

The Aquarist

and Pondkeeper

AUGUST 1964



MONTHLY
Vol. XXIX No. 5

TWO SHILLINGS

WALTER R. SMITH LTD.

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 x 15 x 12	£ 7 7 0	£ 9 9 0
30 x 15 x 12	£ 8 8 0	£ 11 11 0
36 x 15 x 12	£ 10 10 0	£ 13 13 0
48 x 15 x 12	£ 13 13 0	£ 21 0 0

DISTRIBUTOR OF—

- McLYNN'S FISH FOOD
- ES-ES PRODUCTS
- ELECTRICAL AND GENERAL
- WATER LIFE, AQUARIST, DITCHFIELD'S AND T.F.H. BOOKLETS
- REJECTORS, SEIJEETS, AND MAINTENANCE EQUIPMENT
- PROCKTER, SUMMIT AND STAR PUMPS
- CONSTAT THERMOSTATS
- AQUAFERN AND COLORFERN PRODUCTS
- HYFLO PRODUCTS
- LIVERINE PRODUCTS
- STOKES FOUNTAINS
- WINDMILL PRODUCTS
- ROCK GRAVEL AND STRATA ROCK WORK
- STUDENTS' MICROSCOPES
- ALL FEEDING AND AERATING APPLIANCES
- MERCURY, SPIRIT AND DUMPY THERMOMETERS
- STUART TURNER WATER PUMPS
- ZOUBEKO AND BIKO PUMPS
- VI-FIT FISH FOOD
- BLACK MAGIC GLAZING COMPOUND
- GLASTICON '303' AQUARIUM SEALER
- AQUAMASTA GLAZING COMPOUND
- LIQUIFY AND INTER-PET PRODUCTS
- FIBRE GLASS PONDS
- OTTER WATERFALL AND FOUNTAIN KITS

Angle Iron Aquariums, Frames and Stands a speciality.
Odd sizes made to order, painted any colour, guaranteed square and free from welds. Stove enamelled Corner Bows, Bow Fronts and Wrought Iron Units.
Half Carriage Paid on these items.

Retail Price List 6d inc. Postage
Wholesale List to Bona-fide Traders on application

WALTER R. SMITH LTD.
39 Tib Street and 16 Whittle Street
(Off Tib Street)
Manchester 4
Telephone: Deansgate 2961 and 2520

M. & R. (DOG-FISH) LTD.

presents



Over 120 varieties including Marine Tropicals on show and for sale. We are Direct Importers of Tropical Fish. Decorate your tank with 2,000 year old wood—stocked only by us. Fish for personal shoppers only.

466 PAISLEY ROAD WEST, GLASGOW, S.W.1

Telephone: IBROX 3615

Open Sundays 11 a.m.—2 p.m.



PHILLIPS fish food

Fine Grade for Tropicals and
Coarse Grade for Cold-water Fish*

Extra high in protein and rich in vitamins and minerals, Phillips Fish Food contains dried shrimp, daphnia, meat meal, white fish meal, alfalfa, milk powder, cod liver oil, wheaten cereal and yeast, scientifically blended to provide a well-balanced, nourishing food.

For all Cold-water Fish - - 1/6d
For Tropicals - - 1/6d



*Phillips Cold-water Fish Food contains **SAPROLEGNIL** to protect against the ravages of "cotton wool" fungus.

PHILLIPS YEAST PRODUCTS LIMITED, Park Royal, London N.W.10



the scientific method of feeding your baby fishes

Start your Baby Fish on LIQUIFRY and watch them GROW!

LIQUIFRY is a liquid suspension containing: (1) Particles of immediate nutritional value to the fry. (2) Particles to produce infusoria in the minimum possible time. Nothing compares with LIQUIFRY — No smelling tanks, no trouble, no waiting, no waste. LIQUIFRY No. 1 (red tube) for fry of egg-layers. LIQUIFRY No. 2 (green tube) contains added green vegetable matter especially for livebearers.

A few drops a day is the LIQUIFRY way

(Regd. Trade Mark)

2s. 6d. per tube

Approved by



FEDERATION OF BRITISH AQUATIC SOCIETIES after inspection and test

... Then follow on with

BIOL LABORATORY CULTURED DRIED PLANKTON

- ★ A safe, instantly available food
- ★ The growth food for young fish and conditioning food for adult fish
- ★ The ideal follow-on for Liquifry — the first food for baby fish

Remember!

For Fungus and Finrot... LIQUITOX THE PROVEN SPECIFIC

- ★ Colourless — Effective — Does not harm the plants
- ★ Definite dosage given by ingenious chart

Price 1/9d. per carton of 2 capsules Breeders pack 6/9d. per 12 capsules
Each capsule will treat 4 gallons of aquarium water

Available from your dealer or post free from the

Inter-Pet Supplies Company

18, Church Street, Dorking, Surrey
Tel. Dorking 2566

Sales Division of the Liquifry Company Limited

Please send for our new catalogue

AQUAPETS

NEW FROM AMERICA

FROZEN BRINE SHRIMP

ALL SIZES OF AQUARIA, INCLUDING, ALL GLASS, ARBE, AND GLASS FRONTED BOW FRONTS, ALSO NYLON COATED FRAMED TANKS AND PLASTIC HOODS

THERMOSTATS, INCLUDING CONSTAT, SPRINGFIELD, UNO, INTER-PET, ETC. HEATERS, ALL WATTAGES, HEATER/THERMOSTAT COMBINED, MERCURY, SPIRIT AND COMPASS THERMOMETERS

AERATORS, INCLUDING ZOOBEKO, RENA, MONTROSE, MINI, ETC. HYDRO PISTON PUMPS, FILTERS, INSIDE, OUTSIDE, BASE, ETC. AERATING EQUIPMENT

1 1/2 oz. .. 3/3
4 oz. .. 7/6
8 oz. 12/6
16 oz. .. 20/-

LIVE FOODS, DAPHNIA, TUBIFEX, GRINDAL, MICRO AND WHITEWORM

NATURE'S OWN TROPICAL FISH FOOD. THE FINEST NUTRITIONAL FOOD FOR ALL TROPICAL AND COLDWATER FISH, REGARDLESS OF SIZE.

TROPICAL AND COLDWATER PLANTS

BOOKS, BOOKLETS, BACKING PAPERS, NATURAL AND ORNAMENTAL ROCKS, ARCHES, ETC. SELF-COLOUR GRAVEL, AND COLOURED CHIPS. REMEDIES, INCLUDING TETRACARE

Hundreds of Excellent Quality Aquarium and Pondfish, including:—

GOLDFISH & SHUBUNKINS 10/ to 20/ each
NYMPHS 3/ to 10/6 ..
CALICO COMETS 3-7" .. 4/- to 15/- ..
FANTAILS 2" 4/8 ..
FANTAILS 3-4" 12/6 to 17/6 ..
TELESCOPE FANTAILS 3-4" .. 15/- ..
MIRROR CARP 3" 3/6 ..
RED HEADED
LIONHEADS 2" 8/6 ..
PEARL SCALES 2 1/2" 8/6 ..
ORANDAS 2" 6/6 ..
BLACK MOORS 2" 7/6 ..
BLACK MOORS 3-3 1/2" .. 15/- to 17/6 ..
GREEN TENCH 2 1/2-5" .. 3/6 to 6/6 ..

GLASS FIBRE POOLS
(9 shapes)
Examples:

4' x 2' 8" x 12" Deep .. 66 17 6
7' x 2' 6" x 17" 115 19 6

NEW OTTER SUBMERSIBLE PUMP

Complete with either Waterfall or Fountain Kit.

0000

POLYTHENE POND LINER

(To Your Own Shape)
Approx. 7' 6" x 6' x 15" Deep.
35/-

PAY US A VISIT AND YOU WILL FIND WE ARE SECOND TO NONE IN VARIETY, QUALITY AND QUANTITY OF FISH FOR ALL AQUARISTS

WE CATER FOR THE NEW AND ALSO FOR THE EXPERIENCED AQUARIST

GOLDEN ORFE .. 3/- to 7/6 each
HIGOI 3/- to 7/6 ..
GOLDEN RUDD 3/6 ..
GOLDFISH, 2-3 in. .. 1/6 ..
GOLDFISH, 3-4 in. .. 3/6 ..

SHUBUNKINS, 2-3 in. .. 1/6 each
SHUBUNKINS, 3-4 in. .. 3/6 ..
CALICO COMETS 4/- ..
SILVER RUDD 3/6 ..

"ADVANCE" POLYPROPYLENE FLEXIBLE POND
Approximately 3' 9" x 2' 6" x 10-18" Deep.
63/11

STOKES FOUNTAIN .. 47 19 6

MINIMUM RAIL ORDER FOR FISH £1 10 0 CASH WITH ORDER
(PLEASE ADD 10/- CARRIAGE & PACKING)

We can offer an extremely Good and Healthy Variety of Tropical and Coldwater Fishes

J. T. HUNT (AQUAPETS) LTD

17 LEELEND ROAD
WEST EALING
W.13
Tel. EALING 2748

1 GRAND PARADE
EWELL ROAD
TOLWORTH
Tel. ELMbridge 0678

Opening Hours 9.00—5.30. Half-day Wednesday

WINGLESS FRUIT FLIES
5/- & 7/6 a culture
Postage and packing 1/-

NEW ! RUSTPROOF POLYTHENE COATED AQUARIUMS at a few shillings above conventional painting prices

10 x 6 x 6	15/6	16 x 8 x 8	20/6
10 x 6 x 8	16/-	18 x 10 x 10	27/-
12 x 6 x 6	16/6	18 x 10 x 12	30/6
12 x 8 x 8	17/6	18 x 12 x 12	37/6
14 x 8 x 8	18/6	24 x 12 x 12	47/-

LIGHT WEIGHT FRAMES
CARRIAGE AT COST B.R. ON TANKS
AND STANDS

FINISHED IN SIX BRIGHT COLOURS—RED, YELLOW, GREEN, BLACK, WHITE, BLUE

NEW ARRIVALS

Golden Orfe 6"-7"	15/-
Fantails	4/6 to 7/6
Green Tench	3/- & 4/-
Large Goldfish 7"-8", 8"-10"	10/- & 15/-
Small Orfe & Bitterling	3/-
7" Calico Comets	13/-
Medium Goldfish	5/- to 7/6
Small Goldfish & Shus	1/- to 2/6

ALL POND PLANTS STOCKED

THERMOSTATS

Procter	each
Constat External	33/-
Constat New External Type QK	22/-
Wizard External	22/-
Inter-Pet	22/6, 29/6
UNO	
Out/Adj.	18/-
Ina/Adj.	15/-
Ina/Adj. "Populus"	10/-
"Populus" with neon indicator	12/6
Presat Magic	24/6
Wizard	10/-, 12/6, 18/-

AERATORS

Inter	29/6, 39/6 & 59/6
Es. Summit	21/-
Quicko	22/6
Hena	45/-
Beko	55/-
Zoobeko Total	75/-
Zoobeko	46/-
Zoobeko Junior	37/6
Montrose Major	24/-
Montrose Minor	21/-
Procter	60/-
Dymax Mk. I A.C./D.C.	49 0 0
Dymax Mk. D A.C. only	49 5 0

PISTON PUMPS

Hy-fo Junior New Super	107/6
Hy-fo "A"	130/-
Hy-fo "B"	143/-
Hy-fo "C"	250/-

Thermometers

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

Filters

Hydro Outside	15/-
Corner	4/6
Outside	18/6
Windmill Hand	15/-
Rejector	15/-
Windmill Air	10/-
Rejector	10/-
Consort	19/6
Premier Biological Sub	21/-
Gravel Filter	12/6, 15/-
Sedijet	8/-
With Bellows	16/-
Slim Jim	17/6
Klear King	22/6
Bottom Filter 8/3	
Rock Filter	17/6

TROPICALS

Large Neons, 6 for £1 ; 3/6 each

Rosaceus	4/-	Plecostomus	15/-
Angels	2/6 & 3/6	Jack Dempsey's	3/6
White Cloud Minnows	2/6	Large Green Saltfin	from 5/-
Flames	2/6	Black Angels	7/6
Beacons	2/6	Black Lace	Angels 4/- to 7/6
Black Widows	2/6	Tiger barbs	2/6 & 3/6
Platys various	from 2/6	Glowlights	3/-
Swordtails various, from 3/-		Penguins (each)	3/6
Schubert barbs	3/-	Bumble Bees	(each) 3/6
Sciostoma	3/-	Mollies, Black	from 3/6 & 5/-
Guppies (pair)	1/6, 3/6	Lemon tetras	4/-
Harlequins	3/-	Glassfish Adult	4/6
Cherry barbs	3/-	Aeneus Cats	6/6
Nigger barbs	3/-	Oscelotus Cats	7/6
Chequer barbs	3/-	Fighters	10/-, 12/6
Red Eyed Tetra	3/-	Serpae	4/-

Thick lip 3/-, dwarf or leeri 3/6, Kissing 4/-, Opaline 3/6, Gouramis.

"SWIRL-AWAY"

Aquarium Vacuum Cleaner	46/6
Super Model	56/6

BOOK CASE BOW-FRONTED AQUARIUM

48 x 10 x 15	£28 10 0
36 x 12 x 15	£19 10 0
Standard Bow	£22, £15 10, £11 10 0

PLANTS

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

By post, add 1/6d. Minimum 7/6d.

HEATERS 25w to 150w

Inter-Pet	10/6
Uno	8/6
P.S. Standard	7/6
Wizard	9/6

ADULT RARE FISHES

Pelmatichromis Kribbensis	7/6 & 10/- each
Elephant Nose Fish	18/- each
Black Veiltail Guppy	15/- pair
Cardinal Tetra	9/- each
Knife Fish Nigerian	9/-
Black Cardinal	9/- each
Red Eyed Congo Characin	15/-
Scats from	7/6 to 20/-
Amonieri Cats	5/- & 7/6
Malayan Angels	7/6 to 15/-
Ramirez	6/- & 7/6
Tin Pail Barbs 3"-4"	6/- & 7/6
Silversharks 2"-5"	17/-, 20/-, 25/-, 30/-
Firesmouth	4/-
Red Veiltail Guppy	10/- pair
Red Tail Shark 7/6	Large 18/- each
Butterfly Fish	7/6

Our minimum order for fishes is £2, a charge of 15/- is made for container. Carriage charges, by fast passenger train and telegram stating time of arrival. Increase due to telegram charges.

NYLON COATED AQUARIA, STOCK SIZES

24 x 12 x 15	£4 15 0
18 x 10 x 12	£2 12 6
White or black covers	18/6 & 25/-

Larger sizes on quotation

STANDARD AQUARIUMS (Light Gauge) (Angle Iron)

12 x 6 x 6	10/6	24 x 12 x 12	50/-
10 x 8 x 6	9/6	24 x 12 x 15	55/-
14 x 8 x 8	14/-	30 x 12 x 15	74/-
16 x 8 x 8	15/6	36 x 12 x 15	90/-
18 x 10 x 10	21/-	48 x 12 x 15	120/-

COVERS

18 x 10	14/6	18 x 10 x 36	33/6
24 x 12	21/-	24 x 12 x 36	45/-
30 x 12	30/-	30 x 12 x 36	50/-
36 x 12	35/-	36 x 12 x 36	55/-

Aquarium covers sent by post only at customers risk.

FOODS

Eosic Flakes	1/6
Hydro Flakes	1/-
Brosiam	1/6 & 2/6
Bioric	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/- & 7/6
McLynn's	1/6, 2/6, 4/6, 17/6
Reine Shrimp	2/-
Tetra Min Groth Food Hahnel	4/-
Wardley's	8/-, 4/6, 2/6, 2/3, 1/3
Guppy Food	4/-
Fantasy	
Tetra Min.	1/10, 3/-, 6/6, 22/6, 70/-
Suregrow	

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. TERMS, CASH WITH ORDER

THE CENTRAL AQUARIUM

Situated on the A41 Route, opposite Hendon Central Station

391 HENDON WAY, HENDON CENTRAL, N.W.4 Phone: HEN 9700
OPEN 8.00 a.m.—7.00 p.m. Emergency Phone: HEN 9700

FROM GERMANY THE HOME OF TROPICAL FISH



TetraCare
AQUARIUM REMEDY



- 21 'BLACK WATER TONIC' Creates natural Tropical water which makes fish colourful, induces spawning. Results are fantastic.
- 22 'GENERAL TONIC' Prevents Diseases. Cloudy Water, Algae.
- 23 'CONTRA ICK' White spot cure.
- 24 'FUNGISTOP' Fungus cure.
- 25 'FLORAPRIDE' Plant food for perfect growth and soft water.
- 26 'CONTRA CHLORINE' Neutralizes chlorine content of tap water.

Each bottle will treat 40 gallons of Aquarium water.

NEW PRICE
NOW 4/6 per Bottle



Polythene measured bottles

"TETRAMIN" STAPLE FOOD. Immediately digestible to all fish. We offer 5 different formulae flake foods in Staple Food blended to give a properly balanced diet for all types of fishes, consisting of 26 pure natural ingredients such as fish meat, fish eggs, cod liver, daphnia, insect larvae and vegetable food rich in vitamins.

	s.	d.
1 unit size	1	10
2 unit size	3	0
5 unit size	6	6
20 unit size	22	6
100 unit size	70	0

**FROM ALL GOOD
PET SHOPS AND
AQUARISTS**

AniMin

SPECIALLY PREPARED FOR FANCY GOLD-FISH 1/10 - 4/6 - 12/6.

Trade Supplied.
Leading Wholesalers or Distributors.
Tetracraft Ltd., London.

SPECIALISTS AND BREEDERS
OF TROPICAL AND COLD-
WATER FISH. LIVE FOODS.

CHISWICK AQUARIA

136, CHISWICK HIGH ROAD, LONDON, W.4
TELEPHONE: CHISWICK 6549

CABLES: CHISAQUA, LONDON, W.4

PLANTS, ACCESSORIES,
BIRDS, BIRDCAGES,
EXHIBITIONS AND
INSTALLATIONS.

ENGLAND'S LEADING AQUARISTS

Don't miss the opportunity of seeing some of the
rarest fish in the world

EXPECTED DURING AUGUST

UNIDENTIFIED AFRICAN & S. AMERICAN FISH

We only sell Healthy Fish and Plants
The Finest Equipment and Reliable Tanks

REMEMBER
WE ARE REGULARLY IMPORTING FISH AND PLANTS
FROM ALL OVER THE WORLD

WHOLESALE ORDERS EXECUTED IMMEDIATELY

The GRO-WEL WORMS ALIVE

Automatic tubifex keeper & feeder

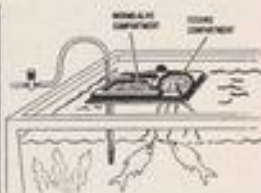
A steady flow of aerated water keeps the worms alive for weeks. Any weak worms automatically overflow into the worm feeding cup and are eaten while still alive.

A constant supply of live food will ensure fast, healthy, natural growth of fish.

Price 9/-

keeps worms
alive safely
in your aquarium

...where they
belong!



The GRO-WEL 5-WAY CONVERTIBLE TANK TRAP

The most versatile trap available. Can be used for breeding 1 or 2 livebearers, as a rod trap for breeding egg-layers or as a self-cleaning display tank for 1 or 2 Bettas.

Price 28/6d.

The GRO-WEL SWIRL-AWAY

- ★ A Highly efficient battery operated cleaner ★
- ★ Uses disposable filter bags ★
- ★ Ready for instant use at the touch of a switch ★
- ★ The outstanding new aquarium gadget for years ★

Standard Model 46/8d.

Super Model with more powerful batteries 56/8d.

Box of 5 disposable filter bags 4/-.

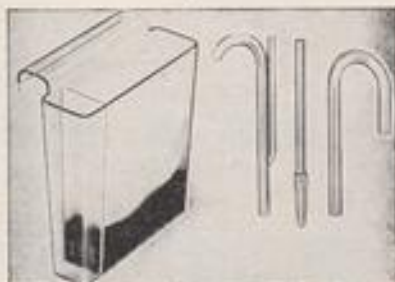
Extension tubes and other spares now available.

Other popular GRO-WEL PRODUCTS

Outside filters to fit all frames up to 1" wide

SLIM JIM, for tight quarters. The slimmest outside filter on the market. A quality filter for only 17/6d.

KLEAR KING 3-compartment filter. Separate compartments for glass wool and charcoal. Price 22/6d.



Internal Filters

BOTTOM FILTER. For filtering and aerating the tank. Handsomely styled. Unobtrusive and efficient. Price 8/3d.

ORNAMENTAL ROCK FILTER. For ornamental filtration for tanks up to about 10 gallons. Price 17/6d.

Available from your dealer or post free from:—

Inter-pet Supplies Company

18, Church Street, Dorking, Surrey

Sales promotion division of Liquify Co. Ltd.
Please send for our new catalogue.

IT'S SO EASY
 WITH THE
'DIAL-O-MATIC'
THERMOSTATIC HEATER

- ★ The perfect aquarium heater.
- ★ The natural choice of the discriminating.
- ★ The result of 30 years experience from the originators of glass-cased aquarium heaters.
- ★ It is one of a range of twenty first-class products to suit all pockets.
- ★ Products with those extra touches of craftsmanship—Made to a high standard—Safe to use—Dependable—Durable—Different. *All guaranteed.*



YOU CANNOT GO WRONG WITH 'Es-Es'

PRICE

35/-

100w 150w
 10" 12"



View of Control Head with Condensation Cover removed. Note the Neon Indicator and the Calibrated Control Dial affording immediate visual selection of temperature between 60°—90° F. To prevent accidental alteration the dial is recessed and its movement requires the insertion of a ball-pen point into the cavity provided. The required temperature numeral should be aligned with the raised arrow point against the cable inlet recess.

SINGLETON BROS. (Electronics) LTD.
 53, VICTORIA STREET • LONDON • S.W.1.

SPECIAL PLANT OFFERS

OFFER No. 1

2 Wistaria	5/-
1 Aponogeton	4/-
1 Nymphaea Stellata	5/-
1 Bacopa	4/6
1 Cryptocoryne Haerbelliana	3/6
3 Micro Sagittaria	1/6
Yours for 10/-	
23/6	

OFFER No. 2

50 Assorted Tropical Plants including—
Dwarf Lily, Aponogeton Cryptocoryne,
Wistaria.
Yours for 20/-

OFFER No. 3

30 Assorted Tropical Plants ... 10/-

SPECIAL SERVICE LIVE DAPHNIA BY POST 2/- post free

FULL CATALOGUE SENT ON
REQUEST S.A.E.

SPECIAL COLDWATER PLANT OFFERS

- 70 Plants for your pond or Aquarium £1.
- 30 Plants for your pond or Aquarium 10/-
- 30 Assorted Marginal Plants for your pond 10/-

All Standard Sizes of
Aquaria in Stock. Any
shape or size made to
Customers' Specifications.
Installations a Speciality.

STANDS

18 x 10 x 36	37/6
24 x 12 x 36	47/6
30 x 12 x 36	52/6
36 x 12 x 36	57/6

REMEDIES, etc.

Aquasonic	3/6	Halamid	3/-
Broslam White Spot Cure	2/-	Liquidox	1/9
Vivo Salts	2/-	Dissolve	2/6
Sea Salt	1/6	Broslam Fertilizing Tablets	1/6
Tetraozon all 4/- each			

THERMOSTATS

Coastal External	33/-
Coastal New External	22/-
Type GK	22/-
UNO	18/-
Out/Adj.	15/-
Inn/Adj.	15/-
Inn/Adj. "Popular"	10/-
"Popular" with neon indicator	12/6
Rena (with Neon)	21/-
"Ea-Ea" Sentinel	26/6
Springfield Safety	22/-

THERMOMETERS

Mercury	each
Gen	4/6
Plastic Backed	4/6
Spirit Blue Gem	5/-
"Ea-Ea" Dummy	6/6

FILTERS

"Windmill" Plastic Outside Filter	each 19/6
"Windmill" Biological Aquarium Filter 12, 16, 15, 14, 13, 12, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2, 1	15/-
"Windmill" Regent Inside Filter	10/-
Corner Filter	6/-
Air Lift	2/6
"Slim Jim" Outside Filter	17/6
"Klear King" Outside Filter	22/6
Bottom Filter	8/3
Ornamental Rock Filter	17/6
Uvo Polyfilter	3/6

AERATORS & PISTON PUMPS

each	
Meotrose	21/-
Fairy	24/-
Star	27/6
Infusyl	26/-
Elite	21/- and 4/6
Dried Daphnia	Our 6d.
Ground Shrimp	1/-
Fish Food	1/6
Ants Eggs	6d.

HEATERS

"QUEENSBOROUGH" 25w., 40w., 60w., 75w., 100w., 120w., 150w., 200w., 250w., 300w., 350w., 400w., 450w., 500w., 550w., 600w., 650w., 700w., 750w., 800w., 850w., 900w., 950w., 1000w.	10/-
Rena (75-200w.)	10/-
"Ea-Ea" Flexible Heaters (100w. and 150w.)	19/-
"Ea-Ea" Thermostatic Heaters, 100w. and 150w.	36/-
Presi-matic	24/6
Inter-Pet Thermostatic Heater 22/6 and 29/6	
Heater Holders	2/-

BACKING PAPERS

STRATA ROCKWORK	
PEBBLE BEACH	
SEA & SHORE	
24in. long x 20in. high. 1/6 per sheet, or 1/3 per foot. (post free)	

SEDIMENT REMOVERS

"Windmill" Air Rejectors	each 10/-
"Windmill" Head Rejectors	15/-
Fishtail	3/-
Siphon Tubing	7d. 9
Hand Type Plastic Swirl Away	4/6
	46/8

PLANTS

Valisneria Spiralis	9d.
Elodea Densa	9d.
Hydrophila	9d.
Sagittaria natans	9d.
Sagittaria micro	9d.
Valisneria spiralis	9d.
Ludwigia	9d.
Myriophyllum	7/6
Spotteddock 3/6, 5/- and 7/6	
Cryptocoryne Beckwithii	2/-
Wallisi	2/6 and 5/-
" Cordata	2/6 and 5/-
Haerbelliana 2/6 and 5/-	
Water Wistaria	3/6
Giant Hydrophila	2/6
Giant Sagittaria	2/6
Najas Microdon	2/6
Amazon Chain Sword	2/6
Duckweed per portion	1/-

FOODS

"Queensborough" Tropical Fish Food	1/6 and 2/6
Exotic Flakes	1/6
Hykro Flakes	1/6
Broslam	1/6 and 2/6
Broslam Frygrain	1/6
Broslam Biovic	6d. and 1/6
Liquify Nos. 1 and 2	2/6
Infusyl	2/6
Elite	2/- and 4/6
Dried Daphnia	Our 6d.
Ground Shrimp	1/-
Fish Food	1/6
Ants Eggs	6d.
Wardley's Treat Pac.	8/6
7 kinds of food	8/6
Hi-Glow	4/6
Glow Tube	3/6
Bob	2/6
O. Hartmann	3/6
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Aquarium Scourge

WHEN we decided that we would publish a review article on white-spot disease, to meet the demand from many readers, it soon became apparent that the information presented by Dr. F. N. Ghadially 8 years ago in *The Aquarist* could not be improved upon. Nothing required to be added or amended, and in fact one reader particularly requested its publication again, so we have included the first part of Dr. Ghadially's full survey of the disease in this issue. On the first appearance of the article we said it was needed because "there is so much muddled thinking concerning white-spot disease, and because the disease is of such common occurrence that an understanding of it is essential for the aquarist . . ." Both reasons unfortunately hold true now as then. It seems certain that the disease will always be around, for it frequently accompanies imported fishes, but if precautions are taken it can be prevented from spreading in an aquarist's tanks and affected fishes can be quickly cured, as Dr. Ghadially indicates in his article on treatments which will appear next month.

Goldfish in Canada

CANADIANS buy more than 3 million goldfish a year. Over 1 million a year—several millions of dollars' worth—come from the 50 terraced pools of Canada's only breeding ground for goldfish at Stouffville, 30 miles north-east of Toronto, Ontario. Five kinds of goldfish—common, comet, shubunkin, calico and moor—are raised on the 14 acre farm and measure from 2 to 12 or 14 inches.

Most people buy fish in the autumn, and after the rush is over the remaining fish are taken from their summer pasture of outdoor pools and transported by tank-truck, 20,000 a trip, to their winter quarters in an aquarium factory 2½ miles away.

Of the million fish hatched annually, 60 per cent are big enough and gold enough for sale in the autumn. In winter, a few stay in the outdoor pools, surviving under a foot of ice.

The fish are sorted by sex and breeding quality when they go out to pasture in the spring and for size when they come in for the winter. From the sorting table they are counted into large plastic bags for shipment from the plant to retail stores.

White-Spot Disease

A complete review of
this parasitic condition

by Dr. F. N. GHADIALLY

(Photographs by the author)



Fig. 1. Young free-swimming white-spot parasites (*Ichthyophthirius*). These occur in the water around an affected fish in large numbers.

EVERY year a large number of budding aquarists are lost to the hobby when their beautiful tanks are ruined by "white-spot". Perhaps nothing produces a more acute sense of frustration in well-wishers of this hobby than news of this nature, for really the disease is so easy to tackle once you know how. Part of the blame must be laid on the perpetual plague of letters which appear in aquatic journals describing new "wonder cures", decrying old well-proved methods of treatment, making fantastic claims for some drug and proclaiming all others as useless.

The evidence on which such conclusions are based are usually so flimsy that no scientific or logical thinker would consider them seriously for a moment. While nobody wants to stand in the way of progress or discourage free thought it must be realised that such letters are a real menace as they mislead the novice and cause endless confusion and chaos in a subject which by itself is hard enough to grasp at the best of times. Therefore I feel that a somewhat detailed review of our knowledge on the subject of the disease is now sorely needed.

If you are thinking that I am about to describe a new wonder cure let me disillusion you straight away. I do not know of any, but at the same time let me assure you that once you understand the natural history of white-spot and the way in which various drugs can be used to attack this parasite, and if you are prepared to apply this knowledge intelligently, you need never suffer serious loss of fishes from this disease. Furthermore, if you are a careful, methodical type of individual, and have the requisite knowledge and facilities to place new arrivals in strict quarantine, your collection of fish need never get white-spot. No rule-of-thumb propounded by some pseudo-expert, no patent drug supplied in a fancy bottle with a multi-coloured label at a prohibitive price, will forever banish this plague from your tanks. The only true weapon to fight this menace is knowledge; I am afraid there are no easy short cuts.

In the interests of the novice I have tried to write this article in as simple a manner as possible, but the subject itself is a complicated and difficult one, so let me warn you this may not prove easy reading. Do not lay this article aside now just because your fish are healthy at the moment; if and when the disease does break out it will be too late to start learning then. Let us now consider the many

aspects of this problem in some detail in an orderly fashion.

White-Spot; Definition. White-spot is a disease produced by the parasitic infestation of the skin of fish, characterised by the appearance of small slightly elevated white spots on the skin. (Note that the term infestation is used when denoting the presence of an animal parasite while the term infection is restricted to disease caused by bacteria.)

Aetiology. By aetiology we mean the study, or theory of the causation of any disease: the sum of knowledge regarding causes. More than one cause (correctly termed aetiological factors) may operate to produce a disease. To give an example, in human beings the disease called tuberculosis or "T.B." is caused by the germ *Mycobacterium tuberculosis*, but as a rule it succeeds in producing illness or disease mainly in run-down, poorly-fed individuals living in crowded conditions. Thus we see that there are numerous aetiological factors responsible for the production of tuberculosis in an individual. The primary aetiological factor is the germ itself. This is the main or important factor, without which tuberculosis could not occur, and the secondary aetiological factors are malnutrition, overcrowding, etc., without which the germ would have poor chance of producing serious illness. Let us now examine the aetiological factors involved in the production of white-spot.

Primary Factor. The disease is produced by a protozoan parasite called *Ichthyophthirius multifiliis*. (Protozoa is the lowest division of the animal kingdom including the unicellular organisms.)

Secondary Factors. Mainly chilling (sudden or prolonged drop in temperature or both), such as experienced by fishes during transit or owing to failure of the heating apparatus in an aquarium. Perhaps malnutrition, old age, overcrowding, etc., are other factors of some importance.

The main point that I would like to stress here is that

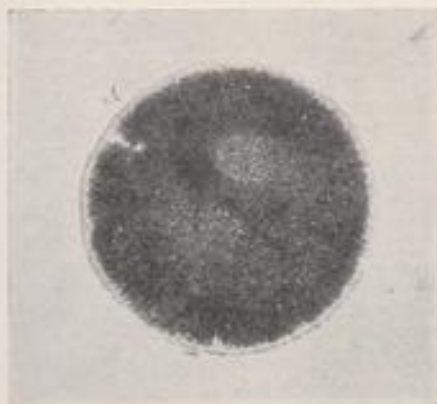


Fig. 2. A large mature parasite scraped from a white spot on a fish. It is filled with opaque food granules and the horse-shoe-shaped nucleus is faintly visible (pale area). Both photographs on this page were obtained under a phase-contrast microscope.

if the parasite is absent no amount of chilling, malnutrition or anything else will produce white-spot disease; of this we are absolutely certain. No *Ichthyophthirius multifiliis*, no white-spot. On the other hand, it is quite possible that even when a few parasites are present in the water, if the fishes are in fine condition and are not chilled, they may not develop the disease. That chilling is not absolutely necessary to produce the disease is illustrated by the fact that fishes can get the disease when parasites are introduced to a tank in which an adequate, fairly constant temperature is maintained.

Thus the primary factor is all important, the secondary factors, as their very name implies, are only of secondary importance. Many aquarists firmly believe that white-spot is caused by a chill, but I hope you will now appreciate that this is at best only partly true. Such statements cause much misunderstanding and they detract attention from the main cause of the disease—the parasite *Ichthyophthirius multifiliis*; hence they are best avoided.

If you still believe that white-spot disease can be produced in the absence of the parasite by chilling alone, I suggest that the next time a fish suffers from the disease

in my tanks and those of fellow aquarists I have observed that catfish (*Corydoras paleatus* and *C. aeneus*) are invariably not affected. I have often wondered whether these fishes, with their hard bony plates, are really completely immune from attack by these parasites. It is generally agreed that cichlids are somewhat more resistant to attack than say characins, barbs and livebearers. This is no doubt true, but even the large cichlids are by no means completely immune from attack.

Life Cycle of the Parasite. If the contents of a white spot are examined under the microscope one can see the adult form of the parasite. This is a unicellular round or oval organism (0.2-1 mm. in diameter) with a dark crescentic nucleus. Its surface is covered by fine cilia (hair-like projections used for locomotion). The parasite lies in the superficial layers of the skin of the fish. The tissues of the fish react against the parasite by pouring out a small quantity of fluid which then surrounds the parasite. In this cavity filled with fluid the parasite lives, and feeds on the tissue juices of the fish. The white spot thus produced gradually increases in size because: (1) as the parasite feeds

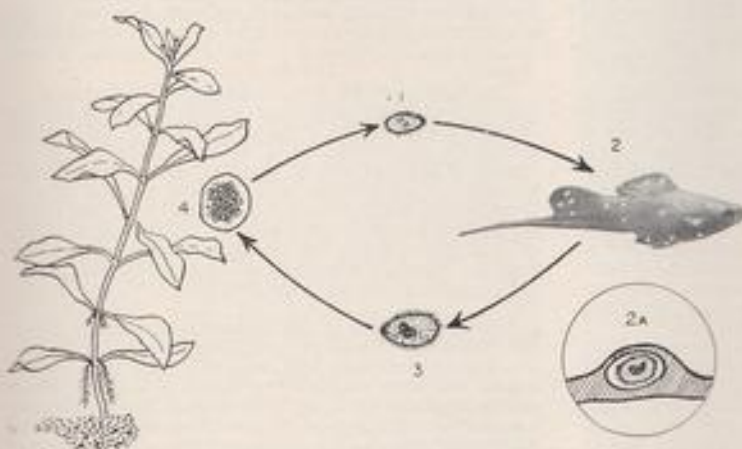


Fig. 3. Diagrammatic representation of the life cycle of white spot. The young free-swimming stage (1) infests the fish (2) and produces white spots. A section through a white spot and the skin of the fish (2A) reveals the parasite in a fluid-filled cavity. When this bursts the adult *ichthyophthirius* emerges (3) and settles on a water plant as a cyst (4). Within this, rapid division of the cell produces 500-2,200 young parasites which are then liberated into the water and can infest new fishes to start the cycle all over again.

you should examine under the microscope the contents of some of the spots by gently scraping them off the fish and placing the material so obtained in a drop of water between a slide and cover slip. You will then find organisms similar to that illustrated in Figs. 2 and 3 (2A) and this should convince you beyond a shadow of doubt that the parasite is present.

Numerous reports of outbreaks of disease in set-up tanks where neither material capable of spreading the disease nor new fishes have been recently introduced, but where the fishes have been chilled, have been made. If these reports are correct the explanation may lie either in a hitherto-undiscovered resting phase of the parasite, or in the yet unproved power of one of the known stages of development of the parasite to be unduly prolonged by factors we are not aware of, and not on the often-made ridiculous suggestion that the disease can be caused by a chill in the absence of the parasite.

Species-resistance. Various species of fishes vary in their susceptibility to white-spot though probably none are completely immune. Individual variation between members of a given species also no doubt exists. Thus when an outbreak of white-spot occurs in a tank not all fishes develop the disease. In the outbreaks that I have studied

it grows larger; (2) more and more fluid is poured out by the tissues of the fish; (3) there is accumulation of waste products produced by the parasite.

This increasing tension within the white spot first causes a thinning of the superficial layer of skin covering the top of the white spot, and finally its rupture. This sets free what may now be called the adult free-swimming form of the parasite; see Fig. 3 (3). This plump creature, loaded with food reserves, as it emerges from a fish cannot infest other fishes; it must first develop in a series of stages in the water before it can infest other fishes. It swims away from the ruptured white spot and soon attaches itself to a plant or rock or any other such static object in the aquarium. Here it secretes around itself a cyst and proceeds to divide within it a number of times until approximately 500 to 2,200 young parasites are produced. The cyst ultimately ruptures and this large number of young free-swimming parasites are liberated into the water. These are pear-shaped individuals covered with cilia (Fig. 1), and are much smaller than the plump adult form which emerges when the white spot on the fish ruptures.

The young free-swimming parasite then swims about in the water till it meets with a fish, when with its pointed end, it burrows into the skin and produces a white spot (each spot usually contains one or two parasites). There,

by feeding on the tissue juices of the fish it grows and is transformed into the adult form of the parasite, thus completing the life cycle.

The time taken to complete the cycle depends upon the temperature of the aquarium. The life cycle of the parasite is considerably faster at 80°F than at 65°F. At any given temperature only approximate times can be stated, as considerable variations are quite commonly encountered. Nevertheless, this is an important subject that will repay study.

Incubation Period. The incubation period of a disease is the time taken from the moment of entry of the parasite into the host animal to the time of appearance of the first characteristic signs or symptoms of the disease. Thus it is well known that we do not go down with typhoid or pneumonia as soon as we come in contact with a person suffering from the disease, but that some time elapses between this event—when obviously the germs enter our body—and the actual occurrence of the disease; that period is called the incubation period. During the incubation period although the animal is infested and is about to suffer from the disease it appears quite normal. The importance of that is quite obvious. Even if a fish looks as fit as a fiddle it is not safe to introduce it into your community tank without quarantining it first, for it may be incubating white-spot.

The incubation period at 80°F usually varies from approximately two to four days, though there are reasons to believe that this may sometimes be much more prolonged. Thus, if a newly purchased fish that has been kept at 80°F does not show white-spot at the end of four days one can be reasonably certain that the fish is free from white-spot. The time taken from the moment a spot is first sighted to the moment it ruptures varies roughly from three to six days at 80°F. A raw area technically called an ulcer is left behind when the spot ruptures (very small and difficult to see). In otherwise healthy fish this rapidly heals over but in heavily infested fish or in otherwise debilitated individuals fungus may form over the raw area.

It is said that at a temperature of 68°F the young free-swimming form of the parasite must find a host after it emerges from the cyst in approximately 55 to 60 hours or perish. (At 80°F this time would be considerably shorter.) This is what one would expect, for this creature is a complete parasite and has no means of feeding when free in water. It must find a fish to feed on the tissue juices or perish. When it is liberated from the cyst it carries a small store of nutrient material in its body to provide the necessary energy for life and locomotion for a few hours till it finds a host; if it fails in this it must starve to death. It is like a car running short of petrol with no pump in sight, it can go so far and no further.

How long it takes the adult free-swimming parasite to form a cyst and for the cyst to rupture and liberate the young free-swimming forms cannot be accurately stated, but there is evidence to suggest that all this takes much less than a week, probably as little as four to five days. For if a tank in which an attack of white-spot has occurred is allowed to stand after all fishes have been removed at 82° to 85°F for a week, it is then safe to introduce healthy fishes without treating the tank in any way. That is to say, that within eight days all the cysts have hatched out and the young free-swimming forms produced have perished.

Mode of Spread of Infection. The most common way in which this disease starts in a healthy tank is by the introduction of a new fish suffering from the disease or one incubating the disease. To the best of our knowledge snails, *Daphnia* and *Tubifex* do not themselves suffer from the disease nor do they form intermediate hosts for some stage of development of the parasite. Hence, these as such

cannot be held responsible for spreading the disease. However, it must be realised that as these objects are sold in the wet state or immersed in water, there is the risk that the water itself may be contaminated by the parasite and thus can produce an outbreak of white-spot when introduced into a healthy tank; e.g. a dealer or aquarist may use the same net to catch some fish from a tank where an outbreak of white-spot has occurred or is about to occur, and then use it to net out some *Daphnia*; or he may dip his hand in the tank to pull out a plant and then handle *Tubifex* with the still-wet hand. Such contaminated material when later introduced into a healthy tank can then produce an outbreak of white-spot.

Daphnia and *Tubifex* collected from the wild by the aquarist himself can be considered reasonably safe as far as white-spot is concerned, for these live foods are usually collected in water too polluted to support fish life. And if no fishes are present then obviously no white-spot parasites will be present, as this organism cannot live without its host for any appreciable length of time. Further, it is said that in this country this parasite is not or only very rarely found in the wild. However, on the continent and in the U.S.A. *Ichthyophthirius multifiliis* is endemic in the free waters. Plants, rockwork, gravel, etc., may in yet another manner help in the spread of the infestation for, as we have seen, the parasite encysts on the surface of such objects.

The dipping of wet jars belonging to friends into one's own tank when giving them some plants or fish is another dangerous practice, for if the jar had held a diseased fish earlier the small quantity of water so often left at the bottom of jars may contain parasites or cysts which could be easily transferred into your tank and produce an outbreak of white-spot. Lest in case you think that this is far-fetched, let me state that two past outbreaks in my tanks were almost certainly due to failure to observe this precaution. However, any article which is dry cannot transfer the parasite, as drying invariably kills it.

Signs and Symptoms. By symptoms one strictly means the evidence of disease as noticed by the patient himself, i.e., nausea, headache, pain, etc., while the term sign is usually restricted to objective evidence of a disease which can be observed by some other person like a physician, e.g., skin rash, fever, paralysis, etc. Since our fishes cannot tell us what they feel we can only strictly speak of signs of white-spot and not the symptoms.

The main sign on which the diagnosis of white-spot is commonly based is the appearance of one or more slightly elevated white spots approximately 1-2 mm. in diameter on the skin of the fish. There is no characteristic distribution of these lesions; they may be seen on the fishes' fins or on the body or on both. The diagnosis can be confirmed by examining the contents of such spots under the microscope and finding the adult form of *Ichthyophthirius multifiliis*. But even before the appearance of these characteristic lesions the observant aquarist will notice that all is not well in the tank, for he may see fish standing still in corners with folded fins (some species will "shimmy") or making mad swoops against rockwork or gravel as if they were trying to "scratch" themselves.

The burrowing action of the parasites as they make their way into the skin of the fish probably causes some irritation and hence the fishes behave in this manner. But one cannot diagnose white-spot by these appearances alone, as they can be caused by numerous other conditions. For instance, fishes will behave in a similar manner when they are placed in polluted water.

(Preventive and curative treatment of white-spot disease will form the subject of another article by Dr. Ghadially next month.)

Safety and the Fishkeeper

by PETER LEE

HOW safe is your aquarium? In a great many cases, the aquarium is set up with less regard for a safe installation than for display of the fishes as soon as possible. Yet there are certain hazards which should be taken into account whenever installing a new tank.

First of all, there may be an objection to the intended site of the aquarium, from the point of view of the weight loading on the floor. Many people do not realise that a cubic foot of water weighs 62½ lb. The approximate weights of water which can be contained in four standard sizes of tank, are as follows:

	Weight (lb.)
14 in. by 8 in. by 8 in.	32
18 in. by 10 in. by 10 in.	65
24 in. by 12 in. by 12 in.	125
36 in. by 15 in. by 12 in.	225

In addition, one must consider the gravel and stones within the tank, which, of course, weigh more than the water that they displace. Then the weight of the tank itself must be taken into account, plus the stand.

A common installation is a pair of 24 in. by 12 in. by 12 in. tanks on an angle-iron stand. This would weigh approximately 30 lb. for each empty tank, plus 125 lb. of water in each tank, plus, say, 30 lb. for the frame and a few pounds for reflectors, cover glasses etc. This will add up to a floor loading of about 350 lb. If the stand is of the type with feet about 1 inch square, then the loading will be almost 100 lb. on each foot.

From these figures, it is obvious that great care must be taken when siting the aquarium. Similarly, if a home-constructed stand or table is used to support the tank, then the load must be carefully considered and not left to chance.

A further siting requirement is that the table or stand must be such that the tank cannot be rocked about. Apart from the risk of a distorted aquarium frame, causing leaks, there is the possibility that a rocking motion can be set up, causing a slopping about of the water, often with disastrous results.

Leaks are, of course, a potential hazard, since a small leak can quickly grow. Very small leaks often cure themselves by reason of the small particles in the water building up and sealing the gap. Slightly larger leaks can be cured without emptying the tank, by using one of the proprietary sealers obtainable from the dealer. Do not expect these to work miracles, though. If a leak appears troublesome it is better to empty the tank and either reglaze the offending side, or to use one of the heavy duty internal sealers.

Loss of water is possible, apart from leaks. Occasionally, when the air pump is switched off, the water in the air-lift tube attempts to regain its level so quickly that it overshoots. If this temporary rise of level becomes as high as the uppermost part of the air line, then a siphon action is started and the water will run continuously into the air pump. Apart from the electrical hazard, it is possible with some types of pump for the water to spill out on to the floor. The siphon action would then continue until the water level in the tank was down to the bottom of the air-lift tube. This problem can be overcome by ensuring that the air tube, leaving the tank, carries on upwards for a few inches.

The electrical safety of the aquarium often leaves a great deal to be desired. At all times care must be taken not to overload the wiring and connectors. Most ordinary flex is

rated at only 2 amps. Remember that 1 amp will be required for each 240 watts of load. If at all possible, avoid the use of multi-way adaptors. Never run cables under carpets, since this soon leads to chafing, which is not noticed and creates a fire risk.

Ideally, a control box should be provided for the aquarium, so that services may be correctly wired and switched. If the heater and thermostat are connected via a plug and socket, then they may be easily disconnected whilst the hands are in the water, at the same time leaving the lights on, so that it is still possible to see what one is doing.

Since 1962 there has been a British Standard in existence laying down sensible requirements for the construction of aquarium heaters and thermostats (B.S. 3471:1962, price 5s., from The British Standards Institute, British Standard House, 2 Park St., London, W.1). Unfortunately, there is no legal obligation for products to comply with this. It is significant, however, that the heaters and thermostats laid down in this specification all call for an earth terminal. Also, in each case, the cable exit is above the water level. Many of the submersible appliances sold at present are potentially dangerous, since they have a slight 'leak' of electricity, which can often be felt if the arm brushes against the edge of the tank. The non-submersible type of combined heater-thermostat is perhaps the safest combination to use, since the cable exit is above the water level and thus agrees in some respect with the B.S. Specification.

Condensation can account for electrical hazards, when fittings such as lampholders become wet. This can be minimised by using a closer fitting cover glass beneath the reflector. Lampholders not in use, because of burned-out lamps, should be occupied by bayonet connectors until a new lamp is provided.

Earthing the tank frame is a matter on which there are two schools of thought. Several authorities say that the frame should be earthed. There is, however, another aspect of this. If the tank is correctly assembled, then the water will never touch the frame. Should an electrical fault develop under water, then the water will become effectively 'live'. If the hand is placed in the water and the frame is then touched, a certain shock will result, due to the earthing of the frame. If the frame were not earthed, and a shock were felt on touching the surface of the water, then the hand would be instinctively withdrawn, and the shock would be less likely to be fatal.

I put this question of earthing the tank to the Royal Society for the Prevention of Accidents, who in turn took the matter up with the Electrical Development Association. Unfortunately, after some 3 months of discussion, the only advice which could be offered was to follow B.S. 3471 as far as possible, which still does not answer the question. Perhaps the best solution to this problem would be to approach individual Electricity Authorities for their guidance.

Regular maintenance of all electrical equipment should be carried out. Screws inside plugs and sockets can work loose, and these should be tightened. The exit points of all cables should be examined carefully for signs of chafing, and reterminated if this should occur.

As far as fishkeeping is concerned, there is still a lot of truth in the old saying, 'Better safe than sorry'!

An Aquatic Lawn-Mower

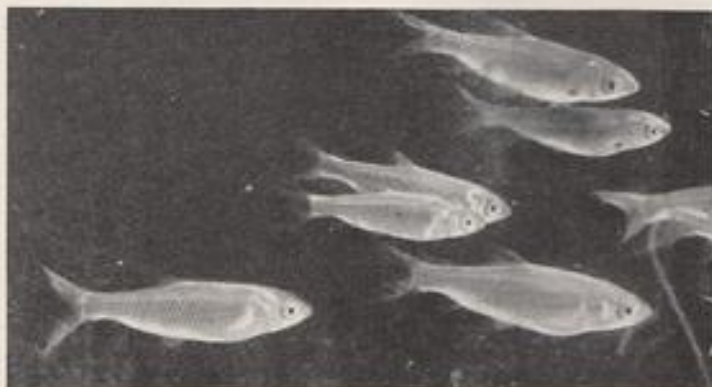
by R. B. ILES

THE grass carp, *Ctenopharyngodon idella*, is an important vegetarian food fish native to the rivers of the eastern Asia seaboard from south-central China to the Amur river in Siberia. It is an elongated cyprinid of an undistinguished dark grey colour which grows to 44 lb. or more in China, and which according to Soviet authorities attains a maximum weight in excess of 70 lb.

Every year during May and June many thousands of millions of fry and eggs of grass carp and other species are taken from the Yangtze and West River systems for cultivation in ponds all over south-east Asia. Those cultivated outside China originate mainly from the West river in the provinces of Kwangsi and Kwangtung. The fry are captured in large conical nets suspended in the river from poles on the banks. Each net terminates in a floating box of fine mesh, open at the top, into which the fry drift, and from which they are removed by dip net. As well as grass carp,

species for human consumption in ponds in China, Thailand, Malaya, Japan and Ceylon. The species is said to be of excellent food value, and in the hands of a good cook, very palatable. It has been introduced to Bulgaria, Czechoslovakia, France, Israel, Rumania and the west and south-west states of the U.S.S.R., such as the Ukraine, Krasnodar, Turkmenia, Kazakhstan, Yzbekistan, Latvia, Moldavia, and to the estuary of the River Volga. It is basically a hardy temperate species which grows very fast between 82°F (28°C) and 89°F (32°C), but which survives even in water near to freezing, and tolerates diurnal fluctuations of more than 32°F (18°C). Although it is native to rivers, it thrives in slightly brackish waters up to at least 25 per cent sea water, like other cyprinids such as common carp (*Cyprinus carpio*) and rudd (*Scardinius erythrophthalmus*).

Ctenopharyngodon is remarkable amongst fishes in that it



A group of young grass carp

fry of big-head carp (*Aristichthys nobilis*), silver carp (*Hypophthalmichthys molitrix*), black carp (*Mylopharyngodon piceus*), mud carp (*Cirrhina molitorella*), mandarin fish (*Siniperca chuatsi*), common carp (*Cyprinus carpio*), goldfish (*Carassius auratus*), bream (*Parabramis pekinensis*) and *Eliostichthys* and *Lutibrama* are caught.

The sorting of these various fry is a skilled and ancient art practised by experts who are the key men of the industry. The fry are first passed through batteries of sieves, and this removes the larger predators and other unwanted fishes. The fry which pass through the sieves are then placed in a large basket about half full of water, until the water becomes deficient in oxygen and the fry gather at the surface. More water is then splashed in, and the fry tend to separate into layers of separate species which are then skimmed out. This process is repeated until the various species are completely separated. Some 11,000,000,000 fry are reputed to be sorted in this way each year. After sorting, the fry are either sold immediately, or grown on to a marketable size of 5-7 cm. in ponds and are kept temporarily stunted for as long as 2 years until they are needed.

The grass carp is cultivated together with other carp

prefers green vegetation to any other food. Young fry feed on phytoplankton and zooplankton until they are about 2 cm. long, when they start to feed on aquatic vegetation such as *Lemma* and *Spirodella*. Fry of 3 cm. or more are exclusively and voraciously vegetarian and are often used for aquatic weed control in the U.S.S.R. and south-east Asia. They are so voracious that they have been known to feed on decaying clothing, and are frequently reared on human and animal faeces in Asian countries. The fish may require to consume about 50 lb. of terrestrial grass, or approximately 90 lb. of pond weeds such as *Potamogeton* or *Myriophyllum*, for each lb. increase in weight. The growth rate to a large extent is probably proportional to temperature. In China, fish grow to between $\frac{1}{2}$ lb. and 1 $\frac{1}{2}$ lb. during their first year, 4-5 lb. during their second year and to around 10 lb. during their fourth year. In the cooling ponds of a Moscow power station, fry grew to about 4 lb. in 15 months. In Malaya, grass carp exceed 3 lb. at the end of their first year, and are around 10 lb. at the end of their second year. In the latter region, the species is capable of growing to 7 lb. within 6 months, and to 12 lb. or more in 18 months.

Continued overpage

Further Signs of Trouble

by A. BOARDER

A DISEASE which might be mistaken for fungus is velvet disease (parasite *Oodinium*). The difference between the two is that whereas fungus shows up as whitish fluffy substance, velvet disease appears as a covering over the whole body. It can be almost white when it first shows but later turns to a brownish hue. The fish will become sluggish and go off its food. When the film covers the eyes and gills as well as the body the fish will die unless it is given treatment. Treatment is similar to that recommended for fungus; the disease is caused by a small parasite which irritates the skin, and the fish can have the salt treatment. After this it can be given as much live foods as it will take.

If the attacked fish has been in an aquarium it is possible that the water is in a bad state and the whole tank should be sterilised. If the fish was in a pond and is the only one affected then there may be nothing radically wrong with the pond water but the individual fish may be in a low state and so become a prey to the parasites.

Should a fish become bloated and its scales stand out from the body it is probably suffering from dropsy. This disease is caused by a minute organism and I do not hold out much hope of a cure. It has been recommended to tap the body of the fish with a hypodermic syringe to withdraw the fluid from the body, but I cannot see how a fish can be cured by this method, as the germs causing the trouble would still be present. It is often found that the affected fish is rather old and so has lived its normal life. In my opinion it is useless to try to cure a dropsied fish, and no-one would want to try to breed from such a fish.

Another body complaint is costiasis, which is caused by a minute parasite which enters the mucous covering and appears as small patches of inflamed or roughened skin. The best treatment for this seems to be the salt bath again. (It sounds as if the salt treatment is of almost universal application for skin complaints, but it is a fact that it succeeds in most cases.) As long as the strength of the solution is not made too great at first, it seems as if most fishes in poor health benefit from this immersion. There are several other cures recommended by various writers but I have found that in the hands of novices these cures, which usually involve drastic chemicals, can be dangerous. It is not easy for the amateur to measure the very small amounts needed for a cure and so too much could be a fatal dose. Some of the chemical cures can have bad after-effects, whereas provided that the correct amounts of salt are used and the solution is gradually lessened in strength, little harm can result.

If a fish appears to have a wasted body and shows no desire to feed, the trouble may be a form of tuberculosis. This may be a different disease from that which attacks human beings, but the outwards signs may be somewhat similar. The fish will gradually become weaker, hollow-eyed and very sluggish. I do not think that there is much hope of a cure unless the disease is taken in its early stages. The first thing is to remove the fish from its usual quarters to a thoroughly clean tank, and aeration may help to get the fish into a more normal state. Plenty of live food, especially earthworms, should be offered. If you can get the fish to take these there is a hope of a cure, but once again I must

emphasise that it is not a good practice to try to cure such a fish for the purpose of breeding from it.

It may not be the case always but often a fish will become diseased if it is from a weak strain. This state is recognised among other forms of life and so the aim of the breeder should be to rigidly cull from his stock any fish which shows a tendency to any form of disease which could be inherited.

If the body of a fish becomes swollen abnormally especially to one side it is probable that the fish is a female and has eggs swelling inside the body. This swelling may show up in very early spring, and in some types of goldfish, such as the veiltail and fantail, which have short bodies, the fish may become very troubled to keep an even keel. Sometimes such a fish will lie on its side on top of the water, but usually swims down all right when disturbed. It will only be the female fish that is so affected and the discomfort usually disappears when the eggs are laid. It is sometimes suggested that the eggs can be forced out of the fish by gradual pressure applied with the fingers towards the vent, but as the average aquarist would have no idea whether the eggs were ready to be laid or not, more harm than good could be done by this procedure.

A disease which sometimes attacks the fins of fancy goldfish is known as fin congestion. This shows as blood streaks on the fins, especially on the caudal fin of veiltails. These blood streaks can cover almost the whole of a fin and if treatment is not soon given the fin may start to split. The trouble is generally caused by bad conditions in the tank or even a chill may start this condition. Sometimes a tank is kept too long without a partial change of water. In such circumstances the water may become over-charged with solids and be unhealthy for the fish. Also a dirty tank, that is one which does not get its proper weekly servicing, will encourage the trouble. Again this trouble can be cured with the salt bath. Naturally it is of little use returning a fish to the unhealthy tank when it has been cured.

An Aquatic Lawn-Mower

(continued from the preceding page)

The grass carp spawns in Chinese and Siberian rivers from April to August during the summer floods. Spawning takes place in strong currents in mid-river, and the eggs hatch out in 30-40 hours at 77-86°F (25-30°C). Considerable efforts are being made to induce the species to breed away from its original habitat. Fertile eggs and larvae have apparently been obtained by artificial fertilisation techniques in Russia, and the species has spawned naturally in the cooling ponds of a Moscow power station.

The grass carp, being a hardy vegetarian, should have a great future for aquatic weed control in both temperate and tropical regions. In temperate regions, their growth rate could probably be enhanced by cultivating them in the warmed waters of suitable power stations, and there seems to be a reasonable chance that they would breed in such waters. The establishment of breeding stocks in European power station waters would obviate the need to import expensive stocking material from China.

Dwarf African Cichlid (*Pelmatochromis kribensis*)

by Dr. R. O. B. LIST

Habitat: West Africa (mouth of the Niger).

Family: Cichlidae.

Size: 2½-3½ in. (body length).

Temperatures: 80-82°F (27-29°C).

THOSE of us who have seen this fish have always spoken very highly of it yet it has not yet attained that degree of popularity which provides it with a popular name. Perhaps this may be due to the mixed opinions that I have found among those who at some time or another have kept *Pelmatochromis kribensis*. Some of us are quite emphatic that they are very peaceful, but others adhere to their opinions that they will gladly fight, albeit not to kill but sufficiently to show their aggressive manners. I have personally found them to be quite peaceful and trouble-free.

For feeding they show very little preference for any particular type of food and will take both dry and live foods. The former must, however, be on the coarse side. One of their requirements is salt in the aquarium water. A little will suffice and with such an addition they always seem to be at their best.

For breeding they prefer plenty of space, as well as heavy planting. This may sound paradoxical but the end result shows a requirement for heavy planting of *Vallisneria* and Indian fern. Consequently a large aquarium is necessary. They should also have slightly acid pH conditions. It is orange, but always with the slightly lesser known species we stumble over controversies about the degrees of hardness. Some favour 3° D.H. and others say 5-8° D.H. I have used water from 3 to 8° D.H. and my conclusion is that this point is completely unimportant. (I prefer the German method of pin-pointing degrees of hardness, as I find this more accurate, and this method I applied with this species.)

Breeding

One must firstly be convinced that the species of *Pelmatochromis* that you have is this one. One certain means of identification is that the male *P. kribensis* has two to three dots on the caudal fin and the scale count on the lateral line is 27 to 29. The female will usually be heavier and rounder than the male and is inclined to be less colourful.

When breeding the eggs are laid by *P. kribensis* on the underside of any smooth surfaces of rocks, but a flower pot is preferred. If you prefer to use the rock method only, these should be so situated that they can be tunnelled under. It is, however, simpler to use the flower pot method. One of the interesting things about these fish is that when ready they will build a sand wall in front of the flower pot opening and leave just sufficient room to survey the outside world.

The eggs are of a reddish-brown colour and when laid, the female will usually take charge of them, but both male and female will take turns to guard the eggs and care for them generally.

Hatching will take from 2 to 3 days and the fry are free-swimming in 4 to 5 days.

When preparing for breeding the pair should receive heavy supplies of live foods. One of the unusual aspects of this species is the fact that it is not the male who makes the decision about breeding and the courtship. It is the

female who prescribes the date and time, and when she has decided, she cavorts around the male and they will then continue to swim closely to one another, with a frenzy of meeting mouth to mouth in the way of the kissing gouramis.

The principal delight to be found in this species is the colouring, and I have not as yet found any colour photographs which do true justice to the simply glorious colouring. There is an overall purple hue with the upper portions of the body being darker. The abdomen is usually lighter, with a pinky hue, also has a wine red area on both sides. If the pair that you have bred from are used again, you will with near certainty find that the succeeding broods all vary in colour.

Variety of Colours

The fins show a variety of colours. The dorsal can vary from yellow to orange with a red border and the male will have one black spot. The caudal can be orange to red with two to three spots. Very occasionally four such spots are found but this is infrequent, and there is never more than four. The ventral fins are blue and orange, with jewel markings on the anal. Both the ventral and anal can, however, be violet.

I have never found any need to remove the parent fish after spawning and as I conclude that conditions must be right for them, I have left the parents to repeat the process. This will never occur until the first batch of fry is free-swimming. Should any of the first batch get too near the breeding parents, they are simply nudged away by either of the parent fish, which finds favour with my opinion that they are of a peaceful nature.

Such care is taken of the free-swimming fry that any of the young which step out of line get picked up in the mouth of either parent and brought back to the rest of the brood.

German aquarists tend to place a very heavy emphasis on the chemical aspects of the water in breeding tanks. I think that if the pH is correct and you have a suitable pair of fish to breed from, and that their requirements as to planting, hiding places etc. are fulfilled, then you have done what is required of you and the fish will do the rest.

I see from the foreign writings on *P. kribensis* that a lot of controversy is raging about the proper water concentration of chlorides, sulphates, carbonates and other minerals. To emphasise the nature of the controversy I have picked two authors at random on the matter of concentration of sulphates: one gives 25 mg./litre and the other 388 mg./litre. If we are to be so precise on these matters, then I fear that breeding will not become a pleasure but a task of great magnitude. Incidentally, these authors I have just mentioned vary from pH 5.8 to 7.5 and from 0.6° to as much as 43° D.H. for hardness. Yet both have apparently bred this species with success!

Getting fishes to breed is not like building aeroplanes or power stations, which are accomplished with many thousands of plans and drawings. Breeding fishes requires a little guidance, a lot of patience and some luck, and is not so mechanical as to require complicated formulae. Apart from all this, *P. kribensis* is a species that will reward all your efforts.

The Blue-Chin Catfish

by JACK HEMS

XENOCHARA DOLICHOPTERA is an uncommon but very desirable scavenging catfish from the central and northern regions of tropical South America. It attains a length of about 6 in. in the wild, but less in captivity, and is a member of the family Loracariidae. It lives longest—upwards of 5 years if conditions are right—when the left-overs it finds on the bottom of a community tank are supplemented with such things as chopped earth-worms, white worms, *Tubifex* worms and finely minced meat.

To make sure that the fish gets adequate nourishment, for it is by nature more active after dark than it is during the hours of daylight, the aforementioned items should be introduced into the aquarium last thing at night. It also eats, and should have for the good of its health, mossy green algae or suitable substitutes such as cooked green vegetables pounded to a puree.

The general colour is blackish blue, darker on the back than the underparts, liberally spotted with ivory-grey to white. The body is particularly well armoured; for there is a formidable array of hook-pointed spines on the lower part of the gill-covers, and many tiny spines on the bony-plated sides. The underslung mouth is modified into a powerful sucker by virtue of which the fish can attach itself to broad-leaved plants, a stone, or even to the glass of its aquarium. A dozen or more tentacles, some branched, and smaller spines project from the front part of the head and snout. Like the body, the dorsal, anal and caudal fins are ornamented with light-coloured spots. These fins also



have white margins. The pectoral and pelvic fins are usually carried well spread out from the sides. In well-grown fish the male may be distinguished from the female by his longer tentacles and overall brighter colours. Owing to the fish's bluish tints, and the fact that its snout is more bewhiskered than is usually the case among the general run of catfishes, *X. dolichoptera* is sometimes referred to as the blue chin.

The tank in which *X. dolichoptera* is placed should be well planted to give the fish a sense of security and some shade. Although a newly purchased specimen will tend to keep out of sight, after it has become used to its surroundings it will show itself with increasing frequency, especially when food is around; for in common with most other catfishes it is very sensitive to movements or sounds in the water.

Not perhaps unnaturally for a fish whose native waters are often fast-running, it flourishes best in a well-aerated aquarium maintained at a temperature range of about 65° F (18° C) to 85° F (29° C).

Reverting to its role as a scavenger in a community tank, it is scarcely necessary to say that the species, although so fierce-looking, is absolutely harmless.

Equipment for the Aquarium

by A. JENNO

MOST aquarists, particularly beginners in the hobby, quite rightly pay a lot of attention and devote much interest to the fishes and plants in their tank or tanks without appreciating that the fishes and plants can only survive if the equipment which maintains their artificial environment performs its function satisfactorily and will keep the conditions correct over long periods of time. When setting up his first tank, the budding aquarist will find himself overwhelmed by the many advertisements for various pieces of equipment and the great difference of opinion existing between more experienced aquarists on the merits of particular items.

The aquatic equipment trade nowadays seems to be a very flourishing industry and the result of this is that available items come in a large number of patterns, shapes and sizes, and each is advertised as being better than all the others. In most cases the equipment is of a good standard of workmanship and can be relied on for a number of years. The main difficulty is that the beginner has to sort out from this mass of advertising and mixed advice the particular items he will buy for his own tank or tanks.

The experienced aquarist, over a period of time, will

have tried various makes and types and he will usually settle, in the end, for a standardised set of equipment made up of items which he has found, in his own opinion, to be the best for the job in question. To do this, however, he may have spent a lot of cash and time in trying various things and this is all time and money which could have been spent on his fishes rather than on the equipment surrounding them.

The point which tends to confuse the beginner is not which make to buy, but more which type to buy. A good example of this is the aquarium thermostat. There are several types available, each having its own particular advantages. Some are cheap and some are expensive and the whole range is produced by several manufacturers so that each type is replicated several times. For the beginner to select the best of the range for a particular tank is asking rather a lot. It is also easy to buy the dearest, thinking it to be the best for the job, when a cheaper one would be quite satisfactory.

I propose to attempt to explain the principles of the various pieces of equipment and their correct use for the best efficiency, both economically and for the user's

personal satisfaction. I will also, in some cases, state which pieces I find satisfactory and other pieces which I do not. I will try to give reasons for my own particular likes and dislikes, not necessarily to influence the aquarist's choice of his equipment, but to show the drawbacks inherent in certain items, so that he may be aware of both their faults and good points before buying.

Immersion Heating

At one time there were a number of methods commonly used for heating tropical aquaria. Nowadays, however, almost every aquarist makes use of small electric immersion heaters, controlled by automatic thermostats. These heaters are placed in the aquarium which is to be heated and have the advantage of warming the water in the tank immediately, where other systems have either to warm the air around the tank or to transfer the heat through a slate base, fitted for the purpose, with consequent heat losses and expense.

Immersion heaters are small, cheap and clean in use. Properly used they will last several years. They are simple in construction, consisting essentially only of an electrical element enclosed in a protecting tube. As the heaters are totally immersed it is necessary for them to be properly sealed into the protecting tube to prevent the entrance of water. This is done by means of a rubber bung in most cases, and should be quite satisfactory. The mains supply cable should be double-insulated P.V.C. Single insulated cable is used in some makes, but this is not recommended. A point to note about heater cables is that the wire carrying the current usually consists of one large strand, rather than a lot of small strands as used in other mains cables, such as those for domestic appliances. This makes the cable less flexible and it should not therefore be repeatedly bent at any one point or the wire will snap, with unfortunate results.

There are three types of immersion heater in common use: the short glass tube type; the long, thin glass tube type; the long flexible heater.

The short type is the common heater used in most tropical aquaria. Construction and workmanship are usually very good. Price is less than 10 shillings at the moment and there are no real disadvantages. They can be more difficult to hide in a decorative aquarium than the long, thin type.

The long, thin type is constructed in the same way as the short type but has its element spread over a longer former. Owing to its small diameter this construction is not so reliable, in my opinion; the rubber bung does not form such a good seal, because there is so little rubber between the protecting tube and the mains supply cable. Being longer, these heaters spread the heat better than the short ones, but they are more liable to damage if accidentally knocked against hard objects. Cost is slightly more.

Flexible heaters consist of a very long element in a flexible protective insulating sheath. This type is laid in the tank in the form of a loop with the two ends together. One wire from the mains cable goes to one end of the loop and the other wire to the other end. The heater is usually buried in the gravel on the bottom of the tank and is useful where young fry might damage themselves on a glass enclosed heater. It will, of course, burn the roots of any plants placed very near to it and will cause the gravel to be at a higher temperature than the water in the tank, which is not always advisable for plants. Being flexible, these heaters are not so easily damaged, but they are quite expensive compared with glass enclosed heaters.

All heaters should be positioned so that the element lies horizontally. This reduces the effect of the heat on the rubber bung and gives the best spread of the available heat. The heater which lasts longest is the one which is moved

about the least. All glass enclosed heaters should have a protective tube of heat-resistant glass, such as that used for domestic ovenware. This should be remembered when replacing broken tubes. Glass enclosed heaters should not be buried in gravel to hide them as they have a tendency to explode under these conditions.

One of the more important points about heaters is to use the correct wattage for a given size tank. If the heater wattage is on the low side for a particular tank, it may control satisfactorily at normal temperatures, but cannot be used to raise the water to emergency temperatures when diseases such as white spot are encountered. On the other hand, if the wattage is too high the thermostat will have to work much harder to control the temperature properly. This will shorten the life of the thermostat. A very high wattage may cause large fluctuations in the tank temperature.

The table shows recommended heater wattages for tanks kept in living rooms and other fairly warm locations.

Tank size	Suggested wattage
Below 18 in. by 10 in. by 10 in.	25
18 in. by 10 in. by 10 in.	50
24 in. by 12 in. by 12 in.	75
30 in. by 12 in. by 12 in.	100
36 in. by 12 in. by 12 in.	150
48 in. by 12 in. by 12 in.	200

It should be noticed that the figures in the table refer to tanks kept in warm locations. In cold locations higher wattages should be used. Unless the tank is in an extremely cold position, the wattage recommended for the next largest size tank to the one in use will be satisfactory. I do not recommend the use of short heaters of high wattage (150W or 200W). It is far more reliable to use two small heaters rather than one large one, as element life is not so good at high wattages. If two heaters are used and one fails, the other will stop the tank temperature from falling too far or too fast.

Thermostats

To control the tank temperature at a constant value we use an automatic thermostat. Basically this consists of a bi-metal strip which operates a pair of switch contacts carrying the mains supply to the heater. To make a bi-metal strip, two strips of different metal, usually steel and brass, are fastened together face to face. When a temperature change takes place, both metals expand or contract, depending upon whether the temperature goes up or down. Instead of getting longer and remaining straight as a single metal strip would, the bi-metal strip forms a curve, because one side of it expands more than the other, its two metals having different rates of expansion.

The bi-metal strip used in aquarium thermostats is so designed that when it reaches the minimum temperature required in the aquarium, the free end curves the correct distance to bring the switch contacts together and thus it switches on the heater. When it reaches the maximum temperature the points will open and switch off the heater. The difference between the temperature at which the thermostat cuts on and that at which it cuts off is known as the 'differential'. Good quality thermostats have a differential of only 1 or 2 degrees and therefore will maintain the aquarium at a constant temperature quite easily.

Adjustment of the control temperature setting is carried out by applying pressure to the bi-metal strip. Most makes use a screw arrangement for this, as this permits precise adjustments to be made. A small magnet is usually fitted adjacent to the stationary switch contact. When the bi-metal curves to such a position that the points are about to close, the magnet attracts the steel side

of the bi-metal and this results in the points closing quickly and preventing any arcing from taking place at the contact surfaces, which would rapidly ruin the thermostat. Similarly, when the thermostat is opening the contacts do not part until the curvature of the bi-metal is enough to produce a force large enough to overcome the magnetic attraction. The points then spring open fast and arcing is again prevented.

There are three main types of thermostat in common use at the moment: the so-called submersible; the internal fitting adjustable; the external fitting adjustable.

Submersible thermostats are designed to be totally immersed if required. There is no adjustment of the control setting provided on the outside of the thermostat and when adjustment is required it is necessary to remove the thermostat body from the protective glass tube and turn a small screw. For obvious reasons the mains supply must be isolated before doing this. These thermostats are generally smaller than other types, have a smaller bi-metal strip and smaller electrical contacts. Their working life will probably be shorter than that of large thermostats. It is a wise precaution, in my opinion, to keep the top of these thermostats above the water level, as they do sometimes admit water when submersed, especially after the bung has been removed and replaced several times when making adjustments. The manufacturers usually supply this type set to control at a stated temperature, to save the aquarist making initial adjustments. While the setting will be correct for most cases, it cannot be relied on because the final temperature reached by any aquarium depends on many factors and these are different for different aquaria. Therefore, when first using a thermostat of this type always check that the temperature setting is correct.

All internal thermostats are designed to be used vertically. If used in any other position the action of gravity on the weight of the bi-metal strip may cause the differential of the thermostat to alter and possibly cause large fluctuations in tank temperature.

Internal fitting adjustable thermostats generally have a larger bi-metal strip and more substantial contact points. They are easily adjusted by means of a knob protruding through the rubber bung. Some are fitted with key or screwdriver adjustments. These are preferred where small children or other persons might tamper with the adjusting knob. The top of these thermostats must be kept above the water level and most types are susceptible to condensation dripping on them. In some cases the spindle or screw bearing the adjusting knob is metal and because its inside end touches the bi-metal strip it will be electrically live. This can be dangerous if proper insulation is not provided or if the insulation gets damaged. This type is dearer than the submersible, and must also be used vertically.

External fitting adjustable thermostats are, in my opinion, the best thermostats available for general aquarium use. They are mounted outside the tank and 'feel' the water temperature through the glass. This means that they must be fitted flush on to the glass, and this is usually done by an adhesive or a stainless steel clip which hooks over the top of the tank. The clip type is better if it is desired to move the thermostat to other tanks from time to time, but probably not so good as those which are stuck on, particularly when used on glass which is not flat. The clip type is also more easily knocked off the tank accidentally, which would result in the heater remaining on permanently. The stick-on type also has the advantage that it can be mounted near the bottom of the tank so that it can be used when the tank is only partly filled with water. On most tanks, the clips provided for the other type are not long enough for this.

Outside thermostats are safer electrically, but should not be subjected to dripping condensation or a damp atmos-

phere. If the tank in question has glass thicker than a quarter of an inch the internal fitting thermostat will probably give better temperature control. It is possible for outside thermostats to be affected by the surrounding air temperature if this varies greatly, and for this reason they should not be fitted where they will be subjected to strong draughts.

There are several points to note on the general use of aquarium thermostats. Keep the water level about three-quarters of the way up the glass tubes of internal fitting thermostats, and above the top of external ones. Bigger thermostats have a longer life and are more reliable, so use good quality well-known makes in the largest size you can afford, although there is no need to go to the expense of using a large, expensive external thermostat on a 12 inch tank. Especially where the aquarist has only one tank, it is of particular value for him to invest in a really good thermostat, as should anything go wrong with a cheaper one, he has no emergency quarters for his fish. Do not allow condensation to drip on any thermostat. If possible mount internal thermostats so that the top is in the air above the tank. This may mean cutting away a small piece of the hood, but it is worth the trouble.

When heating a large tank, or a batch of tanks controlled by one thermostat, the current rating of the thermostat switch points must be taken into account as contacts will only carry a certain maximum current. Loading above this value will damage the thermostat. Manufacturers usually state the maximum current and wattage on the thermostat itself, or on the box it is sold in.

Many thermostats nowadays have neon indicators fitted, and these are very useful if their use is understood. On small thermostats the neon usually lights up when the heater is off, and on large thermostats when the heater is on. It is essential to know which way a particular neon is working or the wrong impression will be gained from its action.

Used carefully, a good quality thermostat will do its job well for many years. Signs of deterioration are bad temperature control and/or a large differential. If arcing is taking place across the contact points, this can be a sign of coming failure. In glass-enclosed thermostats the arcing will be visible and in other types the neon indicator (if fitted) will flicker for several moments each time the thermostat switches on.

When adjusting the temperature of a tank to a new value, it is advisable to make several small adjustments to the thermostat rather than one large one, and it is important to give the water temperature plenty of time to respond to the initial adjustment before making a second one. If the occasion arises where it is required to take the water temperature to a value which differs greatly from normal, make sure that this value is within the working limits of that particular thermostat, otherwise the bi-metal may be strained and permanently bent, and it might then prove difficult to get back to normal temperature when required to do so.

Combined Heater-Thermostats

There are on the market at the moment several models of what are described as 'combined heater-thermostats'. These consist of a long protective tube, inside which is a short heating element and, above this, a thermostat. The thermostat may be fitted with internal or external adjustment. The impression given by the manufacturers is that these are superior to separate heater-thermostat systems, and that they are, in fact, the ultimate in aquarium temperature control. In my opinion neither of these points is correct and I would like to state my reasons.

In the first place, the heating element is used in a vertical position, which is contrary to normal practice with in-

dependent heaters. The fact that it is used in this manner must, in my opinion, shorten its working life and does not help to spread the heat in the tank. When the heating element is switched on, the first thing affected by the heat will be the thermostat, because this is inside the tube with the heater. This is bad practice from a point of view of temperature control; far better results are obtained by placing an independent thermostat where it will assess the average water temperature after this has responded to the action of the heater, than by attempting to control by means of a combined thermostat which is influenced more by the heating element temperature than it is by the water temperature.

In a large tank with neither aeration nor large fishes to stir the water, where the water is virtually static, large temperature differences will probably result from the use of this type of instrument. It is also probable that the bung at the top of the tube and the parts of the thermostat would eventually suffer from the effect of having the heater mounted directly beneath them. Cost is slightly dearer than a separate heater and thermostat of the same quality.

Thermometers

To read the water temperature easily and at any time a small thermometer is usually fitted in the tank. There are three types; mercury in glass; spirit in glass; a small, round 'compass' type of mechanical action.

The mercury in glass are very accurate, if of good quality, and have a good response to temperature change, but they can be difficult to read quickly.

The spirit type is very easy to read, but unless of top quality the accuracy is less than that of mercury thermometers. Spirit thermometers have a slow response to temperature change.

Compass-type thermometers are small and circular and thus much neater for use in decorative aquaria. They are dearer than glass thermometers.

The best glass thermometers are those which have the numbered scale fitted inside the glass. Most aquarists will find good quality spirit thermometers quite sufficient for their needs. Place the thermometer where it will read the average tank temperature, not directly above the heater. In large tanks it is sometimes an advantage to use two thermometers, spaced apart. The main trouble encountered with thermometers is that after some time in use it is often necessary to renew the rubber sucker or sealing ring. These can be obtained quite cheaply, however.

Most aquarium thermometers are scaled in degrees Fahrenheit, but nowadays the change to degrees centigrade is taking place in various fields and in some aquatic literature temperature values are now given in centigrade. Conversion from one scale to the other is carried out by means of the following formula:

$$^{\circ}\text{C} = (^{\circ}\text{F} - 32) \times \frac{5}{9}$$

To give an example, if we wish to know the equivalent value of 75°F in degrees centigrade, we proceed as follows:

$$^{\circ}\text{C} = (75 - 32) \times \frac{5}{9}$$

$$\therefore ^{\circ}\text{C} = 43 \times \frac{5}{9}$$
$$= 23.9$$

$$\therefore 75^{\circ}\text{F} = 24^{\circ}\text{C (approximately)}$$

Aquarium Heating

Heating a single aquarium is not a costly business, unless

the tank is very large, but when the aquarist has a number of tanks in use it is worthwhile to consider several points which increase efficiency and reduce costs.

The lowest costs will be obtained when all the tanks are situated close to each other in a small, well-insulated room. The waste heat from the tanks then warms the air in the room and it will be found that the smaller the difference between room temperature and tank temperature, the smaller will be the heat losses. In two-tier installations the lower tanks will help to warm the top ones.

Use heaters of the correct wattage for the tank sizes in use, taking into account whether or not the air temperature in the room is normally cold. Place the heater in each tank as near the centre as possible and keep the element horizontal. Most people put the heater at the back and in a corner, for tidiness, and this results in a lot of the heat going straight out of the tank without warming the water, particularly in large tanks. Position the thermostat so that it responds to the average water temperature and not to the heat from the heater. Aeration, in all but the smallest tanks, will improve temperature control and will prevent stratification which occurs in large, static tanks and results in the water at different levels being at different temperatures. Certain types of fishes fare badly under these conditions.

Some aquarists insulate their tanks on all sides except the viewing side. This will prove beneficial, but remember that most insulating materials are hydroscopic and should not be subjected to condensation or a damp atmosphere.

Where it is desired to use tanks without gravel, such as when raising fry in large quantities, it is important to keep the heater away from the glass bottom or it will cause heat cracks. There are several plastic heater clips on the market which do this quite satisfactorily. If tank insulation is being carried out, it will be advantageous to insulate the bottom of the tank as well as the sides in this case.

When controlling several tank temperatures by means of a common or master thermostat, remember that this can only be successful with tanks which have the same heater wattage: volume of water ratio. This means that either all the tanks must contain the same volume of water and the same wattage heaters, or, if the volume of water varies from tank to tank, the wattage of the heaters must also vary to compensate for this. This last system would involve a fair amount of trial and error to set up correctly, and is not recommended. When controlling several tanks from one thermostat it is also important that the heat losses from each tank should be more or less the same. This system requires a top quality thermostat, with contacts large enough to carry safely the total current drawn when all the heaters are on. A really good heater is also necessary for the master tank, because if this fails the thermostat will keep all the other heaters permanently on, with disastrous results.

The master thermostat system is not a good one, in my opinion, as it has too many drawbacks. The only advantage is the saving in initial outlay on the number of thermostats required and even this is partly offset by the fact that a really expensive thermostat is required for the master tank. Furthermore this system can be very cumbersome if used with small tanks which need frequent cleaning and must be isolated from the electrical circuit each time. Either the aquarist has to isolate the bank of tanks, or wire up the individual heaters in such a way that any one can be safely and easily removed from the circuit without interfering with the operation of the others. When it comes to cleaning out the master tank, either the lot must go off or the thermostat must be temporarily placed in or on another tank.

Next month: **Aeration and Filtration**

Breeding the Neon Tetra

by D. W. AMIS

BREEDING the neon tetra can truthfully be said to be the ambition of all those who keep and breed tropical fishes, whether they are professional or amateur aquarists.

As with the breeding of all fishes the basic principles must be adhered to: i.e., fish of good size and condition (but not old fish) should be used. Conditions in the breeding tank should be as near as possible to their natural environment.

When selecting my pair for breeding I was faced with the problem that I had good males but no suitable females. This was soon overcome, however, by a fellow club member, Mr. T. Cowling, offering me one of his excellent females.

After selecting the pair and placing them in separate tanks I proceeded to prepare water for the breeding tank. This was done by soaking several handfuls of sedge peat in water (two parts of tap water to one part of distilled water) for 2 weeks. The breeding tank (18 in. by 10 in. by 10 in.) was then thoroughly washed and dried and 2 days before breeding was attempted the tank was arranged and the temperature set at 78-80°F (26°C). The water was tested with a pH-test kit and was found to be approximately pH 5.8. I must admit I did not worry about water hardness unduly, as the water in the area is reasonably soft. A few drops of acriflavine were added to the water and also about a quarter of a cup of cold weak tea. Three nylon mops were then prepared, two of which were weighted and placed in the tank and the third was left to float to resemble a floating plant.

The fish were then placed in the tank with a net which had been dipped in boiling water containing a few drops of acriflavine. The tank was then covered by a piece of thick brown paper to minimise the amount of light.

Next morning, rising early and going quietly to the tank, I removed the brown paper from one corner of the tank and noticed a few tiny white spots scattered over the tank bottom, but I also noticed the male chasing the female in and around the nylon mops. Placing the brown paper back in position, I returned to the tank about 1-1½ hours later and took the pair out, first of all dipping the net in boiling water to kill any bacteria.

Next morning to my disappointment I found that the eggs lying on the bottom of the tank were covered with a coat of fur and were obviously no good at all. However, further inspection on the following day proved more hopeful as I used a large magnifying glass and, on looking at the nylon mops, I could see about four of the young fry hanging on.

I waited until the fry could be seen free-swimming (fifth day) and started feeding with Infusoria, proprietary tube fry food and a small quantity of egg yolk three times a day. This was continued for about 10 days and then a little micro worm was added to the diet, as this dropped straight to the bottom and was eaten very quickly. After a further 5 days brine shrimp was given and a small amount of light was allowed to enter the tank. After about 2 weeks on brine shrimp I started to add chopped Grindal worms and finely ground liver to the diet, which the fry rapidly ate.

When I was fully satisfied with the progress and growth

of the fry the paper was removed. The tank was, however, built into a cabinet which allowed only subdued light. The fry remained in the breeding tank until they were about 3 months old and were then transferred to a larger tank containing similar water with the omission of the acriflavine and cold tea.

My neons are now 4½ months old and doing very well. There are only about 14 which I have managed to keep but they are the most prized fish in my collection.

DISEASES OF FISHES

Fungus of the Eye



EYE fungus is a secondary infection following either physical injury to the eye or damage caused by chemicals. The fungus is recognised by the presence of tufts of grey or white threads hanging from the eye, resembling cotton wool in the manner so characteristic of fungus. Without treatment the eye will be destroyed within a few days and if the fungus is allowed to continue beyond this stage the roots of the fungus will penetrate to the brain and cause death.

A cure can be obtained by touching the eye and fungus with a soft brush dipped in a 1 to 2 per cent solution of silver nitrate. The eye is then swabbed immediately after with cotton wool soaked in a 1 per cent solution of potassium dichromate. The treatment may be repeated as necessary.

A 1 to 2 per cent solution of silver nitrate is prepared by dissolving 1 to 2 grams (approximately 15 to 30 grains) of silver nitrate in 100 ml. of distilled water; it is essential to use only distilled water, for a precipitate will be formed if ordinary tap water is used. A 1 per cent solution of potassium dichromate is prepared by dissolving 1 gram (approximately 15 grains) of potassium dichromate in 100 ml. of water. Both chemicals may be obtained from dispensing chemists.

R. E. Macdonald

THE AQUARIST

HOUSE PLANTS FOR THE FISH HOUSE

Monstera deliciosa borsigiana

by BILLY WHITESIDE

A NATIVE of Mexico, *Monstera deliciosa borsigiana* will flourish in the humid atmosphere of the fish house. Its name, roughly translated, means delicious monster. The plant's giant leaves qualify for one part of the name, and the fruit of the plant is delicious when eaten.

On seeing the plant for the first time one is struck by the 12 in. long, glossy deep green leaves, which are serrated with deep holes or gasbes. Two explanations are usually given for these, the first being that as the plant grows in tropical forests, it receives little light. The holes allow the sunlight to filter down to the lower leaves of the plant. Support for this idea is given by the fact that the first few leaves on a young plant are usually without these holes. Reason number two could be that the plant, coming from areas where strong winds are common, has developed these holes to lower its resistance to wind.

Monstera is able to tolerate low light conditions, but in higher illumination it will often produce its hooded flower, which opens to reveal a green cone-like fruit. On ripening, the fruit, with its pineapple-like flavour, is pleasant, but if eaten before it ripens it can be rather fibrous in texture. Seeds need a temperature of about 80° F (27° C) for germination. A compost rich in leaf mould suits the plant, which, although it grows to a large size in its natural habitat, remains manageable in the confines of a flower pot.

Watering freely in summer, and keeping just moist in winter, prevents the leaves from yellowing or browning, and periodic liquid feeds in summer are appreciated. Sponging the leaves will keep them dust free. Aerial roots forming on the plant should be trained down into the compost, where they will branch and help to nourish the plant.



Monstera deliciosa borsigiana, with its luxurious foliage, gives to the fish house an exotic look which blends well with the tropical atmosphere. It is often sold under the common name Swiss cheese plant.

Polythene to the Rescue

by BILLY WHITESIDE

SINCE their introduction, polythene and similar materials have been put to many uses by a variety of people, but not all aquarists have discovered just how many uses these materials can have for them. The following are some of the uses to which I have put polythene, with advantage.

In breeding Grindal worms, I tried to keep the breeding box in the kitchen, to increase the yield. Unfortunately many small flies also reproduced and the worms soon had to go. The problem was solved when the box was enclosed in a polythene bag, the mouth of which was sealed with an elastic band. Humidity was high in the enclosure and the worms quickly multiplied. Soon the fly population decreased, and, as the compost did not dry out, it needed very little watering. I have not found any evidence of the medium going sour.

Other uses for polythene bags are many, one of the commonest being for fish transportation. These work

successfully for either tropical or coldwater fishes; for the former, however, they have to be placed in, say, a cardboard box to prevent loss of heat. Being a poor conductor, polythene shreds can also be used to line the box, round the bag containing the fish. These shreds also trap large quantities of air, which is another poor heat conductor. When choosing polythene bags for fish transport, test the bag with water for a short period before introducing any fish. Even a pin hole can allow the water to slowly escape.

It has been my experience to find the odd tropical fish to have jumped out of the tank through the small opening left in the corner of the cover glass to facilitate feeding. A flap of polythene film over this space will give easy access while preventing fish from escaping.

Siphoning sediment and mulm from the base of the tank often results in a rubber siphon tube being blocked by gravel or snail shells. This is annoying in that one cannot

Continued on page 83

our readers

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.

A Show Mourned

I MAKE no apology for returning to the subject of a National Show, as in my opinion it is essential for the welfare of our hobby that one should be held. I cannot visualise complete success for a National Show anywhere else than in London. Where else could we anticipate a "gate" of around 30,000, necessary to ensure such success?

I feel that some of the real go-ahead societies should take it up, at least three based on London. One to take over staging and serving, another to be responsible for the gate, programmes and attendance on main stand, another for planning the trade stands and general lay-out. Surely there are enough really first-class societies in London, such as Hendon, Willesden, Tottenham, Riverside, The Friends, to make child's play of the job?

I call on every aquarist worthy of the name to pledge his support to the planning and holding of a National Show in 1965.

I have read many reasons against holding a show, and in the main they can be dismissed off-hand: how and where does one park a car or coach—the organiser of coach parties will provide their own answer; if it is essential to take a car to London there are many facilities to park if they are looked for.

The question of a week for the show; again it is obvious that there is little more work required for a show lasting a week than for 2 or 3 days.

It is common knowledge that there is far more money available to-day for the furtherance of hobbies and other activities that give pleasure than 10 years ago.

I do not know where the suggestion of 10s. admittance came from. I suggested 3s. 6d. admission and 2s. for entry fee and I think these would pay off handsomely.

At the beginning of this correspondence, back in January, I asked all the aquarists who wished to see the National Show revived to write just a line to the Editor expressing their approval. I ask once more for readers to do this so that the Editor can publish a list of names and addresses and their clubs, to try and convince certain people that there is a demand for a National Show.

T. H. MARSHALL,
Buckhurst Hill, Essex.

IT is good to see that there is a demand for a big show in London, and it is good to see that the Nottingham Society is again, after being badly missed for some years, about to stage a big show. But it is a pity that these things



write

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

should immediately lead to denigration of the British Aquarists' Festival.

The promoters of this event have made the best use of the resources and facilities available. This has been done well enough, ever since 1951, to give pleasure each year to thousands of visitors from all over the British Isles, and many from further afield.

May I plead that we should all get on with our various show promotions, all of them welcome, and trouble no more about 'closed shops' or bars, or the distinction between National and 'National'? And let's not start anything about 'British'!

T. R. LEE,
Wilmslow, Cheshire.

Terrapins and Tropical Fishes

I FEEL sure that your readers will be interested to read of my experience in keeping American terrapins with larger tropical fish.

The miniature terrapin on sale in this country will live quite happily in the community aquarium provided that he has a small rock or floating platform above the surface of the water so he can rest when he wants to. I feed mine on shrimp pellets, which he eats greedily when they are placed on his rock.

The fish are not troubled by the terrapin or vice-versa, and I feel sure this interesting and colourful creature would be more popular if this is generally known.

PETER ISAACS,
Leeds, 8.

Skinks Bred in London

THE pair of giant skinks (*Tiliqua gigas*) that I have in my possession, have produced six young. I purchased these lizards in October, 1961; they were 8 inches long when I received them, and since then they have grown to 22½ inches (male) and 22 inches (female).

When the young were born on 4th June this year they measured from 5½ to 6½ inches, and in 2 weeks grew an inch each.

The parents were kept apart for 4 months before the young were born. I have left the young with their mother, and she does not worry about them. All are feeding well and putting on weight.

I thought this might be of interest to you, as I think it's rather unusual for these skinks to breed in captivity.

H. WILSON,
Plaitow, London, E-13

German Fish Food



Machinery used in the manufacture of Vitakraft fish foods

THE firm of Vitakraft H. Wuhmann from Germany have introduced their fish foods to the British market. Vitakraft products are already exported to 36 countries. This company was established in Germany in 1837. The factory was bombed three times during the Second World War. Now Vitakraft claim to have the largest and most modern fish food factory in Europe, giving employment to 450 people, many of whom have modern houses and apartments on the Wuhmann estate.

Polythene to the Rescue

(continued from page 91)

see where the block is, and so cannot release it without a search. A transparent tube, made from one of these modern substances, soon shows where such a block has occurred. Such tubes, although more expensive than rubber, cannot perish and should last indefinitely. Transparent aerator tubing has the same long life.

As most firms have now discovered, a variety of aquatic materials can be sent through the post, packed in polythene. Plants, live foods such as worms, aquatic snails, dried foods etc., all travel well in this material, enclosed in a carton.

In the breeding tank it is easy to separate a parent fish from its young by suspending it in a polythene bag. This method can be used for ailing fish where no other tank is available, and it may be used by dealers to separate several male fighting fish in the same aquarium.

Modern measures for fluid ounces or cubic centimetres are often made from rigid polythene materials and can be used for measuring out chemicals for the treatment of diseases. These measures are inert to chemicals and are unbreakable.

A sheet of polythene placed on the floor below the tank, before weekly servicing, prevents those splashes of water which cause unpopularity when they get on to carpets or polished floors. In the glazed fish house a layer of thick sheeting makes an effective double glazing which conserves heat and cuts down on heating costs.

The outlay on any of these items is amply repaid by their length of life, for they are practically indestructible, and their usefulness.

The AQUARIST Crossword

Compiled by

L. BRADLEY



CLUES ACROSS

1. One variety of *Xiphophorus helleri* (3, 9)
2. Heavenly body or fish (4)
3. In law the relation of either husband or wife (8)
12. Anagram of 8 across (8)
13. Mammal adapted to marine life (4)
14. Period of time (3)
15. Struggle with a flat sea fish (8)
17. Climbed like a fish? (5)
18. *Barbus tenuis*, ace of hearts (3, 4)
20. Another worm (7)
24. Harries to the pond side (6)
26. Used to discharge freight (8)
28. — and flow (3)
29. Look after (4)
31. Organs that help fish to swim (4)
32. One type of 31 across (6)
33. No men predict (4)
34. *Macropodus opercularis* (8, 4)

CLUES DOWN

2. Partakes of food in a cafe at Stratford (4)
3. Margin of the sea (6)
4. Bedded down under the sea (7)
5. Is stated to produce a distlike for food (6)
6. Imitates monkeys? (4)
7. *Colisa lalia* (5, 7)
8. Stern Quasman (6)
10. Bribed this dance to obtain *Anguilla vulgaris* (4)
11. So a red pincer turns round this water plant (6, 6)
16. Pinch (3)
19. Preoccupied (8)
21. Tetra from — (3)
22. Corder holy orders (6)
23. Blown to ensure a home for young fighters (7)
25. Found usually on 3 down (4)
27. Excuse (3, 3)
30. Measure back for the entrance (4)
31. Paid to a public officer (4)

Solution on page 95

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 annual show of the **Macclesfield A.S.** will be held on Friday and Saturday the 25-26th September. At the June meeting the presentation of awards for the Aquarist of the Year prize was made by our show secretary Mrs. E. Wilson. I. R. Bradley; 2, P. Boulton; 3, E. Wilson. The social evening was enjoyed by all members.

THE recently-formed **Coalville and District A.S.** had an interesting and enlightening talk on furnished aquaria at their meeting, by Mr. D. W. G. Fretwell, of Burn-on-Trent. The talk was accompanied by a demonstration and the aquarium which Mr. Fretwell set up, plants and other equipment were provided from society funds. The aquarium has now been installed in one of the public rooms at the inn and is causing quite a lot of interest and comment among the general public. During the demonstration, a table show comprising two classes—guppies and A.O.V. livebearers—was judged by the society's competition secretary, Mr. G. Degg. Winners were: Guppies: 1, Mr. J. Beet; 2, Miss A. Waad; 3 and 4, Mr. J. Beet. A.O.V. livebearers: 1, Mr. G. Brown (green sword); 2, Mr. G. Brown (platy); 3, Mr. C. Garrett (red sword); 4, Mr. F. Bower (mollie). The society secretary is Mr. J. A. Reed, 391, Ashby Road, Coalville, Leics. to whom correspondence should be sent.

THIRTEEN are a large number of aquarists who combine the growing of cacti with fish-keeping, but at the June meeting of the **Weston-Super-Mare and District A.S.** an unusual and interesting talk was given by a local horticulturist on the many other types of plants that can be grown in the fish-house and used to add beauty to the fish-house. About 50 various plants were brought along to illustrate the talk, the speaker pointing out that the temperature and humidity of a fish-house made it possible for many beautiful tropical and sub-tropical plants to flourish. Other indoor plants were shown for staging on and around a furnished aquarium standing in a hall or in the living, or front room to spread over or to decorate that tank having the pride of place in the house.

At this meeting there were two table shows, one for fighters, and the other for dwarf cichlids, both of which attracted a good number of entries.

Keen satisfaction is felt by the club at the outstanding successes gained by member J. R. Evans at The Bristol Tropical Fish Club's Open Show, being awarded the cup for the best fish of the show and also winning four firsts and one third, while other members obtained a third, V.H.C. and H.C. cards at the same show.

THE **Didcot and District A.S.** was formed recently and the officers are as follows: chairman, Mr. Les Timms; treasurer, Mrs. Timms; Committee, Messrs. Terry Daley, Ron Trevor, Les Tyrrell. The secretary is Mr. N. A. Tucker, 120, Abingdon Terrace, Didcot, Berks.

THERE were 300 fish on show at **Peterlee and District A.S.** third annual show, held in the Edenhill Community Centre, Peterlee. The Marshall Challenge Trophy for the best fish in the show went to Mr. I. Hunt, of Tyneside A.S.,

for his piranha, a fine example of the famous "man eater" of South America.

The judge was Mr. J. M. Skinner, of Leeds, and trophies were presented by Mr. J. Easton, Warden of the Community Centre. Award winners were: Furnished aquaria: 1, (Keith Whittham Cup), A. Bailey, Sunderland; 2, I. Hunt, Tyneside; 3, Mrs. Atkinson, Tyneside. Fighter: 1, (Sharley Aquatics Cup), I. Hunt; 2 and 3, A. Bailey. Labyrinth: 1, (Jeremiah Ambler Cup), R. Atherton, Horden; 2, I. Collins, Hartlepool; 3, R. Hay, Hartlepool. Dwarf cichlid: 1, (P. W. Dunn Cup), J. G. Herring, Peterlee; 2, D. Porter, Horden; 3, E. Motherhill, Horden. Cichlid: 1, (Grotto Aquaria Cup), 2 and 3, I. Hunt. Guppy: 1, (Peterlee A.S. Cup), W. Payer, Hartlepool; 2, D. Heslop, Peterlee; 3, C. Sampson, Peterlee. Livebearer: 1, (Mollusid Cup), J. Hewitson, Peterlee; 2, C. Roberson, Peterlee; 3, G. Corkin, Sunderland. Shark: 1, (Honey Pot Cup), M. G. Watson, Peterlee; 2, W. Jones, Peterlee; 3, M. Coxon, Houghton. Small barb: 1, (W. Emmerson Trophy), H. Bell, Consett; 2, J. Hewitson; 3, T. Westgarth, Houghton. Large barb: 1 and 2, I. Hunt; 3, J. G. Roberson, Tyneside. Rasbora and damie: 1, (Echo Cup), Mrs. Atkinson; 2, J. Hewitson; 3, R. Barran, Darlington. Small dancon: 1, (Neil Jones Cup), J. G. Reed, Newcastle; 2, D. Porter; 3, E. Motherhill. Large characin: 1, I. Hunt; 2, A. Bailey. Corydoras: 1, (Jan Hunt Cup), F. Harrison, Peterlee; 2, A. Bailey; 3, D. Porter. Catfish or loach: 1, (Peterlee Doctors Cup), D. Roberson, Peterlee; 2, D. Porter; 3, G. Corkin, Sunderland. Goldwater fish: 1 and 3, I. Hunt; 2, H. Bell. Egglayer: 1, (Elizabeth Cup), J. Grieves, Houghton; 2, Mrs. Atkinson; 3, R. Clark, Middlesbrough. Breeding pairs, livebearers: 1, (Mank Trophy), D. Heslop; 2, G. Corkin; 3, R. Barnes. Breeding pairs, egg-layers: 1, (Northern Daily Mail and Sunderland Echo Cup), D. Porter; 2, J. G. Herring; 3, J. Robinson, Peterlee. Breeders class, livebearers: 1, (Beadley Trophy), L. Collins, Hartlepool; 2 and 3, J. G. Reed, Newcastle. Breeders class, egg-layers: 1, (Fish Bowl Rosebowl), E. Motherhill; 2 and 3, R. Barnes.

AT their June meeting, **Thorse A.S.** were given a talk by Mr. Nicholas of Hull on simple electricity in the fishhouse and equipment for the fishkeeper. The table show was for fighters, the result being: 1, K. Bennett; 2, K. Harbeck; 3, G. Lowe. At the July meeting the society watched slides and listened to a tape recording from the Hendon Society. Plans are being made now for the annual Christmas dinner. The table show was for catfish, the places being as follows: 1, M. Hobson; 2, J. Gray; 3, R. Duffell.

RECENT visitors to **Southern, Leigh and District A.S.** for an inter-club table show were Thurrock A.C. The home club were winners by 18 points to 12. Full results were: Mollies: 1, B. Martin (Southern); 2, Mr. Durrant (Thurrock); 3, B. Clemens (Southern). Danos, rasbora and white cloud mountain minnows: 1, A. J. Mason (Southern); 2, Mr. Nicholls (Thurrock). Platies: 1, Master D. Geaves (Southern); 2, Mr. Sowell (Thurrock); 3, D. G. Perrot (Southern). Siamese fighters: 1, B. Martin (Southern); 2, Mr. Durrant (Thurrock); 3, Master P. Mason (Southern).

Barbs: 1, G. Pryor (Southern); 2, Mr. Prescott (Thurrock); 3, Mr. Nicoll (Thurrock). The society meets at 8 p.m. on the first and third Tuesday in each month at The Liberal Hall, Clarence Road, Southern-on-Sea, Essex. The officials are as follows: president, A. J. Mason; vice-president, M. J. Willis; hon. secretary, V. C. Pickett, 2, Whitehall Road, Great Wakering, Southern-on-Sea, Essex. Telephone Wakering 582; hon. treasurer, D. M. Cheswright; magazine editor, J. H. Preston; librarian, D. G. Perrot. Other committee members: B. Bonner, B. Martin and L. E. Willis.

THE annual table show of the **Yeovil and District A.S.** was held recently. There were over a hundred entries and the judges were Mr. Matley (tropical) and Mr. Coombes (coldwater), both of Bournemouth. The results were as follows: Special awards—Best coldwater: S. Langdon. Highest points coldwater: S. Langdon and V. Collins, joint. Best livebearers: A. Nicholls. Best tropical: G. Gillard. Highest aggregate points: T. C. Perry. Coldwater—Goldfish: 1, G. Gillard; 2, W. Reeves; 3, T. C. Perry. British shubunkins: 1, 2 and 3, S. Langdon. London shubunkins: 1, A. Nicholls; 2, T. C. Perry; 3, V. Collins. Fancy goldfish: 1, 2 and 3, V. Collins. A.O.V. pond or river: 1, G. Aston; 2 and 3, V. Collins. Coldwater breeders: 1 and 2, S. Langdon; 3, V. Collins. Tropical—Labyrinth: 1, G. Aston; 2, A. Nicholls; 3, T. C. Perry. Barbs: 1 and 3, G. Gillard; 2, G. Aston. Characins: 1, T. Perry; 2, G. Gillard; 3, G. Aston. A.O.V. egg-layer: 1, G. Gillard; 2, T. C. Perry; 3, G. Gillard. Catfish: 1, L. Pilkington; 2, T. C. Perry; 3, M. Hulbert. Mollies: 1 and 2, G. Gillard; 3, T. Sharp. Male guppies: 1, A. Nicholls; 2, N. Stainer. Female guppies: 1, T. C. Perry; 2, D. Moore. Swords or platys: 1, T. C. Perry; 2, A. Nicholls; 3, D. Moore. Breeders egg-layers: 1, D. Moore. Breeders livebearers: 1, T. C. Perry; 2, N. Stainer; 3, T. Sharp. Cichlids: 1, T. C. Perry; 2, D. Moore; 3, M. Stainer.

THE **Workshop Aquarist and Zoological Society** held the second leg of the inter-society tropical fish show recently. The match was keenly contested with seventy-six fish of these different classes on show from the four following clubs, Sheffield Aquarist Society, Mansfield Aquarist, Chapeltown Aquarist and Workshop Aquarist and Zoological Society.

Workshop were winners with ten points, Sheffield were second with seven points, Mansfield third with one point and Chapeltown failed to score. The individual winners were: 1, Dennis, Workshop, two firsts, one second (eight points), Mr. L. Tye, Workshop, one third (one point) and Mr. W. Iddles, Workshop, one third (one point). M. Colton, Sheffield, one first (three points), Mr. Crosland, Sheffield, one second (two points) and Mr. Green, Sheffield, one second (two points). Mr. Bowers, Mansfield, one third (one point). After this contest the positions are, Sheffield sixteen points, Workshop sixteen points, Mansfield four points and Chapeltown no points.

AT the **Hford and District Aquarists' & Pondkeepers' Society's** annual general meeting, the following officers were elected to serve for the forthcoming year: President, Mr. V. Price; vice-presidents, Mr. J. Charter, Mr. L. Jarvis, Mr. J. Ness; chairman, Mr. A. Stebbing; vice-chairman, Mr. M. Brill; secretary, Mr. R. Ruth—13, Dunkeld Road, Dagenham; assistant secretary, Mr. V. Price; treasurer, Mr. D. Postlethwaite; assistant treasurer, Mr. M. Beahms; show secretary, Mr. H. Berger; press and social secretary, Mr. L. Smith; librarian, Mr. K. Ellis. Committee members, Mrs. K. Ruth and Mr. Cook.

RECENTLY Mr. W. Barker of Morecambe gave a short but interesting talk entitled "Some Unusual Fishes" to the **Loyne Aquarists**. Among those specimens mentioned were such curiosities as sea horses, electric-eels and lamprey. After the talk a table show of the more orthodox fishes was held.

THE Grantham and District A.S. has been re-formed and it is hoped that in the near future to organise shows and other events. Already the society is to set up a show tank at a local horticultural society's annual show. It is hoped that enthusiasts in the area will join the Society and participate in future events.

THE Hounslow and District A.S. are holding their first open fish show at the Chatsworth School, Heath Road, Hounslow, on Saturday, 29th August. Show schedules may be obtained from Mr. D. J. Woodward, 16, Ellerdine Road, Hounslow, Middx., phone ISLewoth 5918. The closing date for entries is Monday, 17th August.

THE Bracknell A.S. staged a very successful show on 11th July. It was the 10th Three Counties Show and the judges were Mr. Jessop, Mr. and Mrs. Meadows and Mr. Large. The show was very well attended and the results were as follows: Common goldfish: 1, Mr. Druce (Bracknell); 2, Mr. Ryder (Portsmouth); 3, Mrs. Leavy (Basingstoke). Shubunkin: 1, 2 and 3, Mr. Ryder (P). Fancy goldfish: 1, Mrs. Leavy (B.); 2, Miss Ryder (P). A.O.V.: 1, Mr. Forest-Jones (B.); 2, Mr. Druce (B.); 3, Mr. Forest-Jones (B.). Coldwater breeder: Mr. Druce (B). Characin: 1, Mr. Forest-Jones (B.), best fish; 2, Mrs. Jordan (B.); 3, Mrs. Coombes (B). Platy: 1, Mr. Baker (Uxbridge); 2, Mr. Dove (B.); 3, Mrs. Leavy (B.). Molly: 1, Mr. Cobden (Catford); 2, Mr. Rundle (B). Siamese fighter: 1, Mr. Rundle (B.); 2, Mr. Cobden (C.); 3, Mr. Mason (P). A.O.V. labyrinth: 1, Mr. Cobden (C.); 2, Mr. Low (B.); 3, Mr. Armitage (P). Danio, rasbora, minnow: 1, Mr. Cobden (C.); 2, Mr. Keeping (B.); 3, Mr. Hall (Riverside). Barbs: 1, Mr. Low (B.); 2, Mr. Cobden (C.); 3, Mr. Jordan (B). Catfish: 1, Mr. Jordan (B.); 2, Mr. Forest-Jones (B.); 3, Mr. Franklin (P). Boeia loach: 1, Mr. Cobden (C.); 2, Mr. Leavy (B.); 3, Mr. Forest-

Jones (B.). Dwarf cichlid: 1, Mr. Mason (P.); 2, Mr. Cobden (C.); 3, Mr. Stevens (Clapham). Cichlid: 1, Mrs. Jordan; 2 and 3, Mr. Jordan. A.O.V.: 1, Mr. Cobden (C.); 2, Mr. Thompson (B.); 3, Mr. Rundle (B). Breeders livebearer: 1, Mr. Keeping (B.); 2 and 3, Mr. Hall (B.). Breeders egg-layers: 1 and 2, Mr. Roberts (B.); 3, Mr. Armitage (P). Swordtails: 1 and 2, Mr. Dove (B.); 3, Mr. Baynton (H. Wycombe). Interclub, coldwater aquaria: 1, H. Wycombe; 2, Portsmouth; 3, Reading. Interclub, tropical aquaria: 1, Uxbridge; 2, Reading; 3, Portsmouth. Individual coldwater: 1, Mr. Frayne (H.W.); 2, Mr. Druce (B). Individual tropical: 1, Mr. Jordan (B). Individual miniature: 1, Mr. Forest-Jones (B.). Cups—Best fish in show: Mr. Forest-Jones (B.). Rathdown Cup: Mr. Druce (B). Bracknell Cup I: Mr. Forest-Jones (B.). Bracknell Cup II: Bracknell. Speedy Edmunds—Bill Lock Bowers Trophy: Mr. Dove (B.). Three Counties Shield I: Mr. Roberts (B.). Three Counties Shield II: Mr. Keeping (B.). Basingstoke Cup: Mr. Forest-Jones (B.). Rundle Rose Bowl: Mr. Rundle (B.). Rundle Cup: Mr. Rundle (B.). "Here and Now" T.V. Trophy: Mr. Jordan (B.). Colindale Trophy: Mr. Dove (B.). Michael Ingrams T.V. Trophy: Mrs. Jordan (B.). Oxford Shield: Reading. Reading Cup I: High Wycombe. Oxford Cup: Mr. Jordan (B.). Wendy Cup: Mr. Frayne (H.W.). Breeding Achievement Cup: Mr. Roberts (B.). The following received 4th certificates: Mrs. Leavy, Miss Ryder (2), Mr. Cobden, Mr. Raynton (2), Mr. Rundle (2), Mr. Irrey, Mr. Keeping (3), Mr. Dove (2), Mr. Roberts, Miss Jordan.

It is interesting to note that all first three places in the A.O.V. tropical class were won by red tailed black sharks.

THE Cambridge and District A.S. recently held their second members' show of 1964. The judge was Mr. Flynn of Northampton and the best fish in the show was a common goldfish belonging to Mr. E. Wright. Results were as follows: Cichlids: Mr. A. Hulver (Jack Dempsey).

Anabantids: Mr. A. Hulver (dwarf gourami). Barbs: Mr. R. Betts (cherry). Guppies: Mr. A. Hulver. A.O.V. livebearer: Mr. M. Hibbit (green swordtail). Pairs: Mr. W. Ingrave (splashing tetra). Catfish and loach: Mr. Hulver. A.O.V. egg-layer: Mr. E. Wright (sharptail). Brood: Mr. P. Ward (guppy). Common goldfish: Mr. E. Wright. A.O.V. goldfish: Mr. A. Chapman.

THE annual show of the Kingston and District A.S. will be held at St. Luke's Social Centre, Elm Road, Kingston on the 26th September.

Crossword Solution

			R	E	D	S	W	O	R	D	T	A	I	L			
D	A	T	Y	I	P												
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continued on page xiv

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