The aquarist

and Pondkeeper

APRIL 1964

MONTHLY
Vol. XXIX No.1

TWO SHILLINGS

WALTER R. SMITH

For Complete Tropical and Coldwater Aquaria also Tropical Marine

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

POLISHED STAINLESS STEEL

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

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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.

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Mr. Kelly—professional aquarist and leading Guppy authority

Mr. James Kelly says

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"BIOL is an excellent food for my baby Guppies and for adult fish. Also we have raised highly successful batches of Dwarf Gouramis on BIOL."

FOR TOP CONDITION – MAXIMUM GROWTH

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Standard size, 7 grams — **2/6d.** Breeders' Pack, 28 grams — **5/3d.**
Economy Bottle, 380 grams — **68/6d.**

***BIOL** is pure dried plankton cultured in a laboratory
—Contains 73% protein.

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(LIQUIFRY COMPANY LIMITED)

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Visit our Plastoline Pond Display 6 feet by 4 feet, £3 16s. od. All sizes available. "Otter" fountain displayed. Large selection of glass fibre pools, plants, lilies and marginals. Breeding pairs of Goldfish and Shus from 20/- Stokes fountains £7 19s. 6d. Otter kits £8 8s. od.

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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	15/-
Medium Goldfish	5/- to 7/6
Small Goldfish & Shus	1/- to 2/6

ALL POND PLANTS STOCKED

THERMOSTATS

	each
Prockter	30/-
Constat External	33/-
Constat New External Type QK	22/-
Wizard External	22/-
Inter-Pet	22/6, 29/6
UNO	
Out/Adj.	18/-
Ins/Adj.	15/-
Ins/Adj. "Popular"	10/-
"Popular" with neon indicator	12/6
Preset Matic	24/6
Wizard	10/-, 12/6, 18/-

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Jeto	20/-, 39/6 & 59/6
Es. Summit	21/-
Quicko	22/6
Rena	45/-
Beko	95/-
Zoobeko Total	75/-
Zoobeko	46/-
Zoobeko Junior	37/6
Montrose Major	24/-
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Prockter	60/-
Dymax Mk. I A.C./D.C.	£9 0 0
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Hy-flo Junior New Super	107/6
Hy-flo "A"	130/-
Hy-flo "B"	165/-
Hy-flo "C"	250/-

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

Sundries

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

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Hykro Outside	15/-
Corner	4/6
Outside	18/6
Windmill Hand Rejector	15/-
Windmill Air Rejector	10/-
Consort	19/6
Premier Biological Sub-Gravel Filters	12/6, 15/-
Sedijet	8/-
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Bottom Filter	8/3
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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 Sailfin Mollies	from 5/-
Flames	2/6	Black Angels	10/-
Beacons	2/6	Black Lace Angels	5/- to 10/-
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
Schuberti barbs	3/-	Bumble Bees (each)	3/6
Scissortails	3/-	Mollies, Black from	3/6 & 5/-
Guppies (pair)	1/6, 5/-	Lemon tetras	4/-
Harlequins	3/-	Glassfish Adult	4/6
Cherry barbs	3/-	Aeneus Cats	6/6
Nigger barbs	3/-	Otoclinus Cats	8/6
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.

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Aquarium Vacuum Cleaner	46/8
Super Model	56/8

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48×10×15	£28 10 0
36×12×15	£19 10 0

Standard Bow £22, £15 10, £11 10 0

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Sagittaria	6d. each
Vallis. Torta	6d. ,,
Vallis. Spiralis	6d. ,,
Ambulia	6d. ,,
Ludwigia	6d. ,,
Hygrophila	6d. ,,
Cryptocoryne	2/- & 3/-
Wistaria	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
F.S. Standard	7/6
Wizard	9/6

ADULT RARE FISHES

Pelmatochromis Kribensis	7/6 & 10/- each
Elephant Nose Fish	22/6 each
Black Veiltail Guppy	15/- pair
Cardinal Tetra	9/- each
Knife Fish Nigerian	9/-
Black Cardinal	9/- each
Clown Loach	12/6 & 15/-
Scats from	7/6 to 20/-
Amonieri Cats	5/- & 7/-
Malayan Angels	7/6 to 15/-
Ramirezi	6/-
Weather Loach	5/-
Silversharks 2"-5"	17/-, 20/-, 25/-, 30/-
Firemouth	4/-
Red Veiltail Guppy	10/- pair
Red Tail Sharks 7/6	Large 15/- each
Anostomos 4"-5"	25/-

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

24×12×15	£4 15
18×10×12	£2 12
White or black covers	18/6 & 22

Larger sizes on quotation

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(Light Gauge)		(Angle Iron)	
12× 6× 6	10/6	24×12×12	5
10× 8× 6	9/6	24×12×15	5
14× 8× 8	14/-	30×12×15	7
16× 8× 8	15/0	36×12×15	9
18×10×10	21/-	48×12×15	12

COVERS

18×10	14/6
24×12	21/-
30×12	30/-
36×12	35/-

STANDS

18×10×36	3
24×12×36	4
30×12×36	5
36×12×36	5

Aquarium covers sent by post only at customers risk.

FOODS

Exotic Flakes	
Hykro Flakes	1/6 &
Brosiam	6d. &
Biovic	6d. &
Shrimp	6d. to
Dry Daphnia	
Liquifry	
Infusyl	2/- &
Elite	2/- &
Hobby	
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Wardley's	8/-, 4/6, 2/6, 2/3,
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Add 1/- up to 10/-; 1/6 up to 20/-; 2/- up to £2; 3/- up to £3; over Free

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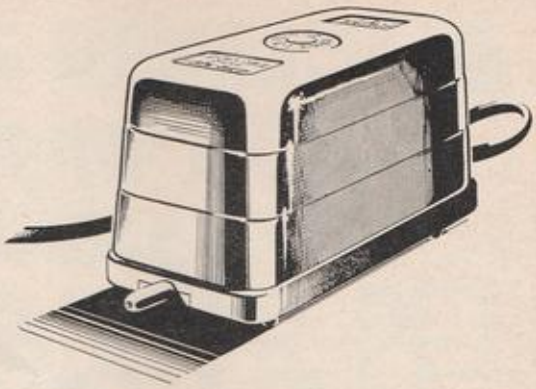

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ALL SIZES OF AQUARIA,
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FILTERS, INSIDE, OUTSIDE, BASE, ETC.
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HUNDREDS
OF EXCELLENT
QUALITY LARGE
BREEDING PAIRS OF
POND FISH, INCLUDING

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NYMPHS 4 in. .. 20/- Pair
6 in. .. 30/- ,,
8 in. .. 39/6 ,,

GOLDEN ORFE
8-10 ins. .. 35/- Pair

RED COMETS
10-12 ins. .. 50/- Pair

CALICO COMETS
6 in. .. 35/- Pair
8 in. .. 40/- ,,

BOOKS, BOOKLETS, BACKING PAPERS,
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GOLDFISH, 2-3 in.	1/6	SHUBUNKINS, 2-3 in...	1/6
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BLACK MOORS	6/6	CALICO COMETS	3/6
GOLDEN ORFE	3/- & 4/-	RED FANTAILS	6/-
HIGOI	6/6 & 8/6	CALICO FANTAILS	6/6
GOLDEN RUDD	3/6	SILVER RUDD	3/6
LIONHEADS	7/6	ORANDAS	6/6

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

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GLASS FIBRE POOLS
(9 shapes)
Examples:
4' × 2' 8" × 12" Deep .. £6 17 6
7' × 3' 6" × 17" ,, .. £15 19 6

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POLYTHENE POND LINER
(To Your Own Shape)
Approx. 7' 6" × 6' × 15" Deep.
35/-.

WATER LILIES
White 7/6
Red, Yellow & Pink 12/6

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Complete with either Waterfall or Fountain Kit.
£8 8 0.

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

STOKES FOUNTAIN .. £7 19 6.

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NEW AND ALSO FOR
THE EXPERIENCED
AQUARIST

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

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THE MOST REALISTIC AQUARIUM ROCKS

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FIBREGLASS Reproduction ROCKS

LIGHT! STRONG!
NON-TOXIC!

Produced in various shapes and sizes, in a Westmorland Grey finish. The shape can be altered by trimming, so that the aquarist can have an individual set-up Overcomes weight problems associated with natural rock.

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Small Corner Set for 24 inch tank	27/6d.
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Rock No. 1 (Small) (about 4 inches across) ...	3/9d.
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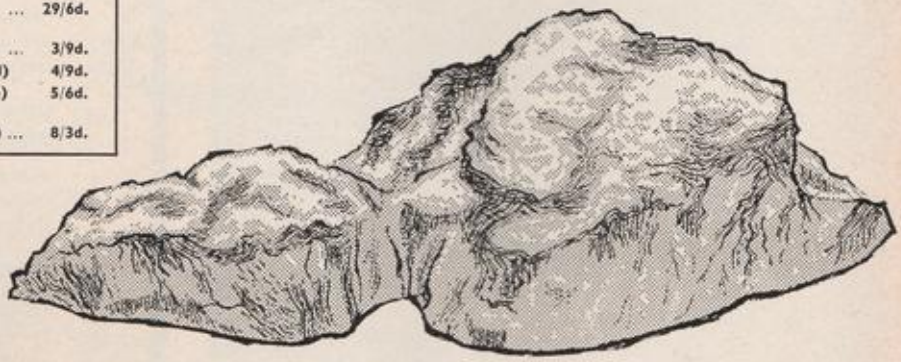

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...the choice of thousands

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Longlife Regular **2/3d.**
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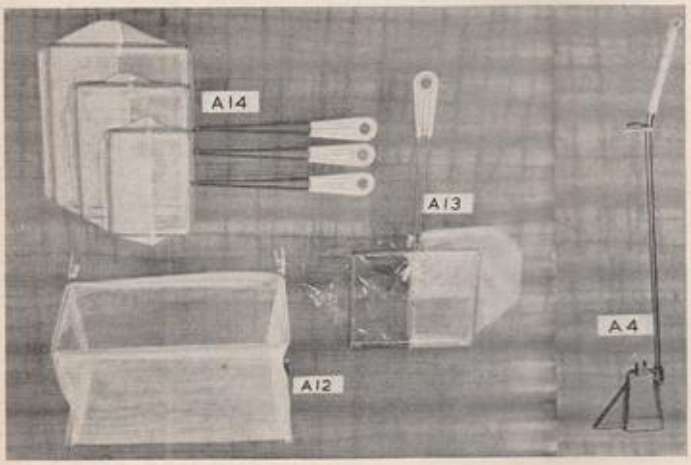

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A4 SYPHONER

Agitates Gravel—Will not clog—Cleans between plants, etc. **4/-**

A12 FISH BREEDER AND FRY NURSERY

Strong rustless frame—Rot proof Terylene Net—Clips on to Tank Frame **5/6**

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Transfers Fry in own water. Fish inspected while swimming. Normal net when required **4/6**

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Rot proof Terylene Net. Plastic handles can be boiled.
Three popular sizes — 3×4 2/-, 4×5 2/6, 5×6 3/-

Cash with order

Leaflet of other Aristocrat Products available on request.
Above products sent post free.

SPECIAL COLDWATER PLANT OFFER

1. 70 Plants for your pond £1
2. 30 Plants for your pond 10/-
3. 70 Plants for your aquarium £1
4. 30 Plants for your aquarium 10/-

THE BOOK OF THE GARDEN POND
G. F. HERVEY and J. HEMS
16/6 post free

BREEDING PAIRS OF GOLDFISH 10"–12" .. .. **35/– pair**
BREEDING PAIRS OF GOLDFISH 8" .. .. **25/– pair**
BREEDING PAIRS OF GOLDFISH 6" .. .. **20/– pair**
BREEDING PAIRS OF SHUBUNKINS 10"–12" .. **35/– pair**
BREEDING PAIRS OF SHUBUNKINS 8" .. .. **25/– pair**
BREEDING PAIRS OF SHUBUNKINS 6" .. .. **20/– pair**
BREEDING PAIRS OF NYMPHS 6" .. .. .. **30/– pair**
BREEDING PAIRS OF NYMPHS 4" .. .. .. **20/– pair**
BREEDING PAIRS OF CALICO COMETS 8" .. **40/– pair**
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BREEDING PAIRS OF GOLDEN ORFE .. .. **35/– pair**

2"–3" BITTERLING, ORFE, BASS, GREEN TENCH, NYMPHS, RUDD **4/6 each.** 3"–4" GOLDFISH AND SHUBUNKINS **3/6 each**

All above fish are pond bred. Rail and Packing – **15/–**

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Strong young trees ideal for the pond surround

6/6 each

WATER LILIES

	each
Cream ...	7/6
Pink ...	10/6
Red ...	12/6
Yellow ...	12/6

(3 year old plants)

MARGINAL PLANTS

Water Iris ...	2/6
Bullrushes ...	2/6
Kingcup ...	2/6

12 Assorted Marginal Plants 12/6
Good strong Plants

COLDWATER PLANTS

	each		each
Elodea Densa ...	6d.	Vallisneria ...	6d.
Elodea Crispa ...	6d.	Hygrophila ...	6d.
Willowmoss ...	1/–	Cryptocoryne	
Moneywort ...	6d.	Beckettii ...	2/–
Ludwigia ...	6d.	,, Willisii ...	2/6
Hairgrass ...	1/–	,, Cordata ...	2/6
Myriophyllum...	6d.	Hartelliana ...	2/6
Hornwort ...	6d.	Anacharis ...	1/–

FLEXIBLE PLASTIC GARDEN POOLS

4'4" × 3'4" 9–15" deep **£3 19 6**
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FOOT VALVE AND STRAINER WITH CONNECTOR **£1 17 6**
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STOKES FOUNTAINS FOR YOUR PONDS **£7 19 6 each**
Send for catalogue S. A. E.
THE NEW OTTER SUBMERSIBLE PUMP COMPLETE WITH EITHER FOUNTAIN OR WATERFALL KIT **£8 8 0** post paid

Garden Pools and Cascades

OVER 20 DIFFERENT SIZES

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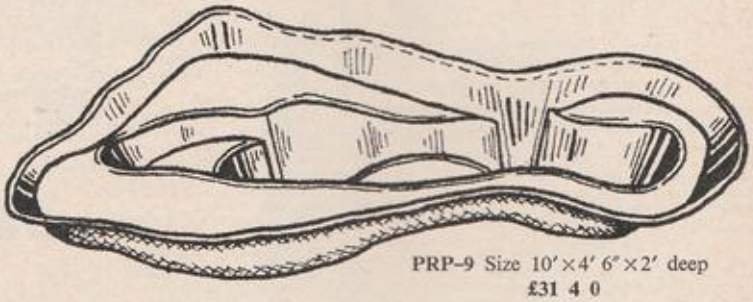

PRP–9 Size 10'×4' 6"×2' deep
£31 4 0

RPP–19
Two tier units – 5' × 2' approx. **£5 13 8**

Available in Light Green, Blue or Farm Stone. Add 10/– to cover postage.

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SPECIAL PLANT OFFERS

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20/- PLANTS FOR 10/-

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

OFFER NO. 2

30 *Assorted Tropical Plants*	10/-
36 " " "	20/-

including Cryptocoryne, Wistaria, etc.

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LIVE DAPHNIA BY POST
2/- post free

FULL CATALOGUE SENT ON REQUEST **S.A.E.**

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36in. × 12in. × 15in. bow-fronted aquarium with wrought iron bookcase stand £19/19/- complete.
Available in penny bronze, black & gold, and cream

WITH PLAIN STAND

Inches 48×10×15	...	£22.15.0
" 36×12×15	...	£15.15.0
" 24×12×15	...	£12.10.0

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

48 inch Bow Fronts in Stock

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

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

REMEDIES, etc.

Aquatonic	3/6	Halamid	3/-
Brosiam White Spot Cure	2/-	Liquitox	1/9
Vivo Salts	2/-	Diseasolve	2/6
Sea Salt	1/6	Brosiam Fertilizing Tablets	1/6

Tetracares all 4/- each

THERMOSTATS

Constat External	33/-
Constat New External Type QK	22/-
UNO Out/Adj.	18/-
UNO Ins./Adj.	15/-
UNO Ins/Adj. "Popular"	10/-
"Popular" with neon indicator	12/6
Rena (with Neon)	21/-
"Es-Es" Sentinel	26/6
Springfield Safety	22/-

THERMOMETERS

	each
Mercury	6/6
Gem	6/6
Plastic Backed	5/-
Spirit Blue Gem	6/6
"Es-Es" Dumpy	

FILTERS

	each
"Windmill" Plastic Outside Filter	19/6
"Windmill" Biological Aquarium Filter	12/6, 15/-
"Windmill" Regent Inside Filter	10/-
"Windmill" Regent Corner Filter	6/-
"Windmill" Regent 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
Uno Polyfilter	3/6

AERATORS & PISTON PUMPS

	each
Montrose	21/-
"	24/-
Fairy	27/6
Star	36/-
Rena	42/-
Zoobeka Total	75/-
Hy-flo Junior	107/6
Hy-flo "A"	130/-
Hy-flo "B"	165/-
Hy-flo "C"	250/-

HEATERS

	each
"QUEENSBOROUGH" 25w., 40w., 60w., 75w., 100w., 120w., 150w.	10/-
Rena (75—200w.)	10/-
"Es-Es" Flexible Heaters (100w. and 150w.)	19/-
"Es-Es" Thermostatic Heaters, 100w. and 150w.	36/-
Preset-matic	24/6
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STRATA ROCKWORK
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24in. long × 20in. high. 2/6 per sheet, or 1/3 per foot. *(post free)*

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	each
"Windmill" Air Rejectors	10/-
"Windmill" Hand Rejectors	15/-
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Imports

MANY authorities are expressing fears about the effects of the expanding importation of animals of many kinds on the numbers of these species in their natural habitat. It should be the wish of everyone to support any measures designed to protect and encourage species whose numbers are dwindling, so that generations of humans who follow us will be able to live in a world with a fauna no poorer in variety than the one we know. Zoos and animal collectors must be prepared to suffer gaps in their collections and displays to this end.

A step in the right direction has been taken this year in the voluntary agreement of importers of tortoises to stop offering very young tortoises for sale in this country. These small specimens have always been very popular with the pet trade but are quite unsuitable as household pets, and thousands have died yearly in Britain. Larger tortoises have a much better chance of survival here (in the hands of people prepared to consider their special needs), but since they do not breed here their further importation may require to be limited if their natural numbers continue to decline. Dealers in tortoises now have available supplies of free leaflets on the care of these animals, and all purchasers should be urged to study these to keep their pets in good health for more than the single season in Britain that is the life expectation of so many tortoises.

We do not know of any aquarium fishes threatened with extinction as a result of collectors' attentions, and in view of the numbers in which fishes naturally reproduce themselves the development of such a situation seems unlikely. However, if it should be found that the increasing demand here and in the U.S.A. for unusual fishes, from, for example, the freshwaters of Africa, was leading to depletion of their numbers we would support wholeheartedly any control it was thought necessary to impose, and however irritating such a step would be for keen aquarists we feel sure that the need for it would be recognised and condoned. Here is another reason why breeders should continually experiment with the new species; the more plentifully the call for them can be met by home-produced stock the less will the natural resources be ravaged and threatened.

Freshwater Fishes of Vancouver Island

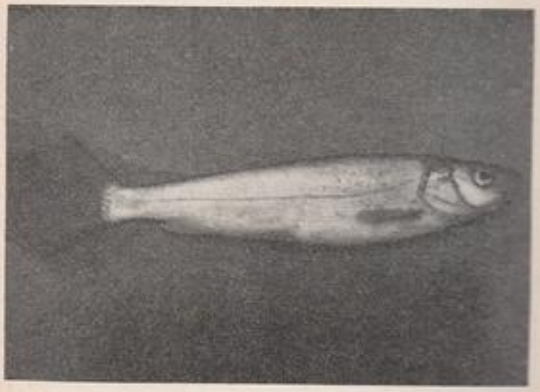
by RICHARD GUPPY

(Photographs by the author)

THERE has been some discussion among scientists as to whether Vancouver Island was completely devastated during the more recent ice ages. Those who claim that it escaped can point as evidence to a mammalian, reptilian and amphibian fauna nearly as rich as that of the adjacent mainland coast, an unusual condition for islands in high latitudes. It is true that at one point a series of sheltered channels, no one more than a mile wide, is all that separates us from the mainland. Most of our mammals, and perhaps the reptiles, could have swum across. But it does seem strange that all the amphibians (nine species) that one might reasonably expect to find on the island are here. An additional half-dozen species reported from north-western North America are either rare and specialised by nature, or are so near the edge of their climatic toleration, that they reach the British Columbia coast only as stragglers.

It is when we come to freshwater fishes that the case for glaciation seems to be established. Of more than 40 species (excluding salmonids) native to the British Columbia mainland, not even one has become fairly established on Vancouver Island. The few that did get here clearly came quite recently by way of the sea, and only one belongs to a typically freshwater family. Since their arrival no extensive geological changes have taken place, which might have left some of them in a truly landlocked situation.

A digression here seems worth while, to contrast the situation outlined above with that found in the British Isles. In the latter we can postulate a land bridge still in existence towards the termination of the last ice age. As a result the count of freshwater fish species compares quite favourably with that of the neighbouring mainland areas. It seems probable, though, that at the time that the last of the bridge disappeared beneath the waves, the climate was still too rigorous for the comfort of some European reptiles and amphibians. These never became a part of the British fauna, though some are able to get along pretty well if introduced now.



Vancouver Island's only species of a typically freshwater fish family is the peamouth chub (Mylocheilus caurinum)

Vancouver Island has a quite impressive list of salmonid species, but five of these belong in the genus *Oncorhynchus*, the Pacific salmons. These are sea fish included in lists of freshwater fauna because of a brief juvenile period spent there, after which they enter the sea to complete their growth, returning at maturity to spawn and die. A partial exception is the sockeye, *O. nerka*, which may be up to 3 years of age when first entering the salt water. A race of sockeye known as kokanee, which spend all their lives in freshwater, occur in interior British Columbia, but not on Vancouver Island.

The two species of the genus *Salmo* have a somewhat better claim to the title of freshwater fishes. The steelhead trout, *S. gairdnerii*, has habits similar to those of the Atlantic salmon, *S. salar*. Immature steelheads are called rainbow trout. As with the sockeye, the steelhead never seems to have penetrated far enough inland on Vancouver Island to develop a landlocked race. The fish in the Forbidden Plateau lakes, known as Kamloops trout, are landlocked steelheads introduced from the mainland.

The cut-throat trout, *Salmo clarkii*, appears to be an estuarine and freshwater fish, not often found in the sea. It is noticeable that those individuals found in very small streams, even near the salt water, resemble those occurring in the headwaters of large streams and rivers, where natural obstacles bar free access from the sea. A different form, distinguishable by lighter colour and trimmer build, is found in brackish tidal estuaries, and in freshwater areas easily accessible from such estuaries. Some cut-throats of the former type may be spoken of as landlocked, but they, along with all other native species, are conspicuously absent from all bodies of water well inland or at higher levels.

The Cottidae, or sculpins, comprise a large family of predominantly salt-water fishes. A few species are found in brackish water, and some have become entirely adapted to life in freshwater. One of the latter, the prickly sculpin, *Cottus asper*, occurs in Vancouver Island streams and lakes. In spite of its being by all accounts a strictly freshwater fish, the prickly sculpin seems to have been even less enterprising than the cut-throat trout; it seems to have negotiated only the most trifling of falls and other obstacles. Another species, the Aleutian sculpin, *C. aleuticus*, is rarer and more local on Vancouver Island, having been found so far only in small streams a short distance from the sea.

We have on the list, of course, the circumpolar three-spined stickleback, *Gasterosteus aculeatus*. In spite of this being perhaps the best known of freshwater fishes, I cannot resist giving it a bit more space here. From all of the literature concerning it, one cannot learn much about its status as a salt-water fish. That large numbers enter the sea is certain. Though I have not myself seen them far from river mouths, no mention of such a restricted habitat is made in the accounts at my disposal.

A newspaper item told of a stickleback attempting to raise

a family in the Vancouver Aquarium; since it went on to say that a starfish destroyed the nest, we can deduce that this constituted an example of the species breeding in salt water. But still I cannot imagine how a fish which normally nests in only a few inches of water could manage its family affairs in waters having a tidal rise and fall of up to 14 feet.

I have noticed, for my part, that sticklebacks commonly breed in brackish pools in salt marshes, which may be replenished with salt water during exceptionally high tides. My guess is that they wander into the sea from these sources, and are then lost as breeders; though it is possible that some might return, or discover new breeding places. I was much interested to notice, recently, literally thousands of sticklebacks under the wharves at the port of Chemainus. Presumably they come from the Chemainus River, the mouth of which is about 4 miles away by sea. To learn where these fish breed, if they breed at all, would be an interesting research project, for which I unfortunately do not have the facilities. One fact I can report, they do not breed, and I have never seen them there, in those rock pools near high-tide line, which support a typical salt-water fauna: barnacles (*Balanus*), mussels (*Mytilus*), shore crabs (*Pachygrapsus* and *Hemigrapsus*) and the tidepool sculpin (*Oligocottus maculosus*).

Many bodies of freshwater on Vancouver Island are populated with sticklebacks. That they should have reached, without human aid, more lakes than any other fish is quite as one would expect. They can travel in a skin of water during floods, and will survive when trapped in puddles, even when the oxygen content of the water becomes very low.

I mentioned earlier that we do have one native fish belonging to a predominantly freshwater family. This is a cyprinid, the peamouth chub, *Mylocheilus caurinum*. Its presence, however, does not in the least upset the theory that all fishes reached Vancouver Island either by human agency or by crossing the salt-water channels. This chub has quite frequently been caught in the sea, under conditions which suggest that it was not suffering in the least from the experience. Moreover, it inhabits in large numbers a tidal, if not brackish, estuary on the west coast of the island. The most localised of our freshwater fishes, it occurs in a pair of adjacent lakes on the east coast, and in one on the west. All these lakes are close to the sea, and nearly at sea level.

Kennedy Lake on the west coast is the largest lake on Vancouver Island. The volume of water discharged is considerable, creating a deep estuary which may be nearly fresh. At one time a salmon cannery was situated there, and shoals of chub could always be seen under the wharves. The breeding habits of chub are nearly identical with those of our familiar goldfish, and so, even more than with the sticklebacks, it is difficult to understand how they could manage their spawning in waters having no fixed shoreline. It is easier to imagine, though, that so large a fish as the chub could undertake annual migrations, and that may actually prove to be the answer to the puzzle.

It is evident that we cannot account for these chub not having reached more lakes on Vancouver Island by supposing that they have specialised requirements. Their other haunt, Quennel and Holden Lakes near Nanaimo, could hardly show a greater contrast to the deep, clear and rocky Kennedy. The two east-coast lakes are small, shallow and muddy. There is little doubt that Quennel once answered to the description of a network of sloughs merging into swamp. Drainage of the shoreline has altered it a good deal, but even now it is a weird pattern of channels separated by willow-grown mud banks.

Maps show a creek connecting Quennel with Holden, the latter being nearer to the sea. This passes under a road, and reconnoitring the locality carefully on foot, I could locate no bridge, culvert or other means of carrying the drainage under the road. It appears that some artificial outlet must have been provided elsewhere. I have not explored the creek which drains Holden, but as it traverses only marshy land, little above sea level, it can be seen that a small amount of dyking and reclamation work could block a one-time free passage for fishes from the sea.

A fish familiar to British coldwater fish-keepers is the common sunfish (Lepomus gibbosus), a successful introduction to Vancouver Island's fresh waters

A possible theory that Vancouver Island waters are not favourable to fish life collapses when one views the extraordinary success of some introduced species. It is not surprising that the few salmonids that were brought in have failed to do much, in spite of coddling. They would run head on into competition with native species which are closely related. The brown trout, *Salmo trutta*, is hanging on in one or two streams. The American brook trout, *Salvelinus fontinalis*, is established in one lake. The Atlantic salmon, *Salmo salar*, was a failure.

When we come to fishes of more specialised families, the story is quite different. Of these only the small mouth bass, *Micropterus dolomieui*, was offered any encouragement at all. The common sunfish, *Lepomus gibbosus*, and the brown catfish, *Ictalurus* (formerly *Ameiurus*) *nebulosus*, have spread like wildfire from what must have been the flimsiest of toeholds. With regard to the sunfish, it is supposed that fry of this species were accidentally brought in along with bass fry. To account for the catfish, the best story seems to be that they were thrown out by people who tired of them after keeping them in aquaria for a time.

Carl in 1959 listed 11 lakes on Vancouver Island known to harbour sunfish. Perhaps some sources of information were missed when these data were compiled, but even allowing for that possibility, the sunfish must be doing well. By 1962 at least 40 lakes were known to be occupied by them, though this count included some from which determined attempts have been made to eradicate the sunfish with poison.

The mystery is how these fish manage to get around the way they do. The trout-fishing enthusiasts have just one answer. To spite them people lug the fish around. This only raises the question of who these individuals are who continually risk tangling with the law, by transporting live fish. Moreover, so far as I know, there has never been a conviction for that offence. It does seem probable that at times some fish species have made overland journeys without human aid, possibly as eggs or fry. But we would suppose this to be the sort of unlikely occurrence that

might take place once in a century or so. One solution seems about as improbable as the other, and I don't pretend to know the answer.

Both sunfish and bass are now in Quennel and Holden lakes. That the chub may prove unable to hold out against the competition of the newcomers is possible but not by any means certain. But we need have no regrets, because what is certain is that the trout fanatics will eventually manage to obtain permission to poison these lakes. They have so far been stalled off by the landowners, not, I am afraid, because of any regard for an interesting fish species, but because of the trouble entailed in keeping livestock away from the water until such time as the poison would be dissipated. The peamouth chub as a Vancouver Island species is at any rate safe. Whether it would be possible to poison a lake as large as Kennedy, I could not say. It will never be considered, because the lake is a main spawning ground of British Columbia's most valuable commercial fish, the sockeye salmon.

Poisoning lakes, even those which contained no fishes before the arrival of introduced species, is a practice which can never be condoned by the true conservationist. We do not all concur with the view that all freshwaters should be reserved for a few species valued as 'game' fish. To begin with there are those who would sooner catch coarse fishes than hope to catch trout. Many of the lakes in which catfish, sunfish and bass multiply like flies possess no spawning grounds suitable for trout; the latter must be maintained by artificial restocking. While it must be admitted that in this country the killing of birds and mammals, on the excuse of their ichthyophagous tendencies, is not tolerated, there seems to be little sense in protecting wild life with one hand and destroying it with the other. In fact, an animal population will usually build up to the point allowed by the food supply, in the face of reasonable losses, but the sudden cutting off of such food supply can be disastrous.

Literature referred to in the above consists mainly of the following:

Carl, Clemens, and Lindsey (1959). *The Freshwater Fishes of British Columbia.* Provincial Museum of Natural History, Victoria, B.C.

Clemens and Wilby (1946). *Fishes of the Pacific Coast of Canada.* Fisheries Research Board of Canada, Ottawa.

Changing the Aquatic Scene

by BILLY WHITEHEAD

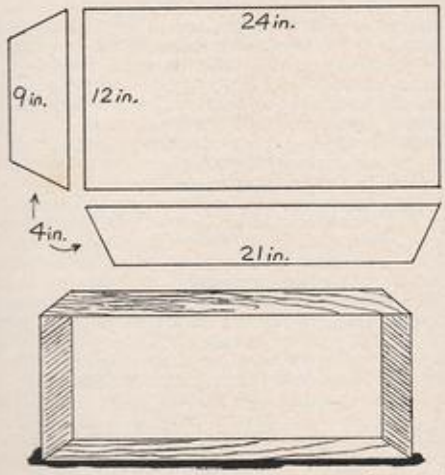
SOMETIMES one tires of the same aquascape day after day, but changing the look of a decorated aquarium is not as difficult as it would seem. An appreciable change can be made by varying the tank's lighting and background. Startling effects can be obtained by combinations of back, side and top lighting.

Side lighting can give the tank a new aspect by making the plants stand out in relief. By experimenting, suitable and interesting combinations can be found. Pieces of coloured cellophan—such as those obtained from around mineral water bottles or chocolates—can be slipped between the light source and the glass, to create a new atmosphere. Cellophan should not be in direct contact with the light bulb or it may ignite. As different coloured lights have various effects on plant growth, coloured light should only be used when the tank is actually being viewed.

More exotic effects can be obtained by applying one colour of light from, say, the side, and another from the top. A few floating plants will cast interesting shadows if top lighting is used.

A new aquascape can be had by occasionally changing the tank background. By leaving the rear glass of the aquarium unpainted, different backgrounds may be inserted. Several pieces of different coloured paper, cut to the appropriate size, can be used—a black one giving the tank an impression of added depth, and a white one bringing out the colour of fishes and plants and making the whole tank much brighter.

To create an impression of extra depth, a frontless narrow plywood box, about 4 in. deep and of the height and depth of the aquarium, can be constructed. The four sides should be sloped, the rear being about 1½ in. smaller than the front, all round. This can be attached to the back glass of the aquarium, the sides painted black, and a suitable background stuck inside the box. Suitable backcloths can be painted with water colours from a child's paint box, or backing papers can be purchased for a few shillings from a dealer's shop. The aquarium glass should be kept free from algae so that the box can give the impression of a deep tank fading away into darkness.



Dimensions and design of open box to fit behind a 24 in. by 12 in. by 12 in. aquarium

Any of these changes can be made without disturbing the inmates of the tank. Why not experiment with your aquarium and discover several striking combinations to try out on your friends when they next call?

FOODS FOR COLDWATER FISHES

Breeding and Keeping Live Foods

by A. BOARDER

THERE are several types of live foods suitable for feeding to coldwater fishes, but all are not easy to breed or keep. The best general live food for most fishes is the garden worm. These are not easy to breed and for the average fish-keeper it is better to collect them and endeavour to store them live for a time. Where one has a garden it is easy to have a small patch which is kept constantly damp, and if covered with old sacking it will soon harbour plenty of worms. A little manure or decaying vegetation will attract the worms and so a few can be taken for use at a time. To keep worms, three important points must be borne in mind: they must be damp, cool and dark. I find that if they are kept in earth during warm weather they soon die and smell badly. The best way is to keep them in an earthenware container in a quantity of decaying leaves, beech or oak are good. The container is then covered to exclude the light and kept in a cool place

White worms (enchytrae) are the next best food and are easily bred once one has a few to start with. I breed mine in concrete boxes in damp peat. A sheet of glass a little smaller than the top of the box is laid directly on the peat and the box is then covered to shut out the light. I use several boxes standing one on the other so that they take up no more floor space than one box. A slice of damp brown bread is placed on the peat and after a time the worms increase in numbers so that many may be used for feeding. If a few are taken from each box at intervals it will be found that there is an endless supply. If a small knob of cheese is placed in the peat many worms will congregate round it and can be lifted out with tweezers in their thousands. Such boxes will last for many months and when it looks as if the peat has become too impacted, a fresh box can be started.

Daphnia or water fleas are not easy to breed in large quantities unless one has two small ponds. A pond is then allowed to become very green with algae and some decaying vegetation is added. When plenty of algae and Infusoria can be seen, a few water fleas can be added and they will then breed well and multiply. After some time it may be noticed that the supply is failing and it is then that the other pond should be taken into use, starting it with *Daphnia* from the first pond. This first pond is then cleaned out and prepared for another breeding. It is difficult to keep water fleas unless they are in a large container and are not overcrowded. Many collectors are too greedy and pack their travelling cans with so many water fleas that most are dead on arrival home. They should be kept cool and with well oxygenated water; an aerator may even be necessary to keep them alive for long.

Mosquito larvae are best collected from natural ponds and no attempt should be made to breed them as they could become a nuisance if left to mature. They will live for some time in a good algae-infested water, but obviously must not be left too long or they will produce mosquitoes.

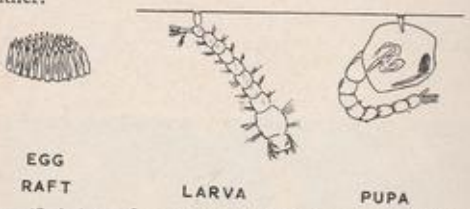
Tubifex is also best collected and usually can be found in the mud at pond or slow-flowing river sides. If a quantity of mud is washed around in a tea strainer the worms will be left behind in a tight ball. They should be left under running water for a few hours and never fed to fishes soon after having been collected. Unless kept cool and in fresh water they will not live for more than a few days.

Photo: Laurence E. Perkins

Water fleas (Daphnia) are a popular live food but seasonal in availability (magnified picture)

Frog tadpoles, a splendid food, will be seasonable. They can be bred in a garden pond where frogs congregate for spawning. In such a case the spawn should be collected and placed in a spare tank to incubate. If left in the pond the young tadpoles will be eaten by the fishes as soon as they are free swimming and so be too small to be of much food value. If the spawn is kept in a warm situation the tadpoles will soon hatch out, and if some has been kept cooler there will be a longer source of supply. Once the tadpoles are free swimming they must be fed. When very small they feed on the old spawn and then on very soft decaying vegetation or soft algae. After this they will eat almost anything, both animal and vegetable. Decaying lettuce leaves are a good food for them and as long as they get plenty to eat they soon grow. Once the

front legs appear they do not eat much and live on the fattened tail until they leave the water. Frog spawn can be collected from natural ponds and it is better to do this if possible rather than to wait until the tadpoles hatch and to catch them then. Frogs normally go to ponds for spawning about the end of February, except in very severe weather.



Magnified views of aquatic stages in the mosquito's life cycle

Gentles or maggots can be bred by leaving some stale meat or fish in the open during warm weather. Blowflies will soon find it and lay their eggs. These soon hatch in warm weather and the maggots grow quickly. They may be collected by having some fine mesh wire netting underneath, when the maggots will fall through on to a tin and can be collected. The disadvantage of this method is that the matter will smell badly and cause a nuisance if near the house. They can sometimes be obtained from a butcher's shop, but be careful how and when they are asked for. Do not ask when the shop is full of customers. It used to be the practice to send the errand boy to another shop to ask for three penn'orth of gentles from the green box under the counter. The result when the shop had customers in can be well imagined!

Some of the other live foods which can be collected from the wild are bloodworms, water shrimps and water lice. Bloodworms can be collected in the way described for *Tubifex* (they often occur in the bottom sediment of rainwater butts). The freshwater shrimps (*Gammarus*) and water louse (*Asellus*) are collected by dragging some water weed from a pond and shaking it over sheets of newspaper. Many of the larger fishes will take this food eagerly.

Mealworms take a long time to breed and if needed are better bought. Brine shrimps are not a very good live food for the coldwater fish-keeper to breed as very warm water in which has been dissolved a quantity of salt is necessary. The eggs hatch in this when the temperature is about 75°F (24°C). However, except for the breeder this food is not worth bothering with. The same applies to micro and Grindal worms. The breeder who wishes to cultivate live foods would do well to get *The Aquarist* booklet *Fish Foods and Feeding* by F. N. Ghadially (4s. 10d. post free from *The Aquarist*).

Macrognathus aculeatus

by

JACK HEMS

THIS interesting species belongs to the family Mastacembellidæ, popularly referred to as the spiny eels (on account of their isolated dorsal spines and their eel-like shape), and is native to the fresh and brackish waters of India, Burma, the Malay Archipelago and Borneo.

In coloration it is dark brown, shading to light beige or greyish white on the underparts. Dark marblings and vertical bars decorate the sides. There are, as already mentioned, a number of erectile spines on the anterior part of the back, followed by a soft, ribbon-like fin which is ornamented with three to ten striking black eye-spots margined with pale beige to white. The anal fin is sombre brown to grey, the rounded caudal fin is similarly coloured with some darker markings, and the pectoral fins are clear. There are no ventral fins.

A distinctive feature of this fish is the long, proboscis-like snout which is often used to ferret out live food such as worms from the sand. As a matter of fact, the species is strictly carnivorous, and worms (red or white) must be considered its staple diet.

M. aculeatus is very active and hungry after dark, but hides during the light hours behind rockwork, in clumps of plants, or buried up to its head in the sand. Nevertheless, a few weeks after purchase it will soon learn to recognise the vibrations and sounds associated with the lifting of the cover glass from its aquarium and, the moment this is done, it will swim into view (unless already gorged) and flurry about for tit-bits.

Apart from providing the necessary retiring places, about all that is needed to make *M. aculeatus* feel at home in the aquarium is slightly saline water, a rather fine sand to lie or burrow into, and a temperature range of 71°F (22°C) to 80°F (27°C).

In the wild it attains herring-size, but under domestication you can consider it fully grown at about 7 inches. In its smaller sizes it is suitable for inclusion in a community tank, but after it has reached 4 inches it is advisable to remove all small and, in particular slim, fishes from its company.

Like most large-growing species it has a life expectancy of several years and, in fairly well-grown specimens, the female can be distinguished from the male by her fuller and deeper body. So far as I can ascertain this member of the Mastacembellidæ has not bred in captivity. It sometimes goes under the common name of arrow-nose.

Experiments with Marine Tanks in Hong Kong

by HUSEIN ROFÉ

AT the end of my second summer of experiments with marine tanks and fishes, I am appreciably poorer financially and richer in experience. From the Nordic point of view, our summer lasts into December, and has begun again by the following April, though most of the local inhabitants have forsaken the beaches for about 7 months at the onset of October. This leaves me greater freedom of action, since I often try my luck in the attractive bays of Hong Kong Island, on rocks, among tide pools, snorkling, putting down traps, using a seine or nets.

It is certainly more agreeable to pursue this frustrating activity without being surrounded by countless noisy spectators in the form of Chinese or English children, whose curiosity might well even lead them to knock over the buckets of fishes collected with such pains. Apart from specimens attractive enough to merit a place of honour in the marine tank, I also spend quite a lot of time on these visits (particularly when the sea is least generous) catching small live shrimps, or fry swimming in schools, hundreds together, to serve as a refreshing and welcome change on the menu for my pets, and if I can't even find that much, then I knock limpets off the rocks rather than return empty-handed, since my freshwater Oscars at any rate are extremely partial to limpets, spitting out the shells when they have removed the flesh.

Sources of Supply

Those visits, usually at week-ends, help to solve the problem of finding adequate fresh air and exercise on a small island, and provide some excitement, since every variation of tide or season brings a different aspect to our shores, a change in the types of fishes visiting them, or sometimes the disappointment of having to return home with nothing more than about 10 gallons of newly collected salt water to add to that reserve which must constantly be replenished and stored in a cupboard.

Were I to rely on the results of my own haphazard attempts on the seashore, my tanks would not often have an attractive collection of inmates, but some time ago I discovered the value of hailing Chinese fishing boats anchored off-shore. There is usually at least one around, and they are easily induced to come inshore, usually assuming that I want to buy myself part of the catch for dinner. When it is pointed out that I am after the smallest, gaudiest and least palatable specimens, they very often have something to offer, perhaps a butterfly or some clown fish, and the price is never more than a few cents (usually about 10 to 20) apiece! This is also a far safer method of purchase than trying to obtain salt-water specimens from the aquarium shops in the town, for all these dealers do is to obtain them from the fishermen, and then sell them to me for five or ten times the price. By the time the dealers show me what they have to offer, the specimens are already in a much more debilitated condition, sometimes blind or diseased, and the dealer is much more resentful than the fisherman if I refuse what he has to offer.

The third source of supply is the more serious dealer, the importer who obtains tropical specimens, usually from Ceylon, for re-shipment to such countries as the United States. Here the price is the highest of all, for I pay approximately the U.S. importer's cost price, less the shipping charges. This, however, is the only means of obtaining some of the more colourful coral beauties. I have learnt from experience that I must purchase them within 24 hours of receiving the dealer's telephone call. Not only does he re-ship within 48 hours, but he keeps the fishes in salt water obtained in large metal drums from the harbour, and never thinks of filtering it before use. Such purchases therefore are not only the dearest but also the heaviest risk. I sterilise them promptly, discard the contaminated water with which he generously offers to supply me free of charge, and leave them in a plastic bucket containing antibiotics for a few days, placing the bucket in full sunlight for a few hours daily. My marine tanks receive no sunlight at all, but I believe in the healing powers of the sun for fishes, and they seem to thrive well under such treatment, although I have never seen it advocated for marines.

Many of our attractive species from the Western Pacific and the Indian Ocean are ignored by the excellent American handbooks on salt-water fishes, probably because they rarely reach the American market in good condition, and perhaps owing to the rich supply of suitable local species. German handbooks deal with them more fully, and often provide the only hints on how to keep them. Nevertheless, I have learnt to treat with reserve many of the statements by marine experts, although they know so very much more about the subject than I do. This is because local conditions here are so different. I have noted often how local Chinese breeders of freshwater tropicals ignore basic rules of Western aquarists, or even contradict them, and nevertheless succeed. The answer is, of course, the differing climatic and environmental factors.

As a pioneer local hobbyist in the marine field, I sometimes face problems which the best authorities have not foreseen, and there is no colleague in this community to whom I can turn for advice, since even the best dealers have never studied the requirements of the marine tank. Perhaps it is only the knowledge that I am on my own here which has enabled me to keep going, accepting the cost in time and money which learning the hard way entails. Then there is the consolation that Hong Kong is among the world's cheapest spots for such experiment, the knowledge that I can permit myself the luxury of trials which only the very wealthy could afford in some other lands.

My First Tank

Before I ordered my first tank, I was literally terrified by the numerous warnings about the dangers of toxicity, and ordered a special aquarium, which turned out to be made entirely of cement, with a glass pane in front, and with a capacity of about 25 gallons. Owing to some confusion resulting from my inadequate knowledge of Cantonese, I had expected to receive a stone aquarium. There were many warnings about poisonous cement, and in my ignorance, I took this to mean the material of which the tank was constructed, and not the aquarium cement used for the inner sealing. Therefore I had the entire inner surface lined with glass sides and base and sealed with epoxy resin. This proved most unwise, for the epoxy resin eventually peeled off, salt water seeped between the glass sides and cement walls, became stagnant, and found its way back into the aquarium proper from below. Minute

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Decorative Plants for the Pool

When a pool is congested with water lilies, such as Nymphaea alba (above), the leaves and flowers become raised above the water surface and the effect is less pleasing to the eye

IT is not the aim of this article to describe the many splendid horticultural varieties of water lily, but rather to direct the interest of the aquarist with a garden pool to some of the less common species of aquatic plants which may be grown out-of-doors, either permanently or for the summer months.

The native white water lily, *Nymphaea alba* ssp. *alba*, varieties and hybrids of which provide some of the cultivated forms offered by nurseries, occurs throughout the British Isles in lakes and ponds and shallow backwaters with a suitable muddy substratum. Its flowers are large and decorative and it is highly suitable for the garden pool. The stout rhizome produces foliage which is exclusively floating, each leaf being almost circular, from 4 to 12 inches in diameter, dark green above, paler and mottled with red below. The flower stalks may be as much as 3 feet long and hold the flowers floating on the surface, except when the plants are cramped, on which occasions the flowers and some of the leaves rise into the air. Each flower is from 4 to 8 inches in diameter, and contains about 20 to 25 white petals of very showy appearance. The species normally blooms during July and August.

The yellow water lily or brandy-bottle, *Nuphar lutea*, often starts to bloom rather earlier, in June, its smaller yellow flowers rising a few inches out of the water. Similar in its general rhizomatous habit, *N. lutea* differs from *Nymphaea alba* in the shape of its floating leaves, which are ovate-oblong, and in forming submerged leaves, which are ovate to rounded, cordate at the base, translucent and borne on short petioles.

Both these native water lilies are completely hardy and may be established permanently in the garden pool: their

Below are shown a flowering shoot of the water primrose Ludwigia adscendens (left) and (in silhouette, right) the habit of Luronium natans, only floating leaves of the latter being present

by C. D. SCULTHORPE

(Illustrations by the author)

rooting medium must be rich in nutrients. A suitable compost contains 4 parts of loamy garden soil, 2 parts of horse or farmyard manure and 1 part of coarse sand or gravel. This should be contained in a large pot, or wire or plastic basket, and the plant should be very firmly anchored with the growing point of the rhizome just above the surface of the compost. Any depth of water up to about 3 feet is tolerated by *Nymphaea alba*, up to about 2 feet by *Nuphar lutea*, but the available water surface must not be restricted for both species are rapidly-growing plants. The usual mode of propagation is by division of the rhizome, either in the autumn or in the early spring.

The fringed water lily, *Nymphoides peltata*, previously known as *Limnanthemum nymphoides* and as *Villarsia nymphaeoides*, is another decorative native plant which is easily adapted to life in the garden pool. It is common only in central and eastern England, but is obtainable from most aquatic nurseries: its only disadvantage is that it suffers in hard winters and in areas where frosts are liable to be severe it should be lifted in late autumn and stored under cover until the spring. It has an extensively creeping rhizome which forms profuse adventitious roots at the nodes and from which arise long-petioled floating leaves. These are orbicular in shape, up to 4 inches in diameter, purplish below and mottled with brownish-purple on the glossy green upper surface. In early summer long floating stems are formed and from the axils of the leaves on these there arise aerial stalks bearing clusters of four or five flowers about 2 to 3 inches above the water. Each flower is about 1½ inches in diameter and has five bright yellow petals which are lobed and have attractive shaggy margins. When first obtained, the plant should be rooted in rich loam: roots produced subsequently from the creeping and branching rhizome may be allowed to anchor themselves in the pool bed. In warm sheltered localities, its growth sometimes becomes rampant, a tendency which may be curbed by cutting back several of the long shoots.

Flowering shoot of the water poppy (Hydrocleis nymphoides)

For the shallower water at the margins of the pool, *Luronium natans*, the floating water plantain, and *Ludwigia adscendens*, the water primrose, may be strongly recommended, though the latter is only half-hardy and should be stored in a tank indoors or in a greenhouse during the winter in colder localities. Both will thrive in composts of sand and soil, or in the bottom mud: the water depth should preferably be less than 15 inches.

Luronium natans, formerly known as *Alisma natans*, produces vigorous floating stems which root profusely at their nodes and may travel 2 or 3 feet from the parent rosette: the young rosettes these stems bear provide a splendid source of new stock. The species bears both submerged and floating foliage: the submerged leaves are linear flattened petioles about 3 to 4 inches long and one-eighth of an inch wide, whereas the long-petioled floating leaves have ovate to elliptical laminas, about ½ to 1 inch long. It is from the axils of the floating leaves that the flowers arise: they float too, each being about 12 to 15 millimetres in diameter, and white with a central yellow marking.

The water primrose, *Ludwigia adscendens*, is still referred to in some horticultural catalogues as *Jussiaea repens*: it is an amphibious plant occurring naturally as several distinct

Floating leaves and flowers of Aponogeton distachyus

Floating leaves and twin-spiked flowers of Aponogeton desertorum

varieties in the Near East, Africa, Asia and America. It possesses long stems which either root in the substratum or remain free-floating, on which occasions the nodes develop pale pink hairy bladders which aid the buoyancy of the plant. The glossy mid-green leaves, which vary in shape from linear-lanceolate to ovate and in length from 1 to 4 inches, are arranged alternately on the stems, and in their axils arise the solitary, bright yellow, 'primrose-like' flowers. Established as cuttings, the species grows rapidly and will spread over the littoral water as a carpet of foliage studded with blooms in early summer.

The water poppy, *Hydrocleis nymphoides*, sometimes sold as *Limnocharis humboldtii*, resembles the water primrose in being a warm temperate and tropical species. It grows well out-of-doors in warm localities, and its beauty is well worth the care necessary in protecting it from winter frosts. The most convenient method of wintering it is to transfer it from the pool in late summer, after it has flowered, to a cool aquarium indoors. The water poppy is naturally distributed in stagnant and slow-flowing waters in Central and South America, often forming dominant colonies in the shallow regions close inshore. Initially, it should be rooted in a small pot containing a compost of 2 parts of coarse sand to 1 part of loam, ensuring that the roots are well spread and firmly anchored. It will soon produce long stems rooting freely at the nodes and bearing clusters of slender-petioled floating leaves: these leaves are oval to orbicular in shape, cordate at the base, shining green in colour, sometimes marked with brown, 1 to 2 inches long, and ¾ to 1¾ inches wide. The aerial flowers may arise solitarily or in clusters of two or three: each is up to 2 inches in diameter, its three petals being bright yellow and its several anthers purplish. Propagation may be achieved by detaching and rooting the strong lateral shoots arising at the nodes of the main creeping stems.

A similar technique of cultivation may be used for the African *Aponogeton desertorum*, previously known as *A. kraussianus*, which also thrives in pools during the warm summer months. It is, however, a larger plant than *Hydrocleis nymphoides* and its rooting medium should be supplemented with some old weathered clay or manure, and should be contained within a large pot or wire or plastic basket. The tuberous rootstock should be firmly anchored in this compost with its growing point just exposed. The foliage consists only of floating leaves, which are leathery, from 3 to 6 inches long, 2 to 3 inches wide, oblong in shape, and rounded at both base and apex. *Aponogeton desertorum* produces the twin-spiked inflorescence characteristic of African members of the genus: it stands about 6 inches above the water and is densely clothed with sweetly scented, sulphur-yellow flowers.

One of the most adaptable and decorative of pool plants is the South African *Aponogeton distachyus*, the Cape water hawthorn, which is a hardy perennial plant, except in very severe winters, and need not be removed indoors. Its rooting medium should be similar to that recommended for *A. desertorum*, though it will grow well if it is rooted simply in clay. The floating leaves are similar to those of *A. desertorum*, being about 6 inches long and 1¾ inches wide, oblong-elliptical in shape, and rounded at both base and apex. The two arms of the inflorescence, which may float or stand about 2 inches above the water, bear large fragrant white flowers with jet-black anthers. The blue water hawthorn, *Aponogeton leptostachyus lilacinus*, may finally be mentioned: it is equally desirable but rather more sensitive to temperature, differing from *A. distachyus* in having bluish-violet flowers and in rarely surviving winters out-of-doors. In late summer the rootstock should be lifted out of the pool and stored until the following spring either in a cool aquarium or in damp soil or peat moss in a corner of the greenhouse or garden shed.

Close-up Photography

MANY aquarists have at one time or another probably thought how nice it would be to have a permanent record in the form of a photograph, whether in colour or black and white, of a particularly prized specimen or an aquarium set-up of which they are particularly proud.

However, put off by the imagined technicalities or vast expense involved in purchasing the necessary equipment they have dismissed the thought from their minds. These notes are intended for any aquarist who possesses or has access to a good though not necessarily expensive camera, and a desire to obtain scientifically accurate though not artistically perfect photographs of his specimens.

Equipment for Going Close

(1) *The camera.* Generally speaking, single or dual lens reflex cameras are the best as they allow accurate focusing on the ground-glass screen right up to the moment of exposure, and the composition of the picture is more accurate. However, it is quite possible to obtain good photographs with normal 35mm. or other cameras provided that the focusing distance can be estimated accurately with a close-up range-finder.

(2) *Lenses and extension tubes.* Most cameras focus down to 3 or sometimes 2 feet with the lens supplied, but for close-up work supplementary lenses, or extension tubes for cameras with interchangeable lenses, are essential. Your photographic dealer will advise you on which is most suitable for your type of camera.

While a solid tripod will be found invaluable to hold the camera perfectly still, a pile of books resting on a table top will be a good substitute, although hand-held shots are quite feasible provided that the camera is held perfectly steady. Another device to eliminate camera shake is a cable release, and this will overcome that infuriating fumble for the shutter release at the crucial moment of exposure.

(3) *The flash gun.* The most important piece of equipment in any branch of photography involving fast-moving subjects at close range is the flash gun. Either the normal battery type, which uses bulbs, or the more expensive electronic flash may be used, although the latter is preferable owing to the capacity for multiple exposures without the necessity for bulb changing. With electronic flash there is virtually no firing delay, the flash reaching its full brightness a few millionths of a second after you press the shutter, the entire operation being over in a thousandth of a second or even faster, enabling the photographer to 'stop' even the fastest swimming fishes instantly.

(4) *The film.* Slow films, of the order of 14-17 DIN, give the best results for a number of reasons, including the fact that they allow great enlargement of the negative without increased 'graininess'. When using colour film it is essential to use blue flash bulbs if daylight is used to illuminate the tank. Use daylight-type reversal film if you are using electronic flash.

The Photographic Aquarium

Whilst it is possible to use the aquarium in which you house your fishes normally for photography it is usual to have a small aquarium specially adapted for the job, unless of course you wish to photograph the entire set-up.

I utilise two small aquaria for the sole purpose of photo-

y of Fishes and Reptiles

by BARRY R. JAMES

(*Photographs by the author*)

graphy. One measures 8 in. by 6 in. by 3 in. and the other 12 in. by 8 in. by 3 in. The small width ensures that the fishes cannot swim wildly in and out of the field of focus during the taking of shots. The backs and the sides are painted plain white and I prefer either silver or brown sand as a bottom covering. Of course, in such small tanks it is not possible or even desirable to have heating apparatus, but the tank covers are equipped with 40 watt bulbs to keep the temperature up and also to supply adequate illumination for focusing. As an added refinement I have cut two slits about one-eighth of an inch wide in the top end members of the frame, about half an inch from the back wall of the tank, and inserted a piece of clear glass cut to the internal depth and length of the tank. This is very useful when for special reasons aquatic plants are needed as a background without the fishes being given the opportunity to hide themselves behind them.

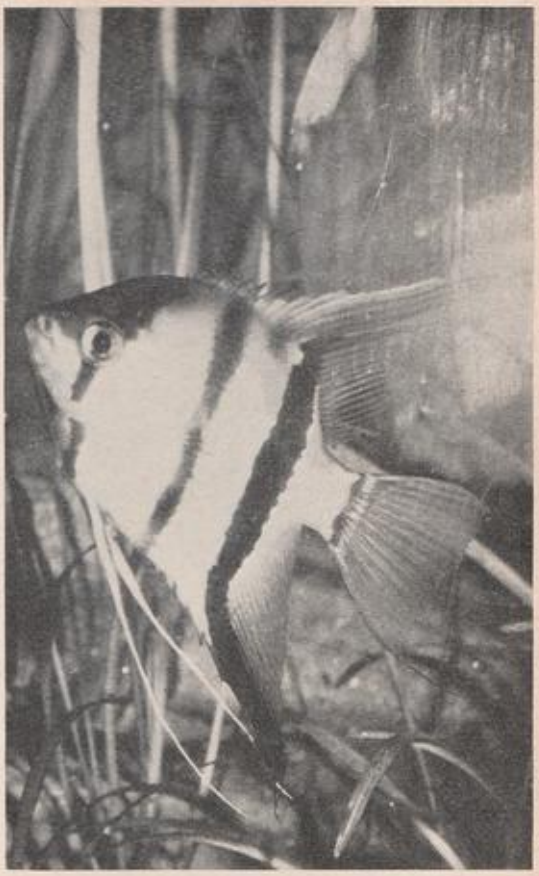
Before use the tank must be thoroughly clean. I always wash the gravel before any operation and make sure that the glass has no smudges or evaporation marks on it, as it is amazing how clearly they stand out in the finished print if allowed to remain. I always use water from an aquarium which is allowed to filter and added crystal-clear at the same temperature as the water in the tank from which the fishes are to be transferred.

Taking the Photographs

Assuming that the equipment is now assembled with the shutter cocked, the flash gun warmed up, the flash synchronised correctly and the specimen in the tank, we are now almost ready to shoot.

The greatest problem which has to be faced is the avoidance of reflections in the multitude of glass surfaces. If the flash gun is mounted straight on the camera and pointed at right angles to the front surface of the aquarium the picture will be fogged by the blinding flash bouncing straight back into the lens, or in some cases a perfect picture of your own camera will appear on your negative.

Blue acara photographed by electronic flash (two heads); exposure 1/100 second, f16



Angel fish photographed by electronic flash (one head); exposure 1/60 second, f11

This problem may be overcome in several ways. In the first the flash is pointed obliquely at the front of the aquarium and black paper is placed beside the camera to prevent reflections being thrown back into the lens. In the second the flash is directed from the top of the aquarium and, although I use this method only when I am employing a second flash in the normal position for taking very flat subjects, it is possible to use this position for a single flash.

The shutter speed should be set to a thirtieth or hundredth of a second and the stop at *f*16, although you may find that *f*11 or even *f*22 may give better results, depending on what distance you are from the tank. When all is ready focus and shoot when the subject is nicely framed. One word of advice here. When a fish is first introduced into a small brightly-lit tank it will in all probability lose its colour and try to hide in the darkest portion of the tank. When this happens it is a good idea to give the fish 10 minutes or so to get used to its surroundings. A *Tubifex* worm or whiteworm might do the trick in making the fish feel more at home and induce it to stop hugging the bottom.

Patience and an eye for detail are an essential part of the art of photography, and the patience necessary in waiting

In this photograph of a chameleon (exposure 1/50 second, f11) the animal is made to stand out from the background, which is not in focus. A twig sticking out from the main branch was selected for this reason

Clutch of gecko eggs (exposure 1/30 second, f11). The rock crevice in which the eggs are resting was moistened with water to make it darker in colour and so provide a contrasting background for the eggs

for the right moment to release the shutter is what makes or mars the final product—the print. However, having said this I would say don't be too fastidious about the first roll of film, but treat it rather as an experiment and be prepared to make a few mistakes to gain the necessary experience. Even experienced fish photographers are fooled by that final twist of the tail right at the moment of exposure. Start if possible with the slower swimming fishes, such as the gouramis or fighting fish, and leave the danios until later, when your own reflexes have speeded up.

Photographing Reptiles and Amphibia

If taken in an aquarium, reptiles and amphibians pose the same problems as fishes, but as some of the snakes etc. are rather large it is advisable to dispense with close-up lenses, as it is impossible to get a 3 foot extended or semi-extended specimen in complete focus.

Outside, shoot when the light is bright and diffused, or failing this when the sun is high, to avoid long shadows, as the camera has nearly always to be pointed down on the subject and very dark shadows distort the subject's outline.

Always use fast shutter speeds unless you are certain of the temperament and mood of the specimen, as even lethargic looking lizards move like lightning when suddenly frightened. It is, of course, quite possible to use flash outside if you wish, but when calculating the exposure you must take into account the existing daylight and allow for it.

Try to avoid exaggerated contrast such as black toads against sizzling white sand, but rather aim for a quiet blending, with the subject toning with its surroundings but still distinctly visible. However, this is delving into the realms of the artistic approach to zoological photography which is a subject in itself (see Hugh B. Cott's *Zoological Photography in Practice:* Fountain Press, for further information).

The main assets necessary for animal photography are a knowledge of the 'personality' of the subject, coupled with extreme patience and the ability to withstand an aching back and progressively blurring eyesight from peering into the viewfinder!

Further examples of the importance of selecting backgrounds for photographic subjects are shown by the horned lizard (left), photographed on silver sand in bright sunlight (1/100 second, f5.6) and the natterjack toad (below), which was placed on coarse white gravel and photographed in bright sunlight (1/250 second, f5.6)

The Aquarium at Chessington Zoo

by E. L. KEMP

CHESSINGTON Zoo, in Surrey, has a small but comprehensive collection of reptiles, fishes and amphibians in its aquarium. Here visitors can see the royal python, a most attractively marked snake with clear-cut dark brown markings on a pale reddish brown background.

This snake, which is 3 to 5 feet in length, comes from Central and West Africa, where it lives on the grasslands, eating small jumping mice called gerbils, which it hunts by night. The royal python is easy to tame, and is sometimes kept as a rat-catcher in Nigerian houses.

When it is alarmed it will curl up into a ball like a hedgehog, so it is sometimes called the ball snake. In Sierra Leone it is also known as the shame snake, as when it does this it is thought to be hiding its head in shame.

Another West African snake to be seen at the Zoo is the sand boa, a burrowing snake whose home is in semi-desert or dry grasslands. The heat of the sand in these areas is so great during the day that these snakes have to bury themselves to avoid the rays of the sun. They are sandy in colour so that they are invisible to their prey, and rather stoutish in shape. They are rather bad tempered, and likely to bite.

The house gecko, like the house mouse and the house sparrow, is a creature which has formed a permanent association with man. It will leave its original habitat amongst rocks, or holes in the ground, for the walls of a bungalow in the tropics, where it will hunt for the insects on which it feeds when they are attracted by the electric light. Geckoes are small lizards with feet that adhere like suckers to the walls of buildings. Various species are found in the hot countries of the world.

The tegu in the illustration is a member of the Teiidae. It comes from South America, and in both habits and appearance it resembles the large monitor lizards of the Old World.

The tanks of Chessington's aquarium are full of brightly coloured fishes of great beauty. The pretty glowlight and lemon tetras show to the best advantage with their tank lighted from above. The striking silver and black penguin fish, kept on their own as they are inclined to nip other fishes, are not, of course, so aggressive as the famous Siamese fighting fish, kept in Siam as fanciers once kept cocks in England, to fight to the death. Males of this species can only be kept with a female.

The contrasting colours of the red-tailed black shark make this fish one of the most attractive at Chessington. This fish could be said to graze on the algae on the glass of its tank, and on the leaves of water plants, with its sucker-like lips.

The rosy barbs from India, egg-laying fish about 3 inches long, are also very beautiful. The best colours are obtained where male and female are kept together so that they display to the opposite sex. In the breeding season their cousin the cherry barb becomes mahogany-red.

The inhabitants of the aquarium at Chessington change continually. A recent arrival with an interesting history is a crocodile called Kam, which once lived in the pool at the Beachcomber Restaurant at the Mayfair Hotel in London. He was given to the Zoo when he attacked and killed one of the 30 terrapins sharing his accommodation.

Tegu lizard pictured in the Zoo's aquarium

Other recent additions to the Zoo's collection are a frog, toad, grass snake, adder and slow worm, part of the wonderful collection of native fauna kept by Mr. W. G. Kingham at Effingham Common as a hobby, and presented almost complete to Chessington when their owner could no longer undertake to look after them. This collection is at present scattered around the grounds of the zoo amongst the other exhibits, but it will eventually be exhibited in a special corner for the benefit of schools and natural history societies.

Admission to the aquarium at Chessington is 6d. extra to the entrance ticket to the grounds, which is 3s. 6d. for adults (half price for children), and the aquarium is open to visitors only during the season, which starts this month.

Experiments with Marine Tanks

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maggots could actually be seen crawling about behind the glass panes.

When I was about to have the glass torn down and re-cemented, I was told that precisely these cement tanks were among the best for marine fishes, and that there was no question of poison, so since then I have used the tank more successfully without the glass sides. Nevertheless, the problems were not at an end: to my horror, I noted that there were red stains on the sides of the tank. The cement was not only porous, there was iron used in the middle to hold the frames together, despite my strict specification of a non-metal tank. Here I was faced with the very problem which I had taken such precautions to avoid. Nevertheless, while I still use that tank for some of my fishes at the moment of writing, it appears that some specimens, particularly *Dascyllus* and sea horses, are untroubled by the gradual iron build-up.

To be continued

our readers write

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

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

Water Snails

MR. Billy Whiteside, in his article "Snails—Aquarium Friends or Foes?" (*The Aquarist*, February), suggests that a solution of carbon dioxide (soda water) is useful for sterilising aquarium plants to free them from snail eggs. Carbon dioxide solution in water in the form of soda water has no disinfecting properties whatsoever; the best place for soda water is in a glass along with its more normal companion whisky.

I wonder whether Mr. Whiteside has confused soda water from a siphon with a solution of washing soda in water? A solution of washing soda may very well have an effect on snail eggs, but would hardly do the plants much good; I must admit, however, that I have not tried this chemical in this context.

Myself, I find the simplest procedure is to drop the plants intended for the breeding tanks into a bucket of cold water; the shock of sudden immersion in this cold water causes most of the snails to drop off of the plants, and they can nearly all be removed by swishing the plants to and fro. The eggs are a different matter; I find it very difficult to exclude them all from the breeding tanks by simple hand-picking.

A really safe method of destroying snail eggs would be a boon not only to aquarists but also to health authorities, for in many parts of the world water snails are carriers of the parasites that cause diseases of both man and his domestic animals. There are a number of chemicals that can be used to kill snails but unfortunately these are also toxic to fishes, and fishes are an important item in the diet of man in the undernourished parts of the world.

Mr. Whiteside refers to the Infusoria or apple snails as *Ampullaria gigas*; the Infusoria snails belong to the family Ampullaridae, which is divided into the genus *Pila*, from the Old World tropics, and the genus *Pomacea*, from the Americas and the West Indies. *Pomacea canaliculata australis* appears to be the commonest species of Infusoria snail offered for sale in the United Kingdom.

Mr. Whiteside also puts forward the suggestion that plaster of Paris (a form of calcium sulphate) will neutralise any acid present in the water that could harm snail's shells. Calcium sulphate will dissolve in water to a small extent (about 0.25 gram per 100 millilitres of water at 60°F) and could possibly be used by snails to build the fabric of their shells. It will not, however, react with the comparitively weak organic acids derived from animal and vegetable sources. A piece of marble or limestone (calcium carbonate) will keep the water in the snails' tank alkaline and, incidentally, on the hard side, for the benefit of the snails.

If this water containing dissolved calcium carbonate (strictly speaking calcium bicarbonate) is used for its Infusoria content to feed fry, it should be remembered that this water will progressively increase the hardness in the fry tank.

A similar increase in the chemical content of the water can also take place when brine shrimp nauplii (*Artemia*) are fed, for even if they are strained through a fine net the mass of shrimps still holds a considerable quantity of salt water.

P. F. CAPON,
Wickford, Essex.

A Show Mourned

FROM the tone of Mr. L. B. Katterns' reply to my letter it would seem that we are never likely to have another National Show. I wonder if Mr. Katterns has really thought about the matter very deeply or looked at the idea under modern conditions. I feel that there is every possibility of a show succeeding to-day as it has never done in the past. Recalling the most successful of past shows, I believe it was 1950 when the N.A.S. employed a Public Relations Officer who did a wonderful job, in fact the one real grumble that year was the fact that the Hall was overcrowded and it was difficult to get around the exhibits. The big mistake made that year was there was no Press Office. I myself was tackled by journalists for two National dailies who could not get a story for their paper. Mr. Katterns will probably recall that on the opening day Lee's cartoon in *The Evening News* featured the exhibition. What has been done before can be done again.

Regarding the financial side, the opportunities are so much greater now, especially when one realises how much the scope of the hobby has grown. To-day I feel that not less than a week show should be considered. The entrance fee and entry fees would stand at least a 50 per cent increase and my suggestions about the tanks, I contend, would apply to all sizes and not just the small ones. Again I feel there would be a much greater demand for trade spaces; in fact I am sure that all the available space would be taken.

Mr. Katterns' estimate of the cost of the show may be right but under modern conditions of finance I do not consider this as an insurmountable barrier. I am loath to make the following remarks but the fact is the majority

of us are far too old to contemplate running such an exhibition, and Mr. Katterns seems to suggest that this could only be done by the 'old hands'!

Replying to Mr. Christian's letter on the same subject, I think it debatable that Nottingham could ever attract the number of aquarists that London can. It is regrettable that in many other hobbies and indeed in most businesses London is a magnet that cannot be overlooked. However, I sincerely hope that Nottingham will have the success with their show which they have enjoyed for so many years.

T. H. MARSHALL,
Buckhurst Hill, Essex.

I WAS interested to read the letters from Mr. T. H. Marshall and Mr. L. B. Katterns on the above subject. The latter veteran and I were concerned with the arrangements for the first competitive aquarium show held in this country. This was in September 1926 at 4 Fetter Lane, E.C. and was organised by *The Amateur Aquarist* as your publication was then titled. There were 200 tanks furnished with 6 cwt. of shingle provided by Mr. A. Durham and 2,000 plants loaned by Mr. L. B. Katterns.

When the hobby was reorganising after the war I arranged an inter-club show at Potters Bar and as an innovation invited several clubs to compete in a furnished aquarium class, bringing their own tanks. Some leaked, of course, and there were no replacements available. What a mess they made!

If we are to revive a 'National' show to be held in the capital I think that the work and cost must be shared among the clubs. The Goldfish Society of Great Britain could perhaps be responsible for the goldfish classes, the Fancy Guppy Association for the guppy classes and the other coldwater and tropical classes adopted by three or four large London clubs, the whole being held together by the National Aquarists Society with its long experience. It would need to be a modest show with only adult fishes and perhaps open on 1 day only so that exhibitors could bench their fish on Saturday morning and take them home at night. How about *The Aquarist* taking the initiative as it did 38 years ago? A conference of strong clubs could be called and an *ad hoc* committee formed. With drive we might get a show in 1965.

M. D. CLUSE,
Potters Bar, Middx.

Blue Platys

I WAS interested to read Mr. L. B. Katterns' remarks on the production of the blue platy and green platy in his article in the March issue of *The Aquarist*. I would like to ask, however, if any reader has seen a truly blue platy? Certainly fish having a number of blue scales are available and are called blue platys but has an all-blue platy been produced? One cheap booklet depicts such a fish on its front cover but I am inclined to think that it is purely the creation of the artist and was not drawn from life.

T. SCALES,
Littlehampton, Sussex.

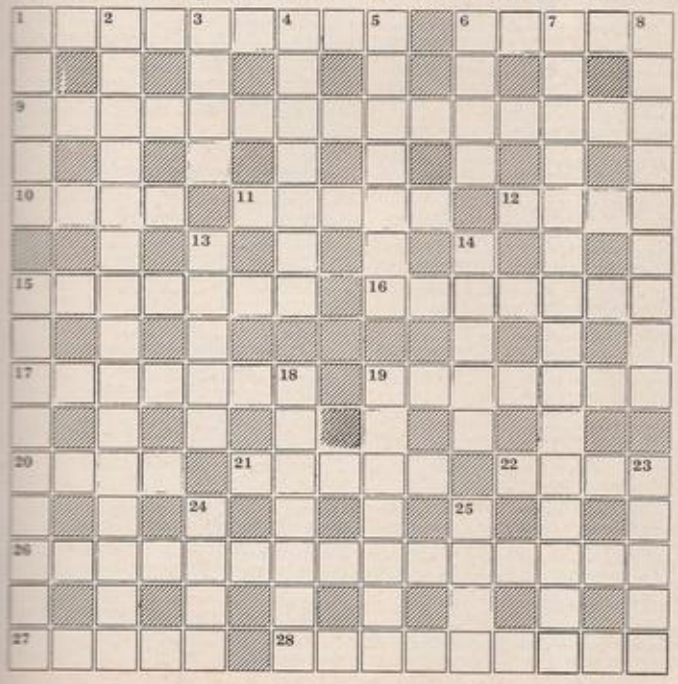
Harlequins in Colour

AS one who attended last year's Convention at Hendon and saw the marvellous collection of colour photographs of fishes shown by Mr. van den Nieuwenhuizen during his talk I was delighted to see the illustrated article on harlequins by him in *The Aquarist* (February). I hope that further colour features from this author will be published.

T. BLAND,
Newbury, Berks.

The AQUARIST Crossword

Compiled by
L. BRADLEY



CLUES ACROSS

1. At which one aquarist competes against fellow aquarists (5-4)
6. *Aequidens* (5)
9. Tiger barb (6-9)
10. Rambling excursion (4)
11. Radiance (5)
12. Shrub (4)
15. Given at 1 across for re-entry (4-3)
16. Human parasite? (7)
17. Education centres for fish? (7)
19. Filaments (7)
20. Able to become an island (4)
21. An ornamental coronet (5)
22. Arm or leg (4)
26. Bronze catfish (9-6)
27. Needed when breeding of tropical fish is undertaken (5)
28. This order is Japanese (6-3)

CLUES DOWN

1. I be in the centre of this country (5)
2. Golden barb (6-9)
3. Australian birds (4)
4. This fish is *Gasteropelecus sternicla* (7)
5. Testimony (7)
6. One of the fins of a fish (4)
7. Japanese rush (6-9)
8. *Elodea* (9)
13. Machine-like person (5)
14. Timber formed by having nothing in armour (5)
15. Set up cops (anag.) (9)
18. Mixer (7)
19. Forces (7)
23. A container to put *Anabas* in? (5)
24. Strangely enough they may be evens (4)
25. Plant with feathery leaves usually found on moorlands (4)

Solution on page 17

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.

AT the **Guest Keen & Nettlefolds Pond and Aquarium Society's** March assembly, the members had a very interesting talk on "Cold-water Fishes" given by Mr. L. Dodge. There were several species on show to help the members follow Mr. Dodge's talk. There was also a table show for anabantids and winners were as follow: Fighters: 1, Mr. J. Pugh; 2, Mr. S. Dangerfield. Any other variety: 1, Mr. J. Taylor; 2 and 3, Mr. H. Fellows. Best fish in show: Mr. J. Pugh.

There was a table show for associate members held for anabantids and winners were as follow: Fighters: 1, Mr. L. Williams. Any other variety: 1 and 2, Mr. P. Hytch; 3, Mr. W. Eggington. The fishes were judged by Mr. C. Whitehouse of Tipton and the best fish in show was owned by Mr. P. Hytch.

At the April assembly, an inter-society table show with Wolverhampton Society is being arranged, and also a talk on fish equipment by Mr. Fenton of Birmingham will be given.

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THE subject at the **Walsall Aquarium and Pool Society** monthly meeting was a talk by Dr. Cole on the cultivation of plants for the aquarium. Dr. Cole covered many aspects of this subject, using his expert first-hand knowledge, and gave heart to former non green-fingered members.

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Mr. William Dallimore

MANY readers will regret to hear of the death of Mr. W. Dallimore, who until his death at the age of 72 was an active member of Bristol Tropical Fish Club and Bristol Aquarists Society. Although impaired by ill-health in more recent years he could always be relied upon for the thankless task of collecting money and tickets at open shows. There are a number of people who have found his help and guidance invaluable. Bill, being a very practical man, had his own views and theories of breeding and raising fishes and was well known for his success with mollies. A hobbyist in the true sense, he put much more in the hobby than he ever took out. Many newcomers to the hobby sought advice from him, which he gave freely and never let them leave his fish house without a gift of fishes or plants. He will be sadly missed by all fish-keepers.

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A CONSIDERABLE increase in membership was reported at the annual meeting of **Derwent Aquarist Club** at Derby in March. The chairman (Mr. S. Yeomans) said the committee's decision last year to bring some of the best-known speakers on aquatic subjects to the town and give free admission to anyone interested in fish-keeping and breeding had been fully justified. Speakers included Dr. F. N. Ghadially, Mr. T. L. Dodge and Mr. W. Harold Cotton, and still to come was Dr. C. W. D. Cole of Birmingham. Mr. Cotton had been booked for a return visit in September.

The treasurer (Mr. T. Swinburn) reported a substantial balance in hand, despite increased expenses.

The following were re-elected: Chairman, Mr. S. Yeomans; treasurer, Mr. T. Swinburn; librarian, Mr. W. Gwynn; secretary, Mr. H. P. Finch, 6, Sale Street, Derby, with Mr. A. Addey as assistant secretary and show secretary. The committee was also re-elected, with Mr. D. R. Gates in place of Mr. K. Steele, who resigned. Auditors, Messrs. F. Reader and B. Radford. Later Mr. Gordon Bellis, president of Derby Philatelic Society, gave a display and talk on "Fishes on Stamps".

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RECENTLY an inter-club show was held between Freelance and the Clapham Aquarists Societies at the first-named society's headquarters. The classes were livebearers, barbs and labyrinths, the show being won by the Freelance A.S. In addition the Freelance A.S. held their home furnished tank competition on the 12th March the result being as follows: 1, E. R. Keep; 2, V. Keep; 3, M. Thomas.

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A VERY interesting talk on "Marine Aquaria" was given recently at a meeting of the **Hounslow and District A.S.** by Mr. England. He illustrated his talk with some wonderful colour slides of sea life which included the culture of sea anemones of which the speaker has had much personal experience in this country and abroad. Mr. R. Luff of the Hounslow society has also given a talk on the various types of "Platys" and gave some useful hints on the breeding of these handsome fishes. At a table show for labyrinth fishes Mr. Scurry was the winner with a dwarf gourami, 89 points, 2, Mr. Howarth, lace gourami, 88 points, and 3, Mr. Schofield, also a lace gourami, 85 points. The society now meets fortnightly at 20, Heath Road, Hounslow, Middx.

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AT the last meeting of the **Chester and District A.S.** a copy of the new edition of the *Manual of Aquarium Plants* published by Shirley Aquatics Ltd., was examined and discussed. Appropriate to this discussion was the report from a member of the first known experience of *Cryptocoryne* disease.

The four-foot aquarium had been established for just over two years and contained species *Cryptocoryne affinis, Nevillii, Beckettii, Willisii, undulata, Blassii, Griffithii, ciliata, lutea, cordata* and *retrospiralis*. All species were growing and many were multiplying.

Within a week of the introduction of a specimen of *Nurii* which had been carefully immersed in a deep pink solution of permanganate of potash for fifteen minutes before planting, all but the *affinis* had been reduced to the root-stock. In every case leaves became glassy in patches and then disintegrated. Only one reference to the disease could be found and that was a brief mention of it in the *Dictionary of Tropical Fishes* by Hans Frey. Any information on the subject would be welcomed. Please write to the secretary, Mr. P. B. Millington, 129, Appleyards Lane, Chester.

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THE following officials were elected at the annual general meeting of the **Wigan and District A.S.**: Chairman, Mr. T. Whalley (re-election); secretary and treasurer, Mrs. L. J. Frazer (re-election); committee, Messrs. T. Travis, S. Dempsey, L. A. Bamber, K. Regan, R. Boulton; librarian, Mr. K. Regan; show secretary, Mr. J. Wilkinson. The annual subscription was retained at 10s. 6d. for adults and 5s. 6d. for children. Meetings will, for the time being, be held at the Vine Inn, Caroline Street, Wigan, the dates of the next two meetings being the 23rd April and the 21st May.

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AT the March meeting of the **Leeds and District A.S.** an enjoyable evening was spent when members watched a slide show given by Mr. Sam Hunt of Grotto Aquaria, Sunderland. Mr. Hunt called his show "The Wanderings of an Itinerant Aquarist" and the slides were of fish at various shows and public aquaria around the country. The results of the table show held were: Barbs: 1, Mr. I. Hunt; 2 and 3, Mr. R. Hampson. Carps and minnows: 1, Mr. I. Hunt; 2, Mr. R. Hampson; 3, Mr. Jackson. The novice prize was won by Mr. N. Twist.

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THE **Bracknell A.S.** are holding the tenth Three Counties Show at the Victoria Hall, Bracknell, all entries welcome. There will be events for club furnished aquaria as well as individual aquaria, also a class for miniature furnished aquaria set up in standard 4 in. jars. This last item should prove a real challenge to furnished aquaria specialists. Requests for schedules to Mr. K. Phillip, 40, Pondmoor Road, Bracknell, Berks.

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THE **Warrington A.S.** has recently been reformed. Meetings are held on the second Tuesday of each month at the Liberal Club, Bewsey Street, Warrington.

At the first annual general meeting the following officers were elected: President, Mr. A. Higham; chairman, Mr. A. Cameron; secretary, Mr. J. Higham; treasurer, Mr. R. Nadin. New members are welcome, and are invited to contact the secretary, Mr. J. W. Higham, 42, Hood Lane, Sankey, Warrington.

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PRESIDING at the annual meeting of the **Regent A.S.** at Derby, the president (Mr. H. P. Finch) referred to the outstanding event of 1963, the highly successful first open table show organised by the society which attracted approximately 300 entries from a very wide area. The second open show on the same lines will be held on Sunday, 19th April, and aquarists from all parts of the country will be welcome. Officers elected at the meeting were: Chairman, Mr. P. Hanks; vice-chairman, Mrs. A. Turner; secretary, Mr. C. E. Everett, 21, Beverley Street, Wilmorton, Derby; treasurer, Mr. J. Darbyshire; librarian, Mr. J. Burrell; committee, Mrs. W. Gould, Messrs. T. Jerram, S. Tainton, D. Maddocks, M. Wright and J. Jones.

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THE use of sedatives by importers to allow larger consignments of tropical fish from overseas was deplored by Mr. W. Harold Cotton, F.R.M.S., F.R.H.S., the well-known consulting aquarist of Birmingham, when he addressed a recent meeting of the **Derwent Aquarist Club** at Derby. All too often, he said, it was the retailer or his customer who had to suffer any ill effects of the "dope". In reply to a question, Mr. Cotton said it was impossible for the customer to tell whether a fish had been "doped" or not.

Speaking of the many new species of fish imported nowadays, Mr. Cotton said difficulties sometimes arose because it was often impossible to find out the kind of water in which the fish had its habitat; the water in which it was imported was no guide. An enthusiastic meeting, over which the Chairman of the Club (Mr. S. Yeomans) presided, resulted in several new members. Mr. H. P. Finch, honorary life member of the Club, thanked Mr. Cotton, who has been booked for a return visit in September.

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THE first steps were taken in a new venture at the last annual general meeting of the **Wolverhampton and District A.S.** In future the title of the society will be the Wolverhampton Aquarists' Study Group. The aims of the group will be to impart to beginners the rudiments of tropical fish keeping and at the same time to cater for the more experienced aquarist. The study group proposes to study every known tropical fish in detail, including sex differences, conditioning of fishes, water conditions (pH, hardness etc.), colour variations classification, temperamental oddities, feeding, diseases and cures. The group also intends to study the propagation of species of fishes that are difficult or have not previously been bred in an aquarium. To achieve this purpose it is intended that discussions be held at each meeting with a leader experienced in the subject who will give his points of view. The members present will then discuss the points raised by the leader or any other conclusions brought out in the general

discussion. Many members who will attend these meetings have over 30 years experience of keeping and breeding tropical fishes although the beginner will also be cordially welcomed and encouraged to bring forward his queries and difficulties.

Colour slides, which are now in the process of production, will be used to illustrate the steps in spawning procedure of the more unusual types of fishes. These slides will also be used in the classification of species for the benefit of those not conversant with them. Other activities of the group will be competitive table shows between members, visits to leading fish farms, social evenings, etc. Meetings will be held on the third Monday in each month at the Mitre Hotel, Cleveland Street, Wolverhampton, at 8 p.m., and further information can be obtained from the group secretary, Mr. F. Bolton, 22, Arnhem Road, Willenhall, Staffs.

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THE **Reading and District A.S.** held its annual general meeting recently when a new secretary was elected, Mr. P. Merritt, 46, Prospect Street, Caversham, Reading.

The chairman reported a very successful year in which several new members were welcomed. Extra interest was imparted through the Three Counties Show, which was staged in Reading, and proved an outstanding success.

The treasurer's report was given and a very healthy balance sheet was adopted. The society is having a dinner and dance at the Grosvenor Hotel, Caversham shortly.

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THE **Friends A.S.** second open show will be held at Brockwell Hall, Effra Parade, Brixton, on 23rd May. Show schedules and details can be obtained from Mr. J. Horne, show manager, 93, Bedwardine Road, Crystal Palace, S.E.19.

The society meet every Friday at Brockwell Hall, Effra Parade, at 8 p.m., when old and new friends are welcomed.

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AT the annual general meeting of the **North Warwickshire A.S.** the elected officers were: President, Mr. Geo. Griffiths; chairman, Mr. S. Swadling; vice-chairman, Mr. D. Bennet; hon. treasurer, Mr. R. Sutton; hon. secretary, Mr. L. W. Male; committee, Mrs. M. Orton, Messrs. K. Jones, R. Brigham, A. Skinner.

General meetings are held on the last Wednesday of each month at the Settlement, Kingstanding Road, Kingstanding, Birmingham, 22C, when all visitors are made welcome.

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THE **Morecambe and District A.S.** had a busy and enjoyable March meeting. Highlight of the meeting was a slide show and talk by Mr. K. Denham, curator of "Marineland" (Morecambe) on his adventures in the Orkney Islands, studying seals, and procuring specimens for the London Zoo and Marineland.

After the slides, the society held a bring and buy sale of fish and aquarium items. The sale was followed by a plant show, judged by Mr. K. Denham. Prizes were awarded as follows: 1, Mr. F. Aveyard, Morecambe, with an arrowhead; 2, Mrs. Smith, Morecambe, with a *Cryptocoryne* variety; 3, Mr. J. Dallish, Lancaster, with *Cabomba*.

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THE **Staithes and District A.S.** held their first annual general meeting recently, the chair being occupied by the president, Mr. J. H. Hurst. The meeting was well attended and three new members were enrolled. The hon. secretary, Mrs. E. M. Smith, gave a report of the club's activities and successes at open shows during the year 1963, particularly the Don Valley shows, where the coldwater section took first, second and third prizes, and the Bradford Show in which Mrs. B. Brunt was awarded the "Best Fish in Show" prize. The balance sheet showed the society to be in a sound financial position and augurs well for the 1964 season. Plans are well in hand to hold an open show in the Memorial Hall, Staithes, on Sunday, 17th May (Whit Sunday) at which there will be a special section for residents who are not members of an aquarist society, to show their finny pets. For various reasons some of the committee were unable to stand for re-election, and the committee is now composed as follows: President, Mr. J. H. Hurst; chairman, Mr. A. Potter; hon. sec., Mrs. E. M. Smith; treasurer, Mr. Hammond and members, Mrs. Whiteley, Mr. J. Unthank and Mr. M. Brignall. The monthly table shows resulted as follows: Championship Trophy (tropical), Mrs. E. M. Smith; six-month plaque, Mrs. B. Brunt. Championship Trophy (coldwater), Mrs. L. Hurst; six-month plaque, Mrs. L. Hurst.

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THE **Midland Association of Aquarists Societies** third annual convention and open show is being held on Saturday, the 23rd May, at the Dunlop Sports and Social Club, Erdington, Birmingham, by kind invitation of Fort Dunlop A.S. and the Dunlop Rubber Company. There are twelve classes and the F.G.B.S. are also staging twelve sections. The show secretary is Mr. A. McDonald, 36, Ennerdale Road, Coleshill, Sutton Coldfield, Warks.

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INCREASED attendances monthly are reported from **Bradford and District A.S.** Recent speakers have been Mr. Hemingway on characins and Mr. A. Whitfield on "Electricity". The last table show resulted in a win for Mr. G. Holmes, second being Mr. J. R. Smith and third Mr. H. Fletcher. Leading positions in the 1964 competition are as follow: 1, Mr. H. Fletcher, 13 pts.; 2, Mr. J. R. Smith, 7 pts.; 3, Mr. G. Holmes and Mr. J. Holmes, 6 pts.; 4, Mr. P. Moorhouse, 5 pts.; 5, Mr. A. W. Cripps, 4 pts.

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IN the final contest for the **North West London Group Shield** the result was a tie between Willesden and Riverside with 138 pts. The other positions were: third, Independent, 61 pts.; Hampstead and Hendon joint fourth with 44 points. The host club was the Independent Aquarist Society and among those present were the Mayor and Mayoress of Islington and Councillor G. Barnard and his wife Gwendoline. The results were as follow: Angels class: 1 and 4, Mr. Oliver (Hendon); 2 and 3, Mr. Williams (Willesden). Fighters class: 1 and 3, Mr. Kettle (Independents); 2, Mr. Morrice (Hendon); 4, Mr. Haynes (Hendon). A.O.V. livebearers class (challenge class): 1 and 3, Mr. Briggs (Riverside); 2, Miss Kettle (Independents); 4, Mr. Stone (Riverside). Danios, W.C.M.M. and rasboras class: 1 and 4, Mr. Briggs (Riverside); 2, Mr. Tie (Independents); 3, Mrs. I. Brown (Willesden). Best fish in the show award was won by Mr. Briggs of Riverside.

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RESULTS of the **Burnley Aquarist and Zoological Society** show were as follow: Swordtails: 1, Mr. J. Ashworth (Osram); 2, Mr. Mierscoff (Accrington); 3, Mr. Ashton (Nelson). Platys: 1, Mr. Crook (Blackpool); 2, Mr. Singleton (Nelson); 3, Mr. Slater (Barnoldswick). Mollies: 1, Mr. Edmondson (Nelson); 2, Mr. Walker (Oldham); 3, Mr. Fletcher (Bradford). Guppies: 1, Mr. Eden (Barnoldswick); 2, Mr. Edmondson (Nelson); 3, Mr. Roberts (Lancs. Breeders). Male fighters: 1, Mr. Holdsworth (Bradford); 2, Mr. Crook (Blackpool); 3, Mr. Hunt (Newcastle-on-Tyne). Female fighters: 1, Mr. Davies (Derby); 2, Mr. Scott (Nelson); 3, Mr. Fibiger (Derby). Dwarf gouramis: 1, Mr. Gorton (Accrington); 2, Mr. Wilshaw (Lancs. Breeders); 3, Mr. Hampson (Ayrebourgh). A.O.V. gouramis: 1, Mr. Wilky (Stretford); 2, Mr. Hughs (Belle Vue); 3, Mr. Petty (Barnoldswick). Small barbs: 1, Mrs. Crick (Nelson); 2, Mr. Hodgetts (Accrington); 3, Mr. Helm (Nelson). Large barbs: 1, Mr. Hunt (Newcastle-on-Tyne); 2 and 3, Mr. Davies (Derby). Sharks, labios: 1, Mr. Collins (Osram); 2, Mr. Hampson (Ayebough); 3, Mrs. Crick (Nelson). Small characins: 1, Miss Bowden (Nelson); 2, Mr. M. Fibiger (Derby); 3, Mr. G. Thomas (Burnley). Large characins: 1, Mr. Pillinger (Merseyside); 2, Mr. Collins (Osram); 3, Mr. Poole (Merseyside). Angels: 1, Mr. Wood (Halifax); 2, Mr. Mirrscoff (Accrington); 3, Mr. Singleton (Nelson). Dwarf cichlids: 1, Mr. Richards (Nelson); 2, Mr. Davies (Derby); 3, Mr. Wilkinson (Halifax). Large cichlids: 1 and 2, Mr. Hunt (Newcastle-on-Tyne). Catfish: 1, Mrs. Crick (Nelson); 2, Mr. Hodgetts (Accrington); 3, Mr. Burkett (Barnoldswick). Loaches: 1, Mr. Moss (Leeds); 2, Mr. Barker (Lancs. Breeders); 3, Mr. Talbot (Lancs. Breeders). Danios: 1, Mr. Cunningham (Burnley); 2, Miss Bowden (Nelson); 3, Mr. Fibiger (Derby). Rasboras: 1, Mrs. Crick (Nelson); 2, Mr. Mulla (Merseyside); 3, Mr. Cunningham (Burnley). A.O.V. single fish: 1, Mr. Hunt (Newcastle-on-Tyne); 2 and 3, Mr. Davies (Derby). Pairs livebearers: 1, Mr. Murgetroyd (Halifax); 2, Mr. Fletcher (Bradford); 3, Mr. Watkinson (Lancs. Breeders). Pairs egglayers: 1, Mr. Davies (Derby); 2, Mr. Watts (Ayebrough); 3, Mr. Fletcher (Bradford). Breeders (livebearers): 1 and 2, Mr. G. Thomas (Burnley); 3, Mr. Barker (Lancs. Breeders). Breeders (egglayers): 1, Mr. Ingham (Accrington); 2, Mr. Turner (Ashton); 3, Mr. Davies (Derby). Coldwater: 1, Mr. Holmes (Bradford); 2 and 3, Mr. Isherwood (Accrington). Specials for class winners: Class 1, Mr. Edmondson (Nelson), molly; Class 2, Mr. Gorton (Accrington), dwarf gourami; Class 3, Mr. Collins (Osram), red-tail shark; Class 4, Mr. Pillinger (Merseyside), piranha; Class 5, Mr. Wood (Halifax), angel; Class 6, Mrs. Crick (Nelson), catfish; Class 7, Mrs. Crick (Nelson), rasbora; Class 8, Mr. Hunt (Newcastle), elephant fish; Class 9, Mr. Murgetroyd (Halifax), black swords; Class 10, Mr. Davies (Derby), pairs egglayers; Class 11, Mr. Ingham (Accrington), emp. tetra. Best in show: Mr. Pillinger (Merseyside), piranha.

Placings of exhibiting clubs: Nelson, 41 pts.; Accrington, 25 pts.; Derby, 23 pts.; Merseyside, 15 pts.; Newcastle-on-Tyne, 15 pts.; Halifax, 15 pts.; Osram, 12 pts.; Burnley, 10 pts.; Bradford, 10 pts.; Lancs. Breeders, 8 pts.; Barnoldswick, 6 pts.; Blackpool, 5 pts.; Ayrebrough, 5 pts.; Stretford, 3 pts.; Leeds, 3 pts.; Belle Vue, 2 pts.; Ashton, 2 pts.; Oldham, 2 pts.

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NEW officers elected by **Oldham A.S.** were as follow: Chairman, Mr. A. Worswick; treasurer, Mrs. E. G. Brunt; secretary, Mr. C. Walker, 95, Springwood Hall Road, Fitton Hill, Oldham, Lancs.; show secretary, Mr. E. Coope; committee, Mr. C. Holroyd, Mr. T. Greenwood, Mr. E. Tweedy.

On the 7th June an open show will be held at 133, Yorkshire Street, Oldham.

* * *

THE **Keighley and District A.S.** has now been re-formed and it is hoping to partake in all local shows and competitions, and also hold similar competitions themselves. They would be extremely grateful for any local support at these shows, and also at the monthly meetings. The Secretary is Mr. E. Hanson, 8, Paget Street, Keighley, Yorks.

Crossword Solution

T	A	B	L	E	S	H	O	W	■	A	C	A	R	A
I	■	A	■	M	■	A	■	I	■	N	■	C	■	N
B	A	R	B	U	S	T	E	T	R	A	Z	O	N	A
E	■	B	■	S	■	C	■	N	■	L	■	R	■	C
T	O	U	R	■	S	H	E	E	N	■	B	U	S	H
■	■	S	■	R	■	E	■	S	■	B	■	S	■	A
P	A	S	S	O	U	T	■	S	P	O	N	G	E	R
O	■	C	■	B	■	■	■	■	■	A	■	R	■	I
S	C	H	O	O	L	S	■	T	H	R	E	A	D	S
S	■	U	■	T	■	T	■	H	■	D	■	M	■	■
E	L	B	A	■	T	I	A	R	A	■	L	I	M	B
T	■	E	■	O	■	R	■	U	■	F	■	N	■	A
C	O	R	Y	D	O	R	A	S	A	E	N	E	U	S
U	■	T	■	D	■	E	■	T	■	R	■	U	■	I
P	A	I	R	S	■	R	I	S	I	N	G	S	U	N

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30×15×12 in.	£15 0 0
36×15×12 in.	£16 0 0
48×15×10 in.	£22 10 0

FLAT FRONTED BOOKCASE SETS

36×15×12 in.	£15 10 0
48×15×12 in.	£21 0 0

TWO TIER STANDS

18×10×36 in.	£1 17 6
18×12×36 in.	£2 2 6
24×12×36 in.	£2 7 6
30×12×36 in.	£2 15 0
30×15×36 in.	£3 2 6
36½×12×36 in.	£3 5 0
36½×15×36 in.	£3 10 0
48×12×36 in.	£4 5 0
48×15×36 in.	£5 0 0

VICTOR ALL OVER SHADES

18×10 in. ..	£1 2 6
18×12 in. ..	£1 5 0
24×12 in. ..	£1 7 6
30×12 in. ..	£1 12 6
30×15 in. ..	£1 17 6
36½×12 in. ..	£2 0 0
36½×15 in. ..	£2 5 0
48×12 in. ..	£2 12 6
48×15 in. ..	£3 2 6

ARBE PLASTIC AQUARIUMS

Bow fronted

18×12×11 in.	£8 5 0
23×12×11 in.	£9 17 6
24×15×12 in.	£12 17 6
36×12×14 in.	£16 19 0
36×15×14 in.	£22 10 0

Corner Aquaria

36×15 in.	£21 0 0

3-D BACKGROUNDS

For 16 in. and 18 in. tanks ..	20/6
For 24×12 in. and 24×15 in. tanks	34/-
For 30 in. and 36 in. tanks ..	62/-

PERMA GRAVEL

Multicolour, Green, Black, Yellow, Blue, Red, Orange, Lilac, White. 4/6 per 2 lb. bag, plus p. and p. 2/3

WHITEWORM CULTURE

Small 3 0 Large 5 0

PISTON PUMPS

Hyflo Jnr. ..	£5 7 6
Hyflo "A" ..	£6 10 0
Hyflo "B" ..	£8 5 0
Hyflo "C" ..	£12 10 0
Stokes Gdn. Fnt.	£7 19 6
Float Assembly ..	£1 10 0
Dymax Mk I ..	£9 0 0
Dymax Mk II ..	£9 5 0
Otter with fountain or waterfall kit	£8 8 0

AIR PUMPS

Summit	£1 1 0
Model "D" ..	£3 3 0
Super Summit	£1 5 0
Montrose Minor	£1 1 0
Montrose Major	£1 4 0
Quiko Pump ..	£1 2 0
Airstream ..	£1 7 6
Fairy Pump ..	£1 5 0
German Minor ..	£1 10 0
Star	£1 17 6
Jnr. Zoobeko ..	£1 17 6
Zoobeko ..	£2 6 0
Silenta	£2 15 0
Biko (twin outlet)	£4 15 0
Rena	£2 2 0
Jeto	£1 0 0
Jeto The Silent ..	£1 19 6
Jeto (twin outlet)	£2 19 6

AIR PUMP ACCESSORIES

Tubing clamps ..	1 0
T-pieces	10
3-way pieces ..	1 0
Small oblong diffuser stone	1 3
Stone with 12 in. stem	1 8
Square diffuser stone	1 6
Square diffuser stone with stem ..	1 10
Diffuser stems 12 in.	5
15 in.	6
24 in.	10
P.V.C. flexible non-toxic air tubing per ft.	3
Rubber air tubing per ft.	3
P.V.C. air tubing 60 ft. coil	7 6
Hyflo regulator valve	4 0
Hykro gang valves ..	3 6
Air Line Valves ..	3 6

AIR PUMP SPARE PARTS

Fairy Diaphragms ..	1 3
Fairy Air Chambers	1 9
Prockter Diaphragms	1 6
Airstream Diaphragms	1 0
Zoobeko Diaphragms	2 6
Biko Diaphragms ..	2 6
Silenta	2 6
Montrose	1 6
Hyflo spare piston sets, old and new models .. from	22 6
Rena Diaphragms 2 for	4 0
Summit Diaphragms	6d.

RUBBER SUCKERS

Knob type	3
Shank type	4
Double sided ..	4

FILTERS

Windmill Premier Biological Filters (S) 18×10 in. ..	12 6
(L) 24×12 in. ..	15 0
Windmill Regent ..	10 0
Windmill Consort ..	19 6
Internal Corner ..	4 6
Growell Bottom ..	8 3
Hykro Jnr. Bottom	5 0
Hykro De Luxe ..	13 6
Michael's Undergravel	8 6
Slim Jim External ..	17 6
Klear King External	22 6
Ornamental Rock ..	17 6

FILTRATION ACCESSORIES

Brosiam Glass Wool	1 6
Brosiam Activated Carbon	2 0
Jaynor spun glass ..	1 6
Jaynor filter carbon	1 6
Datam glass wool ..	1 6
Datam glass silk ..	1 6
Datam filter carbon	1 9
Datam Aq. peat ..	1 3
Nylon filter medium	1 6
Sterasyl	5 3

CLEANING EQUIPMENT

Windmill Air Rejector	10 0
Windmill Hand Rejector	15 0
Aqua Vac Standard (Battery)	46 8
Aqua Vac Super (Battery)	56 8
Spare bags 5 for ..	4 0
Swirlaway (Battery)	46 8
Swirlaway Super (Battery)	56 8
Windmill Hand Rejector spare bags ..	1 6
Windmill Air Rejector spare bags ..	1 6
Windmill Hand Rejector spare bulb ..	2 6
Windmill Rubber Algae Scraper ..	3 6
Windmill Blade Algae Scrapers	3 0
Aluminium Algae Scraper	2 0
Hykro 3-in-1 scraper	3 0
Windmill Automatic Syphon	4 6
Windmill Fishtail Syphon	2 0
Rubber tubing for syphon per ft.	6
Windmill Dip Tube 15 in.	3 6
Hykro take-apart sediment remover 12 in.	3 9
15 in.	4 0
Secca Tongs	6 0
Planting Sticks ..	1 9

HEATER HOLDERS

Windmill Heater Holder	1 6
K.T. Heater Bracket	2 0
Uno Uni-clip Heavy Moulded Plastics ..	1 6
Spare Knob Suckers for heater holders	3

NETS

Round Nylon nets: 3 in. 9 4 in.	1 3
Green cotton nets: 3×2 1 0 5×6	2 0
3×4 1 6 6×7	2 6
4×5 1 9 7×9	3 9
Breeders short wooden handles: 6×9	3 9
Comet Nylon nets: 3×4 2 0 5×6	3 0
4×5 2 6 4×6	3 6
Brine Shrimp or Daphnia nets 3×2 1 0 4×5	1 9
3×4 1 6 5×6	2 0
Wooden handles 6×9	3 9
American dacron nets: 3×2 2 6 6×5	4 6
4×3 3 0 9×7	7 0
5×4 3 6 with plastic covered handles.	

BREEDING TRAPS

Windmill combined breeding and rearing	15 0
Hykro 3-in-1 ..	7 0
Reliant 3-in-1 ..	15 0
Growel 5-way American	28 6
Hykro fish breeders, fine and coarse ..	6 6

AQUAMASTIC

1 lb. tin 2/3 plus p. & p. 2/–
2 lb. tin 3/9 plus p. & p. 2/3
4 lb. tin 6/– plus p. & p. 2/9
7 lb. tin 9/6 plus p. & p. 3/6
14 lb. tin 17/6 plus p. & p. 5/–

DUROGNOST

Water hardness testing kit 14/6 and 17/6
Spare tablets Pkts. of 10 Strength N.1 or N.5 Indicators each 2/- 6/-

COLORMETER P8

Ph. testing kit .. 37 6

MISCELLANEOUS

Hykro Aqua Sealer	2 0
Hykro Leak Stopper	2 0
Aquastop	2 6

OTHER FISH FOODS

Flakes	3 0
Wheat Germ Flakes ..	1 3
Shrimp Meat, Medium	2 3
.. .. .. Small	1 3
Turtle Food, Large	2 3
.. .. .. small	2 3
Infusoria Powder ..	3 6
Infusoria Tablets ..	2 6
Conditioning Goldfish Food Large	2 0
Conditioning Goldfish Natural, Large ..	1 3
Glow Tablets (30 tabs.)	3 6
Pool Fish Food, 8 oz.	8 0
Treat Packs (7 different foods)	8 0
Liquid small fry Livebearers	2 6
Baby Food Egglayers	2 6
Brine Shrimp Packs ..	7 6

POSTAL CHARGES

Aquariums, Stands, Gravel, Mastic and Rockwork at owners' risk. Carriage at cost invoiced after despatch.
1/- for orders up to 10/-; 2/- up to 20/-; 2/6 up to 40/-; 3/- up to 60/-

HARD COVER AQUATIC BOOKS

Illustrated Dictionary of Tropical Fishes (Frey)	65 0
Encyclopedia of Tropical Fish (Axelrod)	63 0
Exotic Aquarium Fishes (Innes)	84 0
Diseases of Fishes (Duijn)	14 6
Tropical Fish as a Hobby (Axelrod)	25 0
How to keep and breed Tropical Fish (Dr. Emmens)	39 0
Saltwater Aquarium Fishes (Axelrod)	63 0
Complete Guide to Tropical Fishes (Schneider)	70 0
All About Tropical Fish (McInerny)	75 0
Color Guide to Tropical Fish (Axelrod)	45 0
Fishes in Colour (Gwynne Vevers)	12 0
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Exotic Tropical Fishes (Bound Cover)	150 0
Freshwater Fishes of the World	70 0
A Manual of Aquatic Plants (Roe)	27 6
Tropical Fish in Your Home	12 6
Tropical Aquaria for Beginners	12 6
Under the Sea (Burton)	25 0
The Junior Tropical Fish Book	9 6

SOFT COVER BOOKS

Tropical Fish (T.F.H. Pubs.)	15 0
Electricity in the Aquarium (Warburton)	7 6
A Manual of Aquatic Plants (Roe)	17 6
Starting Right with Tropical Fish (Gannon)	6 0
Starting Right with Goldfish (Gannon)	6 0
All About Breeding Tropical Fish (Schneider)	6 0
All About Guppies (Axelrod & Whitern)	6 0
Garden Pools (Paul Staton)	6 0
Diseases (Rolf Geisler)	6 0
How to Keep and Breed Tropical Fish (Dr. Emmens)	32 6
All About Aquariums	12 0
The Educational Aquarium	9 0
Your Terrarium	6 0
Playful Turtles	3 0

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Tropical Fish Guide
Beautiful Bettas
Tiny Tetras
Beautiful Goldfish
Saltwater Fish as Pets
Colourful Swordtails
Colourful Livebearers
Aquarium Water Chemistry
Colourful Egglayers
Tropical Fish Primer for Beginners
Hybrid Guppies
Colourful Tetras

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African Barbs
African Cichlids
Angel Fish
Aquarium Plants
Argentine Pearl Fish
Aquarist Repair Manual
Barbs
Beginning the Aquaria
Breeding Egglayers
Breeding Livebearers
Catfish
Cichlids
Danios
Decorate your Aquarium
Discus
Diseases of Tropical Fish
Dwarf Cichlids
Fancy Guppies
Goldfish as Pets
Gouramis
Guppies as Pets
Livebearers
Panchax Group
Pencil Fish
Platies as Pets
Rasboras
Seahorses
Siamese Fighting Fish
Swordtails
Snakes as Pets
Salamanders and Newts
Tetra No. 1
Tetra No. 2
Tropical Fish as Pets
Turtles as Pets
Frogs and Toads
Beginning the Terrarium

DITCHFIELD WONDER SERIES 9d. EACH

Garden Pool Construction
Tropical Fishkeeping
Goldfish
Popular Pets and Tortoises
Coldwater Aquarium
Stocking Garden Pools
Tropical Aquarium for Beginners

OTHER BOOKS

Land and Water Tortoise	2 0	Pond and Stream Life	2 0
Aquatic Insects	1 6	Garden Ponds	1 6
Tropical Fishes	2 6	First Steps and Aquarium Keeping	2 0
Live Foods	2 0	Hardy Reptiles	1 6
Marsh Gardens	1 6	The Goldfish	2 6

FRY FOODS

Brine Shrimp Eggs	1/6, 2/-, 7/6 and (½ pint) 60/-
Biol Plankton Culture	2/6 and 5/3
Infusyl	2 6
Brosiam Fry Grain	1 6
Liquifry—Egglayers (red), Livebearers (green)	2 6

FEEDING ACCESSORIES

Windmill Floating	1 6
Windmill Feedwell Dry Food Feeder	1 0
Windmill Feedwell Live worm feeder	1 6
Windmill Feedwell Live and dry feeder	2 0
Floating dry feeders	1 0
Floating worm and dry feeders	1 6
Hykro four-in-one feeders Small 1 9 Large	2 0
Uno bowl feeder	1 6
Uno stock on square	1 6
Floating dry feeder square	1 6
Es Es Micro Matt	8 0
Worms Alive Auto worm feeder	9 6

WARDLEYS FISH FOODS

Vitalizer mix (8 foods in one)	2 3
Supremix Conditioner (Fine, Med. Coarse)	1 3
" " " (large)	2 6
Superba Homogenised Micro Pelleted Food (Fine, Med., Coarse, Ex. Coarse)	8 0
Vitafare (Fine, Med., coarse)	2 3
Hi-Glow "30" Colourfood (Fine, Med., Coarse, Community)	4 6
Fry Fare Guppy Food Lge.	2 6
Molly Fare Large	2 6
Fancy Guppy Food Ex. Large	4 6
Guppy fare Small 1 3 Large	2 3
Dried Daphnia Small 1 3 Med.	2 3
Salmon Eggs Small 1 3 Large	2 3
Liver Meal Small 1 3 Large	2 3
Beef Meal Small 1 3 Large	2 3
Fish Meal Small 1 3 Large	2 3
Crab Meal Small 1 3 Large	2 3
Brine Shrimp Kit	8 6
Tri Pellets	4 0
Hi Protone	4 6
Brine Shrimp Pellets	4 6

TETRAMIN FISH FOODS

Tetramin Staple Foods for Tropicals.	
Size 1	1 10
" 2	3 0
" 3	6 6
" 4	22 6
" 5	70 0
Large Flake	6 6
Tetramin Staple Food in Tablet Form	3 0
" Conditioning Food	4 0
" Colour Pride	4 0
" Growth Food	4 0
" Guppy Food	4 0
" Marine Staple Food (for Marine fish)	4 6
Anamin Staple Food for Goldfish.	
Size 1	1 10
" 2	4 6
" 3	12 6
Suregrow Fry Food 1 0 & 2	0
Biol Plankton Culture	2 6

ELITE FISH FOODS

For Tropicals	2 0 & 4 6
For Goldfish	2 6

FISH FOODS

Brosiam Tropical Fish Food	1/6, 2/6, 10/-
Brosiam Bro-Vic	6d., 1/6
Brosiam Pond Fish Food	1 6
McLynns Tropical Fish Food	1/6, 2/6, 5/-, 6/6, 17/6
Suregrow	1/-, 1/6, 2/6
Datam Dried Daphnia	1/6
Datam Shrimp	6
Datam Ant Eggs	9
Datam Pond Fish Food	2 6
Exotic Flakes	1 6
Hykro Flakes	1 0
Hykro Natural Flakes	1 0
Hykro Shrimpmeal	1 0
Hykro Dried Flies	9
Coral Goldfish Food	6d., 2/-
Foodex No. 1	3/-, 12/-
Hobby Dish Food	2 0
Hobby Leaf green flakes	2/-, 7/-
Hobby Yolk Flakes	2/-, 7/-
Hobby Goldfish Eggs, Vitamin, etc.	2 6
Hobby Fish Food (Breeders Pack)	7 0

REMEDIES

Wardleys

Anti-Chlorine Crystals	2 3
White Spot Remedy	3 6
Vitamin Tablets	3 3
Anti-Chlorine Tablets	2 6
Treasure Chest Neutraliser	3 0
Turtle Block Neutraliser	3 0
Ph. Test Kit—	
Junior	7 6
Senior	16 6
Bromthymol Blue Ph. Indicator	4 0
Aquatic Tonic (general tonic and remedy)—	
1 fl. oz.	3 3
4 fl. oz.	10 0
Anti Chlorine Compound—	
1 fl. oz.	2 6
4 fl. oz.	8 0
Aquapurer (clears cloudy water)—	
1 fl. oz.	2 6
4 fl. oz.	8 0
Funfus remedy (colourless and stainless)—	
1 fl. oz.	3 3
4 fl. oz.	10 0
Sprout. Plant food	2/6, 8/-
Methylene Blue	4/-, 10/-
Germacin Combats Disease in Aquariums	4 0
Superchlor Removes Chlorine instantly	5 6
Al.G.Free Prevents Algae	8 0
Buffer Tablets. Maintains neutral water	6 6
Fungi Free. Two-way treatment for fungus infections	6 6

Tetracare
All at 4/- each

General Tonic. As a regular tonic in the Aquariums
Florapride. Aquarium plant and water softener.
Blackwater tonic. Reproduces natural tropical soft acid water conditions in Aquariums.
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Contra Ick. Cures White spot, shimmy and Costia.
Contra Chlorine. Neutralises chlorine contents of fresh tap water.
Meersalts, for making sea water for Marine Fish.
4 lb. bag makes 10 gals. 17/6 plus 2/6 p. & p.
2 lb. bag makes 5 gals. 9/6 plus 1/3 p. & p.

Brosiam

Tonic Salts	2 6	Fungus cure	2 0
White spot cure	2 0	Plant Fertiliser	1 6

Hykro Nutra Vitilisers	1 3
Claroc water rectifier	2 6
Claroc Tablets	1 0
Liquitox for Fungus and Fin rot	Small 1/9, large 6/9
Vivo Rejuvenating tablets	2 0
Datum Aquarium salt	1 3
Datam Velvet Cure	2 6
Coral Oxygen tablets	6
Suregrow Diseasolve	2/-, 6/-
Glasol (waterproofing cement for ponds)	5 gal. 4/6 1 gal. 7/-

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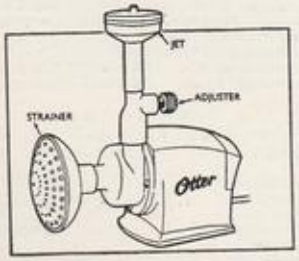

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