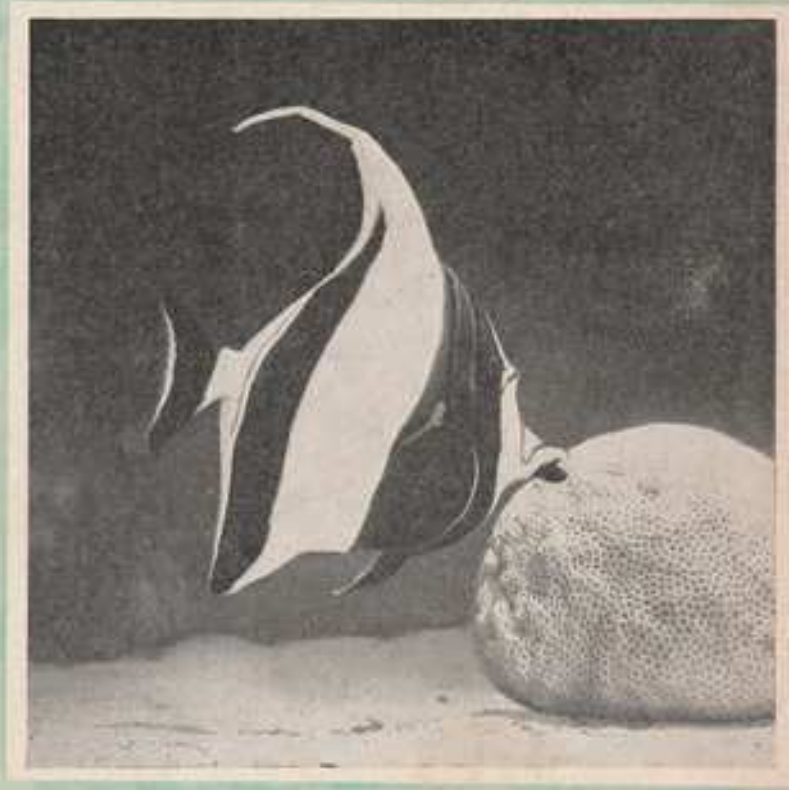
The aquarist

and Pondkeeper

FEBRUARY 1963



MONTHLY
Vol. XXVII No. 11

TWO SHILLINGS

WALTER R. SMITH

For Complete Tropical and Coldwater Aquaria also Tropical Marine

100 Varieties of fish usually in stock on view in 76 polished stainless steel aquariums

POLISHED STAINLESS STEEL

	Frames	Aquariums
24 × 15 × 12	£7 7 0	£9 9 0
30 × 15 × 12	£9 0 0	£11 11 0
36½ × 15 × 12	£10 10 0	£13 13 0

DISTRIBUTOR OF—

- McLYNN'S FISH FOOD
- ES-ES PRODUCTS ELECTRICAL AND GENERAL
- WATER LIFE, AQUARIST, DITCHFIELD'S AND T.F.H. BOOKLETS
- REJECTORS, SEDIJETS, AND MAINTENANCE EQUIPMENT
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- VI-FIT FISH FOOD
- BLACK MAGIC GLAZING COMPOUND
- GLASTICON '303' AQUARIUM SEALER
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Angle Iron Aquariums, Frames and Stands a specialty. Despatched in crates charged at 30/- each, returnable half carriage paid. Odd sizes made to order, painted any colour, guaranteed square and free from welds. Stove enamelled Corner Bows, Bow Fronts and Wrought Iron Units.

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Manchester 4

Telephone: Deansgate 2941 and 2330

YOU ARE INVITED TO SEE AN

EXHIBITION OF TROPICAL FISH

IN OUR NEW M. & R. AQUARIUM

Over 100 varieties on show and for sale. We are direct importers of tropical fish. We stock Marine Tropicals. Fish for personal shoppers only. Club visits by appointment.

M. & R.

466 PAISLEY ROAD WEST, GLASGOW S.W.1

Telephone: IBRox 3615 Open Sundays 11 a.m.—2 p.m.

ARTHUR DERHAM

Maker of 'Elite' Fish Food, the Worlds' Best! in value, in nutritive quality, and in fact, in all that the fishes love. Quietness occasioned by inclement weather has given me a chance to advertise my unique food.

Derham's Luck, an amusing book, but authentic 2/- post paid. *Garden Pools*, a very useful book, 2/- post paid. Foods, 'Elite' (Tropical) 2/- and 4/6 per tin—the 4/6 size contains four times the amount within 2/- tin. A good buy! Cold Water (Blue Label) 2/6 per large tin. Traders should get in touch with Barry M. Austin, 95 Crown Road, Twickenham, who is my only wholesaler, and very reliable too. No biscuit at all in 'Elite', all meats loved by fishes.

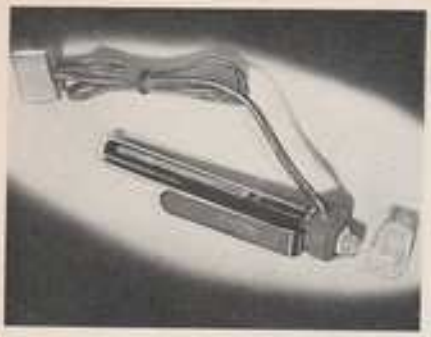
There IS cereal in the Cold Water Food, as Goldfishes etc. need it, but NONE in the 'Elite' Tropical. Not a grain!

23 QUEEN'S AVENUE, WATFORD, HERTS.
'PHONE: WATFORD 21708

One can always get foods from me at ordinary retail prices, post paid, if one wishes!

ARE YOU TROUBLED BY ELECTRIC CUTS?

Then change to high powered Heaters with Reliable Sensitive Thermostats



THE RENA THERMOSTAT

The Body is made of special Bakelite. All wiring is embedded in, preventing any possible short-circuit.
Pure Silver **CONTACTS.**
Powerful **TICONAL** magnet gives perfect snap action.
The **PLASTIC COVER** protects the head of the instrument against water entering. Ideal for use with marine aquaria preventing corrosion.
The **STAINLESS STEEL FIXING CLIP** embraces the collar of the rubber head to make it absolutely water-tight.

THE RENA SUPER AIR PUMP

Large Output to aerate 1 - 12 tanks.
All metallic parts are rustproofed.
Special long lasting synthetic rubber used for diaphragm, valves, joint, etc.
Powerful **TICONAL** magnet.
Felt Filter made large enough to prevent it being stopped up rapidly as happens with smaller types.

RENA HEATERS Long. For spread of heat up to 200 watts 10s. each. Made in wattages 35, 50, 75, 100, length 9 in. 125, 150, 200 length 12 ins. Burns no more current but builds heat quickly.

RENA THERMOSTATS 19s. each. Highly sensitive at the temperature set and of course with plug included.

For Reliable High Powered Aeration the **RENA PUMP** 42s. each.

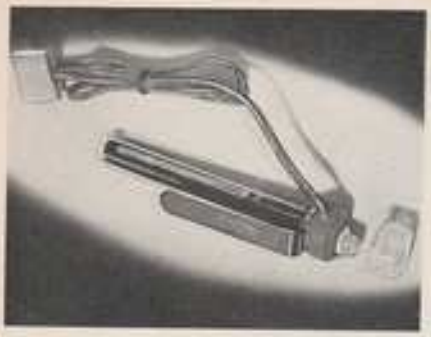
Sole Distributors to the Trade only

SOUTH COAST AQUATIC NURSERIES LIMITED

Old Bath Road, Colnbrook, Bucks.
Telephone: Colnbrook 2673-4

ARE YOU TROUBLED BY ELECTRIC CUTS?

Then change to high powered Heaters with Reliable Sensitive Thermostats



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RENA THERMOSTATS 19s. each. Highly sensitive at the temperature set and of course with plug included.

For Reliable High Powered Aeration the **RENA PUMP** 42s. each.

Sole Distributors to the Trade only

SOUTH COAST AQUATIC NURSERIES LIMITED

Old Bath Road, Colnbrook, Bucks.
Telephone: Colnbrook 2673-4

Rare Cats! and Baby Elephant (Nosed Fish)

From Nigeria 7/6 and 22/6 Respectively

ADULT DISCUS £7 each — 2" DISCUS 35/- each

SILVER SHARKS 4" 35/- each — SIMPSONS SWORDS 35/- pair

NEW ARRIVALS

Pencils	4/6 to 7/6
Green Tench	3/- & 4/-
Large Goldfish 7"-8"	10/-
Small Orfe	2/6
7" Golden Comets	15/-
Medium Goldfish	3/- to 7/6
Small Goldfish & Shubunkins	1/- to 2/6

ALL POND PLANTS STOCKED

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Pendulor	36/-
Constat External	22/-
Constat New External Type QX	22/-
U.N.O.	
Dat-A.S.	18/-
Dat-A.S.	15/-
Dat-A.S. "Popular"	10/-
"Popular" with neon indicator	12/6
Power Mate	24/6
Wizard	10/-, 12/6, 16/-

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Rena	42/-
Bijou	[illegible]
Eastbaker Tetra	[illegible]
[illegible]	46/-
Minimum Major	24/-
Minimum Minor	21/-
Pendulor	40/-
Dynamo Mk. I A.C./D.C.	£3 0 0
Dynamo Mk. II A.C. only	£3 5 0

PISTON PUMPS

Hi-flo Junior New Super	107/6
Hi-flo "A"	130/-
Hi-flo "B"	165/-
Hi-flo "C"	250/-

Thermometers

Mercury	4/-
Blue Gem	4/6
Mercury Gem	6/-
Dumpy	4/6

Sundries

T Pieces	9d.
Clamps	1/-
Aeration Tubing 9d. yd.	
Siphon Tubing 1/6 yd.	
Glass Wool	1/-
Filter Carbon	2/-
Holamil	3/-
Aquarimentum	2/6

Filters

Corner	6/6
Outside	18/6
Windmill Hand Rejector	15/-
Windmill Air Rejector	10/-
Cement	19/6
Premier Biological Sub-Gravel Filters	12/6, 15/-
Sediet	8/-
With Bellows	16/-
Slim Jim	17/6
Kleer King	22/6
Bottom Filter	4/3
Rock Filter	17/6

TROPICALS

Large Neons, 8 for £1 ; 2/6 each

Rosaceus	5/-	Large Green Sailfin Mollies	from 5/-
Angels	2/6 & 3/6	Key Hole Cichlids	5/6
White Cloud Minnows	2/6	Black Angels	10/- to 20/-
Platies	2/6	Black Lace Angels	5/- to 10/-
Beacons	2/6	Tiger barbs	2/6 & 3/6
Black Widows	2/6	Glowlights	2/-
Platys, various	from 2/6	Penguins (pr.) 7/6, (each)	4/-
Swordtails, various, from	3/-	Bumble Bees (pr.) 7/6, (each)	4/-
Schuberti barbs	3/-	Mollies, Black from	2/6 & 5/-
Scissortails	3/-	Lemon tetras	4/-
Guppies (pair) 1/6,	3/-	Glassfish Adult	4/6
Harlequins	3/-	Arnoldi Cats	8/6
Cherry barbs	3/-	Ocellated Cats	8/6
Nigger barbs	3/-	Fighters	10/-, 12/6
Chequer barbs	3/-	Serpae	4/-
Red Eyed Tetra	3/-		
Whiptail Cats	8/-		

Large Brown Acara 6/6, thick lip 3/-, dwarf or bern 3/6, Kissing 4/-, Opaline 3/6, Gouramies.

BREEDERS!

ALL GLASS AQUARIA. 5 sizes, 10 × 6 × 6 to 16 × 9 × 9. Callers only.

BOOK CASE BOW-FRONTED AQUARIUM

48 × 10 × 15	£29 0 0
36 × 12 × 15	£18 18 0
Standard Bow	£21, £13 10, £11 5 0

PLANTS

Sagittaria	6d. each	5/- doz.
Vallis. Torta	6d. "	5/- "
Vallis. Spiralis	6d. "	5/- "
Ambulia	6d. "	5/- "
Ludwigia	6d. "	5/- "
Hygrophila	6d. "	5/- "
Cryptocoryne	2/- and 3/-	
Wisteria	1/6 " 2/-	
Giant Hygrophila	1/6 " 2/-	

By post, add 1/6d.

HEATERS 25w to 150w

Uno	6/6
F.S. Standard	7/6
Wizard	8/6

ADULT RARE FISHES

Pelmatochromis Kribensis	7/6 & 10/- each
Elephant Nose Fish	22/- each
Black Veiltail Guppy	15/- pair
Blue Acara	3/6
Knife Fish	10/6
Clown Loach	12/6 & 15/-
Scats from	7/6 to 20/-
Arnoldi Cats	7/6
Malayan Angels	7/6 to 15/-
Rasboras	6/-
Weather Loach	5/-
Blacksharks	15/-
Firemouth	4/-
Red Veiltail Guppy	10/- pair
Red Tail Sharks	15/- each
Adult Lyretails	12/6 pair
Adult Birmanum	12/6 pair

Our minimum order for fishes is £2, a charge of 12s. 6d. is made for container. Carriage charges, by fast passenger train and telegram stating time of arrival.

NYLON COATED AQUARIA, STOCK SIZES

24 × 12 × 15	£3 19 6
18 × 10 × 12	£2 7 6
White or black covers	18/6 & 25/-

STANDARD AQUARIUMS

(Light Gauge)		(Angle Iron)	
12 × 6 × 6	10/-	24 × 12 × 12	48/-
16 × 8 × 8	8/6	24 × 12 × 15	52/6
14 × 8 × 8	14/-	30 × 12 × 15	70/-
18 × 8 × 8	13/6	36 × 12 × 15	82/6
18 × 10 × 10	21/-	48 × 12 × 15	110/-

COVERS		STANDS	
19 × 10	14/6	18 × 10 × 36	32/-
24 × 12	21/-	24 × 12 × 36	40/-
30 × 12	30/-	30 × 12 × 36	45/-
36 × 12	35/-	36 × 12 × 36	50/-

Aquarium covers sent by post only at customers risk.

FOODS

Exotic Flakes	1/6
Hykro Flakes	1/-
Brewsam	1/6 & 2/6
Biorin	6d. & 1/6
Shrimp	6d. & 1/6
Dry Daphnia	6d. to 3/6
Liquifry	2/6
Infusyl	2/6
Elite	2/- & 4/6
Hobby	2/- & 7/-
McLynn's	1/6, 2/6, 5/6, 17/6
Brine Shrimp	2/- & 2/6
Meta & Vega	1/- each
Bartmann's	1/6 & 2/6
Wardley's	8/-, 4/6, 2/6, 2/3, 1/3
Foodex	3/-
Long Life	2/3 & 3/6
Tetra Min	1/10 & 3/-

Add 1/- up to 10/-; 1/6 up to 20/-; 2/- up to £2; 3/- up to £3; over Free.
CARRIAGE AT COST ON AQUARIUMS, STANDS, AND TANKS

THE CENTRAL AQUARIUM

Situated on the A41 Route, opposite Hendon Central Station

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BIKO

The BIKO is the most powerful vibrator pump in the world. It is more powerful than some piston pumps. Double outlet pipes from separate diaphragms. (Two pumps in one, or one to spare!) Outside filter prevents dust and impurities from entering aquaria. On/off switch at side of pump. Long flex with plug attached. Extra deep solid rubber base: *no vibration, absolutely silent.* Consumption only 5 watts. Six months written guarantee.

PRICE **£4-15-0d.**

HALAMID

A certain cure for White Spot and Fungus. One wholesaler wrote: "It was only 'Halamid' that kept me out of trouble." Don't wait for disease to ruin your aquarium — keep a supply handy. (A pinch every week stops algae from forming in the aquarium.)

PRICE **2/6** plus **6d** Purchase Tax = **3/-** each

INFUSYL

Essential to all breeders. Simply drop a tablet into the aquarium and *real infusoria* is produced in about an hour. Not a substitute for infusoria, but the real thing!

PER VIAL
of TEN TABLETS **2/6**

AQUARIUMSTOP

By applying a little "Aquariumstop" to the outside of a tank, you can cure a leaky aquarium without having to empty the tank.

PRICE **2/6** each

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HILLSIDE AQUATICS

44, WOODBERRY WAY, N. FINCHLEY, N.12

Telephone : Hillside 5430

Members of the Pet Trade Association Ltd.

'PRESET-*matic*'

HANGS FROM TOP OF AQUARIUM BY HOLDER PROVIDED

•

MAINTAINS EVEN AND ACCURATE TEMPERATURE ALL OVER AQUARIUM

•

NO RADIO-TELEVISION INTERFERENCE

•

MAGNETIC SNAP-ACTION THERMOSTAT

•

SOMETHING TO BE PROUD OF

THIRTY WINTERS AGO

BRITAIN'S FIRST GLASS TUBE AQUARIUM HEATERS WERE PROVING A BOON TO SOME OF THE SMALL NUMBER OF ENTHUSIASTS WHO WERE THEN KEEPING TROPICAL FISH.

Hitherto, heating had been by such means as half submerged electric lamps, gas jets beneath a slate bottomed tank or bulky metal cased immersion heaters which obtruded their ugly presence into the would be tropical scene.

Only the ardent aquarist could have appreciated the need for something small, inconspicuous and reliable. One such person with a practical turn of mind conceived the idea of sealing a heating element into a "Pyrex" test tube. The result was a complete success and the idea was soon to provide him and many others with a living. It was the

BIRTH OF 'Es-Es' AQUARIUM PRODUCTS

TODAY A MODERN FACTORY OF 5000 SQ. FT. AT PENRYN, CORNWALL IS FULLY ENGAGED IN KEEPING UP WITH THE DEMAND FROM ALL OVER THE WORLD. PROOF OF THE POPULARITY OF THESE LINES WHICH ARE

DESIGNED BY AQUARISTS FOR AQUARISTS

CURRENT LIST (Tax included)

	Wattages 25	50	75	100	125	150	
IMMERSION HEATERS							
'Flexible'				x			19/-
'Superb'	x	x	x	x	x	x	10/-
'Standard'	x	x	x	x			7/4
THERMOSTATIC IMMERSION HEATERS							
Outside control 60°-90° dial (model CHT) with Neon Light				x 10"		x 12"	35/-
'Preset-matic' (model PSM) with Neon Light	x 8½"		x 8½"	x 10"		x 12"	24/6
IMMERSION THERMOSTATS							
'Sentinel' Outside control 500w on 250v A.C. Neon Light 60°-90° dial							26/6
'Major' Inside " " " " "							18/-
'Minor' " " 300w " " "							10/-
" " " " " " " with Neon Light							12/6
'SUMMIT' AIR PUMP vibrator							21/-
'DUMPY' THERMOMETER 1" diam. Dial Type							8/6
'MICRO-MOAT' (for Micro-Worm culture)							7/-
'VIVO' REJUVENATOR (60 tablets)							2/-
'WHITE SPOT' REMEDY							2/6
'AQUATUBE' AIR LINE (60 ft. coil)							10/-
AIR LINE FITMENTS (Nickel Plated)—							
Clamps—fine adjustment							1/-
Connectors 3-way							11d.
" 4-way							1/1
FINE FLOW AIRSTONES with moulded nozzle							1/-

SINGLETON BROS. (Electronics) LTD.

53 VICTORIA STREET · LONDON · S.W.1

SPECIAL PLANT OFFERS

OFFER No. 1
20/- PLANTS FOR 10/-

2 Cryptocoryne Beckettii	4/-
3 Cryptocoryne Haerrilliana	7/6
6 Bacopa	4/6
2 Amazon Chain Swords	3/-
2 Micro Sagittaria	1/-
Yours for 10/-	20/-

OFFER No. 2
21/- PLANTS FOR 10/-

6 Haerrilliana, 3 Beckettii,

Also yours for 10/-

BOW-FRONTED AQUARIUMS

48in. × 10in. × 15in. bow-fronted aquarium with wrought iron bookcase stand £28/0/0 complete.
36in. × 12in. × 15in. bow-fronted aquarium with wrought iron bookcase stand £18/18/- complete.
Available in penny bronze, black & gold, and cream

WITH PLAIN STAND

Inches	48 × 10 × 15 ...	£21.0.0
"	36 × 12 × 15 ...	£15.10.0
"	24 × 12 × 15 ...	£11.10.0

Complete with Stand and Hood (15in. to centre of bow)

We are specialists in aquarium installations. All sizes and styles to customers' own specification carried out. We have many designs set up in our showrooms. Why not call and let us quote.

We now stock the new rust-proof aquariums with nylon coated frames and plastic covers.

18 × 10 × 12	£4 4 0
24 × 12 × 15	£6 0 0

(Complete with plastic cover)

STANDS

18 × 10 × 36 ...	35/-
24 × 12 × 36 ...	45/-
30 × 12 × 36 ...	50/-
36 × 12 × 36 ...	55/-

REMEDIES, etc.

Aquatonic	3/6	Clamps (Not by post)...	2/6
Brosiam White Spot Cure	2/-	Liquinox	1/9
Viva Salis	2/-	Diseasolve	2/6
Sea Salt	1/6	Brosiam Fertilising Tablets	1/6

Please add 1/- extra postage on appliance orders up to 10/-; 1/6 up to 20/-; 2/- up to 30/-.

THERMOSTATS

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Constat External ...	33/-
Constat New External Type OE	21/-
UNO	
Out (A.G.	18/-
Int (A.G.	15/-
Int (A.G. "Popular"	10/-
"Popular" with neon Indicator	12/6
"Eu-Eu" Sentinel ...	26/6

THERMOMETERS

	each
Mercury	6/6
Gem	6/6
Plastic Backed ...	6/6
Spirit Blue Gem ...	5/-
"Eu-Eu" Duroxy ...	6/6

FILTERS

	each
"Windmill" Plastic Outside Filter ...	19/6
"Windmill" Biological Aquarium Filter 12/6,	18/-
"Windmill" Regent Inside Filter ...	18/-
Corner Filter ...	8/-
Air Lift	2/6
"Slim Jim" Outside Filter	17/6
"Kleer King" Outside Filter	22/6
Bosom Filter	8/3
Ornamental Rock Filter	17/6
Uno Polyfilter ...	3/6

AERATORS & PISTON PUMPS

	each
Minitone	21/-
"	14/-
Fairy	27/6
Star	36/-
Zoobeka Total ...	75/-
Hydo Junior ...	107/6
Hydo "A"	136/-
Hydo "B"	165/-
Hydo "C"	250/-

HEATERS

	each
"QUEENSBOROUGH" 25w., 40w., 60w., 75w., 100w., 120w., 150w.	10/-
"Eu-Eu" Flexible Heaters (100w. and 150w.) ...	19/-
"Eu-Eu" Thermostatic Heaters, 100w. and 150w.	36/-
Frost-matic	24/6
Inter-Pot Thermostatic Heater	22/6
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24in. long × 20in. high. 2/6 per sheet, or 1/3 per foot.
(post free)

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Brine Shrimp Eggs ...	2/6 and 4/6
Cultures of	
Nasi Worm 1 oz. ...	7/6
" ½ " ...	13/6
White Worm	3/-
Micro Worm	3/-
Tubifex worms	1/6 and 2/9

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Guide to Tropical Fishkeeping (J. H. P. Bryner) ...	36/6
Diseases of Fishes (C. Van Duijn) ...	15/6
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Encyclopedia of Tropical Fishes (H. R. Axelrod and W. Vorderwinkler)	62/6
Electricity in your Aquarium (L. Warburton) ...	6/6
Illustrated Dictionary of Tropical Fish (Hans Frey) ...	47/6
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All T.F.H. Books	2/- each

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"Queensborough" Tropical Fish Food	1/6 and 2/6
Exotic Flakes ...	1/6
Hykro Flakes ...	1/-
Brosiam ...	1/6 and 2/6
Brosiam Frygrain ...	1/6
Brosiam Biovit 6d. and	1/6
Liquifry Nos. 1 and 2	2/6
Infusol	2/6
Elite	2/- and 4/6
Dried Daphnia } Our	6d.
Ground Shrimp } own	1/-
Fish Food } pack	1/6
in 3 sizes	
Ants Eggs	6d.
Wardley's Treat Pac. 7 kinds of food ...	8/6
Hi-Glow	4/6
Glow Tabs	3/6
Bio	2/6
G. Bertmann	1/-
Foodex	2/6
Supremix	2/6

SEDIMENT REMOVERS

"Windmill" Air Rejectors	each 16/-
"Windmill" Hand Rejectors	12/-
Fishtail	2/-
Syphon Tubing ...	7d. ft.
Hand Type Plastic ...	4/6

PLANTS

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Vallisneria Spiralis ...	9d.
Elodea Densa ...	9d.
Hygrophila	9d.
Bacopa	9d.
Sagittaria natans ...	9d.
Sagittaria minor ...	9d.
Vallisneria torta ...	9d.
Ludwigia	9d.
Myriophyllum	9d.
Spatterdock 3/6, 5/- and	7/6
Cryptocoryne Beckettii	2/-
" *Willisii*	2/6 and 5/-
" *Cordata*	2/6 and 5/-
" *Haerrilliana*	2/6 and 5/-
Water Wisteria ...	3/6
Giant Hygrophila ...	2/6
Giant Sagittaria ...	2/6
Najas Microdon ...	2/6
Amazon Chain Sword	2/6
Duckweed	per portion 1/-
Riccia ...	per portion 1/-

SUNDRIES

	each
Breeding Trap ...	15/-
Aqua Scissors ...	5/-
Aqua Tongs	3/6
Suckers Knob or Sheath	6d.
" Double ...	6d.
Planting Sticks ...	1/3
Dry Floating Rings ...	1/-
" " Squares ...	1/6
Hykro (4 in one) Feeder	2/3
Worm Floating Feeders	1/6
Worm Cradle with Sucker	1/6
"Windmill" Diffuser Stones ...	1/- to 1/6
"T" Piece	1/-
Aerator Tubing Rubber	ft. 6d.
Plastic	" 6d.
4 Way Piece	1/-
Clamps	1/-
Carbon	1/-
Glass Wool	1/3
Nylon Wool	1/6
Colorfoam	1/6
Coloured Chips ...	1/6
Arbolite Glazing Compound—2 lb. ...	4/3
Wardley's pH sets	1/6 and 7/6
Post 1/9 extra	
Hykro Leak Sealer ...	2/-

FULLY-GLAZED AQUARIUMS

Pressed Steel			Angle Iron	
		Aluminium		
Inches	*Tank H'd Refl.*	*Inches*	*Tank H'd Refl.*	
12 × 6 × 8	10/6 — 6/6	24 × 12 × 12	50/-	21/- 8/6
14 × 8 × 8	13/6 — 7/-	24 × 12 × 15	55/-	21/- 8/6
16 × 8 × 8	15/- — 7/6	30 × 12 × 15	70/-	27/6 —
18 × 10 × 10	22/6 15/- 8/-	36 × 12 × 15	85/-	32/6 —

Carriage extra

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The Frozen Pond

THIS winter ponds in practically all parts of Britain have been frozen and often exposed to freezing conditions for several weeks. Under such circumstances pond fishes can soon be in danger.

Most ponds can stand a day or two of frost quite safely, but when the temperature does not rise above freezing point for a week or more the fishes may be lost. Their chance of survival depends mainly on how the pond was treated during the preceding late autumn. A pond with sweet, fresh water is more likely to go through the winter in a safe condition than one with foul water. Even a neglected pond may be all right for goldfish as long as the surface is not sealed by ice for a few days. It is very surprising how goldfish can exist in rather foul water as long as the surface is open to the air. Once a sheet of ice forms, however, there may be a very different story. Instead of the bad gases passing into the atmosphere, they are trapped in the water under the ice. The fishes will be gasping for oxygen, and as they cannot reach the surface they will soon die. If the ice is thick or discoloured it is possible that the dead fishes may not be seen. Their bodies can then add to the pollution of the water and make matters much worse.

There must be no delay in dealing with the frozen pond; do not put off the necessary treatment even for a day or fishes may be lost. The first thing to do will be to play the hose on the ice. This soon softens it so that it can easily be broken. With a fine sharply pointed chisel, prick along portions of the ice, and then it will soon break. Pieces small enough to deal with should be removed from the pond with a garden fork or a very strong net. Remove as much of the ice as possible and then stop the hose and remove water from the pond. This can be removed with an electric pump or siphoned out with the hose or bailed out with a bucket. Remove plenty of water, especially if it has a bad smell or a milky hue. Then fill up with fresh water and the fishes should soon appreciate the change.

Some pondkeepers make a small hole in the ice on a pond and then remove a little water. This does let fresh air under the ice and, unless it freezes very hard, it is possible that the water under the covering of ice may remain clear. In any case it is always advisable to open one part of the pond to relieve the pressure caused when the water freezes.

Whilst the pond water remains close to freezing point no foods should be added. There is an enormous difference in the amount of food a healthy goldfish can digest in warm

Continued overpage

BOOK REVIEW

Practical Reptile-keeping

Living with Reptiles by Kathleen Pickard-Smith. 222 pages, 31 plates. Nelson 18s.

AS books on reptile-keeping are so scarce the appearance of a new title is a big event in herpetology. So often these books are written by museum experts, with the unavoidable emphasis on systematics, and descriptions of colour and external morphology. *Living with Reptiles* does not suffer from these drawbacks; its author is a country lady who developed a passion for reptile-keeping which her Canadian husband grew to share. Visitors to their delightful Henry VIII home in Glynde, Sussex inevitably ended up having tea in the 'pet room', where a stumpy-tailed and blue-tongued skink slept on the sofa and an iguana and chameleons climbed about at leisure, while exotic tortoises roamed the floor except during the best weather.

Mrs. Pickard-Smith has chosen a fresh approach in her witty, well-written and genuinely entertaining book. She describes the progress which she made with her reptiles and amphibians (despite the title both feature in the book) during 6 years. It was in the third year that I first met the author and I have been most impressed with the ideal conditions and individual attention lavished on the animals she kept. Having been responsible for initiating Mrs. Pickard-Smith to the fascinating hobby of tropical reptile-keeping it gives me great pleasure to see the knowledge she has gained being passed on to a wider public in *Living with Reptiles*. The book is not a scientific account. It is, however, a most accurate text on reptile-keeping and its practical nature will make it most useful to collectors. For a book of its size and price it is well provided with photographs and the publishers are to be congratulated for pricing it so reasonably.

European Reptiles

Reptiles and Amphibians of Europe by Walter Hellmich. 160 pages, 68 coloured illustrations. Blandford 16s.

REPTILES and Amphibians of Europe fills a long-felt gap in popular accounts of European reptiles. As the publishers rightly claim, it is the only book in English covering this subject. It is also superbly produced. All the illustrations are in colour, water colours painted by Irmgard Daxwanger. Compared with illustrations that have appeared in some other books on reptiles, which in my opinion were distinctly crude, these are delightful. The scientific accuracy of almost all of the paintings is excellent and the detail superb. The only fault one can find is in the backgrounds, which show a certain lack of control better suited to children's books. Snakes are extremely difficult to draw, yet here the artist has excelled. In addition the perspective of all the paintings is excellent. It is a pity that such illustrations have to come to us via a German publisher; in this field British books often appear to lag badly behind. The text, too, is excellent, both in detail and in the number of species covered. To consider the geckos, five genera are mentioned, of which only the disc-fingered gecko (*Homidactylus turcicus*) and the wall gecko (*Tarentola mauretanica*) are at all well known to us in Britain. The naked-fingered gecko (*Gymnodactylus kotschyi*), *Alsophylax micrurus* and *A. pipiens* and the leaf-fingered gecko (*Phyllodactylus europaeus*) are also described, and here, as elsewhere, the reviewer found much information that was new to him. For each species notes on the length, description, colouring, habitat and behaviour and distribution are given, as well as useful brief notes on captivity.

The heading "Captivity" for the common lizard (*Lacerta vivipara*) reads: "It should be given moist surroundings. Its favourite food is earthworms". This is most misleading, as this lizard is a sun worshipper and lover of dry heathland, and although earthworms may sometimes be eaten they are very low on the list of food preferences. Spiders are universally accepted as having pride of place in its diet when available. There is no mention, either, that captive green lizards (*Lacerta viridis*) require sunshine if they are to thrive. These are, however, minor criticisms of a most informative text and it is true that the importance of sunshine is stressed in a three pages chapter entitled "Care of Reptiles and Amphibians as Pets". The first chapter is a useful 20 pages on the general biology of reptiles and amphibians. The book terminates with an added brief bibliography, where unfortunately Maxwell Knight's excellent practical book *Keeping Reptiles and Fishes* does not feature although a general pet book by this author which only incidentally deals with reptiles and amphibians does. Nor is there any mention of that classic book, *The Vivarium* by Bateman (1897), which although long out of print is still available secondhand. In a note on the British Herpetological Society it is stated that the *Journal* "is published about once yearly". This is misleading, as, for as long as the reviewer can remember, it has appeared regularly every 6 months. *Reptiles and Amphibians of Europe* is an excellent book for those considering a Continental holiday. It should belong to everyone who is interested in the animals it describes. It will, undoubtedly, prove the great success which it deserves to be, with an excellent text and beautiful and accurate paintings combined with a most modest price.

H.R.B.

The Frozen Pond

continued from the preceding page

water from that which it is able to deal with once the temperature of the water drops below 50°F (10°C). If the pondkeeper continues to feed pond fishes it is almost certain that pollution of the water will follow. What feeding is done when the temperature begins to rise should be with small pieces of garden worm only. No dried foods at all should be given during cold weather.

Although it cannot be said that goldfish hibernate during the winter it is a fact that they become very torpid, lie near the bottom and move about very slowly or rarely. At such times it is quite unnecessary to feed the fish. They will be quite all right throughout the winter. Most beginners imagine that unless pond fishes are being constantly fed they will not survive. Nothing is farther from the truth. Goldfish could go from November to March in a garden pond without being artificially fed at all. I use the term artificially fed as I know that fishes browse on the water plants and so obtain a certain amount of nourishment if they require it.

Astilbes

Experiences with a Marine Aquarium in the Fiji Islands

by Dr. F. R. HOLLINS

IN 1955 I described in these pages the constructional details of a small marine aquarium I built when I was a medical officer in the Fiji Islands, in the South Pacific. This aquarium operated most successfully for a year or so, and then had to be disposed of as I was transferred to another territory. I have spent the last few years in East Africa, some hundreds of miles from the coast where aquarium-keeping is out of the question.

Much of what I learned 8 years ago is common knowledge to-day, especially in the United States, where tropical marine aquaria have become quite popular. It is possible to buy the constituents of sea water in crystalline form, and so it is simple for those living far from the coast to enjoy this branch of the hobby. The fishes are fascinating to keep, as they are so vividly coloured, and many have such a bizarre appearance. In my opinion they are much more interesting than the freshwater varieties, and I hope it will be only a matter of time before they are easily obtainable in England. Admittedly, there are certain practical difficulties, but these should not prove insurmountable.

A small marine tank (mine had a capacity of 10 gallons) is quite simple to maintain. As a matter of fact I had far less trouble with my marine fishes in Fiji than in keeping coldwater species at home. The following simple rules, which are self-evident, gave complete success: always have sparkling clear water; provide constant aeration and filtration; do not have ferrous metals or lead paints in contact with the water.

Most of the fishes, crabs and other creatures are quite hardy, and tolerate wide variations of water temperature and salinity without ill-effects. My tank was situated out of doors on a shaded verandah, and some of the water temperature readings differed by as much as 12°F (7°C) in the course of 24 hours. In a country where the air temperatures are in the mid-eighties for most of the day, and frequently reach the nineties, evaporation is rapid. To overcome this difficulty I marked the water level on the glass when I first filled the aquarium, and continued to top up with fresh water. This arrangement worked admirably, and I had no trouble at all until a small, slow leak developed. I decided to use the tank for experimental purposes before attempting repair, and so I continued to top up with fresh water for nearly 2 months. By this time I estimated that approximately 2 gallons had been replaced. I then managed to repair the leak; I half-emptied the tank and refilled it with fresh sea water. There were 15 fishes in the tank at the time, and neither the slow dilution with fresh, nor the sudden influx of new sea water, had any effect on their health or well-being.

It seems quite clear from these observations that the degree of salinity can vary within wide limits, and this with fishes living around reefs where the saline content of the water is constant, and not contaminated by freshwater from streams. Nevertheless, it should be remembered that freshwater acts as a narcotic poison on marine creatures if large amounts are given fairly quickly. This technique is used by marine biologists to kill fragile specimens such as brittle stars, which would be damaged by any other method. On the other hand, fishes etc. can be trained to acquire a considerable degree of tolerance if small amounts are administered over a period. After this experiment I made a practice of changing about one-third of the water every 3 months, and at the end of the year I had lost one fish out of a total of 19.

Photo: N. Y. Zoological Society

Moorish Idol

All the fishes suitable for home aquaria occur in great numbers around the coral reefs in the tropics and subtropics. These coral fishes are brilliantly coloured, far more so than the majority of their freshwater cousins. On the whole they are peaceful, and settle down happily in a mixed community where, apart from regular feeding and cleaning, they require no special attention. Feeding presented no problems at all. Shellfish dropped into boiling water and chopped up small provided an adequate diet on which all thrived.

There is something very exciting about visiting a coral

reef to collect fishes for one's aquarium, but it can also be one of the most frustrating pastimes imaginable. A coral reef is the most perfect aquarium in the world. The fishes are there—literally in thousands, but they keep close to the coral masses and vanish into the midst of the branches as soon as a net appears. My collecting ground was a beautiful reef which, in the Fijian language, was called "The Place of the Shark!" My wife and I used to go there on the Sundays I was not on duty at the hospital, and spend the whole day in the water. There is nothing so fascinating as a coral reef to a naturalist or an artist. One is transported into a fairyland of colour and movement whether one floats on the surface looking down through a glass faceplate, or swims amid the coral gardens and shoals of brightly coloured fishes with the aid of a weighted belt.

The Fishes by Groups

I have kept or studied the species and families described in the next few paragraphs, and all of them are very suitable for the home aquarium.

Demoiselle fish family (Pomacentridae). All the members of this family are quite small, rarely exceeding a few inches in length when fully grown. Most of them are very brightly coloured with blue, orange, scarlet, green etc. The first inmates of my tank were half a dozen blue demoiselles, which are very common around the reefs of Fiji. The body is a beautiful blue, which varies from a deep, rich colour to a brilliant turquoise. The actual shade depends on the angle of the light rays and is due to iridescence. The tail and fins are a vivid orange, and the combination of these two colours is most attractive. My specimens were about 1½ to 2 inches long. All were very peaceful and made ideal aquarium exhibits.

Wrasse family (Labridae). This is a very large group of mainly tropical-reef fishes, most of whom are brilliantly marked with blue, black, gold, green etc. Once the demoiselles had settled down I added a pair of blue-streaked wrasse to the collection. This species has a very wide distribution, as it ranges through the Indian and Pacific Oceans. The ground colour is a deep, velvety-black, and there is a vivid, fairly broad blue streak running from the nose to the end of the tail. In fact, it is rather difficult to see where the body ends and the tail begins because of the shape and colour. It has a curious, rather sly way of swimming, and mine used to sidle up to the other fishes and try to nip them. Fortunately, they were quite small and never appeared to harm the others.

Scorpion fish family (Scorpaenidae). I was very fortunate one day in catching a delightful little scorpion fish with my faceplate in a coral pool. Members of this family are nearly all large, many being used for food, and it is very rare to find a tiny one. A number of species have poison sacs at the bases of their dorsal spines, and this accounts for the name. The fins are heavily rayed and, in some species, the sharp ends of the rays project well beyond the fin margins. One way and another they have to be handled with considerable care. The pectoral fins are broad, and the fish I saw held them out from the sides of the body like wings. My little fellow was only about 1¼ inches long; his ground colour was rather a dull, sandy shade, but he was speckled and banded with dark olive so as to produce an attractive variegated effect. These fish are bottom dwellers and feeders, and I have watched this little one floating above the sand with his "wings" spread guarding his piece of terrinoy.

Butterfly and angel fish (Chaetodontidae). To appreciate the true beauty of these fishes they have to be seen in their natural surroundings amid the coral. There, flitting among the brightly coloured branches, or circling around a huge, dark-red coral head, it is easy to see why they got their English name. It is only under such conditions that these exotic creatures appear in all their glory, in the bright light of the tropical sun shining through the crystal-clear water. Alas, that so much of their beauty is lost in the aquarium.

I caught a nice specimen of the one-spot butterfly fish about 2½ inches long. The body of this fish is a light golden colour; a vertical black band passes round the head through the eye, and a large black spot is situated on the side of the body above and behind the middle. This was the only butterfly fish I managed to obtain as they are extremely difficult to catch because of their amazing speed and agility. It would have been better to have gone out on the reef at night with a bright light, but I was never able to do this.

The Moorish idol (Zanclidae). Pride of place in my collection went to a Moorish idol. This exotic fish is the sole representative of his family, and in general appearance is very like an angel fish. The dorsal fin is drawn out in a long, tapering prolongation that ends in a point behind the tail. The body is beautifully decorated with broad vertical bands of yellow, white and black. In my opinion it is one of the loveliest fishes one can have in an aquarium and, what is more, it does very well indeed in captivity. No wonder the American dealers stock it regularly; perhaps we may see it in England in the not so distant future.

Cowfish and boxfish family (Ostraciidae). These odd creatures have hard, rigid bodies that are made of a number of bony plates. The shape of the body resembles that of the box-shaped fuselages of certain types of single-seater aircraft, and the fins and tail stick out in a peculiar sort of way. Some species have horn-like protuberances jutting out from the front of the head, hence the name cowfish. They do well in small aquaria but I never caught one small enough to put in mine. Many of these fishes are somewhat dull coloured, but others are brightly marked with black, blue, green etc.

Sea bass family (Serranidae). I next added a shoal of about eight attractive little silvery white fish with vertical black bands. I think they were probably small, or immature members of this family, but I am not at all sure. They settled down quite well but one subsequently died. This was the death referred to earlier in this article.

Surgeon fish family (Hepatidae). This is another group of tropical-reef fishes all of whom are herbivorous. The name surgeon fish was given because of a sharp, bony plate that projects on either side of the root of the tail. Most members of the group grow quite large, and many of them are used for food. They have rather exotic shapes, and some are brilliantly coloured. I never kept any of them, but I was about to try and catch some when the time came to pack up. As far as I know they do well in home aquaria, and are on sale in the States.

I could go on writing about the other families of coral fishes, but I think I have said enough to show how interesting they all are to the aquarist. In addition to the fishes, numerous other creatures such as crabs, anemones, small octopods etc. can be kept. Some of the anemones are very pretty but they have to be fed separately by lowering a piece of raw fish or meat down to the tentacles. These suck the juices, and the remains must be taken out as soon as possible to avoid pollution. A small crab is very useful as it is an excellent scavenger, but more than one leads to trouble in a small tank, as they are very quarrelsome. On one occasion I put in a sea horse. But it was a very dull sort of creature, and seemed so out of place among the brightly coloured fishes that I let it go.

It was a sad day when I had to dismantle the whole thing, but it gave me far more pleasure and interest than any of my previous aquaria during the year it was in operation. The writing of this article has revived many happy memories of days spent on coral reefs, and evenings studying the catch in the peaceful darkness of my verandah.

Agama Lizards

Rough-tailed agama (Agama stellio) from Israel

by ROBERT BUSTARD, B.Sc.

Photographs by the author

THE agama lizards belong to the family Agamidae, which includes such bizarre species as the Australian horny devil (*Moloch horridus*), the frilled lizard (*Chlamydosaurus kingii*) and the flying dragon (*Draco volans*). Various members of this family are popular as vivarium inmates, including several of the dragons, such as the bearded dragon (*Amphibolurus barbatus*) and the water dragon (*Physignathus lesueurii*), both of which are Australian, and the African and Asian mastigure lizards (*Uromastyx*). The small active lizards belonging to the genus *Agama* are also frequently kept as pets and I have had many of them in my own collection.

As is so often the case some species do well in captivity and others do not, and experience in knowing which species to obtain is invaluable. The attractive South African rock lizard (*Agama atra*) does not live long in confinement in Britain and friends in Capetown tell me that even in its native country captive specimens are very short-lived. The easiest species to obtain in Britain is also one of the best to keep, namely, Stellion's agama (*Agama stellio*), sometimes known as the common or rough-tailed agama or hardun.

Stellion's agama is common in countries bordering the Eastern Mediterranean—Egypt, Turkey, Palestine and Syria. It grows to a length of about 12 inches and is usually coloured grey-black. The most handsome specimens and possibly the spiniest that I have kept came from Israel. These were beautifully marked with yellow-orange on the body and tail on a grey-brown or stone-coloured ground.

Agama stellio feeds readily in captivity on all forms of insects. Suitable food in captivity includes gentles, mealworms, bluebottles, grasshoppers, cockroaches, beetles and moths. Provided that large quantities of food are available this agama will live for long periods. It is, however, of a nervous disposition and therefore difficult to tame. When first received specimens rush for cover at one's approach and, although they soon lose this behaviour, it is some time before they will feed while being watched—unless the observer remains really still.

The four specimens in my collection at present are housed

In this close-up view of the head of Agama stellio the ear is seen behind and slightly below the eye. Rough scale arrangements are present on head, body and limbs

Below: female Kenya agama lizard

in a metal vivarium, with a glass front, measuring 30 in. by 20 in. by 20 in. The floor is covered with dry peat and sand to a depth of 2 to 3 inches, and large stones and hollow logs are arranged along the back and one side of the vivarium. These provide basking sites as well as hiding places. A small dish of drinking water is sunk into the sand. The vivarium is heated by means of a pearl electric light bulb to a temperature of 80-85°F (26-29°C). The light is on for 10 hours daily, and at night the temperature falls to 55-60°F (13-16°C).

Another species of *Agama* suited to vivarium life is *Agama agama*, the rainbow agama, which enjoys a wide distribution over large areas of Africa. My specimens came from Nigeria, West Africa, and the Sudan on the East Coast. *Agama agama* requires the same treatment in captivity as the hardun. Males are particularly attractively coloured, with an orange head and bluish body. The upper region of the tail is dirty white, and is followed by an area of orange and the terminal third or so is black. The dorsal area of the lizard is sometimes black (they are able to undergo considerable colour change, especially intensification of colour when excited, as during courtship).

According to Dr. V. A. Harris, who has studied these lizards in natural conditions in Nigeria, threat display in rival males is accompanied by a rapid colour change, in which the head turns from orange to brown and the body from blue to mauve. Agama lizards show considerable social behaviour, which can be watched in the vivarium. Males display to other males by bobbing the head and anterior body region by alternately extending and retracting the front limbs as if they were performing 'press-ups'. The head-bobbing courtship behaviour is somewhat different and the female replies by arching her body and raising her tail vertically if she is receptive to mating.

I have been able to watch this behaviour in the vivarium and have been particularly impressed by the beautiful colours of males during the heat of the day and under bright

Continued on opposite page

Live Foods for Young Goldfish

by A. BOARDER

I AM often asked if it is possible to breed *Daphnia* (water fleas) in small tanks. Although I would not go so far as to state that this is impossible, I do consider it a very difficult task to breed *Daphnia* in good quantities in anything but a small pond. Many experienced aquarists find difficulty in keeping *Daphnia* alive even for a couple of weeks, never mind breeding them in large enough numbers to keep up a food for a number of young goldfish. To keep *Daphnia* alive it is necessary to keep up a good supply of oxygen, and their food must also be provided. This food consists of tree floating algae and many forms of Infusoria. If the *Daphnia* are not fed properly they soon die and will pollute the water very quickly. Collectors of *Daphnia* know quite well that if they try to carry too many in a can they find many dead on arrival home.

To breed a good supply I consider that it is necessary to have two small ponds. These are used in the first place to breed a good culture of Infusoria. This can be done by introducing some old cow manure or rotting vegetation. The pond should be in an open position so that the maximum amount of sunshine can reach it. This will help the formation of green algae. Once the water is well infested with Infusoria a few *Daphnia* are introduced. These will breed rapidly in warm weather and fishes can then be fed from the pond. After a time it may be found that the supply of *Daphnia* is dying out. This may be because the supply of food has run out or the water has become too foul through the excrement of the *Daphnia*. The second pond should then be brought into use by adding a few adult *Daphnia* to start the breeding. The first pond can then be cleaned out and started again as before. In this way it is possible to keep up a continuous supply at least throughout the months when it is not actually freezing. In the winter months the *Daphnia* die out but their eggs will hatch for a fresh supply in the spring.

It can be seen then that it is no easy task to breed sufficient *Daphnia* for feeding a number of young goldfish by using small tanks. A much easier feeding method is to breed white worms (enchytrae). All that is necessary is to have one or two boxes, I use concrete ones I have made, which are 14 in. long, 8 in. wide and 4 in. deep. They are only a quarter of an inch thick, except at the base, where I graduate them an eighth of an inch thicker. These boxes last for ever and will never rot or have the bottoms fall out as would happen with wooden ones. To make the concrete boxes I made a former and use separate pieces for the inside formers. If the inside mould is made in one piece it will be found very difficult to get this out once the concrete sets. I use a mixture of three parts of sharp sand to one part of cement.

The boxes are then two-thirds filled with damp peat. A few white worms are introduced and a piece of wet brown bread is laid on top. A sheet of glass, almost as large as the top of the box, is laid over the lot. Several boxes can be stood one upon the other, taking up no more ground space than one. The top box must have a cover to exclude all light and the boxes must be kept cool and dark. The worms will soon multiply and fresh slices of bread must be provided as soon as the old has been eaten. It will be possible to pick out bunches of the worms from under the bread or from the glass cover. I find an excellent way to collect them is to place a small piece of cheese (rind will do), embedded in the peat. After a couple of days or so there will be thousands of worms collected round the cheese and it will be easy to pick out solid bunches of them for feeding purposes. I have had several boxes such as described for many years and have never been without a good supply of white worms. After a few years the boxes can be emptied, cleaned out and started again. If one box is emptied whilst the others are functioning it is possible to treat them all in turn without ever being without some worms for feeding the fishes.

The great advantage in using white worms in preference to *Daphnia* is that they are not likely to introduce any pests or diseases into the fry tank. As they do not live in water normally they do not carry any of the troublesome pests etc. that are to be found in most *Daphnia* ponds. As for their food value, I rate this higher than that of *Daphnia*. I have been using white worms for many years and have never had the slightest trouble from any disease or pest. I am unable to say the same of the time when I used to collect *Daphnia*. This was also far more trouble and time wasting than breeding white worms. The various pests which could be collected with the *Daphnia* had to be seen to be believed. From the average *Daphnia* pond your catch will probably include many young larvae of various dragon flies, water beetles, planarians and a host of other live creatures. The possibility of introducing leeches and fish lice also exists.

Another point in favour of white worms is that, in cold-water tanks at least, they can live for about 48 hours in water and it is probable that at least another 24 hours would elapse before the worms started to decompose. I have never found any healthy and hungry young goldfish to refuse white worms.

I have fed year old fantail goldfish exclusively for months on end with white worms alone and these fish have remained in perfect health during that time. They have also grown well. I have not had any attack of flukes among my fry since I stopped using *Daphnia*; this may just have been a coincidence, but it is things like this which made me refrain from using them. Again I once had a run of fish lice in my pond, but since ceasing to use anything collected from a natural source of water I have had no more trouble.

Agama Lizards

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(artificial) illumination. Females, which are smaller, are rather drab although faint yellow-brown or red markings are present on the body and a greenish hue is seen on the neck region. Unfortunately I have never been able to get captive females to lay their eggs in the vivarium; all have died of "egg-binding", a condition resulting from the females carrying their eggs for too long in the oviducts. Presumably I have not provided suitable conditions for egg-laying, but I have certainly tried a number of different vivarium conditions. On one occasion a female *Agama agama* laid two eggs before dying. I should be most interested to hear from any readers who have been more successful.

Agama lizards of certain species are certainly to be recommended for inclusion in the collection and the spinose hardun (*Agama stellio*) and beautifully coloured rainbow agama (*Agama agama*) are most suitable species to keep. They are likely to cost about 15 to 30 shillings each.

A JUDGE'S THOUGHTS ON JUDGING FISH

How Big?

by FRANCIS BARRATT

IN my preceding article I pointed out the problems a judge has to face. Now I will give my view of how he should deal with these problems so as to arrive at a fair result.

The Federation of British Aquatic Societies has produced a number of *Guides*, covering a variety of tropical fishes and goldfish. The Goldfish Society of Great Britain has a book of standards for goldfish.

The Fancy Guppy Association and the Federation of Guppy Breeders' Societies each has a set of standards for guppies. There is also the Bristol Aquarium Society standard for shubunkins, which seems to be generally recognised as the "Bristol type" as opposed to the "London type" (the shorter-finned variety).

Now all this is very confusing and will continue so until the fanciers of these specialised fishes get together to straighten things out. Meanwhile the Federation of Northern Aquarium Societies "recommend" that the Goldfish Society's standards be used, and have recently approved those of the Fancy Guppy Association.

Standard Pointing

There are many demands for standards for each kind of tropical fish, but as this is a long and expensive process because of the number of people to be consulted, and unsatisfactory because of the difficulty in describing colours and the rate at which new species are appearing, the F.N.A.S. judges' committee do not believe a standard for fish to be a practical proposition.

Therefore, the Standard Method of Pointing should be used for the vast majority of fishes which appear before us. In the F.N.A.S. Bulletin no. 5, the points allocated for single fish are:

	Points
Size	20
Body	20
Colour	20
Fins	20
Condition and deportment	20
Total	100

Properly used, this points system will enable us to evaluate the good and bad qualities of the fish before us, and place them first, second and third, which is the object of the exercise. But it is possible to use this system in different ways, and it is inevitable that judges do so, each conscientiously using his own "interpretation". It is in the hope that closer agreement on this vital aspect of our hobby may result that I offer my own interpretation.

Size (20 points)

Size is just a matter of mathematics, it seems. If you estimate the overall length to be 3 inches when the desired length is 4 inches, then three-fourths of the 20 points are given: 15 points. But what is the desired length of any given fish? Few books agree on how big the various species can grow. Few judges agree on a basis for evaluating size. Many seem to expect small fish to grow into giants of their kind, but will give full points to a 6 inch fish that could grow to 9 inches or more. A book may give a size as "12 inches in Nature, 6 inches in an aquarium", and this latter size seems to be acceptable to many exhibitors and judges as the "desired" length for judging.

I take the view that each fish should be judged for size as in other respects, against an "ideal" specimen of its own kind. There is no rule that I know of which stipulates that entries should be aquarium-reared, nor is there any standard size of aquarium. Many native fishes benched are pond-reared and if adequately accommodated ought to attain a good size. Good fish-keeping requires that fishes be given space and food in keeping with the species. To give high points for partly grown fish is to give tacit approval to what might well be cruelty.

Another aspect of this problem is that fishes that have for long been bred by man in aquaria, tend to get smaller and smaller. Where are the swordtails of 6 inches, plus the sword? Or sailfin mollies of the same size? Or tiger barbs of 3 inches? Several years ago these were not such very unusual sizes to see, but most exhibitors have not seen such specimens. To give full points for less than these sizes is to give approval to a process of deterioration.

I look through all the books I can find and the greatest size given for a species is my guide. I cannot think of more than one or two cases where I have to modify this because they have given too high a figure, but there are quite a few cases where the biggest size given in any book I have read is well below that commonly seen, or, in some cases, on view in public aquariums.

In most cases these figures are the size of fishes quite common in their native waters. So I maintain that this method is still being fair to the "big ones", and gives the "little ones" a fair crack.

Big Ones Catch the Eye

Too often we hear the complaint that nothing under 6 inches stands a chance. It is true that when we have to use the "gate" method instead of pointing each fish, it is the big ones that catch the eye first, but if the points assessment is made properly, the small species have an equal chance. Because the larger species have not been so popular until quite recently, and because very few of those who have bought them have been able to give them plenty of space to grow, we know very little about their habits, adult coloration or how big they could reasonably be expected to grow if given ideal conditions.

Some of the fishes we are just getting to know have been greatly esteemed as food for many years in their native waters, are therefore subject to intensive fishing and very few survive to what would be a normal fully grown size.

For years big specimens of such as marbled cichlids (*Astronotus ocellatus*), *Metynnis roosevelti*, *Scatophagus argus* etc. were only to be seen at large public aquariums. Now we are getting specimens that are bigger than the "book size" owned by private aquarists. The marbled cichlid at last year's B.A.F. is an example of what can be done, and I am of the opinion that many more examples will be turning up in the future.

WATER—the Cradle of Life

by P. F. CAPON

IN this article I propose to discuss the chemistry of water with particular reference to aquaria. I shall not discuss it too deeply, but will restrict myself to a general discussion of the chemical properties of water and the substances that come into contact with it through natural causes or because of man's activities, and their effects on our fishes. Nowhere will I use chemical formulae or symbols (the strange hieroglyphics that chemists use as a kind of shorthand).

An interesting point about the hobby of fish-keeping is that even if we only take an average interest in it we find after a while that we have picked up a rudimentary knowledge of the sciences of chemistry, physics, biology and basic electrical circuitry, together with the arts of glazing, painting and even wood-working.

Rain Water

Natural waters are constantly replenished by rainfall, the rain itself being derived from the evaporation of the sea or other bodies of water. Ideally, rain water should be as pure as distilled water but this is not so, for the air through which it falls contains many gases and other substances which the rain is able to wash out or dissolve.

The most important of the gases that dissolves in the rain is oxygen, for without it our fishes could not survive. Let me make it quite plain that although water is made up of a chemical combination of oxygen and hydrogen these are so firmly joined together that fish cannot remove the oxygen from the hydrogen but must rely on any oxygen that dissolves in the water.

Oxygen, although so vital, does not dissolve in the water to as great an extent as many gases; at 60°F (15°C) water contains only about 0.7 part (by volume) of oxygen per 100 parts, a very small proportion indeed when we consider that the air we breathe contains 20 per cent by volume of the gas. But the total air, as opposed to the oxygen, dissolved in the water contains a far greater proportion of the vital gas than does atmospheric air, namely 34 per cent. Should this oxygen be used up by our fishes more will dissolve to make up the loss, but this process is so slow that it will take many hours for the water even only a few inches below the surface to become resaturated. This resaturation can be speeded up by mechanical agitation, i.e. aeration.

Another gas that will be dissolved by the falling rain is nitrogen. This gas is of no use in maintaining fish life. Although all living organisms need nitrogen to incorporate into their body material, only bacteria and certain other low forms of life are able to use gaseous nitrogen. Our fishes must rely on getting it secondhand by way of their food. At 60°F (15°C) water will dissolve about 1.4 per cent. of nitrogen.

One of the other important gases from the aquarist's point of view is carbon dioxide. Carbon dioxide is present in the atmosphere to the extent of only 0.03 per cent. by volume, but its solubility in water is many times greater than that of oxygen. Since mouthing of fishes at the surface of a tank is more a sign of excess of carbon dioxide than of an oxygen deficiency it can readily be seen that in a crowded tank with many fishes exhaling carbon dioxide the concentration will rise to dangerous proportions before all the dissolved oxygen is used up. So the purpose of aeration is more to encourage carbon dioxide to be given off from the water than oxygen to be absorbed. As absorption or loss of gases can only occur from the surface of the water aeration effectively increases the surface area by virtue of the turbulence caused.

The proportion of carbon dioxide in rain water will depend on the locality; an industrial area will receive rain richer in this gas than, say, a tropical rain forest. Carbon dioxide is a product of the combustion of such materials as coal, gas and oil, in addition to being expired by animals and plants.

Other gases that will be present in the rain water are ozone, ammonia and the oxides of nitrogen, these oxides being formed during thunder-storms by the violent electrical discharges. Ozone and the oxides of nitrogen can often be smelled in the vicinity of arcing electrical apparatus, especially when a thermostat that has been arcing is removed from its glass tube. Traces of nitric acid have also been reported in tropical atmospheres, especially after storms. Oxides of nitrogen are also formed during the decomposition or putrefaction of organic matter. Ammonia gas is also present in concentrations of from 0.5 parts per million (p.p.m.) in country districts to as much as 10 p.p.m. in the air over towns. This gas is a product of the decomposition of animal matter, and being extremely soluble in water is readily washed out of the air by rain.

Sulphur dioxide, a pungent gas that is also given off when a match is struck, is present in the air to varying degrees. In industrial areas, even smokeless zones, it can reach quite high proportions. The result is an acidic rain, owing to the gas dissolving in water to form sulphurous and sulphuric acid. Sulphuric acid is also known as "oil of vitriol". The presence of these acids in rain is largely responsible for the deterioration of buildings that are constructed of marble or limestone.

In addition to the gaseous impurities there is also a proportion of solid matter which can be washed out by the rain. In industrial areas the atmospheric dust may contain silica, iron oxide (rust), calcium carbonate (chalk), salt, soot and miscellaneous organic matter. Near the sea the rain brings down quantities of sea salts, and depending on the prevailing winds they can be borne many miles inland. Organic matter will also be present, as materials of a vegetable nature in the country, such as spores of fungi, pollen granules and fragments of dried and decayed vegetable tissue. In the towns nitrogenous organic matter (animal origin) will predominate, although to a degree it is present in all localities. It gives rise to its decomposition products ammonia and the oxides of nitrogen.

Of course, most of the gases apart from carbon dioxide, oxygen and nitrogen, and the solid impurities of an animal origin, are only present to a small extent in the rain that falls over open country and to a negligible extent in the rain that feeds the waters that our fishes originate from in the tropics. Rain water in towns is grossly contaminated and if it is collected for use in aquaria heavy showers should be selected so that as much of the rubbish as possible can be washed out before the water is used for fishes. The nature of the vessels that the water is collected in is also of

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Pearls, Zebras

Some danios introduced

Giant danio (Danio malabaricus)

Pearl danios (Brachydanio albolineatus)

AFTER the beginner has passed through the livebearer-keeping stage and gets the urge to move on to the egglayers the more common danios are his best bet to start with, for they are fairly hardy, comparatively easy to breed and active, which adds to the interest in keeping them. When I say "easy to breed" perhaps I should use the words "spawning is easily induced", and that is so. The trouble is to prevent the little blighters from devouring the eggs after spawning!

The various methods of setting up the breeding tank for zebra fish and pearl danios, to prevent egg-eating, and their breeding procedure, have frequently been explained and described in many previous articles and books so it is not my intention to repeat all this but to suggest, in my opinion, what is the best and most expedient method and to consider the reasons for failures with what should be easy subjects.

While the more experienced breeder specialising in these danios as an exhibitor will, no doubt, use more elaborate methods and equipment, the beginner wishing to try his hand at breeding them probably as a passing phase will find a simpler method adequate for his needs, without fitting up a more permanent breeding tank. A tank 18 in. by 10 by 10 in. is a good size for a breeding pair or trio (one female to two males), and helps to keep the spawning more concentrated than with a larger tank and secures a larger percentage of fertile eggs. Cover the base with a layer of ¼ inch size pebbles, and over this spread a second layer of ½ inch size pebbles. This will provide plenty of tiny crevices into which the eggs can settle safely away from the fish.

Clear, well-matured water to a depth of some 4 inches above the pebbles should have a temperature about 78°F (25°C), but plants are not strictly necessary with properly conditioned zebra fish and the pearl danio. I do not think water reaction (pH) within reason matters very much with these fishes, for I have known them breed in waters from pH 6.6 to 7.2; temperature and conditioning seem to be more important.

Intended breeding stock must be fully matured, which means 6 months old and 1½ to 2 inches long to be really good specimens. Conditioning should be carried out away from the breeding tank and when completed the breeding pair may be introduced to the breeding tank, preferably in the evening. Spawning will in all probability, if conditioning is satisfactory, take place the following morning early, and last anywhere up to 12 hours (longer on occasions). Remove breeders as soon as spawning is complete. After 3 or 4 days hatching should occur and Infusoria feeding should be commenced as soon as the fry are seen to be free-swimming. Seven days on this and then they may be offered larger foods such as micro worms, brine shrimps and the like. Adjust feeding according to growth until adult stage is reached.

The giant danio breeds similarly to the zebra and the pearl danio, but there are just one or two points of difference both in habits and the set-up needed. In the first place they are bigger fish and therefore a larger tank is advisable, say a 24 in. by 12 in. by 12 in. Secondly, although the eggs

and Giants

JAS. STOTT

are similar to those of the other two species in size, that is small for the size of the fish, they are inclined to be slightly adhesive, which tends to make them catch on to surfaces and hold momentarily. It is advisable therefore to cover the surface of the pebbles over the base of the tank with boiled willow root, which tends to protect those eggs that may settle and hold to the upper surface of the pebbles and, although it may cause more work in the preparation of the breeding tank, it is considered worth the effort in the long run.

A slightly higher temperature is recommended for the giant danio, say 80°F (27°C), and a water depth of around 6 inches. Again I do not think pH is, within reason, important, but good conditioning is, and should be carried out thoroughly with plenty of live foods, especially chopped earthworm. After the fry are free-swimming they need large quantities of Infusoria for the first week. For the best results with this quick-growing species maintain fairly heavy feeding during the first 3 months of growth.

The three most probable causes of failures with these three species are, in order of importance, insufficient conditioning, attempting to breed with fish which are not mature and too low a temperature either during the conditioning or in the actual breeding tank. Conditioning calls for plenty of live foods, which should not be too large for

Zebra danio (Brachydanio rerio)

their mouths, an important point to remember; a variety of foods is also stimulating. A temperature of 75°F (24°C) should be maintained during the conditioning; and, of course, make sure both sexes are present!

Water—the Cradle of Life

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paramount importance but this will be discussed under the toxic qualities of metals. Amongst the organic matter washed down by the rain will be spores of bacteria, algae and various Protozoa (Infusoria). This explains how an Infusoria culture springs to life even though we do not "seed" it with tank water and also why we all too often get green water and hairy algae no matter how careful we may be to avoid contamination between our aquaria and infected sources.

Surface Waters

Rain falling to the earth divides itself into three portions: that portion which is lost again by evaporation from the soil or bodies of water and is available for reprecipitation; that which runs over the surface, hardly penetrating, and forms rivers, lakes and ponds; and a third portion which penetrates the ground to become available from deep wells and springs.

Surface water in flowing over the various rocks and soils that form the earth's crust dissolves materials, depending on the nature of these rocks. This collection of mineral impurities is aided by carbon dioxide in solution, this gas being responsible for the dissolving of limestones (calcium carbonate) and magnesian rocks (magnesium carbonate) and for the disintegration of silicates (sands and quartzes). This slow but steady dissolving of the earth's crust is far less where the water encounters igneous rocks, such as granite, instead of a porous sandstone or chalk strata. Large quantities of igneous rock are eroded by the water; they do not dissolve but give muds and silts, most of which are readily deposited when the speed of the water course slows. Occasionally the particles are so small as to resist deposition; man, when he wishes to use this water, has to resort to the use of coagulating agents.

One impurity in the water can often effect the solution or deposition of others. For instance, dissolved carbon dioxide results in the solution of limestones by forming the soluble bicarbonates of calcium and magnesium from their insoluble carbonates, which form the bulk of these rocks. Silica (sand and quartz) is only very slightly soluble in pure water but in water containing alkaline carbonates its solubility increases considerably. The alkaline carbonates, such as potash and soda, are themselves leached from some soils. A water containing sodium chloride (common salt), if it percolates through a layer of a certain kind of sand known as a zeolite, swops its sodium portion for calcium, resulting in a water containing calcium chloride. This calcium chloride is one of the materials that cause hard water. There are also other sands that are able to effect the reverse, removing the magnesia or lime, substituting sodium, and so softening the water. These sands or zeolites are used in domestic water softeners. Synthetically prepared zeolites and other "ion-exchange" materials are used to a greater extent now-a-days in place of the naturally occurring types.

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So we can see that the character of natural waters is

affected by the soils and rocks through and over which they pass. This character is affected not only by the minerals that dissolve or go into suspension but also by both animal and vegetable impurities. Surface water has by definition penetrated the soil only slightly and so will contain only relatively small quantities of mineral impurities, whereas that from deep wells and springs is often heavily charged with minerals but is almost entirely free from organic contaminants. In determining the suitability of a water for fish culture it must be borne in mind that different fishes come from different waters of different chemical characteristics. Some come from hard waters, such as the barbs, whilst others such as neons, most tetras and the panchax group live in soft water. However, it should be borne in mind that no natural water will be totally deficient in minerals, nor will organic wastes be completely absent. No fish could exist in a water in the high state of purity of, say a distilled water; this water could not support the small forms of life, such as *Daphnia*, gnat larvae etc., nor the plant life that the fishes depend on for their sustenance.

Organic impurities consist of animal and vegetable debris together with their decomposition products, and as such can lead to the water carrying the organisms of disease in both fish and man. Vegetable impurities in reasonable quantities should not affect our fishes; think of the fruit and leaves that fall into the streams and pools in the tropics. By far the most dangerous contamination is that by animal excreta and animal bodies; the decomposition of these will give rise to poisons such as ptomaines, alkaloids, amines and amino acids. Eventually these materials break down to give ammonia and inorganic nitrates. Boiling the water will not remove these poisons; it will slow down the process of their removal for it will kill the bacteria that destroy the poisons.

The occasional deaths, apparently unexplained, of fishes after meals of *Tubifex* may in many cases be due to their eating dead and decomposing worms and falling victim to ptomaine or other food poisonings. So if feeding with *Tubifex* is a must the worms should be as clean and healthy as possible.

Water from areas rich in peat and heather are usually crystal clear and brown, containing humic and other organic acids. Peat is often used to lower the pH (raise the acidity) of aquarium water and appears to have no ill effects on the fishes unless they are species that object to a high acidity. The acids released from peat into the water appear to have bacteriostatic properties and protect delicate fish eggs from attack by bacteria and Protozoa. But peaty waters should not be confused with stagnant water, which will contain many animal and vegetable decomposition products. The microscopic life that these products encourage, together with the products themselves, may have harmful effects on certain eggs and fry, and to a lesser extent on adult fishes.

River Waters

So we can see that the type of impurities contained in and the suitability of a water for fish will depend to a great extent on the catchment area. The water supplies of many towns in this country, e.g. Manchester and Glasgow, are collected in reservoirs in mountainous or moor-land areas and such will be relatively free from excessive animal waste products and suitable for fish culture. The mineral content of these waters will vary with the geological nature of the collecting grounds. Those from slate and granite areas will contain but little in the way of dissolved solids; those from sandstone and shale areas will contain four or five times as much dissolved mineral matter. Where chalk and limestone occur the solid content of the water can be as high as 800 p.p.m. The lack of organic contamination of an animal source is indicated by the almost entire absence of nitrates, nitrites and ammonia, and by the very low proportion of nitrogen in the dissolved organic materials as opposed to carbon.

As rivers are fed principally by the surface drainage their character will depend on the geological nature of the catchment area. The Thames, receiving its water from chalk areas, is a hard water, whilst the Trent is also a hard water but in this case the hardness is derived from magnesian limestone. Rivers arising in country composed of igneous rocks or granite will be soft and contain very little dissolved matter. At the source of a river where the flow is rapid there is a large amount of suspended matter, but as the flow slackens and the stream widens deposition occurs. Roughly speaking, the longer a river's course before the tidal effects are felt the more solid matter will be deposited.

However, smaller streams and tributaries are constantly replenishing the store of suspended matter, so that the complete removal of this material is rare. Whilst the length of the river affects the deposition the mineral content tends to rise. However, aeration often causes a reduction in the hardness by encouraging the liberation of carbon dioxide and hence precipitation of calcium carbonate from the calcium bicarbonate in solution. This process does not cause an appreciable softening in magnesia waters as magnesium carbonate is itself soluble in water.

In some districts rivers receive their water from mines or ground rich in iron ores and so contain iron in solution as its sulphate. This iron sulphate is derived from iron sulphide (pyrites, often called "fool's gold" and seen as lumps of coal) by the action of oxygen. This water will also contain traces of mineral acid. Should this water containing iron come into contact with a hard water from a limestone area, the calcium (lime) salts and the iron are mutually precipitated.

Rivers also have a natural purification process in regard to organic impurities, although they cannot remove all the nitrogenous organic matter that is poured into them as a result of man's domestic and industrial activities. Rivers such as the lower reaches of the Thames have become little more than open sewers. Man has the peculiar trait of disposing of his garbage, from old prams and bedsteads to dead cats and dogs, in the once beautiful rivers and pools of our land. The quantity of organic nitrogenous matter is reduced, and in favourable conditions almost completely eliminated by the joint action of aeration and bacteria. The bacteria decompose the organic matter, assimilating part of it as food and transforming part into mineral matter, such as vegetable organic acids, ptomaines and amines etc., together with carbon dioxide. Certain bacteria take ammonia and amines etc., produced in this first stage and transform them into nitrites and finally into nitrates. The carbon dioxide, together with mineral carbonates, are derived from the carbon present in the organic matter. All these bacteria are known as aerobic bacteria and need an adequate supply of air and light to perform their task.

In heavily polluted water the bacteria breed to such an extent that they use up all the available oxygen and suffocate, halting the cleansing process; fishes in such waters don't stand an earthly! In such waters where oxygen is deficient another group of bacteria occurs, known as anaerobic bacteria; these can exist without the presence of dissolved oxygen. These organisms partly reverse the process of the aerobic bacteria, converting the nitrates into nitrites, using the oxygen so released to maintain their own bodily processes. In addition methane (marsh gas) and hydrogen sulphide are released and often they may be seen as discrete bubbles. Methane, nitrites and hydrogen sulphide are all toxic to fishes; hydrogen sulphide is reported to be more deadly than hydrogen cyanide (prussic acid gas). Hydrogen sulphide is the gas responsible for the delightful smell that greets one when a bad egg is broken; this gas has such an atrocious smell that only minute traces will

make one feel ill and this will probably account for the lack of fatalities with this gas.

If the natural purification process in rivers, and of course aquaria, is supplied with sufficient oxygen the end product of the pollutant will be mineral nitrates and other mineral salts. These mineral nitrates and salts are assimilated by plants along with carbon dioxide and built up again into complex organic materials. The plants, especially algae, form part of the food chain of fishes and so the cycle of events is repeated.

Wells and Springs

This, the third division of the rain water, is usually regarded as that collected below 100 feet underground. Organic pollution from the soil has been filtered out by the passage through the porous rock and is almost non-existent; bacteria have also been removed. Mineral matter is all that remains of the organic impurities and the water often has dissolved in it quite a high proportion of carbon dioxide derived from the decomposition of organic materials closer to the surface. From the point of view of humans this water is quite suitable for drinking, but for fishes it is usually far too hard and contains large quantities of dissolved minerals. The amount of these dissolved minerals will, of course, depend on the nature of the porous rocks that the water has percolated through.

Most aquarists use tap water for their fishes, only occasionally resorting to rain water or distilled water plus tap water or even water from a pool or river for problem fishes. This is just as well, for all natural waters bring with them the chance of introducing pests and diseases, as well as the chance of introducing poisonous substances from trade effluents and domestic waste.

The characteristics of aquarium water will depend on the area, the treatments applied by the local water board and the remedies and foods supplied by the aquarists. The hardness or softness and acidity or alkalinity of the water will depend on the geology of the area where the authorities collect the water for domestic use, and the type of gravel on the floor of the aquarium.

(To be continued)

DISEASES OF FISHES

White Spot

WHITE spot (ichthyophthiriasis) is perhaps the most common of all the diseases of fishes and is diagnosed on the appearance of hundreds of tiny white or grey spots on the body of the fish. Each white spot is a separate bladder containing one or more of the protozoan parasites, which leave the body of the host after a few days to reproduce. It is during this reproductive period when the parasites leave the fish's body that they can be destroyed by adding a 5 per cent solution of methylene blue, drop by drop, to the water in the tank until the sand shows a bluish tinge. Methylene blue is harmless to even the smallest fry and can be obtained from any dispensing chemist.

It is also essential to raise the temperature of the water during the treatment period of white spot, for two reasons. First, the warmer the water the less oxygen it will contain and white-spot parasites die without sufficient oxygen in their environment. Second, raising the temperature shortens the periods during which the parasites live on the fish and consequently it will shorten the ultimate period of infection. The treatment for white spot should be continued as necessary until no more spots remain on the skin of the fish.

R. E. Macdonald

HOUSE PLANTS IN THE FISH HOUSE

The Spider Plant

(*Chlorophytum comosum* var. *variegatum*)

Photo: J. E. Nelmes

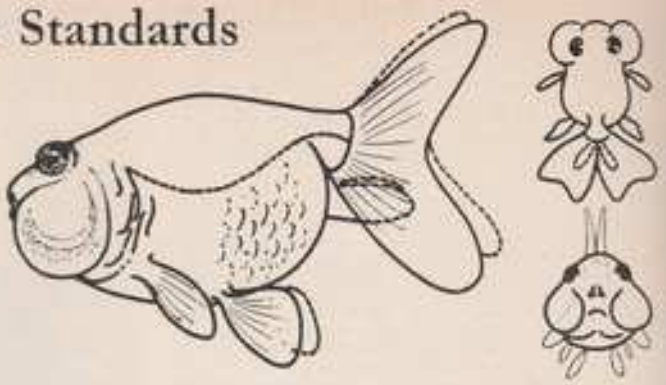
BELONGING to the lily family, *Chlorophytum* is an extremely hardy house plant, originating from South Africa. An attractive plant, its long grass-like leaves are light green striped with cream. In mature specimens they are approximately one-half inch in width, and 18 inches in length. The most unusual feature of the spider plant, and one that endears it to old ladies, is the method of reproduction. At any time of the year an adult plant may throw up a long aerial runner, on which one would expect an inflorescence, but which produces instead, like the aquarium Amazon sword plant, a number of baby plants at intervals along its length. If this runner is weighed down so that the bases of the baby plants make contact with the soil, they will produce roots. They should be kept dry until they have produced a good root ball, and then separated from the parent plant and repotted separately, or, to produce a nice bushy plant, put three young plants in a 3½ in. pot. They may then be watered freely until well established.

In general *Chlorophytum* plants should be given a moderate amount of water during spring and summer but hardly any at all in the winter. Like a great number of house plants the spider plant seems to do better when slightly pot-bound.

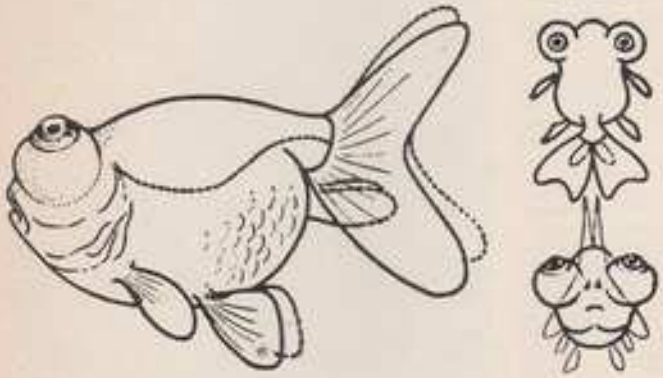
Barry R. James

Fancy Goldfish Standards

In the articles on the celestial and bubble-eye goldfish that appeared in our November and December, 1962 issues it was stated that standards for these two varieties have not been created. In fact Standards GF/10 and GF/11 of the Federation of British Aquatic Societies deal with the celestial and bubble-eye respectively and the outlines from these published Standards are reproduced here.



Above: outline drawings of the bubble-eye goldfish in side, dorsal and head-on views (F.B.A.S. Standard GF/11)



Left: outline drawings of the celestial goldfish in side, dorsal and head-on views (F.B.A.S. Standard GF/10)

The Paradise Fish

by JACK HEMS

THE genus *Macropodus*, its members commonly referred to as paradise fishes, is represented to aquarists by five species and sub-species and one colour variety. They are members of the air-breathing family Anabantidae, which is indigenous to south-east Asia and parts of Africa and includes such curiosities as the walking perch (*Anabas testudineus*) and the croaking gourami (*Trichopsis vittatus*).

The most widely known of the paradise fishes and certainly the best of them all for sheer beauty, longevity, and hardiness is *M. opercularis*. This fish was brought from its native China to Paris by M. Simon, the French Consul at Ningpo, in 1868, and has the distinction of being the first 'tropical' to be introduced into the home aquarium.

The male's rather flattened sides are resplendant with alternate bars of red and blue, which blend imperceptibly into an olive to beige back densly spotted with varying shades of brown. A conspicuous green to dark blue spot margined with gold ornaments the gill covers. A green to blue sheen over a silvery ground adorns the cheeks and throat and fades to white on the belly. The long, red caudal fin is streaked and is edged posteriorly with blue. The elongated dorsal, anal and pelvic fins are blue with lighter tips; the pectoral fins are clear. Sexing is easy when the fish are mature, for the female lacks the splendid finnage and rich colours of the male. Under good conditions, the species attains a length of about 3 inches.

On account of its wide geographic range, from beyond Hainan in the south to Korea in the north, *M. opercularis* is not particular about temperature, and though it flourishes best at about 75°F (24°C) a temperature 20° above or below that figure will not do it any harm. Nevertheless, this does not mean that it will always endure a sudden change of temperature (what fish can?), but a gradual rise or fall of a few degrees every 24 hours will cause no ill-effects.

Given a clean aquarium and plenty of live or meaty food, the paradise fish has a life span of 7 or more years. Although

Continued on page 218

our readers write

Readers are invited to express their views and opinions on subjects of interest to aquarists. The Editor reserves the right to shorten letters when considered necessary and is not responsible for the opinions expressed by correspondents.

Address letters to The Editor, *The Aquarist*, **The Butts, Half Acre, Brentford, Middlesex**

Dangers of Earthing

IN your December, 1962 issue is a most useful article by Dr. R. O. B. List which, by some error, repeats the blanket advice to earth tanks and stands. This can be a dangerous procedure and unfortunately is with the commonest of heating and lighting, i.e. immersion heater and thermostat and domestic bulbs, although perfectly safe with some other forms of heating and lighting.

If a heater or thermostat breaks in the water, or there is a breakdown of insulation of their wires, then the water in their vicinity will be at a high potential. An aquarist who puts his hand into this tank and at the same time touches the earthed frame will, at the least, suffer an unpleasant shock. Earthing the lighting shade causes a similar hazard. The best advice with this type of lighting and heating is "Never service the tank with the power or lighting switched on".

Our Museum Handbook *Tropical Aquaria* deals with all types of lighting and heating and states which should and which should not be earthed.

G. E. WILLIAMS,
Deputy Curator and Zoologist,
The Horniman Museum,
London, S.E.23.

African Fish in China

I WAS most interested in the article in your December, 1962 issue by Mr. Chi Fu-jen. *Tilapia mossambica* is, of course, a speciality of this Institute and we have become known in fish-culture circles for our production of an all-male hybrid of much faster growth than normal. It is of great interest that in China they are doing such valuable work, particularly as here we are unable to obtain much information of the work carried out in that country. If Mr. Chi Fu-jen can secure papers on the subject we would be very grateful (one of our scientific officers, being a Singapore Chinese, is able to translate papers into English).

I would make one correction. If the Chinese stock came from North Vietnam then it is derived from the original stock in the lake in Singapore Botanic Gardens. For genetic reasons this is unlikely to be from the Mozambique area, but is more probably indigenous to Natal further south. The East and Central African strains of *Tilapia mossambica* resemble more closely our Zanzibar strain here. This has the reverse sex mechanism to the other strain, the male being homogametic and the female being heterogametic.

DR. G. A. PROWSE,
Director, Tropical Fish Culture Research Institute, Malacca.

Is the Stickleback Polygamous?

I READ with much interest Mr. W. G. Phillip's letter (*The Aquarist*, January), enquiring whether the three-spined stickleback is polygamous or not.

I have been breeding various species of sticklebacks for a number of years now, but have not yet managed to come to a definite conclusion on the subject. I have found that, on the whole, ten-spined sticklebacks are far less inclined to be polygamous than their three-spined cousins. Houghton suggested that sticklebacks might be monogamous, but warned of the danger of taking activities in the aquarium as normal. Other authorities either disregarded the question or said that they were probably polygamous.

Myself, I feel that the stickleback is generally polygamous only when there is a definite lack of males, and the species may be in danger. A parallel to this can be found in the ostrich, which is polygamous in captivity, but monogamous in the wild. The very size of the stickleback's nest shows that they do not expect a great amount of spawn in them.

As far as I can see, the only way in which this problem will ever be solved is by actually observing the sticklebacks in their natural waters. Until then, it appears that all we can do is to theorise, and try to solve the problem through conducting experiments in our own tanks, under as many different conditions as possible.

JAMES McM. URE,
British Ichthyological Society, Glasgow.

Insurance

I HAVE approached a number of insurance companies with a view to insuring my tropical fish tank *and* occupants. My present policy covers breakage of tank but not loss of fish. Can I get coverage also against power cuts, as this would appear to be the chief set-back?

J. R. PETHERICK,
Clipperfield, Herts.

Has any reader been able to obtain insurance giving such protection?—EDITOR.

Blind Danio

ON looking in our aquarium this evening, my husband found a danio swimming around with no eyes. We have an assortment of barbs, mollies, swordtails and guppys, and all of them live peaceably together.

We examined the danio and found no signs of it having been bitten or bullied in any way. He killed the fish, as it seemed rather cruel to allow it to live in that condition. Have any other readers come across this before, and can anyone give a reason for it?

(MRS.) BERYL SPRIGGS,
Grays, Essex.

A Challenge

THE members of The Ladbroke Tropical Fish Club, 80, Ladbroke Grove, North Kensington, London, W.11, herewith issue a six-man challenge to any Aquatic Society in the London area, to take part in an Angling Match, sometime in the coming season, any proceeds to go to Charity. Do we have a taker?

W. T. LANGRIDGE,
Secretary, The Ladbroke Tropical Fish Club.

The Paradise Fish

continued from page 216

the species is carnivorous by nature, it will accept the coarser grades of dried foods readily. It is remarkably knowing, and will soon learn to take tit-bits such as small gentles or wood-lice from the fingers. Occasionally, an individual fish will grow tame enough to swim into its owner's cupped hand. It is a clever jumper, and on no account should its tank be left uncovered.

Because most specimens like to bully, *M. opercularis* is best excluded from the company of any fishes easily intimidated, or much smaller than itself. In addition, a large specimen is not above making a meal from, say a young guppy or a half-grown neon tetra. Further, it will not tolerate the company of snails, and will soon eradicate them from a tank by nibbling at their bodies and antennae. Yet paradise fish on the market to-day are not nearly as bloodthirsty or belligerent as their ancestors were a decade or two ago; for long domestication appears to have bred a lot of the savagery out of them. The albino form (white body barred with pink, red fins and ruby eyes), which was developed by German aquarists between the two World Wars, is quite inoffensive. It is also less hardy than the type. But then albinism in fishes appears to go hand-in-hand with a rather delicate constitution. The black paradise fish (*M. opercularis concolor*), from the Malay Peninsula and Archipelago, is as tough as it is spiteful.

To breed the paradise fish a tank measuring at least 18 in. by 12 in. by 12 in. is required. This should contain clear, preferably soft water with a temperature in the high seventies or low eighties (°F; 25-29°C) and plenty of plants growing from the bottom to the surface.

When a couple are about to spawn the male intensifies his colours and, with widespread fins, parades before the egg-swollen female. Every now and then he breaks away from his spectacular courtship to blow countless tiny bubbles among top-growing vegetation.

In due course the male drives or entices the female to a position just below the nest and there embraces her. He repeats this performance several times over and, after each embrace, most of the eggs extruded by the female float into the nest. The few that don't are snapped up by the watchful parents and blown out again in the right direction. The total number of eggs laid at a spawning may exceed 500. After spawning is over, the male becomes very spiteful towards his mate and it is advisable to remove her then to fresh quarters.

At a temperature of 78° to 80°F (about 26°C) the eggs hatch out and the fry become free-swimming within the space of 5 or 6 days. All the time the fry are confined to the nest the father fish mounts guard over them. Now and again he blows fresh bubbles to keep the slowly disintegrating nest in good shape.

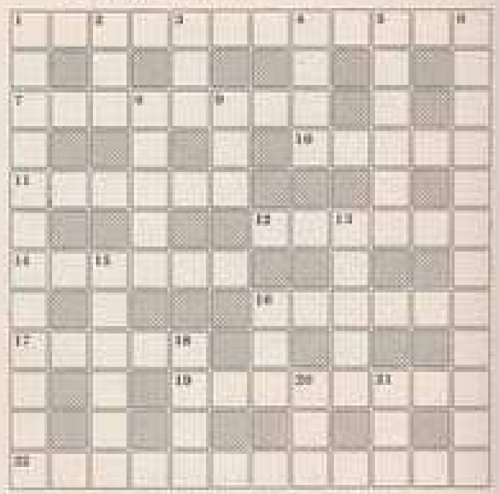
Infusoria should be fed to the fry for the first 9 days of their existence, after which they can be given dust-fine dried food or, better still, such things as micro worms or brine shrimps. It is most important to keep the top of the aquarium properly covered, for cold air blowing across it always results in heavy losses among the fry. Another thing, it is important to keep the surface free from blanketing dust or oily scum. Such impurities prevent the fry from taking their gulps of air. A piece of newspaper drawn across the surface every now and then will keep it perfectly clean.

As a rule, the male does not attempt to molest his offspring until they reach a fair size. But if you notice him sparring too vigorously with any of them, he should be removed to another tank immediately.

The youngsters reach breeding size before 6 months are out, and at 12 months should be as large as their parents.

The AQUARIST Crossword

Compiled by M. W. SAUNDERS



CLUES ACROSS

1. Result of sucking algae from tank (5,7)
7. Common name for *Aphyosemion australe* (4, 4)
10. A berry for a senior citizen (5)
11. If torn about, might indicate this disease (6)
12. Pound the beach and make it whiter (6)
14. Does he chase catfish? (3, 3)
16. The man and I lead on to the area (6)
17. Also known as the genus *Poecilia* (5)
19. Wrong net angle produces a mix-up (8)
22. Probable cause of many a tank battle (4, 8)

CLUES DOWN

1. Headgear for aquarist's space age rest (6, 4)
2. Not one of a fish's organs (3)
3. Handy for catching some—or putting ten back (3)
4. River of no note—in Egypt (4)
5. Aquarium plant grown from slippings (6)
6. Another name for a *Balantiocheilus melanopterus* fancier, perhaps (5, 7)
8. Conferred partly and made a mistake (5)
9. Its eggs are commonly eaten by tank inmates (5)
13. Persuade to spawn, perhaps (3, 2)
15. Here's the R.A.F. with aid for the frightened (6)
16. Found in water or on land (3)
18. A slave, riding the waves by the sound of it (4)
20. Wood from a tree which is burnt (3)
21. American expression for half a baby horse (3)

Solution on page 220

News from AQUARISTS' SOCIETIES

Monthly reports from Secretaries of aquarists' societies for inclusion on this page should reach the Editor by the 15th of the month preceding the month of publication.

THE election of officers at the Annual General Meeting of the **Bradford and District A.S.** resulted as follows: President, Mr. K. Barrett; Vice-President, Mr. E. Little; Secretary, Mr. A. Winterburn, 15, Woodhall Place, Thornbury, Bradford, 3; Treasurer, Mr. B. Norris; Social and Publicity Officer, Mr. R. Marshall; Equipment Officer, Mr. G. Holmes. The Open Table Shows for this year are to be held in Unity Hall, Rawson Square, Bradford, on Sunday, the 19th May and Sunday, the 6th October.

The Society has had a very successful year in 1962, and any aquarist in the area is most welcome at the meetings. This year an additional meeting is being held on the third Wednesday of each month, this being purely a discussion evening among the members. The usual meetings continue on the first Wednesday of the month.

* * *

AT their monthly meeting the **Dewsbury and District A.S.** heard a lecture, illustrated by colour slides, by the founder-president of the Society, Mr. E. Hemingway. He recently returned to this country from West Africa where he has been engaged in research on fish and aquatic life and animals. His talk was about these experiences and proved very interesting.

Recently members, their families and friends enjoyed the Annual Dinner. The President-elect, Mr. A. Ross, presented the awards for the year for table shows. Both the specified variety and A.O.V. were won by Mr. Allan Brown.

* * *

THE following officers were elected at the annual general meeting of the **Tottenham and District A.S.**: Chairman, Mr. E. Nutt; Secretary, Mr. G. Bundle, 14, Steele Road, Tottenham, N.17; Treasurer Mrs. L. Ratcliffe; Show Secretary, Mr. A. Bates. Plans for the year include illustrated lectures by well-known aquarists, colour slides, brains trust, inter-club table shows, outings, etc. New members are welcomed to the meetings which are held the second and fourth Thursdays in the month at the T. L. and R. Club, 604, High Road, Tottenham, N.17.

* * *

THE Yorkshire Section of the Fancy Guppy Association held their annual general meeting recently when the following officers were elected: Chairman, Mr. K. Riding; Secretary, Mr. F. Pogsworth, 21, Marion Street, Bingley, Yorks.; Treasurer, Mr. Harrison; Show Secretary & P.R.O., Mr. D. Carr. The winner of the monthly table show was Mr. A. Barr and a new class has been introduced for A.O.V. which represents any tropical fish. This was won by Mr. D. Carr.

* * *

AT the annual general meeting of the **Bedford and District A.S.**, the following officers and committee members were elected: Chairman, Mr. J. Butler; Vice-Chairman and Show Secretary, Mr. R. Smith; Treasurer, Mr. G. Beech; Hon. Secretary, Mr. B. Henson, 29, Brereton Road, Bedford; Hon. Assistant Secretary, Mr. F. Angel. Committee members: Mr. Gibson, Mr. Toft, Mr. Satterthwaite, and Mr. Taylor.

* * *

THE annual show of the **Skipton and District A.S.** will be held on Sunday, 16th June. More details will be ready later. The Secretary is Mr. K. Bartlett, 58, George Street, Skipton.

* * *

THE annual general meeting of the Manchester and District Section of the **Fancy Guppy Association** was held at their new headquarters, The Longsight Hotel, Redgate Lane, Belle Vue, Manchester. The new committee was elected as follows: Chairman, Mr. J. L. Kelly; Secretary, Mr. R. Beresford, 99, Valley Road, Arden Park, Bredbury, Cheshire; Treasurer, Mr. James Allen; Show Secretary, Mr. F. Campbell; Asst. Show Secretary, Mr. Frank Partington; P.R.O., Mr. V. Partington and one member, Mr. J. Jeffery.

At the Show held in conjunction with the meeting, the following members attained their Gold Badge: V. Partington, J. Jeffery and R. Beresford, these being the first awarded in the Association and after the business was finished a slide show was enjoyed by members. The committee put forward a complete programme for the next twelve months, one item of which was a trip to Chester Zoo and Aquarium. A novelty of this trip being a fish show on the coach, which is believed to be the first time this has been attempted.

* * *

AT the annual meeting of the **Middlesbrough and District A.S.**, the following officers were elected: Secretary, Mr. H. F. Laidler; Chairman, Mr. D. Clarke; Vice-Chairman, Mr. B. Heath; treasurer, Mr. D. Lamonte; Assistant Treasurer, Mr. B. Clark; Show Secretary, Mr. K. Whitam.

A junior club was restarted on Wednesday, 16th January. Anyone wishing to attend is asked to contact the secretary, Mr. H. F. Laidler, 47, Princes Road, Middlesbrough.

* * *

AT the last meeting of the **Thorne A.S.**, a very interesting talk on tropical fish was given by Mr. Oscar Wright of Doncaster. The result of the table shows for mollyness was as follows: 1, Mr. D. Machin (Scissortail); 2, Mr. G. Lowe (Harlequin); 3, Mr. P. Powell (Scissortail).

* * *

THE **Thurrock Aquarist Club** has now settled down in its new headquarters at Parish Hall, Gypsy Lane, Grays, Essex, and continues to meet fortnightly on Mondays. At the recent annual general meeting Mr. P. Sowell, 7, Lander Road, Little Thurrock, Grays, Essex, was elected secretary and Mr. R. Nicholls was re-elected chairman. A successful club year was reported during which the "Seasbury Shield" for club table shows was won by Mr. K. Pearl. The "Dover Cup" for the winner of the Home Aquaria competition was presented to Mrs. J. Sowells by the Chairman who said that in the forthcoming year it was proposed to run a "Member of the Year" competition, points for which would be awarded for services to the Club. It was also hoped that it would be possible to start a series of inter-club shows with Southend and Leith Aquarist Club.

* * *

AT a recent meeting of the **Northampton and District A.S.** members heard a talk on the results of the 1962 Home Aquaria Competition, by Mr. W. Stocker, who accompanied the Judges. The monthly table show, for livebearers, was won by a junior member, the result being: 1, Miss L. Mansory; 2, Mr. R. Webb; 3, Mr. L. Williams.

* * *

THE **Accrington and District A.S.** will be holding an open show in the Accrington Town Hall on Saturday-Sunday, 10th and 11th August.

* * *

THE seventh meeting of the season of the **Dundee A.S.** was held in the Clubrooms and was attended by 18 members. The table-shows were Scott Trophy—Characins "A" (Hemigrammus, Hyphessobrycon and Cheirodon) and Characins "B" (any species other than above). The results were as follows: Characins "A" (16 entries): 1, Wilson Lowdon (*Cheirodon axelrodi*); 2, James McGeoghie (*Hemigrammus caudovittatus*); 3, Andrew Insch (*Hemigrammus armstrongi*); 4, James McGeoghie (*Cheirodon axelrodi*). Characins "B" (7 entries): 1, James McGeoghie (*Gasteropelecus levis*); 2, Andrew Insch (*Gymnocorymbus ternetzi*); 3, Charles D. Smith (*Nannostomus anomalus*); 4, James McGeoghie (*Copeina guttata*). The leading positions in the Scott Trophy Competition are as follow: F. N. Greening, 16 points; James McGeoghie, 12 points; Fergus McNaughton, 10 points; William Cockburn, 8 points; Wilson Lowdon, 7 points; Andrew Insch, 7 points. The leading positions for the Member of the Year Trophy are: Wallace S. Russell, 129 points; Albert Harris, 120 points; Chas. D. Smith, 110 points; Andrew Insch, 100 points; John G. Taylor, 80 points.

* * *

NEWS reaches us regarding the death of Mr. Herbert Higginson at his home in Runington on the 22nd January. He was a founder member of Willesden A.S. and a coldwater enthusiast.

* * *

FILMS on constructing a garden pond and setting up an indoor aquarium were shown at a recent meeting of the **Plymouth and District Aquarists' and Pondkeepers' Society**. The projectionist was Mr. T. Sparrow.

* * *

THE Odeon Trophy, an annual award for the best furnished aquarium owned by a member of **Middlesbrough and District A.S.**, was presented to Mrs. S. Whitam by the Chief Constable of Middlesbrough, Mr. R. Davison, himself a keen aquarist. The trophy is awarded by Mr. Ray Cook, manager of Middlesbrough's Odeon cinema, where the presentation took place.

Results of the competition: 1, Mrs. S. Whitam; 2, Mr. D. Clark; 3, Mr. W. Parry. Special prize: Mr. L. Collins. Reserve: Mr. B. Hay. Winner of small tank class: Mr. L. Binns.

* * *

WELCOME news comes from York where the **York and District A.S.** has been reformed. New members will be very welcome and the Secretary is Mrs. J. M. Hields, 24, Buckingham Terrace, Bishophill Snr., York.

* * *

THIS month's News Letter received from **Coventry Pool and A.S.** is the 100th edition and contains a number of retrospective items covering the past eight years. This year Coventry are hosts for the Midland Association of Aquarists Societies annual convention which is being held on Saturday, the 27th April at the Kenilworth Works canteen.

* * *

THE latest Bulletin from the **Association of Yorkshire Aquarists' Societies** contains a note of the next meeting of the Association which is being held at the Church Institute, Albion Place, Leeds on Saturday the 23rd February. The Annual Show has been fixed for the 5th May, the venue being the Modern School, Goole. Goole A.S. have kindly offered to act as hosts for this Show.

* * *

THE annual general meeting of **Pontypool A.S.** was held recently but due to unfavourable weather there was only a small attendance. A letter of resignation from the Secretary Mr. F. Jephcott was read out to the meeting. The following officers were elected unanimously: Chairman, R. Harris; Vice-Chairman, A. Morishead; Secretary, P. E. Jeffries (27, Victoria Road, Pontypool, Mon.); Magazine

Editor, P. E. Jeffries; Show and Assistant Secretary, C. Lewis; Committee, Messrs. J. Jenkins, J. Oliver, Mrs. A. Morrisdead, Mrs. Jones, Treasurer, Mr. R. Couch.

* * *

THE **Leeds and District A.S.** held their annual meeting recently and the following members were elected to take up office: President, Mr. A. Bray; Vice-President, Mr. R. Moss; Secretary, Mr. J. Smith, 86, Grange Park Crescent, Leeds, 8.

* * *

CHANGE OF TITLE

DUE to varied reasons the Newcastle Guppy Society members decided at their annual general meeting, to broaden their interests and activities to include all other types of livebearers in their future shows. The new title of this society is **The Newcastle Guppy and Livebearer Society.** New committee members elected were as follow: Chairman, Mr. L. Thompson; Vice-Chairman, Mr. J. Swan; Secretary, Mr. S. Fox; Treasurer, Mr. R. W. McFarlane. Visitors and prospective new members are welcome to attend the meetings held fortnightly at the Blue Bell Hotel, Shields Road, Byker, Newcastle-upon-Tyne. For further particulars apply to the Secretary, Mr. Stanley Fox, 128, West Farm Avenue, Longbenton, Newcastle-upon-Tyne, 12.

* * *

WHEN the **British Ichthyological Society** held its executive committee elections recently, the following gentlemen were elected: Messrs. Edward L. Willerton, Neil Robertson, William C. Lynn, David MacDonough, David S. Trigg and Daniel P. McCrea. The new President is Mr. Eric E. Boon, and Mr. Edward Willerton received a vote of confidence as Examination Secretary and President of the Board of Examiners. Mr. William Southon, 46, Broad Street, Milltown, New Jersey, U.S.A., was appointed Branch Secretary for North America, and it is to be hoped that his appointment will raise the membership there further, and help to publicise the work of the Society on the other side of the Atlantic. Enquiries regarding membership from other parts of the world should be addressed to the Secretary General at 10, Wharncliffe Avenue, Muirend, Glasgow, S.4, Scotland.

* * *

SECRETARY AND ADDRESS CHANGES

The following changes of secretary and addresses are reported from the following societies: Basingstoke and District A.S. (Mr. J. E. Cumming, 58, Winchester Road, Basingstoke, Hants.); Belle Vue A.S. (Mrs. C. Kelly, 212, Ashton New Road, Manchester 11); Bradford and District A.S. (Mr. R. Winterburn, 15, Woodhall Place, Thornbury, Bradford, 3); Canterbury and District A.S. (Mr. R. Jackson, 126, Wincry Road, Canterbury, Kent); Croydon A.S. (Mr. P. G. Jones, 1, Percy Road, South Norwood, London, S.E.25); Leeds and District A.S. (Mr. J. Smith, 86, Grange Park Crescent, Leeds, 8); Macclesfield A.S. (Mr. F. H. R. Davenport, 61, Coare Street, Macclesfield); Medway A.S. (Mr. C. F. Sawyer, 139, Boundary Road, Chatham, Kent); Newcastle Guppy and Livebearer Society (Mr. S. Fox, 128, West Farm Avenue, Longbenton, Newcastle-upon-Tyne, 12); Rochdale and District A.S. (Mr. R. Haddock, 97, Kingsway, Lower Place, Rochdale); Thurrock A.S. (Mr. P. Sowells, 7, Leader Road, Little Thurrock, Grays, Essex); Tottenham and District A.S. (Mr. G. Bonelle, 14, Steele Road, Tottenham, London, N.17); York and District A.S. (Mrs. J. M. Hields, 24, Bootham Terrace, Bishophill Snr., York, Yorks.).

* * *

AT the January meeting of the **Prestwich and Bury A.S.** the members were admirably entertained by Mr. F. Partington of Middleton who delivered a lecture on "The Identification of Fishes". The manner in which this intricate subject was simplified was indeed an enjoyable experience.

The table show was for any variety cichlids and resulted as follows: 1, Mr. Jennings (Glowlight); 2, Mr. Campbell (Cherry Barb); 3, Mr. Jennings (Thick Lip Gourami). In spite of the icy conditions there was a good attendance and one new member was enrolled.

Crossword Solution

G	R	E	E	N	F	I	N	G	E	R	S			
O		A		E			I		L		H			
L	Y	R	E	T	A	I	L		O		A			
D			R		N		E	L	D	E	R			
F	I	N	R	O	T				E		K			
I			E			B	L	E	A	C	H			
S	E	A	D	O	G			G			U			
H		F				R	E	G	I	O	N			
B	A	R	B	S		A		O			T			
O		A		E	N	T	A	N	G	L	E			
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L	A	D	Y	F	I	G	H	T	E	R	S			

PREPAID ADVERTISEMENTS continued from page xiv

PREPAID ADVERTISEMENTS

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