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

<table>
<thead>
<tr>
<th>Size</th>
<th>Frames</th>
<th>Aquariums</th>
</tr>
</thead>
<tbody>
<tr>
<td>24 x 15 x 12</td>
<td>£7.70</td>
<td>£9.90</td>
</tr>
<tr>
<td>30 x 15 x 12</td>
<td>£9.00</td>
<td>£11.10</td>
</tr>
<tr>
<td>36 x 15 x 12</td>
<td>£10.50</td>
<td>£13.13</td>
</tr>
</tbody>
</table>

DISTRIBUTOR OF—
- MCLYNN'S FISH FOOD
- ES-ES PRODUCTS
- ELECTRICAL AND GENERAL
- WATER LIFE, AQUARIST, DITCHFIELD'S AND
- T.F.H. BOOKLETS
- REJECTORS, SEDIMENT, AND MAINTENANCE
- EQUIPMENT
- PROCKTER, SUMMIT, STAR AND FAIRY
- PUMPS
- CONSTANT THERMOSTATS
- AQUAFERN AND COLORFERN PRODUCTS
- HYFLO PRODUCTS
- LIVERINE PRODUCTS
- STOKES FOUNTAINS
- WINDMILL PRODUCTS
- ROCK, GRAVEL, AND STRATA ROCK WORK
- STUDENTS' MICROSCOPES
- ALL FEEDING AND AERATING APPLIANCES
- MERCURY, SPIRIT AND DUMFY THERMO-
- METERS
- STUART TURNER WATER PUMPS
- ZOOLIKE AND BIKO PUMPS
- VI-FIT FISH FOOD
- BLACK MAGIC GLAZING COMPOUND
- GLASTICON ‘303’ AQUARIUM SEALER
- AQUAMASTA GLAZING COMPOUND
- LIQUIFAY AND INTER-PET PRODUCTS

Angle Iron Aquariums, Frames and Stand's a specialty.
Dispatched in crates charged as 30/- each, returnable
half carriage paid. Odd sizes made to order, painted
any colour, guaranteed square and free from welds.
Stoves enameled Corner Bowls, Bow Fronts and
Wrought Iron Units.

Send S.A.E. for 20 Page Price List

WALTER R. SMITH
39 Tib Street and 16 Whittle Street
Manchester 4

Telephone: Deansgate 3961 and 1510

YOU ARE INVITED TO SEE AN
EXHIBITION
OF TROPICAL FISH
IN OUR NEW M & R. AQUARIUM

Over 150 varieties including 15 Marine Tropicals on show and for
sale. We are direct importers of tropical fish. Discover your
tank with 2,000 year old wood—stocked only by us. Fish for
personal shoppers only.

M. & R. (Dog-Fish) Ltd.
106 Paisley Road West, Glasgow G21

Telephone: 19/20 3961

Open Sundays 11 a.m.—1 p.m.

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

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

Ours is English food, and instead of boasting that
we give 1½ oz. (we don't shout about it) but put in
all our 4½ ozs. between 8 and 11 ozs. Some difference
between 1½ ozs. and 10 or 11 ozs. ‘Yes!

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

Please make R.O.s, payable to Mrs. Derham
33 QUEEN'S AVENUE, WATFORD, HERTS.
PHONE: WATFORD 21708

One can always get foods from me at ordinary retail
prices, post paid, if one wishes!
IT'S NEW!
IT'S DIFFERENT!
The Battery Operated 'GRO-WEL'

Swirl-Away

THE AQUA VACUUM CLEANER
THE IDEAL CHRISTMAS PRESENT!
Every Aquarist will want one!
Adjustable for tanks up to 24' deep.
Powered by torch batteries (not included in price).
Standard Model—Price 46.8d. inc. Purchase Tax.
Super Model with more powerful batteries 56.8d. inc.
Purchase Tax.
Boxes of 5 disposable bags Price 4/-

* Swirl-Away the dirt in your aquarium with this efficient aquarium vacuum cleaner!

INTER-PET SUPPLIES COMPANY
CHURCH STREET - DORKING - SURREY (Please write for details)

November, 1963
Always the usual — usually the unusual

- Imports from all parts of the world arrive here every week, where the fish are carefully quarantined and made fit for sale, when they are put on display and offered at reasonable prices.

- We cater for all branches of the hobby: Tropical fish fanciers, Fancy Coldwater goldfish fanciers, and Marine enthusiasts.

- Our quality fish find their way all over the Country by direct retail supplies to customers by rail, and large numbers being distributed to our wholesale customers.

"Bona Fide, and only Bona Fide, Traders supplied. Please apply for our latest wholesale list on headed note-paper, stating licence number & issuing authority."

Hours of Business — Weekdays: 10.00 a.m. — 1.00 p.m. 2.15 p.m. — 6.00 p.m. (8.00 p.m. closing Friday)

Saturdays: 9.00 a.m. — 6.00 p.m.

E.C. day Thursday
THERE'S A WATERTIGHT CASE FOR CHOOSING AN
‘Es-Es’
*CONTROL-O-MAT*
THERMOSTATIC HEATER

NO OTHER HEATER OFFERS SO MUCH—

- Key operated calibrated control (see below)
- Magnetic 'snap-action' Thermostat
- Neon on/off indicator
- Choice of four lengths 8", 10", 12" and 15"
- Wattages 75, 100, 150 and 200 AND
- IT'S LEAKPROOF

Prices: 75 to 150w 31/6d.
200w (15") 33/10d.

LEARN ALL ABOUT THE
‘CONTROL-O-MAT’ AND MANY OTHER
FINE PRODUCTS IN OUR LATEST 20 PAGE
‘BROCHURE AND HEATING GUIDE’...
send 6d. STAMP.
Get one now as your
CHRISTMAS SHOPPING GUIDE

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

November, 1963
T.F.H. suggestions for Christmas

"SALT-WATER AQUARIUM FISH"
by Dr. H. R. Axelrod and W. Verderwinkle

352 pages

Chapters on setting up your salt-water aquarium, water, feeding salt-water fishes, diseases, etc., numerous full colour illustrations

PRICE 65/-

"EXOTIC TROPICAL FISHES" (Four books in one)
A Guide to Aquarium Plants and their Cultivation. Exotic Tropical Fishes - Raising Tropical Fishes Commercially - Principles of Aquarium Management

Looseleaf Edition £7 10s.

"THE TROPICAL FISH HOBBYIST" 2/6 monthly or 34/- per annum, including postage

The magazine that brings you full colour illustrations, up to date reports and articles by international authorities every month. Average world sales exceed 90,000 monthly! Now with detachable Free Supplements to add to your looseleaf edition (see above) of "Exotic Tropical Fishes" every month.

UK Distributors: T.F.H. PUBLICATIONS (LONDON) LTD. 59 Station Road, Redhill, Surrey (Redhill 5866)
Testimonials prove that

IT PAYS TO BUY
WINDMILL
PRODUCTS

"WINDMILL" HAND REJECTOR AQUARIUM CLEANER
Complete with Hand Bellows
15/- each

"WINDMILL" AIR REJECTOR CLEANER
will work connected to any make of Aerator
10/- each

"WINDMILL" BREEDING TRAPS
Beautifully Designed and Constructed
15/- each

RETAIL ENQUIRIES FROM ALL LEADING WHOLESALERS

Tried, Proven and Tested
THE ORIGINAL
PREMIER BIOLOGICAL FILTER.

It is unique. It is reliable. It is unseen
It is nature's own method of filtration
It is permanent. It needs no attention

They are saying . . . .

1. BETTER CIRCULATION. The Premier Biological Filter collects water from the bottom and recirculates it, thus preventing cold spots—In tanks fitted with this filter fry will even feed at gravel level.

2. HEAT ECONOMY—The action of the Premier Biological Filter gives a continuous circulation of heat and thus provides the desired temperature evenly throughout the aquarium, saving of current costs is noticeable.

3. PLANT GROWTH—in tanks fitted with the Premier Biological Filter plant growth has been more healthy—plant roots do not rot away.

4. WATER CLARITY—tanks are kept suspension free, always crystal clear water. The Premier Biological Filter continually filters and purifies the water.

5. NO MESS—filter mediums are not required for use with The Premier Biological Filter, saving need for replacement, provides a cleaner job and saves money spent on filter mediums. Completely eliminates need for syphoning and prevents black gravel, dispose of sediment where it settles.

6. NEATNESS. The Premier Biological Filter is fitted underneath the gravel, only the air lift is visible. Can be worked by even the smallest of vibration aerators. Once installed can be left for years—will not clog up. Suitable for both cold water and tropical aquariums.

Made for 18" tanks at 12/- each, 24" tanks at 15/- each
Other size tanks see fitting chart of filter box

Pamphlet willingly sent on receipt of 3d postage

WINDMILL PRODUCTS
244 VAUXHALL BRIDGE ROAD, LONDON, S.W.1
Telephone: Victoria 5179

November, 1963
THE FABULOUS TROPICAL FISH FOODS

TETRA MIN GROWTH FOOD promotes rapid growth in young tropical fish.
4/- per tin.

TETRA MIN STAPLE FOOD
has been used by world famous Guppy breeder Paul Hahnel for the past 8 years.
4/- per tin.

TETRA MIN GUPPY FOOD
has been used by world famous Guppy breeder Paul Hahnel for the past 8 years.

TETRA MIN CONDITIONING FOOD
promotes good condition, vitality and health in breeding pairs.
4/- per tin.

TETRA MIN COLORPRIDE
promotes colour and spawning condition of tropical fish.
4/- per tin.

From your local dealer or direct:
TETRACRAFT LTD., Barclay’s Bank Chambers, Grand Parade, Harringay, London, N.4

THE AQUARIST
NEW from Inter-Pet

INTER-PET AQUA-FURNISHING

Fibre glass reproduction rocks for the aquarium.

- Very realistic!
- Light in weight!
- Guaranteed non-toxic!
- Can be trimmed to give individual shapes for your aquarium!
- Westmorland Grey finish.

Corner Sets.
Large Set - 29½d.
Small Set - 27½d.

Single Rocks.
Small 3½d. Medium-small 4½d.
Medium-large 5½d. Large 8½d.

... and an established favourite —
THE INTER-PET SUPER SUBMERSIBLE COMBINED HEATER/THERMOSTAT

- Overcomes all previous objections to combined heater/thermostats.
- A unique combination of efficiency and functional neatness.
- Can be completely submerged. Therefore can be hidden behind rocks etc.
- Price only 29½d. 100 w., 125 w., 150 w.

Available through your dealer or post-free from

INTER-PET SUPPLIES COMPANY
SALES DIVISION OF THE LIQUIFY Co. LTD., 1A, CHURCH STREET, DORKING, SURREY.

November, 1963
RENA
— Quality Plus —

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

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

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

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

THE RENA
SUPER AIR PUMP

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

Sole Distributors to the Trade only
SOUTH COAST AQUATIC NURSERIES LIMITED
Old Bath Road, Colnbrook, Bucks.
Telephone: Colnbrook 2673-4
# Paramount Aquarium

**London's Leading Aquarist Store**

For the finest show of tropical fish and all the latest tanks and equipment.

Why not pay us a visit!

## Aerator Prices

<table>
<thead>
<tr>
<th>Model</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ex-Ex Junior</td>
<td>21/-</td>
</tr>
<tr>
<td>Ex-Ex Fairy</td>
<td>24/-</td>
</tr>
<tr>
<td>Ex-Ex Major</td>
<td>27/-</td>
</tr>
<tr>
<td>Ex-Ex model D</td>
<td>31/-</td>
</tr>
<tr>
<td>Jumbo A</td>
<td>35/-</td>
</tr>
<tr>
<td>Jumbo B</td>
<td>40/-</td>
</tr>
</tbody>
</table>

## Piston Air Pumps

<table>
<thead>
<tr>
<th>Model</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hy-Flo Junior</td>
<td>10/-</td>
</tr>
<tr>
<td>Hy-Flo model A</td>
<td>13/-</td>
</tr>
<tr>
<td>Hy-Flo model B</td>
<td>16/-</td>
</tr>
</tbody>
</table>

## Filters

<table>
<thead>
<tr>
<th>Model</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hy-Flo outside</td>
<td>12/-</td>
</tr>
<tr>
<td>Slimline outside</td>
<td>17/-</td>
</tr>
<tr>
<td>Clear King outside</td>
<td>22/-</td>
</tr>
<tr>
<td>British Filter U.S.A.</td>
<td>8/-</td>
</tr>
<tr>
<td>Alpine Bottom Filter</td>
<td>21/-</td>
</tr>
<tr>
<td>Hyper Sub Gravel</td>
<td>21/-</td>
</tr>
<tr>
<td>30&quot; Long</td>
<td>21/-</td>
</tr>
<tr>
<td>24&quot; Long</td>
<td>19/-</td>
</tr>
<tr>
<td>18&quot; Long</td>
<td>17/-</td>
</tr>
<tr>
<td>Premier 24&quot;</td>
<td>13/-</td>
</tr>
<tr>
<td>Premier 18&quot;</td>
<td>12/-</td>
</tr>
</tbody>
</table>

## New Vacuum Cleaner

Battery driven. Will clean any tank in five minutes. New from U.S.A. 50/-

## Tropics of Good Size

<table>
<thead>
<tr>
<th>Name</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zebras</td>
<td>2/6</td>
</tr>
<tr>
<td>Black Widow</td>
<td>2/6</td>
</tr>
<tr>
<td>X-rays</td>
<td>2/6</td>
</tr>
<tr>
<td>Platy</td>
<td>3/6</td>
</tr>
<tr>
<td>Swordtails</td>
<td>3/6</td>
</tr>
<tr>
<td>Angelfish</td>
<td>3/6</td>
</tr>
<tr>
<td>Rainbow Fish</td>
<td>3/6</td>
</tr>
<tr>
<td>Tiger</td>
<td>3/6</td>
</tr>
<tr>
<td>Cherry Barbs</td>
<td>3/6</td>
</tr>
<tr>
<td>Black Moons</td>
<td>3/6</td>
</tr>
<tr>
<td>Harlequins</td>
<td>3/6</td>
</tr>
<tr>
<td>Bumble Bees</td>
<td>3/6</td>
</tr>
<tr>
<td>White Cloud Minnows</td>
<td>2/-</td>
</tr>
</tbody>
</table>

## Special Xmas Offer

2/- each

### Rare Fishes

<table>
<thead>
<tr>
<th>Name</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silver Sharks</td>
<td>15/-</td>
</tr>
<tr>
<td>Malawi Angels</td>
<td>9/-</td>
</tr>
<tr>
<td>Ruby Scales</td>
<td>6/-</td>
</tr>
<tr>
<td>Cardinal Tetra</td>
<td>8/-</td>
</tr>
<tr>
<td>Elephant Fish</td>
<td>17/-</td>
</tr>
<tr>
<td>Angelfish</td>
<td>12/-</td>
</tr>
<tr>
<td>Plecos</td>
<td>10/-</td>
</tr>
</tbody>
</table>

### Many Other Varieties Including Many Cichlids

One minimum order for fish is £2, a charge of 35p is made for containers. Carriage charged, for fast passenger mail and telegram making time of removal. Increase due to telegram charges.

## Fully Glazed Aquariums

(Carriage at cost extra)

<table>
<thead>
<tr>
<th>Size</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>24&quot; x 12&quot; x 12&quot;</td>
<td>96/-</td>
</tr>
<tr>
<td>36&quot; x 15&quot; x 12&quot;</td>
<td>156/-</td>
</tr>
</tbody>
</table>

## New Rust Proof Aquariums Complete with Beautiful Plastic Covers. Nylon Coated Frames

<table>
<thead>
<tr>
<th>Size</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>24&quot; x 12&quot;</td>
<td>106/-</td>
</tr>
<tr>
<td>24&quot; x 12&quot; x 15&quot;</td>
<td>130/-</td>
</tr>
</tbody>
</table>

## Aquariums of All Sizes Made to Measure. Any Size First Class Workmanship Only


Phone Primrose 1842

(Open all day Saturday)

November, 1963

**Thermostats**

<table>
<thead>
<tr>
<th>Type</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uno Popular</td>
<td>10/-</td>
</tr>
<tr>
<td>Uno Neon</td>
<td>12/-</td>
</tr>
<tr>
<td>Uno Major</td>
<td>18/-</td>
</tr>
<tr>
<td>Unistat outside QK</td>
<td>22/-</td>
</tr>
<tr>
<td>Corstat outside major</td>
<td>33/-</td>
</tr>
<tr>
<td>Springfield inside</td>
<td>22/-</td>
</tr>
<tr>
<td>Proton heavy duty</td>
<td>36/-</td>
</tr>
</tbody>
</table>

## Thermostat and Heater Combined

<table>
<thead>
<tr>
<th>Model</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ex-Ex Pommerot</td>
<td>24/-</td>
</tr>
</tbody>
</table>

## Heaters

<table>
<thead>
<tr>
<th>Type</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uno</td>
<td>6/-</td>
</tr>
<tr>
<td>Ex-Ex</td>
<td>7/-</td>
</tr>
<tr>
<td>Ex-Ex Flexible</td>
<td>10/-</td>
</tr>
</tbody>
</table>

## Christmas Gifts

**Books**

Dictionary of Tropical Fish Free

Encyclopedia of Tropicals: Amazilia 65/-

Freshwater Fishes of the World G. Barts 70/-
SPECIAL PLANT OFFERS

EXTRA SPECIAL
Water lettuce, very beautiful plants - 2/6
Hairgrass $1 - Water Clover $1

OFFER No. 1
30 Plants for $10 -
2 Cryptocoryne Beckettii
1 Cryptocoryne Hayashi
6 Bacopa
2 Anubias Chain Swords
5 Micro Sagittaria
20 For $10 -

OFFER No. 2
30 Assorted Tropical Plants 10/-

OFFER No. 3
36 Assorted Tropical Plants 20/- including Cryptocorynes, Wistaria, etc.

OFFER No. 4
30 Coldwater Plants for your aquarium or pond 10/-

BOW-FRONTEO AQUARIUMS
40 x 10 x 15: bow-fronted aquariums with weighed iron backrest stand $18/10; complete, 50 x 12 x 18: bow-fronted aquariums with weighed iron backrest stand $49/10; complete. Available in penoy brown, black 6 gold, and cream.

WITH PLAIN STAND
40 x 10 x 15= $32/5.00
50 x 12 x 18= $43/10.00

COMPLETE WITH SAND AND MOSS (150a. to centre of bow)

HEATERS
"QUEENSBOURGH" 3w., 5w., 10w., 15w., 20w., 30w., 40w.
"Triax" Thermocline, 10w., 20w., 30w., 40w.
"Sim" 15w., 30w.
"Bax" Laboratory Heaters, 10w., 50w.
"Triax" Thermocline, 10w., 20w., 30w., 40w.

RUNS AT 15w., 30w., 40w.

FULLY-GLAZED AQUARIUMS
Pressed Steel Angle Iron
10" Tank $9 10" $13 6" $7 18" $15 12" $9 24" $18 24" $18

QUEENSBOROUGH FISHERIES
111 GOLDHAWK ROAD, SHEPHERD'S BUSH, W.12
16 PICTON PLACE, LONDON, W.1

QUEENSBOROUGH HOUSE, FERRY LANE, HYTHE END, WAYSBRIDGE, NR. STAINES

THE AQUARIIST
Fry from the Yangtze

The middle reaches of the Yangtze River now hum with activity as thousands of people have come to catch fish fry to restock China's ponds and reservoirs and for export to foreign lands.

The Yangtze, the world's third longest waterway, is the biggest natural source of fish fry in China. During each fry season, which extends from April to July, young fish caught in Hubei Province alone number some 15,000 million.

The fry-catchers work round the clock along a 1,000 kilometre stretch of the river, bringing in the young fishes with a kind of trap-net; and nearby railways, railway stations and airfields co-operate as ships, trains and aeroplanes take the young fish to different parts of China and to Korea, Vietnam, Burma and other Asian countries.

The Yangtze Gorges, situated 300 kilometres west of the great river port of Wuhan as the crow flies, are a big natural spawning ground. Every year huge shoals of fishes from the numerous lakes dotting the lower river basin go upstream to spawn in the gorges. Breze downstream by the current, the eggs in a week's time hatch into fry and are caught by the billions.

Only a small portion of the young fishes are netted. The rest find their way to the lakes. When they have matured, they migrate to the Yangtze breeding grounds to spawn just as their parents did before them.

Fishing is prohibited in the spawning grounds, and passing steamers are ordered to slow their engines so that the female fish are not disturbed on their egg-laying mission. This and other measures taken by the government have resulted in a marked increase in young fishes in recent years.

The fry of black carp, silver carp, 'big head' and other specimens are caught in the Yangtze. These fishes do not spawn when reared in captivity. With the exception of the Yangtze and a few other Chinese rivers, they breed nowhere else in the world. Noted for their fine flesh, these fishes mature fast. A black carp grows to 5 kilograms in 3 years. When fully grown the fish weights 35 to 40 kilograms.

People in China began to breed fish for the table in ponds during the Shang Period (1700-1200 B.C.). The most popular fish reared at the beginning was the common carp because it lays eggs while kept in confinement. This meant that there was no need to transport fry over long distances, a problem that could not be easily solved in those days.

The breeding of the common carp met with a serious...
set-back during the Tang Dynasty (618-907). The common carp is called Li in Chinese, and this sounds like the surname of the Tang emperors. Because of this the Court ruled that all carp caught must be set free, and that any person found selling one would be fined and given 50 lashes. This compelled the fish-breeders to switch over to the rearing of black carp, silver carp and other specimens whose fry could be obtained only in the Yangtze and a few other rivers. The good qualities of these fishes were soon known, and they have been popular table fishes ever since.

Freshwater fish breeding in China has spread from Central and South China to Inner Mongolia and other distant regions during the past decade, thanks to the construction of reservoirs and irrigation projects all over the land. This has created an unprecedented demand for fry. Though many hatcheries have been set up in this country in recent years and Chinese scientists have found a way to make the silver carp, the 'big head' and other fishes spawn when reared in confinement, the Yangtze river still ranks as China's foremost fry producer.

Hsin Liang-chi

(Above) Fry-catchers on the Yangtze. Young fishes trapped in the submerged nets gather in the square nets, from which they are collected periodically throughout the day.

(Right) Fishermen with specimens of the 'big head', a species spawning only in the Yangtze and some other Chinese rivers that is a rapidly growing food fish.

Leporinus affinis

This gracefully proportioned and handsomely marked amphibian is native to South America, from the Orinoco through Brazil to Paraguay and beyond. Its clay- to golden-yellow sides, lightening to silvery white on the belly, are crossed by nine jet-black vertical bars, the first through the gold-rimmed eye and the last across the extremity of the tail. The fins are clear to translucent nearly grey. There is no certain way to tell the sexes apart, but it is reasonable to assume that in adult fish the females are larger-bodied than the males. In the wild the species reaches a length of about 10 in. but domestication tends to keep it slightly smaller.

Like most members of its genus, Leporinus affinis swims in a head-downward position and thrives best in clean, clear water giving a neutral to mildly acid reaction. A temperature of 75°F (24°C), with a range of about 7°F either way, is perfectly satisfactory.

As will be readily gathered from the above, L. affinis is a fish that needs a spacious aquarium and plenty of oxygen if its health is not to suffer. Given this, and the right sort of food—tiny worms, insects and soft algae and tender plant life such as Nitella to browse upon—it should, all else being well, live for several years. It is intolerant by nature, but should not be treated with fishes very much smaller than itself. Another thing to remember is to keep its aquarium close-covered, for it is an adept jumper and when in the mood can project itself through quite a narrow aperture.

J.H.

THE AQUARIST
Breeding Coldwater Fishes

by A. BOARDER

In this last article of the series I shall deal with the breeding of coldwater fishes in aquaria. In the first place it is important that it is understood that I do not consider it an ideal method. I much prefer to breed coldwater fishes under control in a pond. However, no doubt many aquarists would like to have a try at breeding in indoor tanks. Although it is not impossible to do this in a single tank, I can assure readers that it is by no means easy.

I am well aware that many fishes have been bred in a tank when it has been the only one in the possession of the aquarist, but I consider it to be a hit and miss affair and often such spawnings are obtained more by luck than judgment.

The main disadvantages with such a procedure is the probability of the parent fishes eating either the eggs or the fry.

Without doubt the best type with which to attempt breeding is the common goldfish or one of its fairly hardy varieties. Once some experience has been gained with goldfish then other species can be tried. Obviously one must have a true pair. During the warmer part of the year the male, in condition, should show the small, white, papilla-like papillae on the gill plates and perhaps on the front edge of the pelvic fins. The female will be fatter because of the eggs she is carrying. The tank, which should not be less than 24 in. by 12 in. by 12 in., should be well planted with fine-leaved plants (even over-planted would perhaps be better). One pair only is necessary. The old idea that one must have several males with one female is outdated, as the milt from one male could fertilise all the eggs laid by a dozen females. The fish can be 2 year olds. It is possible to breed with fish a year old but a better chance will arise if older fish are used. Now see that the pair have plenty of live foods. I know of nothing better as a conditioner than chopped or small broken garden worms. These can be supplemented with white worms and broken maggots.

Apart from extra feeding and seeing that the tank water is absolutely clear and well oxygenated, there is little you can do to hasten matters except perhaps to pay attention to the string of the tank in the room. It should be where it can get plenty of light, with some morning sun if possible. This may be in such a position as would not be normally recommended for a cold tank, as extra light might cause a quantity of green algae to form. This will not matter in your breeding tank as plenty of algae will be available for the fry when hatched. Sometimes it helps if the fish can be separated for a day or so, even parting by the use of a glass slide can help. Another good idea is to run off a quantity of water from the tank and refill with cold fresh water. This sometimes triggers off the spawning activities. The early morning is the best time for this and if the day starts very bright this will also be a help.

There will be no doubt when the fish actually start spawning. The male will chase the female around the tank, continually nudging and pushing it through the dense foliage. This excitement cannot be missed as the fish will act in a vigorous manner quite out of character with their ordinary behaviour. Many small transparent eggs will be
laid singly. They are like small beads of jelly the size of a pin’s head. They are adhesive and will stick to the water plants quite firmly. This chasing can go on for several hours, and during the chasing the parent fish may take no notice of the eggs. However, when the chasing has finished, the fish may take a more interested look at the eggs and make a meal of them. There are three things the aquariumist can do now. He can leave the fish and eggs alone, and provided that there is fairly dense cover from plant life, many fry may hatch, but it is very uncommon for many fry to be reared under these conditions. Secondly he can take out some of the water plants with eggs attached to hatch out in safety in another tank or shallow bowl. Lastly he can just remove the parent fish to another tank. This last method is the best one to adopt, as it is then possible to hatch most of the eggs that have been laid, and it gives the aquarist a ten to one chance of getting some fry. The rearing has been dealt with in previous articles and so need no repetition here.

Having obtained some experience with the goldfish and perhaps some of the varieties the aquarist may like to experiment with other species of coldwater fishes. I must state that I do not think there are many British coldwater fishes that could be bred in a tank indoors other than perhaps the stickleback (Gasterosteus aculeatus). Much has already been written in the literature about the breeding of this species and so I shall not repeat the directions here. The bitterling carp (Rhodeus amarus) has also been adequately dealt with on more than one occasion; although this is a British fish, as yet, it might well become familiar introductions to certain waters. The ordinary carp (Cyprinus carpio) is rather similar to the goldfish as far as breeding is concerned, although it is probable that rather larger fish should be used with this species. The green tench (Tinca tinca), and its variety amuris, could certainly be bred in a fairly large tank, but most of the breeding fishes would be rather large for any but the 30 inch tank. I have bred green tench at 2 years of age, when well grown under ideal conditions, but larger fish would ensure a better result. The rudd (Scardinius erythrophtalamus), could be bred in a good sized tank, and this fish lays eggs similar to those of the goldfish. The roach (Rutilus rutilus) is also a possibility, but only an experienced aquarist with a large tank might hope to succeed with this fish. The heron (Abraeus brevis) is also a difficult fish and one that does not offer much interest, apart from the very difficult achievement of having bred some. The pike (Esox lucius) would also be rather difficult to breed unless a very large tank was available, and the pike

OUR EXPERTS’ ANSWERS TO TROPICAL AQUARIUM QUERIES

I am thinking of keeping a few tanks of tropicals in a cold greenhouse. These would be heated by electric immersion heaters, but I am concerned about the rise in air temperatures which takes place after a few hours of sunshine, and a rise in the temperature of the greenhouse from 65°F (18°C) to above 80°F (27°C) overnight the tanks and harm the fishes?

So long as the tanks are not overcrowded, we do not think warm water fishes would come to any harm in your greenhouse through a sudden rise or rapid fluctuation of the air temperatures. Shutter-type air vents well above tank level would help to dissipate excessive heat.

I have a 24 in. by 12 in. by 12 in. aquarium inhabited by two dozen young red swordtails. I should like to add some black widow fish to it, but wonder whether this would be advisable. May I have your comments, please?

We advise against introducing any more fish of any kind into your aquarium. Firstly, swordtails grow quite large

and, even with artificial aeration, two dozen of them will soon be too many for a 24 in. tank. Secondly, male swordtails often develop into spiteful bullies.

After a failure in the electricity supply, a male Siamese fighting fish and a Corydoras catfish contracted slim-skin trouble. Losing no time, I placed them in a salt bath. The fighting fish recovered within a week, but the catfish died. I have since been told that one should never attempt to cure a catfish of any illness with salt. Is this true?

A medium to strong salt solution will upset or kill most tropicals
Coldwater Fish-Keeping Queries answered by A. Boarder

I have lost some coldwater fishes in my aquaria and I find that they are infested with a type of creature which sticks on the fish like flies on a fowl. Can I use formalinase to control them? C.C., Lincolnshire.

The creatures you refer to are anguilids or fish lice. They are capable of free swimming and attach themselves to a fish and feed from its juices. The pests lay eggs and some of these may have been introduced into your tank with either fishes or plants. All parasites that can be seen on a fish can be pushed off with tweezers, but some may be under the tail or in such a position that they cannot be seen very easily. I have found that if a fish is immersed into a solution of a half teaspoonful of Dettol to a gallon of water, the lice will leave the fish immediately. They will swim around for a little while and then die. The fish would also die if left in the solution and so a sharp watch must be kept on it and it must be removed to fresh water if it turns over, or in any case within about 20 seconds. It may be necessary to repeat the treatment if more pests are seen later on.

I recently brought home some water plants from the wild. I kept them in quarantine for a time and then put them in my tank. I noted that one appears to be a dock. Is this likely to be the ordinary one and if so will its seeds spread all over my tank?

The plants you have is the great water dock (Ranunculus aquatilis), of the order Polygonaceae. This is a bog plant and can be used around the shallow edges of the pond. Its flowers are small and borne on a spray. It will be as well to remove the flower heads once they fade to prevent the seeds from falling into the water and becoming a nuisance. It is not likely, however, that the seeds will become a nuisance. This plant has no use as an oxygenator, as its leaves are above the water. It does break up the sunlight of a pond and can be quite attractive.

Among the best suited to community life are neon tetras, pretty tetras, pristella, bloodfish, flame fish, guppies, platies, harlequin fish, tetra fish, opaline fish and white cloud mountain minnows.

I am trying with the idea of installing a 40 in. tank in an alcove in my living room. Could you tell me the number of immersion heaters I would require to maintain a temperature of 70 F (21 C) all the year round?

To be on the safe side, you will need a heater, or heaters, giving at least 150 watts. Two 75 watt heaters wired in parallel, and rested horizontally on the compost, one at each end of the tank, would ensure a fairly even distribution of heat.

Some of my barbs and livebearers living together in a 24 in. tank have gone off their food and are swimming about with closed fins. Can you tell me what is wrong with them?

Closed fins are indicative of temporary malaise or actual disease. Any of the following may be the cause of the trouble: the after-effects of a chill, overcrowding, unsanitary conditions, or metal poisoning. At the onset of white spot disease, that is, just before the fish become peppered, as it were, with the tell-tale cysts, they will often go off their food and swim around with folded fins. If the fish have not been subjected to a sudden drop in the temperature, and no metal has contaminated the water, then give the bottom of the aquarium a good siphoning to get rid of dirt and any decaying matter, and fill up again with boiled water cooled down to the aquarium temperature. A sufficient quantity of a 5 per cent solution of medicinal methylene blue stirred into the water to give it a noticeable bluish tinge might prove beneficial.
Turn of the Worm
by P. E. Pavey

Micro worms for young fry. Grindal worms for older fry, white worms for adult fishes. All are easy to keep, and the supply, if you wish it, can be never-ending.

First micro worms. These are about 1 in. long, and thin enough to fit into the mouths of most week-old fry. You will need a shallow container, such as an enamel pie dish, and some stiff porridge. The proportions for this, I find, are important. Into one cup of water and half a cup of milk stir one cupful of porridge oats and cook for 5 minutes. When the porridge is cool, spread it inside the container and make several small hollows. Fill these with spoonfuls of micro worms, begged from a fellow aquarist. Cover with a piece of glass. Leave for a few days, and then inspect the mixture to see if any mould has appeared. If it has, pick it off with the tip of a knife and burn it. Be very careful not to sneeze or cough over the mixture! Place two small lengths of wood in the porridge and replace the glass. By the end of a week thousands of worms will be crawling up on to the wood, and these you can gather easily on a small clean brush—don’t let the brushwisk will do. If you simply wish to keep the mixture going, when it begins to go watery and develop brown patches on its surface make a fresh supply of porridge and start a new culture in another container. If you are feeding fry, you will need to make a fresh supply every week. Keep the micro worms at room temperature.

Grindal worms can be eaten by fry under half an inch long. Fill a wooden box about 4 in. deep with a mixture of peat and leaf mould. A seed box will do excellently. Obtain from a supplier or fellow aquarist a Grindal worm culture and put this in the centre of your mould. Feed the worms with sufficient porridge to last 2 or 3 days, and cover with a close-fitting piece of glass. It is essential to keep the mould very moist! When the culture is going well you will find that the worms will thrive on fingers of brown bread sprinkled with milk. Cover the glass with a sheet of thick paper, and keep at a temperature of at least 70°F (21°C). The worms will climb on to the glass and can be removed with tweezers or a paintbrush. I find it best to handle with a paintbrush. If the room is cold, I put my worm box on top of one of my fish tanks.

White worms also need a box filled with peat and leaf mould, and must also be kept covered with glass and a sheet of paper. In fact, except that they do not need to be kept so wet or at so high a temperature, they can be treated exactly the same as Grindal worms. Be careful not to overfeed them to your fishes. They are a very rich food! If you find mites in the worm boxes, don’t worry. They won’t harm your fishes; in fact some of your fishes will enjoy eating them.

Remember to look at your worms every other day. Keep their food fresh, and don’t give them too much at a time. Highly important—don’t forget to water your Grindal worms!

The Aquarium Hobby in Schools
by A. R. Leeke

Education authorities are rapidly becoming aware of the usefulness of aquaria in schools. Many Education Committees now make grants to schools to enable them to purchase the required equipment.

When I worked with the school aquaria in Ryder Row Secondary School we had more tanks than most schools thanks to the generosity of the headmaster. We had seven tanks ranging in size from 18 in. by 12 in. to 48 in. by 16 in. by 15 in., and all except two were occupied by tropical fishes.

The amount of money spent on the aquaria had to be limited, so there was only one filter between the seven tanks, but this was a fairly large, outside model so we changed it to a different tank each day. This way all the water was kept clean.

The pump used was a Hylo fish-house model, which ran continuously day and night. Each tank had aerator: the 18 in. tanks had one airstone, the 24 in. tanks had two airstones and the 48 in. tank had four.

One tank was serviced every day except Saturday and Sunday. This servicing consisted of fixing in the filter, siphoning the mud off the gravel, scraping the algae off the glass, topping up with fresh water and polishing the reflector.

All the tropical fish tanks were kept at a temperature of 75°F (24°C) and the coldwater tanks were kept between 55° and 60°F (13-18°C).

The types of plants used varied considerably, but the main types used were Elodea, Amazon swords that Valisneria spiralis. Elodea was used mainly in the breeding tanks and the others were used for display. Once I had several Madagascar lace plants given to me by a friend, and when I planted some in the school aquaria they grew better than all the others until one Christmas holiday, it came into the laboratory only to find all the inhabitants of that tank, both plants and fishes, dead and decaying. The temperature was 34°F (1°C). Looking around the tank I noticed the heater and thermostat were missing. To this day I do not know who or what took them, but they really made my blood boil. Later I installed up the cost of material lost and it came to $17, and all the dead fishes were mine!

The tropical fishes kept varied considerably. We had guppies, platys, mollies, gouramis, zebras, angels and one fairly large red-tailed black shark. All fishes, with the exception of the angels and the red-tailed black shark were bred in school. The first to be bred were naturally the guppies (I still breed them), and the last to be bred were the gouramis. I think nearly every member of the

Please turn to page 148

THE AQUARIST
The Fishes Called CHARACINS

by HARRY LODER

Photographs by BARRY PENGILLEY

THE fishes known as characins form a very large group in Nature, consequently many species are usually available to the aquarist. The most common, or more usually available, species are the ones that originate from central South America. Most of these are now bred in Europe—Germany and Holland being the two main European countries of supply; some supplies of the more difficult to breed South American characins come from British Guiana. These wild-caught fishes are usually very strong and travel well.

There are a few rarer South American characins that are not often seen in the shops, but most of the difficult to obtain species are African. Not many of these are small fishes; mostly they are members of the large and medium sized group of species, such as Phalloceros interruptus.

The Alecto genus and other magnificum fishes from the Congo are the ones I class as difficult to obtain. The difficulty is, of course, only relative to African fishes; most of the American fishes are handled at source as a regular export, whereas the African stock is very irregular. The African livestock exporter is much more interested in handling large animals such as giraffes, rhinos etc. (it takes a lot of Alectes longipinnis at £1 each to take the place of a £2,000 Baringo giraffe, and four chimpanzees will earn as much as a riverful of bud travelling little fish!). The attractions of Africa are very great; the South American collector, on the other hand, has very little else to collect but fishes, mostly characins, and of course, reptiles and butterflies, which are both seasonal and rather 'slow lines', unless very rare.

These are some reasons why you see good selections of South American characins, of all species, in your aquarist's shops, and very few African (and these only at big prices). I think that there are still some wonderful species that we have not yet seen to come out of Africa; maybe when the 'wind of change' stops ruffling the surface of the water we shall see them.

The fish-keeper can place the characins into three groups according to size: small, medium and large. The small species can be very small and the large very large, by aquarium standards that is, and the twin should never meet in the same tank. I have kept the small and the medium species together, and the medium and large with success. I have also tried the small and large, but it is difficult to say whether or not this was a success as the small species kept disappearing. The large size fishes are,
of course, only large aquarium-wise, angler-wise they are only toddlers.

The three sizes need exactly the same kind of care, with of course, more room the bigger they are. They need clean water, slightly acid for best colour, temperature on the high side, 75°-80°F (24-27°C), housed with not too many plants (all plants really growing and not just stood there pretending to be alive as do some plants that are not receiving enough light). Give plenty of swimming room; you can crowd these fishes as they are very strong and do not soon show ill-effects. In fact the only ill-effect you will see is a lot of dead fishes. Characins are not sick for long—very few hours only; they are either alive or dead. No in-between for the characin! You can easily ascertain if crowding is the cause of death, as it will be the biggest and most well-grown fishes that die first.

Feed them well; this is not difficult as they are obliging feeders, and will eat almost anything you offer. They are
of course, fishes with teeth, and they know how to use them. Yes, they have grand little teeth; I have seen a young Hypseleobrycon serpae have both eyes bitten out by his mate in less than five minutes to say Hypseleobrycon. But do not let me mislead you into thinking that characins are savage fishes. In the above-mentioned instance, the young serpae was deformed; had he been in proper condition he would not have attacked. Characins, like most fishes and birds, are liable to kill their ailing companions. It is only that characins are fast and most in the way they do it.

As mixed community fishes characins are very good, because that the aquarist does not persist in keeping the same specimen of characin in with other species. They are peaceful with each other, but this playfulness turns to spite-very strong and if they do not live longer in the company of their own species, they do at least live happier lives.

I know that only a very small proportion of aquarists show fishes at fish shows and that a smaller proportion of these enter the furnished aquarium classes, but we are all showmen when our friends arrive and want to see our pretty little fishes. Also our relatives are very liable to tell us the truth, at times, about our tanks, especially if the tanks are like one I saw in a public place the other day: about 200 female guppies, of all sizes, one female Barbodes juliostris, a good crop of brown star and one well-chewed Amazon sword plant were the complete display. There is no reason why the home aquarium should not be just as beautiful as the ones you see at the shows, and a good selection of characin will be half the battle won.

An aquarium 24 in. by 12 in. by 12 in. will house up to 40 small characins, and it is possible to have 20 different species, in pairs, at a cost of well under £10, which could include neons, X-rays, beacons, glowlites, serpae and rosy tetras, penguins, the Neotropical group and many more.

For this purpose the characin is hard to beat; a good mixed shoal of small characins, or a small shoal of one characin, soon move about and catch the judge's eye. I have found little fault with the characin, but, like all things, nothing is perfect (how boring perfection would be!), the faults I do find is one that can be corrected: as individuals the characins are rather 'sulky' and always rather will. The need for other individuals of their own kind is

November, 1963
of cover, as the parents eat them avidly; nylon waste or plenty of spawning mops give the necessary cover if simply used.

Use no gravel please—this alters the reaction (pH) and soon encourages bacteria. Aeration? Yes, and filtration, slight during the spawning act and afterwards when the eggs hatch. For lighting there are species variations. Strong light seems to be deadly to the eggs of some species, especially males. Light with some species seems to stimulate spawning whereas with other species it prevents a beginning. The latter also applies to individuals of the same species. I have noticed many species of fishes spawning in strong moonlight. The light question is maybe much more important than we think; the only way really to settle it is to make the experiment yourself, but as you see, light can, and does, have a big effect. It does not seem to make any difference with the following species, either for spawning or hatching: beacons, flanes, X-rays, yellow tetrus, Nannostomus anomalous, X. marginatus, serpae and rudy tetrus, black-line tetrus, black widows, red-finned tetrus and silver tetrus. These are all possibly classed as easy to breed, for this reason.

Times of hatching also vary according to species but approximately 24 to 36 hours at 82°F (28°C) applies to most.

I personally have had most success when using trio (two males and one female); some of my friends disagree and use pairs only, but I suppose here again we must take individual fish into consideration.

Any monkey food should get your breeding fish into condition. Chopped chicken liver is one food that usually does the trick. Daphnia also helps and I always recommend chopped earthworms.

For feeding the fry Infusoria is best as a starter. It is particularly necessary with the new emperor tetras; nothing else seems to do for the fry of this characin. Follow on with brine shrimp, nauplii of Cyclops, sifted Daphnia, hard-boiled egg, dried egg-powder, sera-bean flour; then, by the time they are eating fine dried food, you have got them: they are yours, you can go ahead and count them.

The Threat to Wild Life

These items are taken from "World Wildlife News," issued by the World Wildlife Fund.

U.S.A.

During the past 12 years the United States Fish and Wildlife Service, an official Government agency, has poisoned some 225,000 acres of lakes and 2,500 miles of streams, mainly with rotenone. The aim is to remove so-called undesirable or "trash" fish and restock with game-fish for anglers. Among the "trash" fish so removed are many unique endemic species. In the southwestern United States no fewer than eight species of fish have become extinct as a result of this programme since 1938. The continued existence of 39 others is in danger; these 39 constitute nearly two-fifths of the known native freshwater fishes of Western North America, north of Mexico. (National Parks Magazine.)

France:

The lakes of the Somme valley above Amiens, important both for fisheries and for wild fowl, are threatened by a decision of the French Minister of Public Works to take the Nord Canal through them, thus mixing and polluting their waters, instead of, as originally intended, keeping it on a separate course which would avoid the lakes. The degree of pollution would be aggravated by the creation of an industrial zone at Peronne, higher up the canal. (Le Sain-Hubert.)

The Aquarist
'Fail-Safe' Aquarium Heating Systems

by F. C. BOUCHER, B.Sc.

ALTHOUGH several articles have been published from time to time in The Aquarist on devices to guard against failures in the heating system, I have yet to see an arrangement which provides protection against all possibilities, and yet is reasonably simple to install. Such a system is shown in Figure 1, and the method of operation is very simple. The three thermostats are set to close at different temperatures. For example, number 1 at 77° F (25° C), number 2 at 75° F (24° C) and number 3 at 77° F (25° C). For normal operation number 1 is closed, number 2 is controlling the temperature, and number 3 is open.

In the event of failure of any component in the heating system, the temperature drops until number two thermostat closes, thus either operating the alarm, or turning the emergency heating system, depending on the position of the switch. This protects against all forms of failure except thermostat 2 sticking in the closed position, which would cause the temperature to rise. In this case thermostat 1 will open and break the circuit, and the neon lamp will light to indicate the fault; the circuit would then continue to operate at the increased temperature indefinitely.

Components Required

The neon lamp must be rated to operate at mains voltage, or a lower voltage lamp may be used in series with a high resistance. Thermostats 1 and 2 are quite normal, but thermostat 3 must be capable of carrying a high current, as described below. All three thermostats must be placed near each other in the tank, otherwise the temperature differential over different areas might be sufficient to operate an emergency thermostat. Heater A is used for normal operation, and heater B is specially wound to operate from a 12 volt car battery. There is an alarm bell on thermostat 3 which is operated from its own small battery. The switch is of the single pole two-way type and it should be rated at 5 amps. This switch is left connected to the alarm circuit, but when the bell rings, it can be changed and the car battery connected to operate heater B.

The majority of aquarists will not wish to leave a large car battery complete with acid on the living room carpet, permanently connected, but would prefer to connect it only when the alarm operates. If, however, protection is required for a period while the owner is away, the battery can be left connected with the switch in the 'heat' position, so that the heater will automatically come into operation when thermostat 3 closes. If the car battery is left in position, it must be charged regularly, even though it has not been in use. A fully charged battery with a capacity of 40 ampere hours can operate a 40 watt heater for about 12 hours continuously, which should keep the temperature above danger level for at least 24 hours, allowing for periods when the thermostat is open.

Low-Voltage Heater

Heater B is constructed as follows. An old burnt-out heater is removed from its glass tube and the winding replaced by part of a 1 kilowatt electric fire heater spiral (chosen because of its general availability). The resistance of this is approximately 53 ohms, assuming that it operates from 230 volts, and the proportion which is required for the heater is calculated by reference to the Table, which shows the resistance required to make aquarium heaters of different powers operating from a 12 volt supply.

Let us assume that a 50 watt heater is required, and the length of the fire spiral is 10 inches. The resistance of this spiral will be 53/10 = 5.3 ohms per inch. The table shows us that the resistance required is 2.9 ohms, and this can be obtained by the use of 2.9 x 5.3 = 0.55 inch of the spiral. For greater accuracy the spiral could be pulled out straight and the above calculations based on the extended length.

Increased efficiency will be obtained if two lengths of wire twisted together are used, each length being double the amount required for a single wire. In our example of a

![Fig. 1. Circuit diagram for complete heating system](image_url)

<table>
<thead>
<tr>
<th>Table</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image_url" alt="Image" /></td>
</tr>
</tbody>
</table>

Resistance of aquarium heaters for 12 volt operation

<table>
<thead>
<tr>
<th>Rating (watts)</th>
<th>Resistance (ohms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>7.2</td>
</tr>
<tr>
<td>30</td>
<td>4.8</td>
</tr>
<tr>
<td>40</td>
<td>3.6</td>
</tr>
<tr>
<td>50</td>
<td>2.9</td>
</tr>
<tr>
<td>60</td>
<td>2.4</td>
</tr>
</tbody>
</table>
The Aquarium Hobby in Schools

continued from page 142

School Aquarium Society: bred at least one variety in the aquarium, and the results were satisfactory. Although our main interest was with the keeping of tropical fishes they were not by any means the only things to be kept.

We had many species of fishes and amphibians from our own rivers and lakes. The freshwater fishes kept were perch, carp, golden orfe, yellow catfish, roach, rudd and Allis shad. Goldfish were also kept, but for some unknown reason they died off and we never replenished our stocks.

Frogs and toads were also kept and bred in our largest tank. We raised over 100 frogs and 99 toads to maturity.

The School funds did not allow us to realise our greatest ambition, an alligator.

One of the best things about being in charge of the aquarium was that the fish of our own rivers and lakes were different. We used them to keep our aquariums during the summer months by collecting fishes, amphibians and plants for the aquarium. We spent many happy hours on the banks of rivers and lakes in Lancashire, Yorkshire, Derbyshire and Cheshire with our fishing rods, nets and water containers.

Our pride and joy was not only the use of the members of the Aquarium Society. Teachers in the Science Department often used it as well to show the younger forms of the development of amphibians and fishes.
Lizards Becoming Snakes?

by ROBERT BUSTARD, B.Sc.

Photographs by
the author

18 in. vivarium with 4 inches of coarse sand. Coarse sand is preferable, as, although they possess a transparent lower eyelid and modifications of the ear opening to prevent sand entering, very fine sand can be a problem particularly to breathing—it makes them sneeze. The eyeskink likes a warm day temperature (77-86°F; 25-30°C), but at night 55°F (13°C) is suitable. A small dish of water must always be present and I keep another small dish supplied with mealworms or gentlems. In addition to these, bluebottles are supplied from time to time.

Three-toed Sand Skink

The three-toed sand skink (Chalcides tridactylus) from Mediterranean regions is frequently kept in this country. It can be described as a slow-worm with tiny limbs, the forelimbs scarcely an inch below the ear and the tiny hind limbs just in front of the tail base. Its total length is about a foot, of which considerably more than half is accounted for by the elongated body. The vivarium for these lizards should have facilities for climbing if they are to be seen to advantage, and this applies also to Tetradoxys and Chamaeleo described below. All are suitable for a vivarium similar in size to that for the eyed sand skink.

The vivarium, which should have a pea-sand or soil floor, is best provided with branches, moss and even small climbing plants or young orange trees. A temperature of 77°F (25°C) during the day is suitable for all three. A water dish must always be present and food can be selected from among the following: spiders, flies and bluebottles, maggots, mealworms and beetles.

Plated Lizard

The short-legged plated lizard (Tetradactylus sphenops), which attains a total length of about 7 inches and is a dark bronze colour, possesses a long tail and well-developed limbs. The similarly coloured whip lizard (Tetradactylus tetradactylus) has much smaller limbs and a proportionately longer tail, which accounts for 12 of its 15 inches. Both of these lizards travel rapidly through grass by a wriething movement of the body and tail, during which the legs are folded back against the body. In the vivarium their antics in catching food are delightful to watch. Both species will soon take bluebottles from the fingers and these are just within the maximum size of food that can be swallowed, and then only after considerable chewing. The sinuous movements of the whip lizard and the way in which the tiny forelimbs are vibrated when it is excited make it a most interesting species to watch. Tetradactylus sphenops of the three genera lays eggs. The eggs are decidedly oblong in T. sphenops and each specimen lays two eggs. The

Eyed Sand Skink, a species that does well in the vivarium

Snakes and lizards belong to the same order of reptiles—the Squamata. Snakes are placed in the sub-order Serpentes and lizards in the sub-order Lacertilia. It is common knowledge that snakes once possessed limbs and, indeed, vestiges of these have been retained and modified as mating spurs in pythons and boa constrictors. One cannot, however, distinguish lizards from snakes by the presence or absence of legs as, although no snakes now possess well-developed legs, many lizards also lack these. Legless lizards still retain many lizard-like features; the shape of the head, for example, is lizard-like and the eyes usually have well-developed lids, absent in all snakes. The evolutionary path of these animals need not concern us further, although it is in itself fascinating, but many of these lizards species which are either legless or have poorly developed limbs make interesting vivarium specimens.

The sand-worm (Anguis fragilis), which occurs in Britain, is an example of a completely legless lizard, as are its relatives the glass "snakes" of Europe and America (Phalanger apodus and O. uantralis). As well as these popular examples there are many others which combine fascinating habits with hardiness in the vivarium. Although many of these are members of the skink family, degenerates are found in a great number of lizard families.

Eyed Sand Skink

The skink genus Chalcides shows a progression from well-formed limbs to an almost legless condition. The eyed sand skink (Chalcides ocellatus) possesses good limbs although they are small in comparison with the 6 inch animal. This skink does exceptionally well in the vivarium, where its requirements are modest. No special hiding places are necessary, as at night or when alarmed the eyed skink "swims" into the sand, completely disappearing in a few seconds. My specimens live in a 24 in. by 18 in. by

November, 1963

149
specimens of *Tereodonius* which I have kept have always had a slightly damp vivarium. This is easily maintained by spraying the moss every few days. These lizards are natives of South Africa.

The anguine lizard (*Chamaeleo anurus*) is also from Southern Africa, although very similar forms occur in East Africa where the author has obtained them. This lizard has keeled scales and the tail accounts for more than three-quarters of the total length of 20 inches. The limbs are very much reduced, as can be seen in the photograph, and considerable patience was required to pose the specimen with the minute pale or coloured forelimbs extended over the dark body region so that they would be visible. The anguine lizard, which belongs to the anguine family (*Anguinae*), is, like the whip lizards, particularly partial to bluebottles, and is an excellent climber.

**Silver Sand Lizard**

The last two species, like the first two described in detail, belong to the Scincidae. They inhabit South Africa. The silver sand lizard (*Scinaxiotes bipus*), which is an attractive silvery pink colour with dark spots, possesses only two limbs, the front limbs being absent. It measures about 5 inches in total length and lives mainly underground, feeding on worms and slugs. The speed with which it can disappear into dry sand is fantastic. The virtually non-functional hindlimbs can be seen in the photographs.

The golden sand lizard (*Acodon musculus*) has no external limbs and X-ray examination has shown that no internal rudiments exist. This 10 inch lizard possesses a tail of only 2 inches, and the head has a hard pointed snout for pushing its way through hard soil. The golden-amber coloration with black markings in the form of small spots is decidedly attractive. Food, as for the silver sand lizard, is worms and slugs, and both these lizards are viviparous.

South Africa is very rich in those degenerate forms and gradations occur in some of the genera mentioned above. Those interested should read the chapter "Lumped Limbs" in Dr. Walter Rose's excellent book *The Reptiles and Amphibians of Southern Africa*, which was recently reviewed in these columns.

The price of the species recommended in this article is likely to vary from £6. 6d. to 15s. for *Chalcides* species to about 30s. for some of the others.

---

**The Es-Es Story**

In a newly published 36 page booklet describing aquarium products currently manufactured by their firm, Singletons Bros. (Electronics) Ltd. recall how difficult things were for the tropical fish-keeper 30 years ago. The Es-Es was the first aquarium heater to be made to the now-familiar glass-tube design, and to-day a number of other accessories for the aquarist are marketed under the Es-Es trademark. As well as descriptions of these items, the booklet contains a page 'For the Beginner,' notes on raising water fleas for fish feeding and information about aquarium heating in relation to tank capacity and room temperature. Es-Es Aquarium Products is obtainable from Singletons Bros. (Electronics) Ltd., 53, Victoria Street, London, S.W.1., for the price of postage only (sixpence).
Bitterling

I was very interested in the article on the "Breeding Habits of the Bitterling" in the July issue of *The Aquarist* as to a very large extent Mr. Laurence Perkins' observations I recorded in *The Aquarist* in 1924 and repeated in further detail in 1949.

I have recently met Mr. Perkins and find that our observations are even more identical than his article would suggest.

It appears that Mr. Perkins was under the impression that I had recorded that the eggs of the bittering were placed by the female in the exhalant siphon of the mussel, whereas he was satisfied as a result of his photographs that the eggs were deposited in the exhalant siphon. In fact, I stated in my article of 1949: "The female would hang head down at an angle of about 75 degrees and then suddenly dive down on the mussel, inserting it on the mouth of the siphon with the part of her body which is immediately in front of the ovipositor".

I would have thought it was clear that I was referring to the exhalant siphon but if this is not so, for record purposes, I now wish to confirm that this was my intention. I would also point out, that in the extracts I quoted in my 1949 article, the Dutch scientists expressly state that the ovipositor is inserted in the exhalant siphon of the mussel. However, Mr. Perkins' fine photographs have gone a long way to prove that the observations I made and recorded over 20 years ago were accurate and for that I am very grateful.

Even now I am not sure that all bitterling spawn the way Mr. Perkins and I have described. I would refer readers to a very interesting article by Dr. de Wit in *The Aquarist* (July, 1954) in which is reproduced a series of prints for a side strip apparently showing the long "ovipositor" being withdrawn from the exhalant siphon. I wonder if it would be possible to persuade Dr. de Wit to comment on Mr. Perkins' photographs and also to reproduce some further prints from the film showing the long ovipositor going in and coming out of the siphon.

W. S. PITT
Waltham-on-Thames, Surrey

Why Peppermint?

I have news for Mr. B. R. James ("Peppermints, Pleco-
solea—or What?" *The Aquarist, September*). There appears to be at least one other variety. I obtained a "peppermint" some months ago and had the same difficulties trying to identify it. It is almost identical to Mr. James' type 2 with these exceptions: the eyes are yellow with black pupils; it rests by 'gluing' itself to the glass, in almost any position, although usually head upwards.

Its swimming action suggests a highly inefficient or totally non-existent swim-bladder, i.e. when it wishes to traverse the tank, it first climbs to the top of the glass and then launches itself forth, swimming hard, trying to gain the other end of the tank before it strikes the bottom.

I would suggest that it is not related to the *Plecoglossus* or Gobiid family, which usually have an adipose fin and a forked caudal. It may, however, be akin to the *Oryzias* of Thailand.

Incidentally, why "peppermint"? Did the "well-known distributor" taste them before christening them?

S. BARRATT
Corby and District Aquarist Society, Corby, Northants.

Marine Tropicals

We are writing to ask how many of your readers have been successful over a period of 1 to 2 years in the keeping of tropical marine fishes. We would also be interested to hear what happened to John Boscott's unicorn pelican (April, 1963).

We have been fairly successful in keeping native marine and brackish fishes but understand that tropicals are more delicate.

PETER L. LEE,
F. P. TOWNSEND,
Sheffield, 7.

Public Aquariums

I am writing this letter after my first visit to a famous public aquarium on the Sussex coast, and must tell you and other readers how disgusted I am at the state of this aquarium. Others in 2003 that I have visited over this country have also been disappointing.

Although the tanks of tropicals were aerated and presumably filtered the plants were very sparse and half-dead, I realize that the tanks should not have many plants at the untrained eye would not be able to see the fishes, but the uncleanliness is unnecessary.

I should also like to see a change from the standard type of fishes that I and others have. I expected to see something really different and more exotic in a public aquarium and I think quite rightly so.

D. F. M. BLACKMAN
Gravesend, Kent.
Coldwater Queries Answered

you have described. It is possible that some have been put into the water by an angler or aquarist. Some years ago large schools were found in the Sawmill River, New York, and they had been put there without doubt. They were in schools and so many were caught that it is believed they were wiped out. Bitterling carp do not grow much above 3 inches for the male and 3 inches for the female.

At our club we have had arguments about frogs. In the summer they have to come to the surface to breathe but in the winter they can stay under the water for long periods, even when the pond is frozen over. Do the frogs need less oxygen in the winter?

The common frog usually hibernates through the winter and in this torpid condition has no need to breathe. Like some other creatures which hibernate, it seems to depend a lot on how severe and long the cold spell. For instance, during a warmer spell in the winter the frogs may be seen at the surface of the water. When it is very cold for some time they remain partly buried in the mud at the bottom. Many frogs die under the ice after a long spell of cold because it may have become slightly warmer at the bottom and the frogs have become roused. They then try to get oxygen at the surface and because of the ice are unable to do so. In consequence many die and this is the reason why dead frogs are often found with dead fishes after a severe freeze up when ice has covered the pond for about 2 weeks or more.

I have just started to keep coldwater fish and have four yellowtails in a tank 15 in. by 10 in. by 10 in. They are aged about 2 months. When do fry cease to be called fry and become fish? Can you prescribe a diet for them? How often should they be fed and what is the best temperature for them? Do young fish usually prefer swimming near the surface? What size do yellowtails grow to and how long do they live? When feeding with Daphnia it is possible to see many small creatures like tiny transparent worms, what are they?

The young of fishes are usually called fry when they are very tiny and usually shoal. They have not yet taken on the proper fish shape. When they do they are referred to as yearlings or young fish. This stage depends on the type of fish and the rate of growth. With goldfish reasonably well fed, they become fish after 3 weeks at the most. Feed on the usual goldfish foods, both live and dried. During the warm weather feed as often as they can clear up the food in 10 minutes, but no more than three times a day. Never have uneaten food lying on the bottom for long. The warmer the water the quicker the fishes digest their food. Most aquarium fishes prefer to swim near the top as there is usually more oxygen there. They go to the bottom to feed but generally swim near the top after. Veiltails can grow to a body length of 3 inches and if well cared for can live for 12-16 years. The creatures you see among the Daphnia are planktonic, a type of tiny worm which may do no harm to your fishes. Veiltails like a minimum temperature of 50°F (10°C).

I had stocked my pond with some small goldfish and three small catfish. I have now read that it is dangerous to other small fishes to have these in the pond. How can I catch them?

You can net them from the pond or empty it and get them that way. Should neither of these ways be possible you will have to fish for them. Take a medium sized garden worm on a piece of twine and lower it in the pond, preferably in the evening. Have a small stick as a float and when a fish has swallowed the worm draw it out carefully. Have a net ready to slip under the fish when you raise it from the water in case it drops off. Catfish can eat other fishes about two-thirds their own size.

THE AQUARIST
The annual show of the Blackpool and Fylde A.S. was one of the best they have held. There were 250 entries and an excellent condition. The results were as follows: Tropical Pouched Aquariums: 1. G. N. Hadley (Blackpool), 2. B. Crom (Blackpool), 3. C. G. Wright (Blackpool). Open Coldwater Aquariums: 1. J. E. Hayward (Lancashire), 2. B. C. Wright (Blackpool), 3. J. T. Hadley (Blackpool). Open Tropical Fish: 1. G. N. Hadley (Blackpool), 2. B. C. Wright (Blackpool), 3. J. T. Hadley (Blackpool). Any Other Variety Coldwater Aquariums: 1. L. A. Robinson (Blackpool), 2. J. E. Hayward (Lancashire), 3. H. R. Smith (Blackpool). Livebearers: 1. H. R. Smith (Blackpool), 2. L. A. Robinson (Blackpool), 3. J. E. Hayward (Lancashire). Best in Show: G. N. Hadley (Blackpool). The show was the work of the members and was well supported.

RECENT activities of the York and District A.S. included the annual dinner in March and the annual meeting. The dinner was held at the York Club and was well attended. The annual meeting was held at the York Aquarium and was well attended. The members discussed various topics and there was a good debate on some of the issues. The meeting was well run and the members were well satisfied with the results.

PLANS for the annual open show were tentatively discussed at the October meeting of the Peckham and Rotherhithe A.S. It was agreed that the show would be held on the first Saturday of May. The show was to be held at the Peckham and Rotherhithe Aquarium and was to be well attended. The members discussed various topics and there was a good debate on some of the issues. The meeting was well run and the members were well satisfied with the results.

MEMBERS of the Leycester Aquariums had a meeting on the evening of the 3rd of March. The meeting was well attended and the members discussed various topics. The members were well satisfied with the results.

AT the annual general meeting of the National Aquarium Society, the following officers were elected: President, W. A. Brown; vice-presidents, J. F. Perry; secretary, Mrs. H. E. Piercy; treasurer, J. C. Perry. The society was well attended and the members were well satisfied with the results.

THE recent meeting of the society was held on the 1st of March. The meeting was well attended and the members discussed various topics. The members were well satisfied with the results.

THE recent meeting of the society was held on the 1st of March. The meeting was well attended and the members discussed various topics. The members were well satisfied with the results.

THE recent meeting of the society was held on the 1st of March. The meeting was well attended and the members discussed various topics. The members were well satisfied with the results.

THE recent meeting of the society was held on the 1st of March. The meeting was well attended and the members discussed various topics. The members were well satisfied with the results.

THE recent meeting of the society was held on the 1st of March. The meeting was well attended and the members discussed various topics. The members were well satisfied with the results.

THE recent meeting of the society was held on the 1st of March. The meeting was well attended and the members discussed various topics. The members were well satisfied with the results.

THE recent meeting of the society was held on the 1st of March. The meeting was well attended and the members discussed various topics. The members were well satisfied with the results.
The Fighting Fish of Siam

By F. N. Ghadially

(Available now 3/6 plus postage 4d. from: The Aquarist, The Butts, Half Acre, Brentford, Middlesex)

The Aquarist's Badge

Produced in response to numerous requests from readers, this attractive silver, red and blue metallic badge for the aquarist can now be obtained at cost price by all makers of The Aquarist. The design is patterned here (actual size). Two forms of the badge, one fitting the lip-horned-box and the other having a bronzy-type finishing, are available.

To obtain your badge send a postal order for 2s. 6d. to The Aquarist, The Butts, Half Acre, Brentford, Middlesex, and please specify which type of fitting you require.

Prepaid Advertisements (continued from page 114)

Fish for the Pancreas—Young Breeding Firs of Aquilegus Orchidea, Apogonius Linneus, Astronotus Ocellatus, Aphyrodon Callicebitus, Bicolor Nigricans, Chloroticus, Cichlids, German Black Vulturina, Aequina, Apogon, Apogonidae Callicebitus, Bicolor Black, Maximus, Ornatissimus, Guppies, German Black Vulturina, Euphxia, Apogonidae Callicebitus, Bicolor Black, Maximus, Ornatissimus, Guppies, German Black Vulturina, etc. Appointments only. Phone: Bristol 6523.

B) Tanks are being installed in the new Aquatic Department of the Kensington Dog Show, 17, Kensington Road, London, W.8. Visitors are most welcome.

Fancy Goldfish from Mylo's fish food.

Box Fronted Aquarium complete with Thermometer and Humidifier and fitted Cover and Lights. Show Grade 24-12 in. with Thermometer and Humidifier. Cope to order. 3 x 12, 5 x 12. Tropical, Fish in variety. By rail agents: S.A.E. for at Naylor, 64, Derby Road, Selly Oak, Birmingham.

Plaques, Shields, etc.

E. HOLLAND & SON, 306, Oldbury Road, Smethwick. 40, Plaques, Shields, Medals, Cups and Medallions for Aquarian and Bird Societies. Tropical and Coldwater fish centres in full colour. Write for details to order.

The Aquarist
Feed
Your
New-born fish

LIQUIFRY, the tubed liquid food for baby fish

Liquifry No. 1 for egglayers. Liquifry No. 2 for livebearers—price 2/6d. per tube.

Rear them on BI-OL

BIOL, contains 73% protein. If left uneaten, Biol does not foul the tank, but produces copious infusoria. Excellent for marine aquaria.

Standard size 2/6d. for 7 grams. Breeder’s pack 5/3d. for 28 grams.

AND WATCH THEM GROW!

Available through your dealer or post free from

INTER-PET SUPPLIES COMPANY
SALES DIVISION OF LIQUIFRY CO. LTD. 18 CHURCH STREET, DORKING, SURREY

Please send for our catalogue

November, 1963
FOR THE BEST FISH-FOOD
McLYNN'S
FISH-FOOD
THE FOOD IN THE PLASTIC BOX 1/6, 2/6, 5/-, 6/6 & 17/6 THE DIET FISH PREFER CONTAINS EVERY ESSENTIAL INGREDIENT WILL NOT FOUL THE WATER
From your Pet Shop or direct from:
McLYNN'S AQUARIUM
EWHURST, Nr. CRANEIGH, SURREY
Telephone: EWHURST 446

FOR THE BEST BOOK
"ALL ABOUT TROPICAL FISH"
by D. McINERNY OF McLYNN'S AQUARIUM
75/- Postage 2/6

FOR THE BEST FISH & PLANTS
McLYNN'S
AQUARIUM
VISITORS WELCOME BY APPOINTMENT 11 a.m.–5 p.m. CLOSED ALL DAY WEDNESDAY BUY DIRECT FROM THE BREEDER ALL STOCK FREE FROM DISEASE SOLD UNDER A WEEK'S GUARANTEE S.A.E. FOR LIST WHOLESALE, OR RETAIL

HYKRO PRODUCTS from DENMARK
HYKRO: Fish Foods will keep your Fish in Show and Breeding Condition. The Famous Hykro Flakes 1/-; Breeders Packs 32/6.
HYKRO: Natura for all Fish 8d. HYKRO: Coldwater Fish Food 1/- 1 lb; Pack 2/-. Also used for Larger Tropicals. HYKRO: Shrimp-meal 10d. Good for all Fish but especially for Rearing Fry of all kinds. New Fish Foods appear on the market almost daily but Hykro Foods have stood the test of time 25 years, and are used extensively all over the world.
HYKRO Aquatic Appliances have also stood the test of time. Breeding Traps, Filters, Feeding Rings, etc. HYKRO Ichthyophilos. A wonderful cure for most Fish ailments 1/6. HYKRO Nutria Vitalizers 1/- are wonderful for promoting quick growth of Plants and where there is good Plant growth, Fish and other aquatic life will be in good health. HYKRO Lines, are stocked by all good pet stores and Aquatic Traders. Insist on the best.

IT'S HYKRO. Reasonable in price and absolutely unbeatable.

JOE GRASSBY (Importer and Wholesale Distributor)
The Hykro Depot, Mobberley, Nr. Knutsford, Cheshire.

THE AQUARIST
SPECIAL OPENING OFFER

1000 ANGELS 1/6 EACH

BLACK ANGELS 5/-
SWORDTAILS 2.0
BLACK MOLLIES 2.0
MALE FIGHTERS from 7/6

NEON TETRAS 2/-
ZEBRAS 1/6
PLATY VARIATUS (Pair) 5/0
PLATYS ASS. 2/0

MANY OTHER VARIETIES TO CHOOSE FROM
ALL STOCK GUARANTEED FULLY QUARANTINED

NORWOOD AQUARIUM
98A and B NORWOOD HIGH ST. LONDON, S.E.27. (Buses 2-68-196-40-2A-186-172)
OPEN 10 a.m. TILL 6 p.m. CLOSED ALL DAY MONDAY
500 YARDS FROM WEST-NORWOOD STATION

M ARSHALL’S F ISH F ARM
MARSHALL’S AQUARIAS
26, Westbury Lane, Buckhurst Hill, Essex. Open 7 days each week 10 a.m.-1 p.m. 2 p.m.-6 p.m.
(Telephone: BUCKhurst Hill 4788)

THIS CHRISTMAS BUY YOUR FRIENDS & RELATIVES AQUARIUMS, PLANTS AND FISH FOR PRESENTS

We stock all fish, plants and equipment for the ideal Christmas Present. We sell all books connected with fishkeeping including those written by Mr. Marshall himself. I.e. “Breeding the Egglayers”, “Breeding the Lophothis”, “Breeding the Lophothis”, “Breeding the Cichlids”, “Aquarium Management and Fishkeeping”, “Aquarium Plants and Breeds”, all clearly illustrated with photographs and all are exclusively available in this store at 5/- per volume, post free or at a complete set for 42.5/- post free.

Our 18-inch glass tank of 30 mixed plants at 6 varieties post free is still on offer. Also our own fishfood made from bloodfish hearts, best liver, blood, eggs and shrimp is obtainable sent direct from Hereford in perfect condition. Send for N.O.F.F. (Nature’s Own Fish Food) 2/- post free. From our Cichlids eat heartily being 99% protein. Teabag quantity 8/- post free. Many types of plants are always available. Send us for our current list.

CALLERS ONLY FOR FISH

WHOLESALE PLANTS, S.A.E. FOR LIST

THIS MONTHS BARGAIN OFFER—BLUE ACARAS AND ZEBRA CICHLIDS 2/6 each or 4 for 8/-
Our special offer of Thermostat, Heater (state wattage) and Thermometer is available post free for 20/-

November, 1963
LONGLIFE
Foods to enhance the natural colour of your fishes.

LONGLIFE Radiance Colour Food price 3s. 6d.
LONGLIFE Radiance Colour Caps price 4s. 5d.

These foods do not contain dangerous hormones which may render the fish sterile and shorten their life span.

Trust Longlife! First choice for over 35 years. Available through your dealer or post free from the sole U.K. agents:-

INTER-PET SUPPLIES CO., CHURCH STREET, DORKING, SURREY
For full details of other Longlife foods, please send for free booklet on Tropical Fish Care

USE "CORAL"
AS YOUR
BASIC FOOD
It is a BALANCED PROTEIN DIET, not just a cereal filler.
From dealers in 6d., 1/-, 2/- drums.

Keep Them Healthy on Coral
"Treatment systematic, information well laid out, standard of production high, illustrations good. The aquarist will be well served by this attractive and practical book."

New Scientist.

by Derek McInerny & Geoffrey Gerard

OVER 300 ILLUSTRATIONS — 100 IN COLOUR 75s.

HARRAP
ORDER NOW from your local bookshop or pet shop

Add Colour to that
"SPECIAL" SHOW TANK this Christmas with

PERMA-COLOUR AQUA-GRAVEL.
Nine wonderful natural colours from which to choose. Available in 2 lb polybags or loose.

PENN-PLAX 3D BACKGROUNDS
Three styles in three sizes
They add both depth and colour. Fit outside the aquarium in a matter of seconds.

Then—

THE WIL-NES "AQUA-VAC"
The battery-operated Aquarium vacuum cleaner, will keep the whole tank sparkling fresh and free from sediment.

All the above are available at your local stockist and are distributed exclusively in the U.K. by T.F.H. PUBLICATIONS (LONDON) LTD • 59 STATION ROAD, REDHILL, SURREY

NEW EDITION — 4th impression

ALL ABOUT TROPICAL FISH

Two New Foods from wardley's

TRI PELLETS 4/-
Now you can feed the three most essential components of tropical fish nutrition in combination — separately or alternately with WARDLEY's NEW TRI PELLETS, in the convenient pellet form.

TRI PELLETS contain Nature Pellets — Liver Pellets — Fish Pellets all in one container. Each pellet has a characteristic colour for easy recognition.

Ideal for all species of aquarium fish, TRI PELLETS is a real treat, a nutritionally sound treat, for your valuable aquarium fish.

High in animal protein, low in fat, TRI PELLETS provides balanced nourishment economically—in the Jumbo 15 oz. aquarium fish container.

HIGH PROTONE 4/6
* A WARDLEY exclusive — new 80% protein food formula for aquarium fish.
* Now your valuable aquarium fish can have good quality protein with all the essential amino acids an important to health, growth and longevity.
* New process ensures complete uniform protein biologic value which means your aquarium fish will grow more rapidly.
* High Protone is low in fat—eliminates the toxic, depressor effect of polymerised fish oil commonly found in ordinary tropical fishfoods.
* High Protone is available in WARDLEY's exclusive homogenised micronucleated form—makes the food readily available to your fish—no decomposition of aquarium water.
* Packaged in glistering aluminium foil—it protects as it decorates.
* Jumbo size—15 oz.
* High Protone—the highest protein aquarium food available is ideal for maintaining tropical fish prior to, during and after the breeding process.
* High Protone is an ideal starting ration for small fish—excellent for hatchery use.
Bayldons TropicaI5
Hillview Farm, Locking Road, Weston-super-Mare

Hours of Business: Tuesday-Saturday 2 p.m.—6 p.m.
Sunday 10 a.m.—6 p.m.
Closed all day Monday

Directions—Premises are situated on the main Bristol to Weston Road, approx. 200 yards from the Borough Arms Hotel. Bus stop: Baytree Road premises are opposite to this bus stop.

This is the largest breeding establishment in England

In addition large consignments of fish are imported at approx. 12-14 day intervals direct from South America and Far East. This includes rare and very rare fish, also plants. Included in the last South American consignment was the most rare Euloves Paradoxus and the beautiful Gold Lamé Tetra. Consignments are due in from South America also Far East, also expected are rare and most rare Crypta’s. These consignments should be available when this advert is published.

Traders—are you getting your share of these rare fish? Our standard is second to none. Out of 5,000 fish sent out last week we have received one claim for 6 dead on arrival and this was on a 24-hour overnight dispatch. Dozens of really satisfied traders deal regularly with us. We have no hidden quarantine department, everything is open for inspection. We have nothing to hide because we buy the best, and after feeding for a few days of our unlimited Daphnia etc. we guarantee if you can buy better, you can have your money back.

Phillips Fish Food
Fine Grade for TropicaIs and Coarse Grade for Cold-water Fish®

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

For all Cold-water Fish — 1/6d
For TropicaIs — 1/6d

South West London Petfish
554 Garratt Lane, London, S.W. 17
(Pear Lambridge Station, S.W.)
FISH, PLANTS, ACCESSORIES
Early Closing Weds. (Phone Lakeside 2000)

Aquarium Putty
Made specially for AQUARIUMS

★ WATERPROOF ★ A SMOOTH PUTTY ★ EASY TO USE

Makers of the famous Fillers & Stoppings.
If unobtainable write direct to manufacturers.

Brummer Ltd, Oyster Lane, Byfleet, Surrey

The Aquarist
FOR HEALTHY TROPICALS...
AND THE BIGGEST SELECTION OF PLANTS,
FOODS, TANKS, STANDS, LIVE FOODS AND:
THE LATEST ACCESSORIES, VISIT

THE PET SHOP
NEW ZEALAND AVENUE,
WALTON-ON-THAMES, SURREY (Tel. 24076)
Open until 6.30 p.m. Fridays

"MOLLIFUD"
This advertisement is for the benefits of the new starter in Fish
keeping. The old hands know the advantages of feeding all fish
with MOLLIFUD, it has no Bees in to make holes which could
the water. No colour feeding chemicals to shorten the life of your
fish, it can complete wholesome foods most of which, fish get in the
wild.
The trade can get it from Tom C. Saville & Son, 8 Station Road,
Boston, Nottingham, who can be relied on for prompt
efficient service.

MADE ONLY BY THE BANKHEAD
TROPICAL FISHERIES, SEAHAM

I’ve Got Millions!
WORMS! FOODS! COMPOSTS! RESULTS!

EUGLENA
PICROWORMS
MICRO FOOD
GRINDAL WORMS
GRINDAL FOOD
GRINDAL COMPOST
WHITE WORMS
WHITE WORM FOOD
WHITE WORM COMPOST

24—b. With 8 page instructional booklet
2.6—Complete with feeding powder
2.4—Specialty developed for Plain
2.4—Plinius W. W. W. E. to breed
2.4—Plain culture in wooden boxes
2.4—High protein content, rapid results
2.4—Fresh culture in wooden boxes
2.4—Freshly ground with organic base
2.4—With complete instructions
2.4—Nutrient culture in wooden boxes
2.4—Exotic formula. No mildew
2.4—Compost for golden breeding

Boxed — Post 2.8 kg. 50 pence for 7/6

Ask your dealer, or free delivery from
E. ARNOLD, 88, MONEGA ROAD, LONDON, E.7.

REPTILES — AMPHIBIANS
Imports from all Continents
Write for current price list
Sale agency for England:
G. A. IZZARD
13, Romney Close, Chessington, Surrey

Drs. W. De ROVER
Quartier des Arts du Saut Ouest
Fayence, Var, France

Don’t be ignorant—ask
the Man Who Knows at

QUINN’S PET STORE
8 Harmony Row, Govan, Glasgow
Telephone: GOV 1881

40 Aquariums containing Scotland’s
finest collection of tropical fish
including Marine Tropicales for sale.
Come and see us, you will be pleasantly
surprised. Equipment and fish dis-
patched anywhere including Europe
and the U.S.A.

OVER 100 VARIETIES
OF TROPICAL FISH
IN CLEAN HEALTHY TANKS
PLUS a wide range of Equipment.

Stockist of:-
Arbe Aquariums. Topsy Bow Bookcase
Aquariums. Full range of standard
Tanks. Pumps. Hy-Flo, Ozonia,
Zoobeco, Quiko. Montrose Topsy
Fairy etc. Electrical Equipment. Es-Es
Uno Constat. Springfield Inter-Pet.
Perma Gravel. 3D Background etc.

H.P. terms Available. Send 6d. for
full Illustrated Catalogue.

KEITH BARRACLough
AQUARIST
215, Gr. Horton Rd., Bradford 7. Tel. 73372

November, 1963
PREPAID ADVERTISEMENTS

\textbf{WANTED}

PET FISH will be pleased to purchase in quantity for your surplus fishes and plants. Petfish, 954, Gerrard Lane, London, S.W.17 (near Battersea Station, S.R.), box announcement on page 41.

\textbf{FOR SALE}

GLAZED aquariums in all sizes including 36 x 15 x 12, 76 x 6; 18 x 10 x 6; 17 x 4; 36 x 12 x 12, 36 x 12 x 36. High tanks, 36 x 12 x 12, 36 x 12 x 36, 36 x 12 x 15, 36 x 12 x 24, 36 x 12 x 36, 36 x 12 x 36, 36 x 12 x 48. All sizes, please!- Greenray Aquariums, Highview, New Malden, Surrey.

\textbf{PERRY'S} for Prices, 1st and 2nd Awards British Aquariums' Festival to be held at the Aquariums' Society, Battersea, S.W.15, 1st June. Small items, please!- George Perry, 11, Grafton Street, London, W.1. (Ph. 328205).

\textbf{YERBARY} for Plants, 1st and 2nd Awards British Aquariums' Festival to be held at the Aquariums' Society, Battersea, S.W.15, 1st June. Small items, please!- George Perry, 11, Grafton Street, London, W.1. (Ph. 328205).

\textbf{FOR SALE}

\textbf{SUPER VALUUM Guppy, £1 per pair; Blue Algae, 5c. each; Angelica, 2c. each; Goldfish, 3c. each; Guppy, 3c. each; Siamese Fighting Fish, 3c. each; C. R. Perry, Professional Aquariumist, 617, West Street, Crewe.}

\textbf{EASY TERMS.} Sell your old aquarium as easy as pie. Air Pumps, Heaters and Thermometers, Filters, Bubbling Stones, etc., all included. Confidential. Previous arrangements made with some of the most prominent importers of tropical fish and plants. Send a note for "A" Catalogue. J. L. Alzheimer, 12, Parts Farm, Crewe.

\textbf{AQUARIUM FRAMES.} For sale! 30 x 75; 150 x 75; 250 x 75; 300 x 75; 450 x 75; 600 x 75. All sizes. Send for price lists!- C. R. Perry, Professional Aquariumist, 617, West Street, Crewe.

\textbf{WOOD IN STOCK} for sale! For tropical fish, plants and aquaria. Complete sets for the aquarist in the 100 gallon size. 14, Harrods, London, SW1.

\textbf{PREPAID ADVERTISEMENTS continued on page 154}
TACHBROOK TROPICALS
244 Vauxhall Bridge Road
Vic 5179

This is not a press gang but a splendid staff
eager to attend to your every need

COMPLETE CATALOGUE AVAILABLE SEND 6d. TO COVER POSTAGE, ETC.

POST!!!

ALL PARTS OF THE U.K. ALL PARTS OF THE WORLD. WE OFFER YOU
A POSTAL SERVICE SECOND TO NONE—PROMPT AND EFFICIENT—ALL
ORDERS ARE ATTENDED TO ON THE SAME DAY AS RECEIVED,
IMMEDIATE NOTIFICATION GIVEN IF ANY DELAY IN DELIVERY
TROPICAL AQUARIUM PLANTS. Send S.A.E. for full lists

RARE CRYPTOCCORYNE. Nov-Dec. only
- C. Anne/E/Frances 80- each, 3 for 20-.
- C. Cordata (true species) small plants 5- each, 6 for 20-.
- C. Improper 30- each, 3 for 25-.
- C. Harri 10- each, 3 for 25-.
- C. of above all sold out (until Xmas)

ECHINODORUS IN VARIETY
- E. parviflorus (variegated sword) 7- each.
- E. speciosus (red sword) 2.5 each.
- E. Bontani (collinsiana sword) 15- each.
- E. of above all sold out (until Xmas)

SPECIAL — LARGE FLOWERING LACE PLANTS — 15- each. UNTIL XMAS

UNDERWATER BANANA PLANTS. 4 for 10-.
- DIOSPIRUS DIANORA — Water Hyacinth 10-.
- BUNCH. WILLOW-LEAVED HYDRANGEA 10-.
- GIANT MONOPHILA 10- each. 3 for 20-.
- CRYPTOCCORYNE CILIATA 15- each. 3 for 40-.
- BRILLIANT, WINE-BRED ALTERNANTHERA. 15- each.
- FOUR-LEAF WATER CLOVER 15- each. 3 for 40-. UNTIL XMAS

VALLISNERIA CONTORTIONIST — 2- each. 20- Dozen. Small plants 4-.
- TWINNED VALLISNERIA — LARGE PLANTS 12- Dozen. MEDIUM 9-.
- SMALL 6- Dozen

SPECIAL WINTER COLLECTION:

30 PLANTS INCLUDING 10 ASSORTED CRYPTOCCORYNE, 1 CAPE SPATTERDOCK, 1 MELON SWORD PLANT FOR 40- post paid.
UNTIL END OF JANUARY ONLY

TROPICAL FISHES.

CARDINALS, BLACK NEONS, PHANTOMS,
all well grown.
CATFISH:
- LEOPARD.
- SPOTTED.
- RABAUTI.
LEOPARD DANIO (ADULT)
- 2.5 each.
BARILUS SPECIES (NEW FROM CONGO)
- 10 each.
- POLYPTERUS PALMAS
- 50- each.
- EXADON PARADOXUS
- 20- each.
- ANOSTOMUS ANOSTOMUS
- 50- each.
- ANOSTOMUS ANOSTOMUS
- 50- each.
- ANOSTOMUS ANOSTOMUS
- 50- each.
- ROSE TETRAS, LEMON TETRAS, SCARLET TETRAS,
all well grown.
- BLOODSPLASHED BEACONS, PLATYS, GLOWSPOT.
- 2 each.
- NEON TETRAS.
- WILD PERUVIAN GOOD SIZE
- 3 each.
- COPEIA GUTTATA
- 7.5 each.
- GREEN DISCUS
- 30-.
- DISCUS HECKEL
- 60-.
- TRUE BROWN DISCUS
- 15-.
- TALKING CATFISH
- 7.5 each.
- BLUE DISCUS
- 200-.
- GOLDEN TENCH FOR AQUARIUM OR POND
- 5- each.
- 30- Dozen.
- COLD-WATER AQUARIUM FISHES: ORANDAS, BUBBLE-EYES, CELESTIALS.
- FROM 10-.
- 50- each.

PLEASE NOTE: All inquiries requiring a reply MUST be accompanied by S.A.E. Our premises are situated on the main Stratford-Birmingham road, 6 miles from Birmingham, Midland. "Rosy" Bar No. 150 from Bull Ring, Birmingham, pass the door, slight at "The Crown." Monksbrugh. HOURS OF BUSINESS: Weekdays 10 a.m. - 6 p.m. Summer, 10 a.m. - 1 p.m. Winter. Sundays 10 a.m. - 3.30 p.m. (Also Sunday Afternoons June - July Only.) CLOSING DAY EVERY MONDAY. TERMS OF BUSINESS: Cash with order please. Fish sent by tann. Cold water minimum order 31 plus 10- each carriage. Plants by post (minimum order 10-), please add 1/6 for postage and packing.