that needs to be heated in a 2 foot tank, 5 watts for tanks up to 4 feet long and 4 watts for tanks up to 6 feet long. That is 10 watts per 5 litres in a 60cm tank, 5 watts per 5 litres in a 130cm tank and 4 watts per 5 litres in a 180cm tank.

**pH** This is a measure of the acidity or alkalinity of water on a scale of 1 (acid) to 14 (alkaline) with the neutral point half-way, i.e. pH7.

Most freshwater fish prefer a pH of 7 but will tolerate a range of 6.5 to 7.5. Marine fish require a pH of 8.2, which tends to fall with time in the saltwater aquarium, adjustment must be made if the value goes below 8.0. To breed many tetra species, acid water is essential, use peat in the filter or a water storage tank to give a value of 6.2 to 6.5. Easy to use kits for measuring pH are available from the pet shop.

**Weight** Weight of water in lbs = Imperial gallon x 10 or US gallons x 8.34 or litres x 2.2  
Weight of water in kilograms is the same value as the litres.

For total weight add on the gravel (about 100lb/cubic foot) glass (5lb/sq.ft.) and rocks.

**General Conversions** 1 inch x 2.54 = cm  
centimetres x 0.3937 = inches

$$1 \text{ ounce} \times 28.35 = \text{g grams} \times 0.03527 = \text{oz}$$

$$1 \text{ gram/litre} \times 0.17 = \text{ounces per Imperial gallon}$$

$$1 \text{ ounce per Imperial gallons} \times 6.6 = \text{grams per litre}$$

$$^{\circ}\text{F} - 32 \times 0.556 = ^{\circ}\text{C}$$

$$^{\circ}\text{C} \times 1.8 + 32 = ^{\circ}\text{F}$$

### Suggested Heating Requirements

Aquarium size (length/width/depth)			Approximate total wattage	
Inches	cm	volume of water*		
18 x 10 x 10	45 x 25 x 25	5 gallons	25 litres	30-60
24 x 12 x 12	60 x 30 x 30	10 gallons	50 litres	75-160
36 x 12 x 15	90 x 30 x 38	20 gallons	100 litres	100-150
48 x 12 x 15	130 x 30 x 38	30 gallons	140 litres	120-180
60 x 18 x 18	150 x 45 x 45	68 gallons	310 litres	150-200
72 x 18 x 18	180 x 45 x 45	80 gallons	370 litres	200-300

\*allowance has been made for normal amounts of gravel, ornaments etc. if the tank is kept in a cool (unheated) room in the house, then the above wattages should be increased by 50%. For an unheated building, double the wattages and lag the back and sides of the aquarium with polystyrene sheets.

## 'AQUARIAN' AQUATIC HARDWARE



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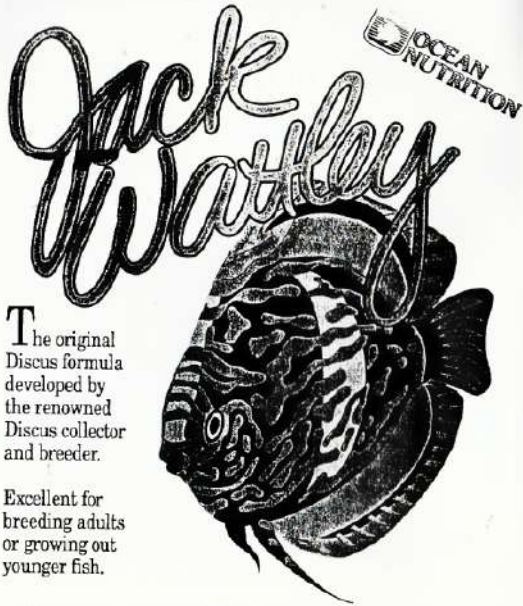
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**FROM YOUR CHAIRMAN**

THE Federation of British Aquatic Societies had a very successful weekend at The "Pet Show" which took place at the Exhibition Centre Earls Court. We were there as the guests of "Aquarian" & "Pedigree" to promote Fishkeeping. Whilst most of the visitors to the exhibition where there for Dog and Cats it was not surprising to find that many also kept Fish, although these, it seemed, were not considered to be "Pets". In the seminars both Dr David Ford and Dick Mills introduced their talks with virtually the same statement - "Wet Pets".

Amongst the many interesting features of our very large stand was a three foot Aquascope, very artistically put together by the Chairman of The Judges and Standards Committee, Peter Cottle and his wife Sheila. This was really brought to life by a continuous Waterfall.

Other displays included:-  
Underworld Products; Coral Reef;

Environ produced a 5 foot Maray Eel. Some very nice Koi were provided from the pond of Brit Koi, Brentford; Harry Hooper of Mill Farm Nurseries built three ponds, one with a fountain, one with water lilies and a large 8' x 4' pond which had a shoal of very nice Golden Orfe, provided by our Editor. Other participants to our stand were Siporax (Bio filter media), King Fisheries (Croydon) and Interpet Products.

It was good also to see our President and wife on the Sunday and many top people in the Aquatic World and Pet Keeping hobby were entertained in our Hospitality Suite.

JOE NETHERSELL, FBAS Chairman

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## FBAS NEWS

As a result of its ever-increasing close associations with the aquatic Trade, the Federation of British Aquatic Societies is pleased to announce even better awards for the hobbyist in 1992. In a recently completed agreement with the Federation,

**INTERPET LTD.** 

have extended their generous sponsorships to 1995. Interpet-sponsored awards include:

### BEST IN SHOW TROPHY

for ANY SOCIETY OPEN SHOW, irrespective of differing Show Rules. If your Society runs an Open Show ... you can apply.

### INTERPET GOLD PIN FOR BEST IN SHOW

again available to ANY Open Show. Back-dated for 1992 Shows already held. (see details below)  
Winners qualify for British Open Fish Championship.

### FBAS CHAMPIONSHIP CLASS TROPHIES

at FBAS Rules Open Shows

### FBAS SUPREME CHAMPIONSHIP

for FBAS Championship Class Trophy winners and Best in FBAS Shows.

### BRITISH OPEN FISH CHAMPIONSHIP

open to previous year's winners of any Best in Shows, and winners of major annual competitions such as Champion of Champions, Fish of Fishes, Fish of the Year, Supreme Championship etc.

Additionally, Interpet are sponsoring this year's **Supreme Festival of Fishkeeping** (Pontin's Sand Bay Holiday Chalet Hotel, 6-8th November) at which there will be a European Open Show to add to the already crowded list of attractions.

### ROLF C. HAGEN

support will continue to include the following:

#### OPEN SHOW AWARDS PACK

Nutrafin Sweatshirt and Powerhead for Best in Show  
Nutrafin Sweatshirt for specially-nominated Classes  
Nutrafin Foods for Class winners

Additional gifts (direct from Hagen on receipt of special application form) for previous Sweatshirt winners

### POWERHEAD OFFER

Societies affiliating to FBAS for 1992 will receive **FREE** Fluvial Powerhead

### HAGEN HELPLINE ADVICE CENTRE

at major aquatic events.  
(Next appearance at Scottish Aquarists Festival)

Application details for Open Show Awards and Show Packs, as detailed herewith.  
(To: FBAS Trophy Officer, address below)

#### Distribution of Interpet Gold Pins, Best in Show Torphies

Society Show Secretaries (with Open Shows yet to come) should apply to FBAS Trophy Officer directly, enclosing a copy of their draft Show Schedule. Winners of 1992 Best in Shows, at Shows already held, send evidence of Award (Winner's Card or photocopy) to receive Gold Pin direct.

#### Distribution of Hagen Open Show Packs

Apply as above, sending a copy of your draft Show Schedule.

NOTE: in both cases, Societies' final Show Schedules MUST carry relevant advertising material from sponsoring Company.  
This is available on application from FBAS Trophy Officer.

### AQUARIAN

have generously sponsored the new **Fish Measuring Caliper** for Judges' use at Open Shows and, more recently, aquarists visiting the *Ilford A.S. Convention* will have benefited by the Company's support for this event too. At the end of the year, again at *Weston-super-Mare*, the *Final of the Aquarian/Practical Fishkeeping AQUACHAMP* competition will be held.

Judges and Speakers who have not yet seen a copy of the new **FBAS Fishworld** magazine are in for a treat from next year: Aquarian are sponsoring complimentary copies during 1992. To make sure of your copy, please send your current address details to the **FBAS General Secretary** (address below).

Its never too early to book accommodation at the **Supreme Festival of Fishkeeping** — the rates are even the same as last year too!  
Adult rate is £57.00 per person; child rates are split into two age groups: 11-15 £35.00, 2-10 £20.00. Deposit required is £15.00 per person, regardless of age group. Day visitor admission is £1.50 per adult, 50p per Senior Citizen and Children under 15.

A comprehensive **Brochure/Booking Form** outlining the various aquatic attractions is available from:  
Colin Richards, Beechwood Cottage, Long Grove Wood Farm, 234 Chartridge Lane, Chesham, Bucks HP5 2SG. (Tel: 6494 773094).

Contact addresses:

FBAS TROPHY OFFICER —

Alan Henderso, 5 The Nook, Corby Village, Northants NN16 1XA

FBAS GENERAL SECRETARY —

Adrian Dempsey, 194 Greenhill Road, Greenhill, Herne Bay, Kent CT9 7RS

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## Judges Corner

by Peter W. Cottle,  
Chairman, Judges and Standards Committee

#### THE SENIOR JUDGES

Many judges have queried the fact that they appeared to have received an incomplete set of size sheets. This was not a mistake or omission — we simply reprinted those sheets which had had alterations on them.

The actual mistakes (computer or brain errors?)

**Class L** *Leptobotia elongatus* & *L. Manichuria* should have been placed in Class M along with *Leptobotia ornatus*. We may review this classification at year end as we now believe that these fishes have pre-orbital spines which would tend to place them all in Class L. For the time being, show and judge in Class M.

**Class B** Add *Barbus fasciatus* 75mm  
Add *Barbus caninus* 40mm

**Class D** Add *Parapetania tetracanthus* 200mm  
Delete *Amphilophus robertsoni*  
*rostratum*  
*tuyerense*

**Class D** Alter sizes. *Theraps robertsoni* 200mm  
*rostratum* 235mm  
*tuyerense* 240mm

### WALTHAMSTOW & DISTRICT AQUARISTS' SOCIETY

#### OPEN SHOW

SUNDAY  
6th September 1992



PATH FINDER LODGE SCOUTS HALL  
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for details contact:

ROY PARNELL  
TEL: 081-521 3383

### Hounslow & District Aquarists Society

#### 29th OPEN SHOW

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Show Secretary Trevor Butler 17 Riborough Road Maidenhead Bucks Tel: 0628 25581  
How Secretary Bob Nelhams 35 Essexford Avenue Ashford Middlesex Tel: 0784 250880

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## Hampton Court Palace International Flower Show 1992

8 - 12 July

Once again, the FBAS will be present at the third year of this excellent event.

It is even more exciting this year, as both Her Majesty, The Queen, and His Royal Highness, The Duke of Edinburgh, are to visit the show on Preview Day.

The estimated attendance on that day will be around 10,000 visitors.

The much sought after 12 aquatic displays will have a range of themes with titles such as "Visions of an Oriental Pool", "A Walk on the Wild Side" (Native Water Meadow scene); "The Garden under the Sea"; "The Aqueduct" (Water Gardening for Everyone); "The Lily Pad" — FBAS (A Trio of Ponds landscaped with pond marginals and bog plants) and finally "The Slate Garden". Other creations are expected to include "A Snowcapped Mount Everest" and "Concord Created in Flowers".

The difference between this exhibition and the Chelsea Flower Show is that the size is much larger. You can actually buy and take away your purchases the same day. The Exhibition is sponsored by Network Southeast, so do try to travel by train. A Joint Ticket can be purchased which will save you money.

Answer these three questions to Win Two Free Tickets to the Exhibition. Tickets include free rail travel on Network Southeast.  
Must be received by 1st July 1992

1. When was the Great Fire of Hampton Court?  
8th June 1885    31 March 1986    17 April 1987    8 May 1988
2. Only three of Henry VIII's wives died natural deaths — which one died at Hampton Court?
3. The kitchens, Great Hall and the Royal Chapel date from the time of Henry VIII.  
Who was the architect who planned and built most of the rest of Hampton Court as it now stands?

**FIRST CORRECT ENTRY OPENED  
ON 1st JULY WINS**

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## "Pot Hunter"

by "Shorty" of Corby



THE year was still 1968, and after our visit to the Trout Farm, my wife and I decided to join 'THE FRUIT & NUT CASES' which were known locally as 'Corby Aquaria Society'. You should realise that we had been blessed ... ??? ... with a 4' inch & a half angle iron tank. We decided to go to the Club's next meeting which was held in a local hostelry ... thank heavens!

We could not quite understand what was going on when we saw people bringing in their little fish tanks and sweet jars in which resided a fish of some description. I remarked to the wife that these must be some of the less rich members of the Club, as they could only afford little tanks to keep their fishes in, whereas we must be in the MEGA RICH class on account of our four footer!

When we were asked later if we were going to put fish on the bench next month, we said we only had one tank and it was too big to move! We were soon put right to the ins and outs of transporting and showing fishes.

We were invited to participate in a Fish Contest, amongst fishkeepers from the now defunct Youshill Club and Bedford and three others from this County of Northants, which are now also defunct. Kettering, Wellingboro, Rusden and a few others which are probably dead as well from the area now known as Milton Keynes.

We set off on a bright Sunday morning with a couple of fish in sweet jars, ready to take on the night of the Southern Societies. We came away triumphant, in the fact that we had managed to get two fourth placed cards.

We did not see any of the Judges whom, were were told, were a special breed of men. Very standoffish — very insular and would not give you the time of day if they could help it. They came in quietly and disappeared like wraiths in the night when their job was over. I was sure

they all had done their training with the S.A.S. (I am equally sure that when money prizes are up for grabs at Open Shows or Festivals, the judges participating will with they had trained with the S.A.S.)

However, the months rolled by and we were not without success on the Show Bench at Open Shows and Monthly Table Shows.

A pair of Velitera Mollies (Green) I had purchased provided prolific, so I put some into the garden pond (about 20' in length) one late, spring day and left them there until October. Boy! Did they grow.

They looked completely different from their brothers and sisters raised in the house. But there was one who was a King amongst Mollies, he was superb. He was shown the following year at all the venues which were within striking distance. Open Shows to the North, South-East and West were attacked with gusto. He won at Invitation Matches and Challenge Matches. We even joined the Wellingboro Club so we could plunder their prizes with "Mr. Magnificent". All in all, he won fifteen firsts. It was a pleasure to go to shows on a Sunday, 'cos I knew I would not come back empty-handed.

But by then, the die was cast. Success went to the head and suddenly I decided it was no good going all over the country with one fish to win one card. I needed two or three fish which were also superb specimens of their respective Class and I would come home laden with Cups. I did not know I had become one of the breed known as ... "Pot Hunters".  
To be continued

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## CLUB NEWS



### Ilford & DAS & Pondkeeper Society

#### ANNUAL AQUATIC CONVENTION RETURNS

Ilford & DAS Pondkeeper Society held their first Annual Aquatic Convention on Saturday 25th April at Woodford High School in Woodford Green. Supported by the FBAS and "Aquarion" they presented two speakers through the afternoon. 130 visitors saw Trade Stands, Raffles, a Mini-Auction and home-made meals.

The Aquatic Convention was started by Hendon AS, an active Society formed in 1947. Hendon started inviting overseas visitors to lecture in 1966 and the tradition continued until 1984. Top Aquarists such as Bill Tomey from Holland, Professor Conde from France, Herbert Axelrod from USA and more, all lectured at the 'Hendon Convention' with audiences that grew to be in the hundreds.

Ilford therefore modelled their convention on the Hendon one and were very pleased to see that Henry White, Chairman of Hendon, was at this first show.

The lecturers were Bernice Brewster, who runs her own Aquatic Consultancy Service from Walthamstow (081 531 2423 for postmortems etc.) and Steve La'Thange from the USA who now runs Kingfish in Bristol.

Bernice talked on 'Keeping Healthy Kai' with slides showing many of the diseases, parasites and general catastrophes that can befall Kai. She emphasised that the solution to these problems was good water quality via proper filtration and control.

Steve showed slides of his home in Rio, Brazil and his trips up the Amazon to collect local fish. His findings on these journeys were surprising — for example, Corydoras barbados were found in water at Ph 8.2 but at zero hardness and a temperature of only 65 degrees F. Amazon Swords were shown to be a marginal plant with giant leaves growing out of the water.

During the Convention member Rab Dingwall was made a life member of Ilford by Chairman Mike Shadrack.

Mike thanked the FBAS (who had a stand at the Show) and "Aquarion" for their sponsorship and promised an even better show next year.



Left to Right  
Mike Shadrack (Ilford Chairman), Dr David Ford ("Aquarion"), Bernice Brewster (ACS), Steve La'Thange (English Bristol), Bob Esson (President FBAS), Joe Nethersell (Chairman FBAS).

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## It won't happen to me ... will it?

by Joe Nethersell, Chairman

HOW many times have we heard the sorry story of sudden, unexplained fish deaths? All our friends pour forth various causes and solutions, but still the fish are dying and we don't know why!

Even the most experienced of fishkeepers are guilty of making mistakes and I can put my hands up and say, I made a very silly mistake recently. What was this horrendous crime you ask?

On a recent visit to a beautiful county in the South of England, I saw a very nice looking 6-7" Kai, I brought it home and placed it in my pond containing a mixture of Kai, up to 20" ..... result, unexplained fish losses ..... **my best fish were dying.**

Sometimes, there are benefits to being Chairman of the F.B.A.S. and my frequent contact with Mike Clarke of Interpet Ltd paid dividends on this occasion. Mike rang me about this year's Festival of Fishkeeping and I told him the sorry story. He told me to do nothing and wait until he contacted me, within the hour the door bell rang and Mike and Adrian Exell were on my doorstep, armed with Pond Check Test Kits and Interpet's Pond Guardian Toxic Salt.

pH fine; Ammonia slightly up; Nitrate OK

..... where's the problem???

Closer inspection of my new fish proved the cause, it was a carrier of both parasitic and bacterial disease.

### QUARANTINING MY NEW FISH COULD HAVE PREVENTED MY SAD LOSSES.

If I tried to tell you how sick my fish looked, it would take far too much space, suffice to say they looked at death's door.

I am really pleased to report that after following Adrian and Mike's advice, my fish are all looking fit and well with no further losses to date. A course of treatment with Interpet's Pond Guardian, Anti-fungus and Bacteria and Anti-Parasite has done the trick.

The moral of the story is ..... even Chairmen of Federations should quarantine fish and test the water conditions in their ponds, if I can get it wrong, after all my years of fishkeeping, then so can you ..... **— be warned!**

My sincere thanks to Adrian and Mike for their help. They obviously don't usually make 'house calls' but the Interpet Advice Line is open every weekday from

4 — 5p.m.  
on 0306 881033

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## THE WATER OF LIFE

(continued)

FINAL PART of a Series

by Adrian Excell Bell

.... Incompatible water conditions may not be the major cause of failed fish keeping, but it is another significant nail in the coffin.

### What are these water features?

pH  
pH is quite a complicated feature and too detailed analysis will probably only serve to confuse. Simply speaking, water is classified as being either acid, neutral or alkaline. pH is measured on a scale from 0-14, 7 being neutral, 7-14 being progressively more alkaline and 7-1 being progressively more acid. This scale is logarithmic, meaning a change of 1 unit is actually a ten times change in the acidity of alkalinity, i.e. pH 6 is ten times more acid than pH 7 and one hundred times more acid than pH 8. Most fish live in water which varies from pH 6 to 8.7, although there are some species which live outside this range (see table in March issue). In the aquarium a minimum pH of 6.5 is sensible because filters do not work as efficiently below this level.

pH is now very simple to measure using a tablet test kit. A sample of water is taken, a single tablet added which causes a colour change. This is matched up with a colour standard on a comparator chart and the resulting pH value given.

Water's pH is closely linked to water hardness. The harder the water the more alkaline it is likely to be, up to a pH of about 8.3. This is because the most common hardness salt, calcium bicarbonate, is alkaline in nature. It is also a buffer, which means that it resists pH change. So, hard water has a higher and more stable pH. Soft water is usually acid in nature, it has no alkaline hardness salts and normally comes from areas with a high level of rotted organic material (peat

bags or forest leaf litter) which leach natural tannic and humic acids into it. Soft water pH is also likely to be less stable because it contains no buffers. It is important to note, however, that water authorities sometimes add lime and other alkaline materials to natural soft acid water to raise the pH, because otherwise it corrodes the water supply pipework. So, soft water's pH may still need adjusting down to suit the fishes' needs.

You have analysed your tap water with a simple test kit, and selected your fish. Human nature being what it is, you probably live in a hard alkaline water area like Bristol and have set your heart on Tetras, Rams and Angels (soft water fish). So, how do you go about supplying the right type of water?

### Soft from hard

In this country more tap water is hard and alkaline, having been pumped up from ground water reservoirs in chalk.

The process of reducing pH and hardness are closely linked. As we saw earlier, hard water is high in the material calcium bicarbonate, which is a pH buffer, i.e. acts against processes which try to change the pH. You therefore have to remove this buffer, i.e. soften the water before you can drop the pH. Rainwater is an alternative source of acid soft water, but it is often polluted and even in this country is an unreliable source of water.

The simplest solution is a partial deioniser, like Water Guardian resin, which you simply pass your tap water through. The resin removes the calcium bicarbonate (the buffer) and the majority of the water hardness) leaving behind all the essential trace elements. All that remains to do is to aerate the water for a few hours and you have soft water with

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## The Water of Life

(continued)

a pH around neutral. (See the table showing the effect of Water Guardian on Dorking, Surrey water).

If you want an acid pH, add a pH adjuster (Easy Adjust for correcting Alkaline Water). These slightly raise the dissolved salt content, but offset this with a radically improved pH stabilising effect. The alternative is to acidify the water by filtering it through peat, which is a bit more difficult to control, requiring a lot of trial and error to achieve the correct result.

### Hard from soft

In general this is less difficult. Good results can be achieved by using a balanced physiological salt like Aqualinium at a level of 1 gram per litre, combined with calcium-rich substratum rocks (like coral sand and tuffa rock). If the pH needs to be raised, then a pH adjuster like Easy Adjust for correcting Acid Water should be added to achieve the required pH level. The results should be monitored with Easy Test High Range pH Test Kit.

So, we have supplied our fish with water which has the feature of the water in which they evolved, so ensuring optimum results. This, unfortunately, is not the end of the matter. There are a number of processes which occur in every aquarium, which detrimentally affect the water quality. And, understanding of what these processes are; what affects they have and what we can do to counter them is absolutely essential to prevent fish disease and death.

### pH Changes in the aquarium

Unfortunately, there are a number of processes which occur naturally in aquaria that constantly attempt to alter the perfect pH that you have provided for your fish. 1. Carbon dioxide is added to the water by the breathing of fish, plants and other living organisms. This forms carbonic acid and drops the pH.

2. Carbon dioxide is taken out of the water by plants to photosynthesise and produce energy. This raises the pH.

3. Very heavy algal blooms, such as green water problems in ponds, can cause massive pH rises. They do this by removing carbon dioxide from the calcium bicarbonates, thereby removing the pH resisting buffers and forming very alkaline lime water.

4. The process of breaking down toxic waste in filters causes the formation of nitrates and nitric acid, which exhaust the pH buffer if present, and then drop the pH.

5. Calcium-rich substrates dissolve into the water increasing the hardness and buffer content to the water, and raising the pH.

These processes can move your aquarium pH sufficiently to cause stress, disease, and in extreme causes death as a result of the pH level itself.

The carbon dioxide produced by respiration of living creatures and used by plants during the day usually only produces a relatively small daily cycle of pH change, which is further buffered if any hardness is in the water. In general the fish can cope with this small daily cycle. Good aeration and circulation of water in aquariums assists in the "gassing off" of the CO<sub>2</sub> into the atmosphere, further reducing its effect on the pH.

Green water and other algal blooms threaten fish through oxygen depletion and extreme pH raises, so they should be dealt with as quickly as possible, using a product which removes them without damaging any plants, and hence the balance of the aquarium/pond. A product such as Interpet Green Away is ideal for this purpose.

In soft acid water aquariums, great care must be taken that the substrates and decorative materials used is inert and does

## The Water of Life

(continued)

not contain lime or chalk contamination, which will simply increase pH and hardness. On the other hand, calcium rich substrates and rocks (coral sand and tuffa rock) will help to counter pH drops in alkaline aquaria.

Preventing the ultimate drop in aquarium pH caused by the filtration system can be achieved in a number of ways. A simple and effective method is by maintaining a pH buffer level by adding suitable pH buffer salt to counter the acidification. Water changes literally dilute the nitric acid content of the water. These are much more effective when

coupled with a thorough removal of acid organic detritus from the substrate. The fresh water-change water also replenishes the aquarium's buffer levels. The removal of nitrate, the end product of the filter's water processing activity, also reduces the acidification of the aquarium by literally removing nitric acid (nitrate is in fact just buffered nitric acid). This can be done very simply in a freshwater aquarium by using Nitrosafe, a simple sachet which when added to the aquarium rapidly and safely absorbs nitrate. Biological breakdown of nitrate in freshwater and marine aquaria can also be hampered by a special system like the Nitrex Box.

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## aquarian

ADVISORY SERVICE  
with Dr David Ford

Q.

The Yorkshire Television Community Education Unit, advised me to write to you for free advice about a certain Tropical Fish Book. Freshwater and Marine Aquaria, foreword by Robert Morris, former curator New York Aquarium (New York Zoological Society) by Reginold Dutta. The last known edition published was in 1976 by Octopus Books Limited. Price £2.96. I wish to question, what is printed on Page 28 about FLUORIDE. It states it is a dreadful problem. Trainers of wild animals in Zoos and circuses have long used fluoride to tame ferocious animals. Added to their drinking water, the nerves are affected and the animals become docile. It also states "...particularly harmful to marines".

Would you enlighten me on this please? Can it really make animals docile?

C.T. of Notts

A.

There is a big difference between the high dose levels of compounds such as Sodium fluoride and the soluble fluoride added in trace amounts to drinking water. Large doses do indeed have sedative effects, but this practice has been replaced by better methods, and attitudes to animals!

The trace amounts added to drinking water do indeed help teeth strength, especially in children and trials have shown it has no effect on fish. In fact, the natural waters of areas such as Cornwall contain much higher levels of fluoride and yet it is a popular area for fish farming.

Q.

I am designing a fish tank feeder for goldfish as part of my CDT technology project. For part of the project I need to research into the market any devices already available which control fish feeding for aquariums, ponds etc. I would be very grateful if you could send me any information regarding such devices in the way of designs, manufacturers' instructions etc.

A.W. of Oxford

A.

Thank you for your letter. I am sorry if the reply has been a long time — we get hundreds of letters and each must wait its turn to reach the top of the pile.

There is one major manufacturer who has an autofeeder on the market — Eheim of Germany. The unit is battery driven and drops a portion of flake every pre-programmed number of hours.

You will find the model advertised in the aquarium magazines or contact the importers, John Allan Aquariums, Eastern Way Industrial Estate, Bury St. Edmunds, Suffolk IP32 7AB (Tel: 0284 755051).

Personally, I believe it is better to let the fish starve for one or two weeks. This occurs in nature and is useful in absorbing stored oils (like our fat) and also improves water quality.

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## aquarian

ADVISORY SERVICE

However, here are some hints

1. The average tropical fish requires 3 flakes a day of our standard size flake for a maintenance diet.
2. We supply a wide range of flake foods but obviously the Tropical blend is the best choice.
3. The flake only has 4% moisture so it will not become stale even after several days... however, it must not be made wet or bacterial decay will start. Design your feeder with a splash guard.
4. Look at our tablet food... a battery operated dispenser of a tablet a day will suffice for all size tanks.
5. Nothing is better than plastic as a building material.
6. The cheapest auto-feeders on the market are Feeding Bleds. They are only Plaster of Paris with ground flake foods therein. They alter the water chemistry so I do not recommend them. For prices, see the Aquarist and Pondkeeper or Practical Fishkeeping magazines.

Good Fishkeeping

Q.

I am writing to you about my Goldfish. I bought it quite a while ago and it was completely orange. I put it in the same fish tank as a black and orange goldfish and now the orange goldfish has started to turn black on the tips of its fins. Also it has a dot of black on its body and a black dot on its gill. I would be very grateful if you could send me any information on why this has happened to my goldfish. I enclose a stamped addressed envelope so you can send me the information.

S.H. of S.Yorks

A.

Over many years, breeders have developed the gold Goldfish (from its original metallic grey) and then varieties such as the blue, red, multicolour (Shubunkin) and white (albino), not to mention Comets and Veltails, Black Moors and Orandas etc.

With so many varieties around casual (or accidental) breeding has produced cross breeds. The analogy in dogs where breeders have developed everything from Chihuahuas to Great Danes, but everywhere can be found mongrels.

Without the dominant gene for the red-gold colour the 'mongrel' fish soon lose their intensity and become colourless i.e. white. If you want prize winning reds or golds you need to get pedigree stock and perhaps breed your own. Similarly the fish develop melanine colouring (black) which is often transient. Your fish may go silver or develop black patches and spots.

There is nothing wrong with the fish — no more than there is anything wrong with a mongrel dog — but the colour problem is in the genes, so nothing can be done about it.

Goodfishkeeping!

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**Q.** Please send me the free booklet "A Guide to the Care of Tropical Marine Fish", as advertised in the February 1992 issue of *Aquarist* and *Pondkeeper*. If available, I will also readily appreciate more information on how the osmotic effect affects freshwater and marine fish differently. I read about the brief explanation by Dr David Ford in the article for beginners but feel that I have not fully understood the osmotic effect. A more detailed explanation would really help, especially with illustrations on the flow directions of the fluids involved.

C.Y.L. of Canada

**A.** Thank you for your letter. Enclosed are all our Guides including *Marines*, as requested. Osmosis is the name of the physical process by which water molecules pass through a semi-permeable membrane. If the solutions each side of the membrane are different in strength water flows from the weaker to the stronger to equilibrate the system.

Fish developed in the Devonian oceans some 400,000,000 years ago. Those oceans were less salt than today's (about 2% salts against modern 3.5%) and the primordial fish were in perfect osmotic balance with the ocean. They carried the body salt levels with them to today's oceans and so there is imbalance between the fish and the sea.

The membrane is the fish's skin and the difference is the vast sea versus the lower salt body fluids. Hence, by osmosis, the fish is dehydrating all the while (in freshwater the reverse occurs and fish are "drowning" all the while).

To compensate, the marine fish drinks the seawater, extracts the salts (via gills and kidney) and packs the water back into the body cells. This means a marine drinks the water it lives in, unlike freshwater fish, and that is why an ammonia crisis can poison a marine fish within hours whereas a goldfish can swim around in its own loo for 20 years.

**Q.** I wonder if you could give me some advise on the health of my fish. Two months ago I purchased two comet goldfish of small size for an indoor aquarium. Within a week of purchase one of the fish developed a white lump on the right hand side of her chin. I have assumed this to be a fungal infection and have treated the tank with various fungal remedies, including your own but nothing seems to shift the lump. I have tried isolating the fish and also dipping the fish into a strong solution of your fungal remedy as recommended in some of your literature but still the lump does not vanish.

I have been fishkeeping for some years and am competent in keeping my tank clean and hygienic using your *Safewater* and *Tanksafe* products. I feed a good quality diet and do not overfeed.

Therefore could you please advise me as to what this lump on my fish can be and how to treat it. The second fish I purchased is also developing an identical white lump in exactly the same place on the right hand side of the chin and I am beginning to fear they may have some kind of cancer. The behaviour of the fish is not abnormal and they have no other visible symptoms.

J.A.F. of Tamworth

**A.** Lumps on fish, especially Goldfish, are usually simple tumours. These are no worse than human warts and can be ignored. The only cure is surgery and that would prove too risky with any fish except perhaps a prize-winning Koi.

If the lump is like a blob of candle fat, it is a virus infection called Carp Pox (most common in pond fish in the Winter or Spring). There is no cure but the fish usually develop self-immunity and the symptoms disappear.

If the lump is red i.e. inflamed, that indicates bacterial activity and so may be a forming ulcer. In this case antibiotic treatment is required.

King British of Bradford make a special antibiotic flake or pellet to order, but that order must be through your local Vet. If the Vet decides to treat the fish tell him/her that Oxolinic acid is effective. If he/she wishes to consult a fish Vet, they are listed at BVA HQ (ring 071 636 6541) or contact the Fish Veterinary Society, Hon. Membership Secretary, Andrew Grant MRCVS, Marina Harvest Ltd, Lochailort (06877 255).

Large Koi can be injected at the site of any ulcer, but a 7 day course of antibiotic feed is best for smaller fish.

As with any disease the water quality must be good ... poor water is laden with bacteria. Do lots of partial (never more than 50%) water changes and filter the aquarium continuously. Do not overcrowd or overfeed.

## BREEDING BETTA COCCINA

by Chris Cheswright, Southend, Leigh & District A.S.

**B**ETTA COCCINA prefer soft acid water and were kept in rain water. Not being a lively fish they are seldom seen and require plenty of cover in the form of plants and cave areas, made from half flower pots.

On 8.2.92 after a foggy start the sun came out and warmed the fish house up a few degrees and seemed to trigger off the urge to spawn. A half flower pot placed at the front of the tank proved the ideal venue and a good viewing area. The male was in resplendent colouration and was courting the female, who showed great interest. The male eventually encircled the female, who had adopted a head down position, in typical anabantoid fashion. They kept this position, with little apparent movement for some 20 to 30 seconds. The male then left the embrace with the female in an apparent comatose state. He retrieved the eggs from the bottom of the aquarium in his mouth. At first I thought he was eating them as he had made no attempt to build a bubble nest (the few previous reports on breeding had indicated a bubble nest).

This process was repeated again and again, the male as it turned out was

storing all the eggs in his mouth. At the end of the spawning sequence the male then built a small bubble nest at the closed end of the flower pot, the white eggs being deposited in this. The female had already been chased off and the male stood guard over his brood. The female was removed for her safety.

He stood guard all that day, but on checking the aquarium the next day there were no eggs in the flower pot. On looking around they were found scattered around the aquarium, some were floating at the surface — disaster I thought. The eggs were all white and look fungused, but I decided to scoop some out into a margarine tub and left them for about 36 hours expecting nothing. To my surprise when I looked in there was movement. A number of fry had hatched and were darting around dragging huge white egg sacs. As the egg sacs were used the fry became black and after a few days were swimming freely. They are quite large when compared to Gourami fry but needed infusoria for the first few days. After this they took the normal foods, brine shrimp and micro worm. I have found the fry to be fairly slow growing and quite inactive.

## What's the difference?

by C.A.T. (Cyril) Brown  
Riverside A.S. and Judges & Standards Member

**I**N 1987 a picture and article was published regarding a new species of Barbus i.e. BARBUS CANIUS. Little is known about the species and although the F.B.A.S. published an illustration and description in Supplement No. 8 with the most up-to-date information available, the fish still appears on the show bench incorrectly named, usually as BARBUS GELIUS therefore it is perhaps time to set the record straight.

**BARBUS GELIUS**  
(Hamilton) Size 40mm



A small slim bodied species silvery bronze to gold in colour with a subtle light golden stripe starting behind the operculum, terminating on the caudal peduncle. Five black blotches are present on the body, one behind the operculum, one each on the dorsal and anal contours intruding on to their respective fins, one with a light centre situated midway between the dorsal and pelvic fins, and the fifth and rear-most blotch forms a bar anterior to the caudal peduncle, two small black spots may also be present at the base of the caudal fin.



**BARBUS CANIUS**  
(?) Size 45mm

A silvery fish with four complete vertical dark bars which run between the dorsal and ventral contours, the foremost runs obliquely behind the head, the second lies between the dorsal and pelvic fins intruding onto them, the penultimate bar runs from behind the dorsal fin to the anal continuing onto that fin and the fourth and last bar is present anterior to the caudal peduncle.

From the foregoing it will be evident that errors in identification between these species ought to be impossible, considering that BARBUS CANIUS displays dark bars and BARBUS GELIUS dark blotches.

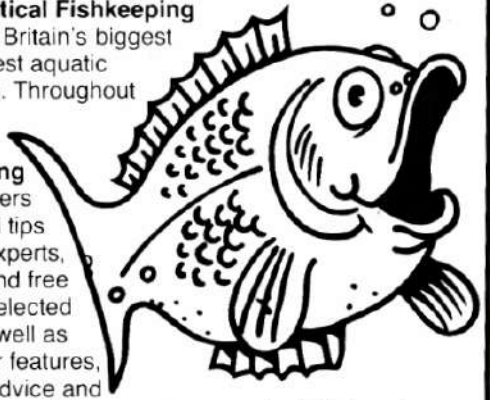
The above fishes together with others in the series will be featured in a new series of books to be shortly published by the F.B.A.S. These will not only identify fishes and highlight the differences between them, but will also cover Temperature, PH, Ecology, etc., as well as compatibility with other fishes and breeding procedures. The above sizes are taken from the current F.B.A.S. No. 6 Booklet entitled National Show Fish Sizes and Technical Information.  
CAT Brown 1992

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## SETTING UP A SPECIES TANK

THE ARCHER FISH by Carl Simpson, Corby & District Aquarist Society

THE temptation of a mixed community tank is hard to resist, especially when a dealer offers a wide range of colourful fish. However, the advantages of a single species tank are numerous; perhaps most importantly conditions can be maintained at an optimum level for the health and well-being of your charges. You can also keep some fascinating fish for which the community tank is totally unsuited.

The Archer Fish (*Toxotes jaculator*) is the most commonly seen) is an intriguing specimen. It is quite attractive, greyish-silver with black markings, growing to about 15cm. The real attraction is not its beauty but its unique method of catching food. The mouth structure is specially formed to shoot out jets of water. When aimed at an insect resting on a leaf, above the water level, the Archer hits with unerring accuracy and with rapid repeats if necessary. Flying insects can also be brought down with this method.

The Archer is also known to leap out of the water and catch its prey. If all this does not surprise you, think of the optical problems facing the fish. Light refraction occurs in water. Try putting a straight stick into clear water, it will appear bent. The Archer has to allow for the angle of refraction when taking aim.

To set up a species tank, 24" is the minimum, 36" would be better, and about six fish could be kept in the larger tank. The water must be brackish (salty), since

the Archer originates from estuaries and mangrove swamps in the Far East. Temperature is not critical and can range from 23 to 29 degrees °C. The water level is the critical factor. The tank needs only to be two thirds full. This will permit the growth of emergent plants onto which the prey can settle. Actually, many commonly sold aquatic plants are really bog plants that do better and may even flower, in an emerged state, rather than perpetually submerged.

Failing this, ledges can be made in the tank with bogwood or rocks and pot plants can be introduced above the water line. It could be a gentle introduction to the noble art of aquascaping.

A good cover glass is essential to stop any unwanted escapes of flies etc., and to protect electrical equipment from splashes. Filtration should be at a low turnover to minimize turbulence, a power filter is better than undergravel and the level of gravel can then be kept low, important when your depth is reduced.

Food supply could be a problem, but the Archer can be induced to shoot pieces of meat from a leaf, or take floating food from the surface. Monkfield Aquatics of Cambridge sell live foods, like crickets by post, and don't forget that maggots from angling shops quickly turn into flies.

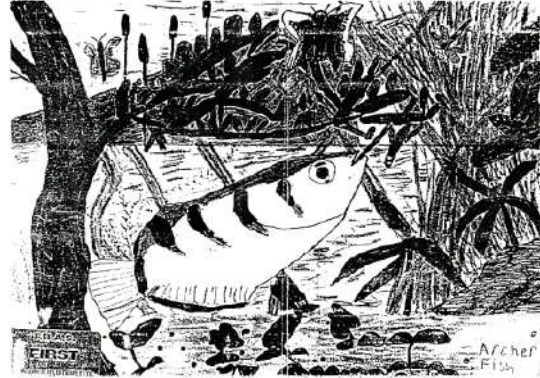
## Setting up a Species Tank

(continued)

I have not kept them yet (Jackie really objects to flies in the house), but my son Samuel who drew the picture, is keen to try. Maybe between us we will set up the single species tank and buy some Archers. Perhaps what deters me is that I like to breed my fish and no captive breedings

of Archers have been reported, still there's always a first time.

Samuel's picture of the Archer Fish won First Prize in the children's Painting Competition at East London A.P.A. Open Show last September.



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The top layer is oxygen rich, and converts (oxidizes) AMMONIA to NITRITE then to NITRATE.

Deeper in the layer of silt etc., low oxygen regions prevail — here lies the key. The bacteria find themselves in a low oxygen region, they have to find a supply of oxygen other than is available in the water. They obtain their supply from the OXIDES, the two OXIDES available are NITRITE & NITRATE, the waste product is NITROGEN GAS to atmosphere.

Present filter methods only treat aerobically (with oxygen) and create NITRATE thus the aquarist has resorted to large water changes to maintain water quality.

Foam and plastic media are not good substitutes for silica based bacteria, because the surface is smooth in bacteria terms they have to secrete a polymeric type adhesive to protect them from water shear, this results in death and regeneration, the resulting slime blocks foam and floss etc., many of you think this dirt is from the aquarium or pond, when in fact it is dead bacteria caused by using unsuitable material.

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## Powerheads Accolade for Interpet

A range of powerheads developed by aquarium accessories specialists Interpet has received a major accolade from a marine systems manufacturer, for the reliability of their products.

Maelstrom Lancaster have developed reef surge simulators for marine aquarists, which set up secondary currents in the aquarium in order to avoid deadspots and improve circulation of oxygenated water. This involves using a power head at each end of the aquarium, and these are switched on alternately by the system at predetermined intervals to create pulse currents.

A number of Interpet PH4 powerheads have been given rigorous testing by Maelstrom Lancaster for use with their reef surge simulators, and they have found the Interpet product to be extremely reliable, despite such heavy use. "We are very impressed", remarked Mike Eydman, proprietor of Maelstrom Lancaster. "The impellers are usually the Achilles' heel of any pump used in such an application, but these are very well engineered. During testing, the powerheads were set to pulse every ten seconds, and therefore effectively underwent 12 days' use in just one day; the test models have already clocked up the equivalent of no less than three years' continuous use, and are still going strong."

## 1992 OPEN SHOWS & FESTIVALS

Date 1992	Society	Rules	Date 1992	Society	Rules
5/7-6	Sandown Park	A of A	22/23-8	F.S.A.S. (SAF)	Festival
07-6	Aberdeen A.S.	USA	23-8	Ashby A.S.	YAAS
07-6	Deal	H (A)			
	Llanrwst Major A.S.	FBAS	06-9	Cramlington A.S.	FBAS
	Redcar A.S.	YAAS		Darlington A.S.	FBAS
	Stockton A.S.	Ba (C)		Walthamstow A.S.	FBAS
	SPAS	GSGB	12-9	Hourslow A.S.	FBAS
13-6	Stafford A.S.	A of A	13-9	Cardiff F.S.	FBAS
	Isle of Wight A.S.	M(C)		Lincoln F.S.	YAAS
	North Bucks A.S.	De (C)		Salisbury	FBAS
	Skelmersdale A.S.	FNAS	19-9	Plymouth	FBAS
21-6	Hartlepool & Dist.A.S.	F (B)	20-9	Barrhead A.S.	FSAS
	Marple A.S.	FNAS		Lancaster A.S.	FNAS
	St. Helens A.S.	FNAS		Northampton A.S.	FBAS
28-6	Bracknell A.S.	FBAS	26-9	Bristol Trop A.S.	
	Cannock A.S.	FBAS		East London P & A.S.	FBAS
	Sidcup A.S.	FBAS	27-9	Malby A.S.	FBAS
				Mid-Sussex A.S.	FBAS
05-7	Blyth A.S.	K (A)		Plymouth	FBAS
	Cannock A.S.	FBAS			
	N/West Cichlid	BKA	03-10	Goldfish Society	GSGB
	Workington A.S.	FBAS	04-10	Ipwich	FBAS
8/12-7	Yorkshire Koi S.	BKKA		Wyke A.S.	YAAS
	Hampton Court	EXHIBITION		TTAA USA Intclub.	USA
11-7	Port Talbot A.S.	FBAS	11-10	West Cornwall A.S.	FBAS
19-7	Reading A.S.	FBAS	18-10	Fair City A.S.	USA
			25-10	Redcar A.S.	NEFAS
02-8	Newtown A.S.	FBAS			
	Phoenix A.S.	FNAS	31/10-1/11	BAF Manchester	FESTIVAL
	Whitby A.S.	YAAS	6/8-11	Weston Weekend	FESTIVAL
06-8	Strood A.S.	Q (B)	08-11	Bradford A.S.	YAAS
09-8	Tarnside A.S.	FNAS			

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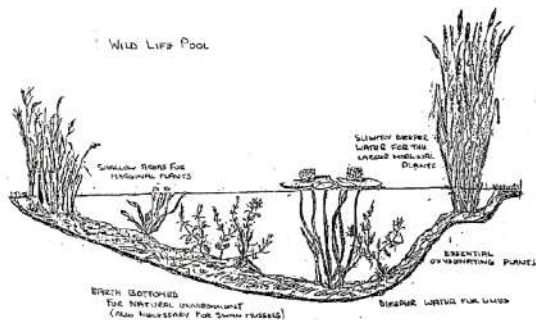
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# PONDS for Wild Life

by Harry Hooper

THE devastation of our natural wetlands caused by modern farming methods or the pollution created from various types of industry has to account for the loss of the majority of our healthy natural ponds and sadly they are still disappearing at an alarming rate. These natural ponds were in abundance up to a few years ago and were teeming with many different forms of wild life. Fortunately the growing interest in water gardening is helping many of the wild creatures that rely on water to survive. More and more individuals are becoming concerned regarding the existence and the conservation of all forms of wild creatures. This is where a garden pond designated to wild life has a lot to offer because with a little help nature will soon adapt to change, especially the amphibians that require water to reproduce, also, many varieties of insects lay their eggs near or under water as the larval stage of their life is dependant on water. A wild life pond will require for more consideration than just digging a hole — installing a liner — filling with water — and leaving the rest to nature. Creating a wild life pond will involve just as much planning as any type of ornamental pond. Design and location is extremely important to encourage wild life to either visit or inhabit the pond, it is imperative that you try to create an environment that is near to nature as possible, this will help the wild life become familiar with new surroundings and make themselves at home.



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Ed.

### Size of Wild Life Ponds

There are several reasons why a pond intended for wild life should not be too small. a) Water temperature will fluctuate too much if a pond is on the smaller side, this will create problems for the pond inhabitants — the larger the pond the better the biological balance will function; b) If you intend to only grow indigenous plants you will find your choice limited as many native plants are fairly invasive and will soon outgrow a small pond; c) Many of the insects larvae prey on other pond inhabitants for food, if the pond is too small many of the other creatures will find difficulty in surviving.

### Fish for Wild Life Ponds

Apart from frogs, newts and toads most members of the family household obviously would enjoy some sort of fish in the pond. You could consider sticklebacks or the very attractive bitterling, but remember should you want to breed the bitterling swan mussels must be present as these fish deposit their eggs inside the mussel until they hatch, but with wild life ponds do avoid large gold fish or shubunkins, and do not be tempted to introduce koi carp although they look and are lovely, they would not be suited to a wild life pond.

### Plants for Wild Life Pond

Plants are extremely important to any aquatic environment. The submerged plants play an important role supplying oxygen to the pond inhabitants. Many insects deposit their eggs on the foliage of the marginal plants, some varieties of insects will lay their eggs on plants beneath the water. The decaying vegetation of

the plants provide food for small scavenging animals dwelling within the pond. When deciding on plant varieties, although it is not absolutely imperative to only plant indigenous plants, it is advisable to consider your particular design of garden. Native plants will blend naturally if you have a wild or cottage style garden.

### List of Native Plants

Acorus Calamus ... Sweet Rush  
Alisma Plantago ... Water Plantain  
Butomus Umbellatus ... Flowering Rush  
Caltha Palustris ... Marsh Marigold  
Cyperus longus ... Sweet Gortalgale  
Eriophorum Angustifolium ... Cotton Grass  
Hippuris Vulgaris ... Mare's Tail  
Iris Pseudacorus ... Yellow Flag Iris  
Mentha Aquatica ... Water Mint  
Calla Palustris ... Bog Arum  
Juncus Effusus ... Soft Rush  
Menyanthes Trifoliata ... Bog Bean  
Minulus Lun. Guttatus ... Monkey Musk Flower  
Myosotis Palustris ... Water Forget-me-not  
Ranunculus Lingua Grandiflora ... Giant Spearwort  
Sagittaria Sagittifolia ... Arrowhead  
Scirpus Lacustris ... Common Rush  
Typha Latifolia ... Giant Reed Mace  
Veronica Beccabunga ... Brook Lime  
Stratotes Aloides ... Water Soldier  
Nymphaea Alba ... Native White Lily  
Nuphar Lutea ... Spatterdock

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# ECHINODORUS The Amazon Sword Plant

PART I by Bill Rundle



THE family Alismataceae comprises of some 12 Genera, with about 100 species of plants that grow mostly as bog plants, and only very occasionally as true aquatics, completely submerged.

Included in the family, are the Water Plantains we find growing in our native streams and marshes, and also in our ornamental garden ponds, where they make attractive marginal plants.

The Genus Sagittaria is also a member of this family, and again, species of these Arrowheads, to give them their popular name, are found in our native waters and ponds, and are also attractive aquarium plants, resembling Vallisneria in form.

Also included in Alismataceae is a group of plants that I believe to be among the most important and interesting that we grow in our tropical aquariums. This is the Genus Echinodorus, the so called Amazon Swords.

Although earlier separated as a Genus by Richard in 1848, the first major description of Echinodorus was done by a Swiss botanist named Micheli in 1881. Unfortunately, most of the plant material that he used is unobtainable or through deterioration, unusable.

In a major review of the Genus by N.C. Fossett, published after his death in 1954, the author paid tribute to the high quality of Micheli's work. He praised the long detailed descriptions that covered all the points that are still relevant today.

To help in the identification of several species Micheli studied the pellucid, or transparent marking in the leaves. Fossett confirmed that these markings were visible, differing from species to species, but noted however they are not easily seen. He cut a small hole in the top of his desk and placed a 60 watt lamp in the drawer underneath and then viewed the illuminated leaf through a microscope.

A German botanist, Buchanan, described some 20 species in a review of the Family Alismataceae in 1903, but we are indebted to D. Karel Rataj, a botanist from Czechoslovakia, who has specialized in the study of aquatic plants, and who has extensively reviewed and brought up-to-date the Genus Echinodorus. Fortunately most of his material is available in English.

Echinodorus are found in Southern North America, Central & South America, where they grow as marsh plants. Some species grow with their foliage emerge for most of the time but with their roots in wet heavy soil, these are usually large plants, too big to grow in the aquarium. They may attain a height of 4 metres. Other species grow sometimes submerged for part of the year. Several of our choicest plants are in this group. Yet others grow as true aquatics and are submerged entirely.

The leaves of Echinodorus form a rosette with the stems growing basically from the rhizome. Very broadly, the leaves are in two forms. Firstly, some are wide and either pointed or rounded at the top with a cordate base where it joins the stem, they are roughly spade shaped. The second group are mostly long and slender, tapering to a point both at the tip and at the base and are sword shaped, hence the popular name Amazon Sword. This group usually have shorter stems than the former.



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## ECHINODORUS

The flower stems can in the larger species grow man high, and may resemble the flowers of our Water Plantain; others float in the water and reach to the surface, and in other species the stems lie prostrate on the bottom.

The flowers are three petalled and sepalled and are usually white or rarely pink. They are bisexual, having both stamens and ovaries on the same flower. However, self fertilization is not possible in all species. Rataj suggests that as a rough guide, plants with triangular leaf stems in section are self-fertile, while those with round stems are not, and so need pollen from a different plant in order to fertilize the seeds.

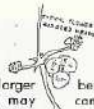
I have self pollinated *E. horizontalis* and produced viable seed. This species does have triangular petal or stems to the lamina or leaves.

When fertilized the ripening seed head forms a spiky globular cluster. Each little single seed or more correctly 'nutlet' has a small beak that points outwards. This cluster is called 'echinate' meaning hedgehog shaped, and as 'dorvo' means tube, in this case referring to the seeds, we are able to arrive at the generic name *Echinodorus*.

The small nutlets may be perhaps 2mm long and differ slightly in shape from each individual species. They are therefore an important clue when endeavouring to identify the species.

South American species of *Echinodorus* are not found just anywhere in the Amazon Basin, certainly they are not found in rivers where most of our attractive Characins are collected.

Amazon waters are grouped into three types. The first are the black water areas of The Rio Negro river. Here, particularly in the upper tributaries, conditions are much too acidic to support aquatic plant life. PH values of 4.0 pH being not uncommon. These waters might



be fine for Cardinal tetras, but our plants cannot grow in them.

Further down we find the second type, the white waters of the Amazon. These waters are heavily loaded with silt, washed down from the terrain through which the head waters flow. This water can and does support plant life, but mostly these are floating plants. The white water areas are subject to heavy flooding for long periods to depths of 12 metres or more. Few, if any of our aquarium plants could survive this, apart from the depth of water, light penetration through these murky waters is minimal and photosynthesis could not take place.

So we have to go to the third water type areas for our aquarium plants. After the heavy flood region the river flows on and widens towards the delta. As it slows the silt is deposited creating mud banks. This clears the water and in these clear, still, water marshes our *Echinodorus* plants grow in profusion. Aquarium plants have for long been collected here, indeed some of the first were transported to Europe by Zeppelin air ship.

Most species of *Echinodorus* adapt readily to aquarium culture, and given the right conditions will grow happily and in most instances propagate.

Water depth is fairly important bearing in mind that several species are bog plants. These and others that only grow a few centimetres tall will be happier in a shallower tank. A good depth of compost is essential, as these plants make a fairly large root system and need room to spread out in. Once planted, Amazon swords prefer not to be disturbed, as usually if a mature plant is lifted and replanted all of its existing roots die off.

It has been to grow a new set before it can obtain adequate nourishes than that it is better to start with young plants and grow them on rather than a large mature specimen.

To be continued in our next issue.....

(continued)

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