

The Aquarist

and Pondkeeper

SEPTEMBER 1963



MONTHLY
Vol. XXVIII No. 6

TWO SHILLINGS

WALTER R. SMITH

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Aquaria also Tropical Marine

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

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Price 2s. 6d. per tube

Rear them on BIOL — the dried pure plankton culture. A tremendous help to growing fish —
contains 73% protein. If left uneaten, Biol does not foul the tank but produces copious
infusoria. Price 2s. 6d. per vial of 7 grams, or Breeder's pack containing 28 grams for 5s. 3d.

Then . . . keep them fit with

PLEASURE granulated conditioning food, price 1s. 9d. per drum and **BIOL**

LIQUITOX (capsules of Phenoxetol) The proven specific for Fungus and
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Colourless — effective — does not harm the plants. Definite dosage given by ingenious chart.



Before Treatment



After treatment

These photographs were taken by Professor Dr. A.
Stolk of Amsterdam University, and show the remark-
able effect of LIQUITOX.

Price 1s. 9d. per carton of 2 capsules; Breeder's pack
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"REGENT"
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**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, disposes 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 12/6 each. 24" tanks at 15/- each

Other size tanks see fitting chart of filter box

Pamphlet willingly sent on receipt of 3d. postage

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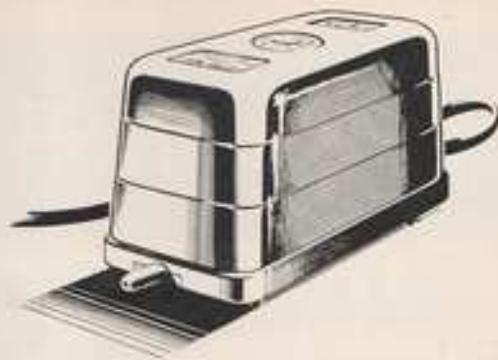
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SHOULD BE

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VIBRATOR



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Proprietor: MAX GIBBS—Manager: GEOFF CONWAY

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Telephone: OXFORD 41825

The following fish were available ex stock at the time of going to press:

Barbs			
Colours bred Tigres ...	1 0	Mohagony Characins ...	2 0
Wild Tigres ...	2 0	Congo Salmon ...	20 0
Golden Barbs ...	1 0	Catfish and Loaches	
Nigger Barbs, large tank bred ...	1 0	Kuhli's, large ...	2 0
Nigger Barbs, Large Wild ...	1 0	Leopard Kuhli ...	2 0
Cunningham Barbs, Adult ...	4 0	Bronze Catfish ...	0 0
Cherry Barbs, Adult ...	1 0	Leopard Cat, Juvs ...	0 0
Cherry Barbs, tank bred ...	2 0	Red Tailed Black Sharks ...	0 0
Chaper Barbs ...	2 0	Red Tailed Barbs ...	7 0
Turkic Barbs ...	10 0	Cichlids	
Marbled Barbs, large ...	1 0	Furciosa ...	4 0
Characins		Blue Acara ...	4 0
Golden Line Pencil, large ...	4 0	Vietnam Angels ...	4 0
Golden Line Pencil, small ...	3 0	Leus Angels ...	4 0
Japonese Fredaris, small ...	7 0	Normal Angels ...	2 0
Belgian Flag Tetras ...	1 0	Egyptian Mochloneus ...	0 0
Pinny Tetras ...	1 0	Nannacara Amazona ...	4 0
Neon Tetras, medium ...	2 0	Apes, Ranzel ...	2 0
Neon Tetras, 5 Str ...	10 0	Apes, Ranzel ...	0 0
Neon Tetras, large coll. bred ...	0 0	Bushies	
Greylight Tetras, large ...	7 0	Scorpaenids ...	4 0
Green Tetras, large ...	2 0	Haircutters ...	4 0
Green Tetras, medium ...	2 0	Danios	
Red Eyed Tetras ...	2 0	Zebra ...	0 0
Red Tailed Tetras ...	0 0	Pearl Danios ...	0 0
Bananas ...	0 0	Giant Danios ...	4 0
Serpent Tetras, small ...	0 0	Spotted Danios ...	4 0
Royal Tetras, large ...	0 0	Labrynth	
River Tetras, small ...	0 0	Male Fighters, Plum ...	10 0
Pompano ...	0 0	Female Fighters ...	0 0
Blind Cave Fish ...	1 0	Kissing Gouramis ...	0 0
X-Rays ...	2 0	Parrot Fish ...	0 0
Bloodfin ...	2 0	Pearl Gouramis ...	4 0
Copeina Outata ...	7 0	Blue Gouramis ...	0 0
Copeina Arcoib, adult ...	0 0	Dynalio Gouramis ...	2 0
Cardinals ...	7 0	Dwarf Gouramis, 30 col. ...	1 0
Red Wood Tetras ...	0 0	Thick Lipped Gouramis ...	1 0
Flame Fish ...	2 0	Livebearers	
		Red Swordtails ...	2 0
		Albino Swordtails ...	2 0
		Red Eyed Red Swords ...	3 0
		Red Sailfin Swords ...	10 0
		Vietnam Guppies, pairs ...	0 0
		Leopard Guppies, pairs ...	2 0
		Black Guppies, pairs ...	4 0
		Perma Black Mollies ...	0 0
		Wagtail Platys ...	0 0
		Red Platys ...	0 0
		Black Platys ...	0 0
		Platy Varietas, pairs ...	0 0
		Large Male Red Platys ...	4 0
		Other Varieties	
		Rhino Horned Gobies ...	0 0
		Bumblebees ...	0 0
		White Clouds ...	0 0
		Parrot Danio ...	4 0
		Scars ...	10 0
		Moss ...	10 0
		Australian Rainbows ...	0 0
		Northernharbour Hatchery ...	10 0
		Goldfish	
		Small Orandas ...	1 0
		Small Black Moons ...	1 0
		Extra Large Orandas ...	0 0
		Extra Large Lionheads ...	0 0
		Celestials ...	50 0
		Mollies	
		Completely sold out ... more expected within a few days	

Plants. All at 6d. Equisetum, Dipsosaurus Polysternum, Bacopa, Sagittaria, Lantana, Myrsine, Ludwigia, Vallis, Typha, Giant Hyacinth 1s. 6d., Indian Fern 1s. 6d., Water Woad 1s. 6d., Cryptocorynes 1s. 6d. and 2s. 6d., Aponogeton 2s. 6d., Hair Grass 1s. 6d. per 100, Ambula 1s.

The following are in quarantine and should be available at the time of publication of this magazine: Glass Cat, Silver Sharks, Black Sharks, Red Finned Sharks, Bubble-goes, Pearlfishes, Marble Cichlids, Neotetra Cichlids, Puffers, Spiny Eels, Red Tereby Swords, Sucking Loaches, small Calico Goldfish.

Please include 10s. towards the cost of the packing and advice charge with all orders. Minimum order value, excluding the 10s. carriage charge, is £3 for fish. Please add 1s. 6d. postage for Plant orders. Customers must state the Magazine station from which they will collect their fish on arrival.

All except eight of the above listed species were available to wholesale customers. Bona Fide traders should write for our current trade list.

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

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WHATEVER YOU NEED, IF IT IS WORTH
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THE SPRINGFIELD SAFETY CONTACT THERMOSTAT

TYPE E.T.5

Which has caused such a sensation
in the aquarium world.

PRICE 12/- Post Free

Does not burn any current—saves electricity. Guaranteed for one year. Developed specifically for the temperature control of tropical aquaria, but also used for a variety of other purposes. A safety cap is provided to protect the adjusting knob from unauthorised tampering, and an earth terminal is available for optional use. Designed by a leading engineer expert, this instrument incorporates the latest techniques and embodies features usually only found in much more expensive apparatus.

Over the years we have built a reputation of which, I think you will justly proud. It follows, therefore that we do not lightly recommend anything unless used and proved to our somewhat exacting standards. Once in a while something of exceptional merit appears, and such is the Springfield Thermostat type E.T.5. Prototypes have been running continuously for over five years, and now that this model is in full scale production, we are pleased to recommend it with our fullest confidence. An interesting booklet with further particulars will gladly be forwarded on receipt of S.A.S.



Illustration just over one third full size, shows thermostat clipped to tank with safety cap removed.

EXCEPTIONAL VALUE IN IMMERSION THERMOSTATS



Illustration (actual size).

The Springfield Brand of immersion thermostats represent some of the best values to be obtained today. There are three models, all sensitive precision instruments built for long life and stability, from the best materials and workmanship, and sold at popular prices. They are all fitted with double sheathed waterproof flex and extra heavy glass tubes with reinforced rims, heavy solid fine silver contacts, magnetic film, and are fully guaranteed for one year. Although preset at the factory at 74°F (approximately 23°C) they are easily adjustable to individual requirements, and will give years of satisfaction.

Springfield Thermometer type CS-11 10/- Similar to illustration, but with opaque body and no neon indicator.

Springfield Thermometer type CS-11N 12/6 Same as the 11/- model but with neon indicator.

Springfield Glowlight Thermometer 18/6 As illustration. The deluxe model with clear transparent body which glows around the neon indicator, so that light is seen in one position.

THIS MONTH'S SPECIAL OFFER

Due to the delays of an export order, we have acquired a large consignment of Glowlight thermostats, at a substantial discount, and while stocks last, offer these fine instruments at the reduced price of 15/6 post free.

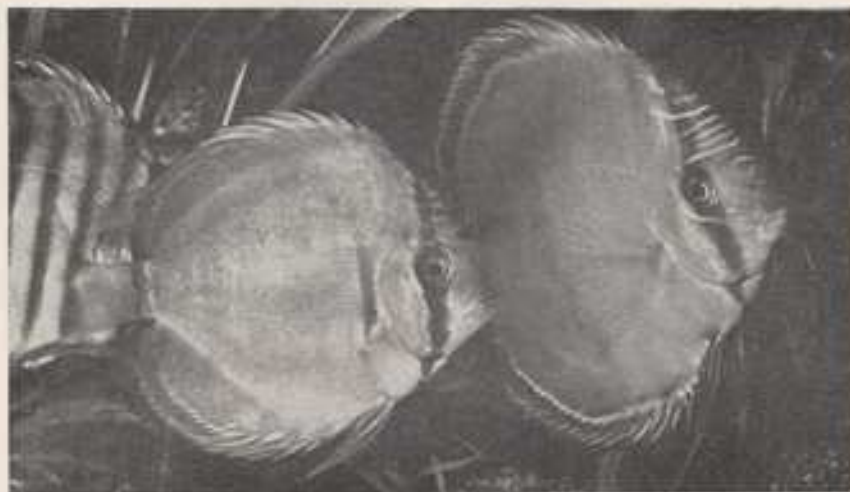
Made in England by Springfield Thermostat Co., Marlow, Buckinghamshire.

TOM C. SAVILLE LIMITED

9 Station Road, Beeston, Notts.

Phone Nottingham 25-5655

Feeding your fish



QUESTIONS

- What food can I feed my Giant fish on.
 What can I feed my Angels, Discus and Dwarf Cichlids on.
 What can I feed my Loricata and Tank Carps on.
 What is the best diet for all my Tropical fish.
 What is the best food to feed to my breeding pairs.
 When I have bred my fish what is the best food to raise them on.
 When preparing fish for exhibitions, to get them into full colour, what is the best food.
 When I go on holiday, what is the best to leave for others or visitors to feed to my fish safely.
 If I get some fish requiring old water conditions, how can I treat tap water.
 If I get disease from my fish what are the best cures.
 If I use water from the tap and it contains Chlorine, how do I best remove it.
 If my Aquarium gets in bad condition and the fish off colour or the water is fouled by bad food, how do I remedy this without changing the water.
 If specialise in Goldfish, what are the best foods for me to use.
 How can I improve the plants in my Aquarium and make them better quality.

ANSWERS

- Daphnia, Tubifex, Whiteworm, and Tetramin Staple Food.
 Daphnia, Tubifex, Whiteworm, and Tetramin Staple Food.
 Extra large Bikes available for large fish.
 Daphnia, Tubifex, Whiteworm, and Tetramin Staple Food.
 Daphnia, Tubifex, Whiteworm, and Tetramin Staple Food.
 Daphnia and Tetramin Staple Food and Tetramin Special Conditioning Food.
 Infusoria, Brine Shrimp, Small Daphnia, and Tetramin Special Growth Food.
 Daphnia, Tetramin Staple Food, Tetramin Colorants for Grasses and Tetramin Habitat Copper Spheral.
 Tetramin Staple Food in tablets is the perfect answer.
 Use Tetramin Blackwater Tonic.
 For Spot use Tetrazene Contra-fish. For Fungus use Tetrazene Fungal-fog.
 Use Tetrazene Anti Chlorine.
 Use Tetrazene General Tonic.
 Daphnia, earthworms, and Anemia Fluke Foods.
 Use Tetramin Phosphate.

TETRAMIN AQUARIUM PRODUCTS ARE AVAILABLE FROM ALL PET SHOPS. INSIST ON NO OTHER

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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:

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"ALL ABOUT
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by D. McINERNEY OF
McLYNN'S AQUARIUM
75/- Postage 2/3

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FOR THE BEST FISH & PLANTS

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VISITORS WELCOME
BY APPOINTMENT
11 a.m.—5 p.m. CLOSED
ALL DAY WEDNESDAY
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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/- 1/2 lb; Pack 2/-. Also used for Larger Tropicals. **HYKRO:** Shrimp-meal 10 1/2d. 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 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 submersed. Therefore can be hidden behind rocks, etc.

- Price only 29/6. 100w., 125w., 150w.

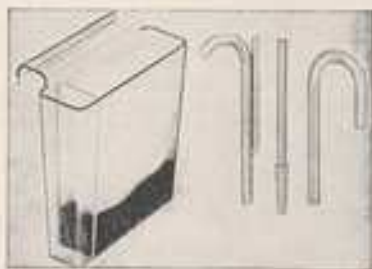
This Heater-Thermostat is finding great favour among aquarists with decorative community tanks, since the instrument can be completely concealed. Aquarists with heated fish-houses find the instrument ideal for raising one particular aquarium above the fish-house temperature.

STOP PRESS !! Look out for next month's announcement of a superb new Gro-wel product !

GRO-WEL superior filters for best AQUARIUM CLARITY.

Moulded of strong, clear polystyrene.

These popular and well-tried products are made by GRO-WEL FISH-ADE CO. INC., U.S.A.



All the above are available through your dealer or post free from

INTER-PET

SUPPLIES COMPANY
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OUTSIDE FILTERS

To fit all aquaria frames up to 1" wide.
"SLIM JIM": The slimmest outside filter on the market. A quality filter for only 17s. 6d.
"KLEAR KING": 3-Compartment filter. Separate compartments for glass, wool and chemical. Removable partitions plus a large siphon stem for faster recirculation. Clog-proof screen mesh giving a steady, non-splash flow. Price 22s. 6d.

TRAPS

5-WAY CONVERTIBLE TANK TRAP: The most versatile trap available. Can be used for breeding 1 or 2 livebearers, as a rod trap for breeding egg-layers or as a self-cleaning display tank for 1 or 2 Betta. Price 28s. 6d.

INTERNAL FILTERS

BOTTOM FILTER: For filtering and aerating the tank. Handsomely styled. Unobtrusive and efficient. Price 9s. 3d. As recommended in T.F.H. for Marine Aquaria.

Ornamental ROCK FILTER: Looks like a rock but is primarily an efficient filter and keeps tanks up to and including 18 gallons sparkling clear. Price 17s. 6d.

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THE LIQUIFRY COMPANY LIMITED

SPECIAL PLANT OFFERS

EXTRA SPECIAL

Water lettuce, very beautiful plants . 3/6
Hairgrass 3/- Water Clover 3/-

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20/- PLANTS FOR 10/-

2 Cryptocoryne Beckwithii	4/-
2 Cryptocoryne Hartmanniana	7/6
4 Bacopa	4/6
2 Amazon Chain Swards	3/-
2 Micro Sagittaria	11/-
Times for 10/-	20/-

OFFER No. 2

30 Assorted Tropical Plants 10/-

OFFER No. 3

36 Assorted Tropical Plants 20/-
including Cryptocorynes, Wisteria, etc.

OFFER No. 4

30 Coldwater Plants
for your aquarium or pond 10/-

BOW-FRONTED AQUARIUMS

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

WITH PLAIN STAND

Backs 48 x 18 x 15	£21 0 0
36 x 12 x 15	£15 10 0
24 x 12 x 15	£11 10 0

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

We now stock the new rush-proof aquaria with nylon coated frames and plastic covers.

18 x 19 x 13	44 4 0
34 x 12 x 13	44 0 0

(Complete with plastic cover)

STANDS

18 x 10 x 36	35/-
24 x 12 x 36	45/-
30 x 12 x 36	55/-
36 x 12 x 36	55/-

REMEDIES, etc.

Aquarium	3/6	Clarin O/Nat by post	2/6
Broniam White Spot	2/-	Liquidator	1/6
Cure	2/-	Diseasex	2/6
Vivo Salts	1/6	Broniam Fertilising	1/6
Sea Salt	1/6	Tablets	1/6

Tetrazone all 4/- each

Please add 1/- extra postage on appliances orders up to 10/-, 1/6 up to 20/-, 2/- up to 30/- Glass, China and Shells sent at purchaser's own risk.

THERMOSTATS

Constat External	30/-
Constat New External	22/-
Type OK	22/-
UNO	18/-
Out/Ad	15/-
In/Ad	15/-
Inst/Ad "Poplar"	15/-
"Poplar" with heat indicator	12/6
Rata (with New)	11/-
"Ea-Ea" Standard	10/6
Springload Safety	22/-

THERMOMETERS

Mercury	each
Gem	6/6
Fauna Becked	4/6
Spirit Blue Gem	5/-
"Ea-Ea" Dummy	6/6

FILTERS

"Windmill" Plastic	each
Outside Filter	19/6
"Windmill" Biological	each
Aquarium Filter 12in. 15in.	15/6
"Windmill" Bagless	each
Inside Filter	10/-
Corner Filter	6/-
Air Lift	2/6
"Wan Zan" Outside	17/6
Filter	17/6
"Klear King" Outside	22/6
Bottom Filter	8/3
Ornamental Rack	17/6
Filter	3/6
Use Polytim	3/6

AERATORS & PISTON PUMPS

Mozzetta	each
Star	21/-
Star	24/-
Star	27/6
Star	34/-
Star	42/-
Zachek's Total	75/-
Hydra Junior	87/6
Hydra "A"	130/-
Hydra "B"	142/-
Hydra "C"	250/-

HEATERS

"QUEENSBOROUGH"	each
150w.	10/-
250w.	10/-
350w.	10/-
500w.	10/-
750w.	10/-
1000w.	10/-
1200w.	10/-
1500w.	10/-
Rata (75-200w.)	10/-
"Ea-Ea" Flexible Heaters (100w. and 150w.)	19/-
"Ea-Ea" Thermostat	19/-
Heater 100w. and 150w.	36/-
Pre-set-matic	24/6
Inter-Pet Thermostat	22/6 and 26/6
Heater Holders	2/-

BACKING PAPERS

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

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Brine Shrimp Eggs	2/6 and 4/6
Cultures of	
Neon Worm 1 in.	7/6
"2" "	13/6
White Worm	2/-
Micro Worm	3/-
Tubular worm	1/6 and 2/6

BOOKS

Guide to Tropical Fishkeeping	36/6
(J. H. P. Bennett)	
Discus of Fishes	15/6
(C. Van Duijn)	
All about Tropical Fish (Millar)	77/-
Encyclopedia of Tropical Fishes	62/6
(H. R. Audrod and W. Van der Woude)	
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Queries about the Shubunkin

HERE are some more answers to questions received since the publication of my articles on shubunkins. I cannot pretend that my answers to the queries are the final words to be spoken on the subject; that would be ridiculous, but if what I have written provides food for thought then my objective is achieved.

Yellow and Brown

You seem very preoccupied with red. What is wrong with yellow and brown—the show standards call for three.

Granted that the standards mention yellow and brown; but, as I have tried to point out previously, fish with much yellow/brown are most undesirable fish to breed from. I have found this type of fish very unsatisfactory as a brood fish as almost all the fry were dull in colour and took a very long time to assume adult coloration. The reason for this, in my opinion, is because the fish have lost the red/orange factor and could be compared with a metallic that has reverted (or, because of a very slow colour change, partially reverted) to the wild ancestry. I suggest that yellow is an albinistic form of the red/orange factor, and brown is merely a mixture of yellow and black. No doubt a show fish can display a small quantity of yellow and brown and be very attractive, but I do not think these colours have any place in the breeding tank.

Judges and Judging

Do you think that the standard of judging has deteriorated in the last few years?

This is a hardy annual. It would appear that the standard of judging has consistently deteriorated ever since shows began, according to certain competitors. Seriously, we all can point to certain instances where, by a general consensus of opinion, the judge had blundered. I know of a case where a twinstail with one globe eye and one normal eye was judged to be best coldwater fish in the show. I also know of a case where the show secretary demanded that the judge change the awards made, and the awards were changed. In spite of instances of this nature I still think that on the whole our judges do a very good job and try to interpret the standards laid down to the best of their ability. By far the majority deserve our confidence and support in a thankless task. I would advise aquarists to enter shows for the social pleasure and go along with the firm intention of enjoying the occasion. They must be philosophical about the awards made and not sour the

occasion for themselves and others. Of course, mistakes in judging will occur, but let us accept the decision with good grace. If you enter a fish that affords you great pleasure to behold, remember that whether it is placed first or last it is the same fish, so enjoy its splendour untarnished by pride or resentment. However, the cold-water fancier has one legitimate grouse. Small shows, which are predominantly tropical, engage judges who are competent for the tropical sections but who are also expected to cope with coldwater classes, and in these they are not always so competent to judge.

Colour Pattern

Is it possible to fix a certain colour pattern in a shubunkin?

This is an awkward question to deal with briefly. It is not difficult to establish recognisable family characteristics in a strain of shubunkins. Indeed, I pride myself that I can easily recognise the family characteristics, which have been brought about by accident or design, in the strains of several shubunkin fanciers. But can a remarkably similar colour pattern be transmitted by parents to progeny? I would say the answer is yes—with two reservations. First, it would be transmitted to a percentage only of the offspring. Secondly, the colour pattern would not be an exact replica (to the same degree as transmitted in tropical fishes), at least not within one person's lifetime. To achieve this end the genetic make-up of the brood fish must be exactly alike as possible and the only recourse the breeder has to attain this is inbreeding. This means mating son to mother and/or daughter to father as well as brother to sister matings. After about four generations there will be a definite and recognisable similarity of the colour characteristics in a percentage of the progeny. Now, a serious note of warning. Should you attempt this the original parents would have to be near perfect in every detail, because with inbreeding the undesirable as well as the desirable features are transmitted. The trouble with inbreeding is the loss of vigour in the strain. By the time the breeder achieves his objective it is time to outcross for new vigour. Frankly, I prefer line-breeding; it gives variety in moderation and can be pursued indefinitely.

Desirable Features

What, in your opinion, are the most desirable features to aim for when breeding shubunkins?

I realise you do not want a recital of a show standard so I will try to avoid making this sound like one. Body shape is very important and that together with a broad well-held caudal should impart to the fish a proud yet graceful and elegant bearing. The position of the mouth is important to me. I like to see it not merely at the end (centre) of the head but much lower, "tucked under" as it were. Colour, too, is of vital importance. My fancy is a head of deep red and a body of red/orange and royal blue; all the colour to be broken up into a pleasing pattern and liberally sprinkled with jet-black spots. The pattern on each side of the fish should be as alike as possible. My final desirable feature would be rate of coloration. I like to see all the youngsters fully coloured at 12-14 weeks old in the approximate adult garb. I would like them to undergo no "dash" stage, but there must be no weakening of the black factor which makes fish lose their colour from 6 months onward. The colour should not be prone to "bleach" out in light surroundings. There should be a certain amount of nacreous reflective tissue to impart brilliance to the pigmentation of the body. The fins should be coloured also.

Visible Scales can Develop

I bought a fine pair of shubunkins which were remarkably free from visible scales. After a few months I was horrified

to find they had developed many hard scales. How did this happen?

I can only make suggestions. It could be that the fish had been bred and reared in very soft water. It is known that some breeders use rain water. If your domestic supply is very hard, the hardening agents, calcium and magnesium, could act as an irritant to the fish and could possibly account for the development of the hard scales. I once had an experience that gives credence to this suggestion. One of my old female shubunkins (in her thirteenth year) lost her balance during a very hard winter and lay on her side for several weeks. Finally, I decided to destroy the fish. I was amazed to find the side of the fish that had been in contact with the cement bottom was almost completely covered with metallic scales. The other side was perfectly normal. It is plain that the scales were formed as a means of protection against irritation. I often wish I had waited to see if the scales disappeared again.

Red Metallic Fish

Is it possible for a metallic fish from a shubunkin spawning to change to red like a common goldfish?

Certainly it is possible for this type of metallic to turn red/orange. I have had several that changed. I think there are two factors which contribute towards the rather rare appearance of a red metallic from a shubunkin spawning. The most common factor is, of course, the fact that very few metallics are allowed to live beyond a few weeks old because they are regarded by many breeders as being worthless. The other factor is the regrettable fact that the red/orange factor has become weakened in many strains of shubunkins and certainly is now recessive as far as the metallics are concerned.

Availability of Stock

Why is it that some breeders are unco-operative in respect of giving advice and will rarely sell a good fish?

You seem to have been unfortunate in your contacts. I have found at least 90 per cent of true hobbyists are very willing to give you the benefit of their experience if they are approached in the right way. As far as purchasing fish is concerned—this is an entirely different matter. This question absolutely bristles with difficulties. Think about it this way. Suppose you had patiently worked at a strain for years and at last had produced a few fine fish; would you be prepared to sell just because someone desired them? Would you have over top-class fish (regardless of the price) offered to a beginner who may not be able to look after them properly? If you are keen on showing would you sell your best fish to your competitors? The facets of this problem are endless. I think that each one of us has an apprenticeship to serve, and rightly so.

Silver Patches

Many of my young shubunkins have large patches of silver on the body. Is this the same silver as sometimes it seen in metallic fish?

The silver areas in shubunkins are caused by a layer of reflective tissue under the skin shining through the transparent scales of the fish. Because there is no pigmentation above or below the reflective tissue it appears silver. In metallic fish the silver appearance is caused by a layer of reflective tissue under the scale itself becoming visible because the red/orange pigment above it is absent or has faded out. In other words the metallic silver is caused by a reflective layer on the underside of the scale itself, whereas in nacreous fish the reflective layer is below the scales. With the absence of colour cells in these areas they appear silver.

Johnson H. Hood

THE AQUARIST

Unusual Aroids for Tropical Aquaria

by C. D. SCULTHORPE

Photographs by the author

MANY plants classified in the family Araceae are now commercially available to aquarists. These aroids are mainly species of *Cryptocoryne*, *Anubias*, *Laguncularia* and *Alocasia*, and they have in common a slow rate of growth when submerged; this, however, is an advantageous feature since the frequent pruning demanded by more rampant aquarium plants is obviated and the foliage remains genuinely decorative for much longer periods.

It is not easy to grow these aroids with complete success: some of the commoner types grow well for long periods in tropical aquaria but others are acclimatized less readily and occasionally suffer complete loss of foliage for no apparent reason. This may occur shortly after planting the specimens, but provided the stock is reasonably well developed and the root system is intact recovery is not long delayed. Nearly all the species are slow in establishing themselves and once they have been planted they should remain undisturbed, at least until the onset of active vegetative growth.

Species of *Anubias*, *Laguncularia*, *Cryptocoryne* and *Alocasia* are all perennial rhizomatous plants from the bogs, marshes and shallow waters of tropical and sub-tropical Asia and Africa. They require a good, deep and rich rooting medium and it is recommended that they be cultivated in flower-pots in tropical aquaria. The size of the pot depends on the size of the specimen initially obtained, but pots of diameter 2 to 2½ in. are usually adequate for young specimens, and of diameter 3 or 4 in. for older ones or for later replanting.

Cultivation

The compost may consist of equal parts of coarse sand, peat and moss and clay (or garden soil), well mixed and moistened before planting. Nearly all these aroids grow best in soft water of a slightly acid or neutral reaction: if the water is slightly alkaline, it is preferable to increase the proportion of peat in the rooting medium. The specimens should be planted singly in the pots, their roots being first washed and spread well out and firmly anchored: care must be taken not to bury the rhizome too deeply: the leaf bases should be just level with, and the growing point of the rhizome just above, the surface of the compost.

The temperature of the water should, for most of the year, be above 68°F (20°C): indeed, these plants will tolerate temperatures as high as 86° to 90°F (30-32°C). For a short period of relative quiescence it is preferable, but not absolutely essential, to reduce the temperature to within the range 64° to 70°F (18-21°C) for about 2 months annually. Intensity of illumination appears not to be an important factor in the cultivation of these plants: many of them will thrive in dim artificial light provided for only a few hours daily. Strong lighting has no intrinsically bad effect but it accelerates the appearance of thick gelatinous "skins" of colonial blue-green algae on the foliage.

Viable seeds are rarely obtainable on the few occasions these plants may produce inflorescences, species of *Cryptocoryne*, for example, being naturally cross-pollinated, and so the method of propagation usually employed is vege-



Anubias laciniata

tative. Two features of the growth of the plants lead themselves to propagation: the branching of the rhizome system and the formation of creeping stolons, which root and produce young rosettes of foliage at their nodes. It is unwise to divide the rhizome or to transplant stoliferous rosettes until the young specimens so formed are fairly strongly developed, i.e. about 2 to 3 in. tall and bearing good roots.

The typically aroid inflorescences of species of *Cryptocoryne* are aerial and normally formed only when the plants are growing with most of their foliage exposed to the atmosphere, though one or two species, such as *C. affinis*, *C. griffithii* and *C. longicauda* are more strictly aquatic and do not grow well above the water-line. Bog conditions may be simulated by keeping the plants, potted in a rich compost of the type described above, in a large jar or tank in which the water is approximately level with the tops of the pots or preferably in which there is a 2 to 3 in. layer of thoroughly damp peat moss warmed by a flexible wire element, the pots being sunk in this bed. In this culture technique, the most important factor is humidity: the tank or jar must be covered and the atmosphere within should be as nearly saturated with water vapour as possible. In the first instance this may be achieved by passing a vigorous air stream through the water for a few hours each day, and in the second instance it will be aided by the heating element in the peat bed. An adequate temperature is secured by maintaining the water or the peat bed within the range 75° to 78°F (23-26°C), even though the air above will be at a



Lagenandra lancifolia

slightly lower temperature. Flowering is often accelerated by allowing the tank to receive some natural daylight and sun, but this is not to say that inflorescences never arise under exclusively artificial lighting.

The low-growing species, *Anubias nana*, has been described on a previous occasion (*The Aquarist*, vol. 25, no. 7; October, 1960); the larger related species, *Anubias lanceolata*, the water aspidistra, is perhaps more often in commercial supply. It is a striking plant, which often reaches a height of 15 to 18 in. in aquaria, though wild

plants often exceed this size. The foliage is very sturdy and spreads from the growing point of the rhizome in the form of an inverted 'shuttlecock'. The lamina of each leaf is mid to dark green in colour, lanceolate in shape, and exhibits a prominent midrib and many less conspicuous lateral veins: the margins of the lamina sometimes curl back slightly. The petiole has a wide sheathing base and is often tinted with reddish brown. Above water, the leaves are rather thicker, and of tougher texture, and their surface has a more noticeable waxy gloss. The inflorescence has the characteristic aroid structure, with a spadix bearing the actual flowers, surrounded by a fleshy sheath-like spathe. Successful fertilisation is followed by the development of small fruits, which have a succulent wall and resemble berries.

Lagenandra and Acorus

At least two species of *Lagenandra* now appear in commercial supplies: they are indigenous to brackish as well as fresh waters in Ceylon and southern India. *Lagenandra ovata* is superficially quite similar to *Anubias lanceolata*, having lanceolate leaves with pointed spices. The lamina is, however, rather broader in proportion to its length than in *A. lanceolata*, and its margins are often shallowly undulate. In natural habitats the species often reaches a height of 2 to 3 ft., but in tropical aquaria it is much slower in its rate of growth and the maximum height is usually between 15 and 20 in. *Lagenandra thwaitesii* is a species of similar habit but rather smaller at maturity, reaching only about 9 or 10 in. in aquaria. Each leaf emerges from the sheath of the preceding one and is borne on a stout reddish-green petiole. The lamina is more narrowly lanceolate than that of *L. ovata* and consequently appears more tapering and pointed: its colour is dark green, the margins sometimes being silvery grey.

A more persistent variegation of the foliage is seen in *Acorus gramineus* var. *folius variegatus*, the variegated Japanese rush, which differs from the other aroids here described in preferring rather lower temperatures, from about 45° to 70° F (7-21°C). It closely resembles the



Acorus gramineus var. *folius variegatus*



Cryptocoryne walkeri

ordinary Japanese rush in its habit of growth, having a much branched rhizome from which arise fan-shaped clusters of linear pointed leaves. Each leaf is conspicuously striped, usually along the whole of one side, with yellow, which contrasts vividly with the mid-green of the remainder of the leaf. When mature, this variegated rush is frequently from 8 to 12 in. tall and makes an impressive feature in the aquarium: young plants from 2 to 4 in. tall, obtained by carefully removing short lateral branches of an established rhizome system, provide excellent specimens for the foreground, where their predominantly vertical habit of growth contrasts strongly with the horizontal lines of rock strata and the bottom gravel itself.

Newer *Cryptocorynes*

Numerous species of *Cryptocoryne* have been described in previous articles (e.g. *The Aquarist*, vol. 25, no. 7, October, 1960) and so it is proposed to focus attention here on several less well-known species of more recent introduction. *Cryptocoryne lucens*, described and named by the Dutch authority de Wit, has sturdy foliage, glistening rich green in colour, arising from a rather erect rhizome. The overall length of the mature leaf is from 7 to 14 in., the lamina comprising about one-third of this length and being narrowly lanceolate in shape, rather abrupt at the base and sometimes slightly undulate at the margins. The rate of growth is rather slow but the plant seems to retain its foliage on transplantation better than most others of the genus. The aerial inflorescence has a stalked spathe, from 3 to 4 in. tall, the flag being slightly twisted and purplish olive-green in colour. The throat of the spathe is dark to dusky purple.

Cryptocoryne walkeri is a smaller species with a brownish stemstock bearing a rosette of foliage to a maximum height of about 7 in. The lamina of each leaf, borne on a reddish brown petiole, is brilliant green and sharply pointed, its shape varying from lanceolate to almost triangular. The laminae of submerged specimens are often borne horizontally and have indented margins.

Also of dwarf habit is another species only recently named by de Wit and not yet freely available in commercial supplies. Known as *Cryptocoryne scovillei*, this species possesses a creeping rhizome from which arises the dark-green, purple-tinted foliage: each lamina is ovate and its surface is crinkled sparingly in a manner similar to that of *C. longicauda*. The inflorescence is about 2 to 2½ in. tall and conspicuously swollen: the colours of the spathe are very garish, the warty flag being dark wine-red, the collar



Cryptocoryne spongatifolia

bright yellow, the throat purple with white striations. The maximum height appears to be about 4 to 6 in., and cultivation of this eminently attractive species has so far proved difficult.

Another recently introduced species is *Cryptocoryne spongatifolia*: this beautiful plant grows well in aquaria, soon becoming established and producing stolons bearing young plants. It resembles *C. belamiae* in the general appearance of its foliage but is a larger, sturdier plant, attaining a height of some 15 to 18 in. The lamina of each leaf is from three to four times longer than the petiole and is narrowly lanceolate, almost strap-shaped, tapering to a fine tip. The whole surface is deeply crinkled, the edges are sinuate and the colour is a rich green.

Cryptocoryne Alania, yet another species described and named by de Wit, arrived in Europe in 1958 and is undoubtedly one of the most magnificent of the genus. Much of its attraction lies in the colour of its foliage, which is quite different from the general run of aquarium plants and is maintained well during submerged growth. The smooth or crinkled upper surfaces of the leaves are reddish, with a dull green shown in reflected light, marked with brown striations, whereas the lower surfaces are, at maturity, deep mahogany red. The oval to spade-shaped lamina is from 4 to 6 in. long, 1 to 2½ in. wide, and is borne on a sturdy brownish petiole which varies in length from 6 to 12 in.



Cryptocoryne lucens

Cacti in the Fish House

IF mealy bug appears on any plant take it out of the fish house at once and clean it up. This bug appears in a small bunch of cotton-wool like substance in which the insects lay their eggs. As the bugs are covered with a white "meal", ordinary insecticides run off them and fail to kill. A certain killer is malathion, but do not use this in the fish house as it would be dangerous. If only a few bugs are to be seen on a plant they can be picked off with a pointed matchstick.

Peppermints, Plecosoles — or What?

by B. R. JAMES

Photographs by the author



A view of a specimen that the author has called 'type A' clinging to the aquarium glass.



A specimen of 'type B' resting on the gravel at the bottom of the aquarium. On the right it is seen clinging to the glass.

SEVERAL months ago I obtained some specimens of an imported fish from a well-known distributor. As he was unable to identify them, he christened them peppermint catfish. Subsequently I noted them being marketed as "plecosoles", this latter name being a mixture of *Plecotessus* and sole, a name being very appropriate as the unidentified fish seems truly to be the product of a cross between these species, although this is impossible, both for biological and geographical reasons.

One authority claimed that the fish is *Gastromyzus borneus*, but this, too, would seem unlikely as I can find no reference to any genus of this name in any of the more comprehensive popular works and the specific name means "from Borneo", whereas it appears that these specimens come from China. Mr. R. J. Whitwell, the well-known tropical fish importer of Colchester, has informed me that



this species was found in the brooks and streams of Kowloon, the mainland portion adjacent to Hong Kong according to his suppliers. This is rather ironic if true as this region is on the doorstep of some of the biggest exporters and breeders of aquarium fishes in the world!

A further complication in naming this fish is that there appears to be two distinct types, which are sufficiently dissimilar to be members of different genera, or even families. On the other hand they may be merely sex differences among the same species.

I thought it convenient to list the characteristics of the two types to facilitate easier identification.

Type A

Body elongated laterally compressed.

Head flattened and rounded with a sucking mechanism around the mouth, which is situated ventrally.

Pectoral and ventral fins rounded and fairly wide apart.

Eyes are yellow with black pupils.

Basic coloration is a lemon or light brown with reticulated markings on the sides. The back has transverse bars of chocolate or black. A black line follows the lateral line, and divides the pale lemon belly from the upper portions. All fins are speckled with brown or black.

Swims with a quick jerky motion and finds difficulty in attaching itself to smooth vertical surfaces.

Perches on the tips of its fins when at rest on the bottom.

Type B

Body elongated with more compression, being almost flat.

Head flattened and rounded, with sucking attachment around the mouth which is also situated below the head.

Pectoral and ventral fins rounded and overlapping.

Eyes are red with black pupils.

Pattern not so distinctive. Ground colour is paler than in type A with darker brown reticulated markings and transverse bars on back. Fins are speckled with brown and the dorsal fin has a bright red margin. Belly is white and transparent; the heart and other internal organs can be clearly seen pulsating.

Swims with smooth darting motion, and clamps itself securely to any smooth surface, from which it is difficult to dislodge.

Flattens itself on to the bottom when at rest.

From the descriptions given the reader will be able to see that the differences between the two types are quite marked. I should add that these characteristics are taken from close observation of over two dozen mixed specimens of both types.

These fish would seem to inhabit fast-flowing streams and brooks, and to feed principally on a diet of algae, although they will accept both live foods and prepared foods in captivity. There are no spines, armour plating or sensory "whiskers" around the mouth as in many catfishes



Sucker catfish (*Hypostomus plecostomus*) attached to the aquarium glass.

and they seem to be mostly active during the day, as I have never observed them swimming after the lights have been switched off.

These fish appear to be hardy under aquarium conditions and are keen algae-eaters. Add to this the fact that they are not unattractive and constantly active and I believe that this fish could become "a regular" on the dealer's list if it continues to remain in good supply as it is at the moment. However, to be a popular fish it must be correctly named. Can anyone identify this fish (or fishes)?

Directing the Movement of Fish

A NEW method of directing the movement of fish shoals has been suggested and is being developed in the Soviet Union.

It has been found that fish, especially small fry and surface varieties, react to black and white stripes and even to the play of dark and white spots on the water. By the use of a sheet painted with black and white stripes, an attempt was made to move the shoals "by hand" from one basin to another. The shoals obediently went into waters they had never frequented before.

The fish will follow the black and white sheet for many

hours, losing weight and strength and stopping only when totally exhausted. Placed in a glass pool plastered with a black and white band a young fish 2 cm. long raced in circles for 16 hours.

The head of the research group, Professor Boris Mantel'tel, says: "This programme of experiments will help in working out a method of guiding the movements of fish. They will be able to by-pass hydrotechnical installations, turbines and other devices and will swim along routes they are directed to. A new method of catching fish without the help of nets will be acquired."

How to Service the Tank

by A. BOARDER

THE set-up tank we described last month should now be functioning well and will require little attention.

The feeding can be done now more than once a day and on one day a week this can be omitted. I think the fishes benefit from a rest from food now and again. The overhead lamps can be switched on for a few hours a day, according to the light available in the room.

Now for the weekly servicing of the tank. I consider that this is very important, although I must admit that nowadays I often forget or am unable to find the time to do it. However, all that appears to have gone wrong is that the inside of the front glass has become covered with a film of green algae which makes the water appear to be not clear.

The first thing to do when servicing the tank is to remove the cover glass and any feeding ring. If you have overhead lighting it is as well to keep this on, as it will make it easier for you to see to prune plants etc., with the cover hood moved back slightly to give access. Next thoroughly clean the front glass. I find a razor blade in a long holder very good for this task. See that the holder is long enough to reach to the bottom of the tank. When cleaning near the bottom of the glass push back any gravel that has built up above the bottom frame. Next take a good look at the plants. It is possible that some may have grown tall and become entangled on the surface of the water. They will then cut out much of the light from the lamps and the tank will look dull. With sharp scissors cut down these plants and leave stems well below the surface. They will soon grow again and are likely to bush out with this treatment. Remove any surplus runners from such plants as *Sagittaria* and *Vallisneria*. Perhaps some need thinning, but it is probable that only a little shortening may be necessary.

Before doing anything more it will be as well to allow the mulm to settle on the bottom. Now have a couple of receptacles, such as pails or watering cans. I use a pail and a 2-gallon watering can. A siphon tube now comes into use: this is a half-inch rubber tube, long enough to reach all over the tank bottom and out into the pail or can. I fix a glass tube in the end of the rubber that is placed in the tank. This allows it to be directed anywhere that it is needed. Give a sharp suck at the end of the rubber tube to start the water running and lower the end into the can. See that the end of the glass tube is clear of the bottom when you commence siphoning or you will pick up gravel and choke the tube. Now direct the end of the glass tube over the front bottom of the tank, just clear of the gravel. By moving it in a small circle you lift the free mulm and suck it up. Do not remove any mulm from the back of the tank. Mulm is better left here to assist in feeding the plants. About halfway across the tank will be enough to clear. In doing so you may have to remove as much as 4 gallons of water. If the tank contains small fishes it is advisable to keep the thumb and finger on the rubber tube during the siphoning so that pressure can be applied at once if a fish is being sucked towards the tube.

Pour away the water removed and refill with fresh water, pouring it into the tank on to a small piece of thin wood

from the watering can. Make sure you do not allow the water to pour into the tank direct or you will disarrange the bottom gravel. Fill the tank up to the top frame, just enough to hide from front view the top of the water. Should there appear to be a film or any dust on top of the water remove it with a sheet of paper drawn swiftly across the surface.

The cover glass can next be cleaned and replaced and the front glass cleaned and the outside of the tank tidied up. Do not clean the inside of the glass other than the front piece. The other glass will become covered with algae and look quite natural and prevent the viewer seeing right through the tank. In a freshly set-up tank, before algae has a chance to form, it is a good plan to stick some green paper on the outside of the back and end panes.

When they are procurable it is a splendid idea to have a few tadpoles in the tank as they are fine scavengers, but place a small raft on the surface for them to get clear of the water once their front legs appear.

I have not mentioned water snails as I consider that they are not beneficial in the set-up tank.

My next article will deal with setting up the furnished tank for exhibition purposes.



BRITISH AQUARISTS' FESTIVAL

16th - 17th NOVEMBER, 1963

Belle Vue Zoological Gardens, Manchester

TRADE STANDS

It is requested that enquiries regarding Trade Stands should be made to Mr. Geo. W. Cooke, "Spring Grove", Fieldhill, Batley, Yorks., and not to Mr. C. Graham, who has now retired.

NOTICE TO SECRETARIES

The closing date for entries is Monday, 7th October.

Schedules covering all varieties are now available from the Hon. Show Secretary (address as above).

High-Casqued Chameleons



View from above of a high-casqued chameleon. Its elongated form is shown and the eyes are seen to be facing in opposite directions.

by ROBERT BUSTARD, B.Sc.

Photographs by the author

IT is now 3 years since I first mentioned this chameleon (in *The Aquarist*, 1960, vol. 25, p. 101) as the hardest species I had encountered. Further experience with it meanwhile has doubly confirmed my first impressions and this, combined with the fact that last year for the first time one of our large importers offered many specimens of this chameleon for sale, has led me to devote an article to it.

The home of the high-casqued chameleon is Kenya. Although it lives near the equator it inhabits elevations of about 7,000 to 9,000 ft. In its native habitat it is accustomed to cold nights, hence its hardiness.

This species is ideally suited to life in the outdoor reptiliary and last year my specimens remained outside throughout October and into early November without suffering any apparent ill-effects. During October there were some very cold spells with temperatures frequently below 32°F (0°C) at night but it was bright and sunny during the day. My outdoor reptiliary is situated in the garden of my Perthshire home and snow could be seen on the nearby hills during the latter half of October. The above details show just how hardy the high-casqued chameleon is.

During the day in Africa, although at elevations of 7,000 to 9,000 ft. the air may be cool, the animals are able to raise their body temperatures well above that of the surrounding air by solar radiation. The high-casqued chameleon, however, does not need a high day temperature,

as is apparent from its healthy condition when housed outside in a chameleon greenhouse in Scotland (as described in *The Aquarist* (July, 1962)). Specimens that I keep indoors have a day temperature of 70° to 75°F (21°-24°C).

Like many Highland species the high-casqued chameleon gives birth to live young. A brood numbers about ten on average and the young at birth measure about 50 mm. (2 in.) in total length. The babies should have abundant food in the form of fruit flies (*Drosophila*) or other small flies and thrive best in airy conditions out of doors. I kept a family of eleven young on a standard bush in the garden.

Housing

The high-casqued chameleon is an easy species to accommodate. As an alternative to the indoor vivarium, where height is important, and the outdoor reptiliary which many enthusiasts do not possess, a bush in the garden can be used as their home. Select a bush in a sunny position that has relatively dense or large leaves to afford protection for the chameleons. Make sure that there are no branches from the bush to neighbouring bushes or trees along which the chameleons can escape. All that then remains to be done is to erect a fence 9 in. high round the foot of the bush, preferably wide enough to take in any overhanging branches, otherwise chameleons may jump or drop to the ground outside the fence and so escape. The fence must



The prominent casque and vertebral and throat crests are shown in this side view of a high-casqued chameleon.

be constructed of some unclimbable, smooth material such as plastic, metal sheeting or glass.

During a detailed study on the behaviour and life history of this chameleon I kept specimens on rhododendron bushes in the garden with great success. It was surprising to me just how many bluebottles landed on the bushes without it being necessary for me to provide a piece of raw fish or meat as a lure. With my outdoor groups I had to provide no food whatsoever, but the specimens in the chameleon greenhouse and those in indoor vivaria were fed regularly, mainly on bluebottles and mealworms. While some specimens ate mealworms with obvious relish others totally ignored them.

The high casque and throat spines together with the slight rostral process on the snout are illustrated in the

photograph of one of my male specimens. Another photograph shows a male specimen in the typical elongated posture which they show from time to time as seen from above—an angle seldom seen in photographs. This posture shows just how camouflaged the lizard is, lying along the branch so that scarcely any part projects to give away its presence to an enemy above. The protuberant eyes, which work independently, covered over by skin except for a small hole over the pupil, are another of the chameleon's specialised features.

Coloration is most variable in this species and females vary from olive brown through all shades of green to near black. Male specimens differ in colour, depending whether they are dominant (i.e. territory holders) or defeated specimens. The foregoings are green with the upper part of the body, head and casque suffused with yellow and the lower regions of the flanks and limbs a brilliant turquoise blue, and the latter drab dull green-brown or near black.

Feeding

Chameleons catch their food on their tongues, which can be protruded considerable distances with great accuracy and speed. What causes the insects to stick to the tongue? This question has caused much controversy; some say that the tongue tip is sticky and others that it is not. In favour of the latter argument are the following facts: one can pick up small pieces of paper with one's tongue, yet no one would say humans have a sticky tongue; a fillet of fish will stick to paper, and a bank clerk dampens his fingers to turn (i.e. count) notes better. One can form the general principle that small light insects will stick to a wet surface and that mucus (present in animal saliva) is more efficient or stickier than water, but it is difficult to state one's terms clearly without carefully defining stickiness, and to the best of my knowledge the matter has not been satisfactorily settled. Consider it the next time you watch your chameleon catch an insect.

The high-casqued chameleon is an ideal species for the beginner or chameleon novice and is strongly recommended. Specimens cost about 30s. each.

Paul Hahnel at Manchester

An enthusiastic gathering of members of the Fancy Guppy Association met the well-known American guppy specialist Mr. Paul Hahnel at Manchester last month. Over 500 guppies were on show and Mr. Hahnel presented the awards. He is seen below with Mr. J. Kelly, chairman of the Association, and Mrs. Kelly.



OUR EXPERTS' ANSWERS TO TROPICAL AQUARIUM QUERIES

Coming in late the other night, I switched on my aquarium top light and noticed that several of my fishes, in particular *Channa striata* and *Notopterus anthurus*, were showing colours and patterns never seen before in their normal lighted-aquarium lives. Can you explain this?

Less of fishes assume a special garb after dark. This arrangement, diminution or expansion of colour areas is said to be brought by the absence of light, which affects the pigment granules in the skin, through reactions of the nervous system.

I should be grateful for some information on the care of the dwarf gourami.

The basic needs of this charming little fish are a brightly lighted tank, a temperature around 75°F (24°C) and masses of top plants to play in. It has a tiny mouth, so all food given to it must be small. It will, however, accept live or dried food with equal relish. Ideally it should be accommodated in a tank to itself, but if this luxury is out of the question, its companions in a community tank must be chosen for their peaceful ways and non-blustering habits.

How do I go about sterilising plants before introducing them into my aquarium?

Drop the plants into a solution of one tablespoonful of powdered alum stirred in a quart of cooled boiled, or tepid tap water.

I have a 4 ft. tank housing pairs of *Chalcidoma ferrugineum*, *C. setosum* and *Dryocotylus maculatus*, all of which get along very well together. I should very much like to add a pair of jewel fish (*Hemichromis bimaculatus*) to this collection. Do you think this would work out satisfactorily?

H. bimaculatus is one of the most erratic tempered and savage of aquarium fishes and is entirely unsuited to life in a community tank unless it is really spacious and tenanted by species large enough and tough enough to take care of themselves.

I am hoping to grow a Madagascar lace plant in my tropical aquarium. Can you give me any tips for success?

The Madagascar lace plant is far from easy to grow. Its prime needs are shade, a compost richer than washed sand—a fibrous loam kept open and wholesome by the addition of crushed charcoal seems to suit it—and a temperature above 55°F (15°C). It is important to keep its stemmated leaves free from algal growths.

I am new to the hobby and am having little success in keeping my fish alive for more than a week or two. I cannot think where I am going wrong because I give them plenty of a top-quality dried food plus white worms twice every day, maintain a temperature of 72°F (24°C) and change the water for fresh at the same temperature or soon as it turns cloudy.

Most likely you are feeding your fishes too generously. Too much food at a time leads to a lot of waste on the bottom. A few days of this, and the water turns cloudy and bad, apart from the harmful effects of pollution arising from decaying food, aquarium fishes soon become mopey, colourless and die if they are subjected to frequent complete changes of water. Perhaps the best advice to give you is to cut down drastically on the food given, siphon all debris from the bottom and refrain from changing the water unless the fishes are seen gasping at the surface.

I have two black widow fish which I have raised to near full size from youngsters. The larger of the two has developed diamond-shaped sides and the other, with unmarked markings, persists in chasing it around. I feel sure I have a pair and wish to know the procedure for spawning them.

Prepare an 18 in. by 12 in. by 12 in. or larger tank as follows. Fill it with filtered (to remove particles of sus-

Many queries from readers of "The Aquarist" are answered by post each month, all aspects of fish-keeping being covered. Not all queries and answers can be published, and a stamped self-addressed envelope should be sent so that a direct reply can be given.

ponded matter) water which has been standing for a week or two with a handful of granulated peat left to soak in it. Furnish the tank with lots of feathery foliated plants grouped at the ends. Introduce the fish into the tank (at their accustomed temperature), and then give them a little extra warmth. If they do not chase and scatter eggs within a couple of days, separate them for a while and then try them again. It is important to remove the parent fish from the aquarium immediately spawning is over. Four days later the free-swimming fry can be fed on Infusoria until they are large enough to accept a bulkier diet.

Could I keep a flying fox in a community tank stocked with barbs and tetras?

The so-called flying fox (*Epalzeorhynchus kallopterus*) will do no harm in a community tank, but it does need plenty of swimming space in an all-over covered aquarium (it is an accomplished jumper), and no overcrowding.

Is the clown loach (*Betta macracanthus*) long-lived?

Given the right conditions and treatment, the clown loach may live for 4 years or longer. Its essential requirements are a temperature above 70°F (21°C), little or no disturbance, dense thickets of plants or fissures in rockwork to retire into, and companions that will not worry it or rob it of every scrap of food. To guard against slow starvation in a community tank, always introduce some live food or scraped red meat last thing at night, that is, just before the light goes out.

Could I use well-washed coal dust as a compost in my aquarium?

Well-washed coal dust (slack) can be used to carpet the floor of an aquarium, but plants do not grow in it very well. If you wish to use coal as a decorative feature, we suggest that you use ordinary aquarium compost on the bottom and spread the washed coal over the top.

I wish to set up a tropical aquarium, but the only water I have available come through a copper pipe. Do you think the fish would die of copper poisoning if I used it?

If your water comes straight from the mains and is drawn frequently during the day, then you have little if anything to worry about. But as a precautionary measure, before you fill the aquarium, let the tap run for a minute or two to clear the pipe of standing water.

Is it possible to make a nourishing dried food for tropicals from easily obtained ingredients?

Yes, but by the time you have assembled the various ingredients, mixed them with a beaten egg and milk to form a stiff dough, baked it to a thin biscuit in a slow oven, spent above an hour crushing it and sifting it to the right size, and so on and so forth, it is more economical to go out and buy a supply from the nearest dealer. Notwithstanding this piece of advice, you will find that any five of the dried and pulverised ingredients mentioned below can be combined together to make a satisfactory fish food: wholemeal bread, shrimp or prawn, white fish such as cod, spibach, duckweed, liver and soya flour.

EXOTIC GOLDFISH



Singletail goldfish (G.S.G.B.)



Bristol shubunkin



Nymph goldfish



Comet goldfish

Goldfish of

by

GROTESQUE, bizarre, monstrous, fantastic, attractive, beautiful, wonderful, delightful. All these adjectives, and others that it is not customary to print in a magazine of this kind, have been used to describe many of the variations from the common goldfish. Their use reflects the great diversity of opinion even among hobbyists on the merits or demerits of the creatures. Beauty is indeed in the eye of the beholder.

Every external part of the fish has at times been subject to mutation, and as soon as these have been noticed groups of fanciers have attempted by selective breeding to emphasize the differences so produced.

Good specimens of any of the variations are extremely difficult to get, and are seldom, if ever, obtainable in the local pet shop. They are mainly bred by specialists, and newcomers to the goldfish fancy who are anxious to obtain fair examples are recommended to get into touch with breeders in this country. They should also be prepared to pay a price that may seem to them to be high. If the price asked seems unreasonable, it should be remembered that for every young fish with promise there exists thousands upon thousands that are no good. Until culled, these latter have all had to be housed and fed, taking up a great deal of time and space. Purchasers of the best young fish are beginning at the point where the breeder of those fish has reached, sometimes after half a life-time of careful work.

Specialist Groups

Three groups of specialists in this country have compiled ideals for the fish in which they are interested. They are the Bristol Aquarists' Society, the Federation of British Aquatic Societies and the Goldfish Society of Great Britain. The Federation has accepted the Bristol Society's standard for shubunkins, and all groups now use the same terminology to describe the various scale groups, but there are differences of opinion between the Goldfish Society and the Federation on many of the variations. Whether these will ever be resolved is a matter of conjecture.

Now for some details of the many variations for which ideals have been compiled.

As far as fins are concerned there is no difference in the number of rays making up the fins, but there are marked differences in the relative lengths of the various rays, and this gives a greatly changed appearance to the same fins on different variations. Some have long pointed fins, others short rounded fins. Most have dorsal fins, but some do not.

Caudal fins and anal fins may be large or small, pointed or rounded, single or twin. The twins are occasioned by a mutation that caused the double rays of the caudal and anal fins to separate to form what appears to be two identical fins where one had been before. When a fish is going to develop a twintail this can be seen while still in the egg.

The trunk of the fish—that part between the head and the caudal fin to which all fins are attached—varies tremendously in shape. In some variations it is almost spherical and in others beautifully streamlined. The

f the Singletail Group

C. E. C. COLE

shorter and rounder the body the more it is fancied in certain variations.

One might think that heads would be just heads, but not with goldfish! The nasal flaps, the eyes, the opercula and the top of the head are all subject to variation.

Fanciers like differences from normal to occur in combinations. A short-bodied fish with short fins does not satisfy them. It must be a short-bodied fish with no dorsal fin, short other fins, divided caudal and anal and with a growth completely covering the top and sides of the head. Or the same head growth on a fish with an even deeper body, a very high dorsal fin, long pointed pectorals and pelvic, twin anal and very long twin caudal.

It is difficult to imagine a further cry from our old friend the common goldfish.

All the variations have been given special names, and I will deal with them from the simplest to the most advanced, beginning with the singletails.

The nacreous and matt forms of the common goldfish are known in the fancy as the London shubunkin. The

more colourful the fish and the less the number of metallic scales the more the fish is valued. Bodies should not be very deep, or tails longer than the head (from snout to rear of opercula).

The comet is streamlined in body, like the common goldfish. Its fins are a little bigger and more pointed. Its chief attraction is an enormously developed tail. In good specimens this should be at least three-quarters of the length of the body, deeply bifurcated with narrow pointed lobes. Overgrowth of tail or weak muscle tone of fish will occasion collapse of tail. Carried well it is beautiful, but drooping it looks just a mess. Metallic specimens are most fancied.

The singletail, a fish recognised by the Goldfish Society, is considered by the Society as more realistic and practical than the Bristol shubunkin. It is a strong fish with a streamlined appearance. Its caudal fin is half the length of the body with rounded lobes and straight anterior margins. There is no waist to the caudal peduncle. It is encouraged in all three scale groups.

The Bristol shubunkin has a larger tail than does the singletail just described, and a waisted caudal peduncle. The anterior margins of the caudal lobes are rounded. It is a beautiful fish if able to carry the tail well spread. Exhibited only as a nacreous fish.

The nymph is the most advanced singletail, and the one about which most controversy has raged. It could be a throwback from an even more advanced variation or a step towards one.

The body is short and rounded, the dorsal fin large, approximately the same height as the body is deep, and the caudal is as long as the rest of the fish and spreading to about one-and-three-quarters of the depth of the body.

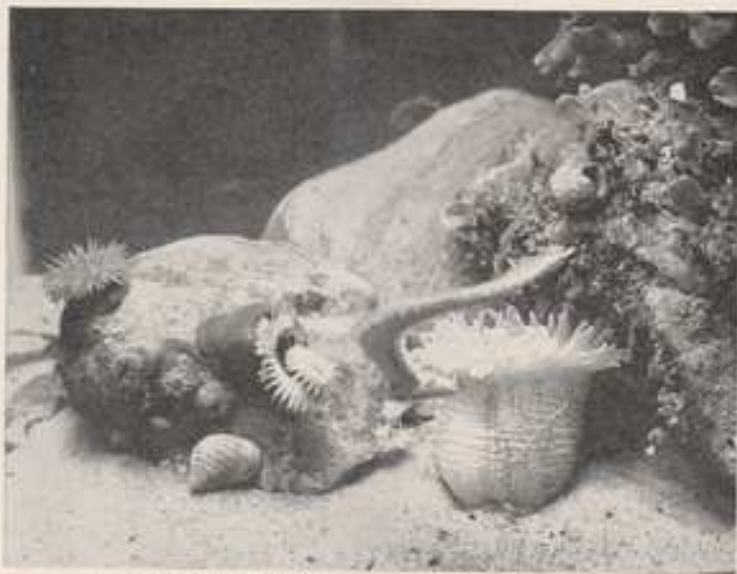
In my next article I will discuss twintails.

Life with the Archers

The way in which the archer fish can 'shoot' down its prey over the water (left) is well known, but it is not above leaping out after a fly, as shown below.



Natural Breaks



A ragworm (*Nereis*) accidentally swimming into the tentacles of an anemone can escape by breaking off its tail, which alone is left for the anemone's meal.

THE commonest lizard that the beginner in reptile-keeping is likely to acquire, and indeed all our British lizards, readily part with their tails if these are grasped. This is one of their methods of escaping from their enemies.

In Nature, where "survival of the fittest" is the rule and most animals do not live to die a natural death, especially if they are of small size, it is much better to lose a tail than a life. Lizards of certain families have developed this ability to snap off their tail to avoid capture. This type of behaviour is called autotomy (natural break) and is widespread in the Animal Kingdom. Crabs will break off a leg to avoid capture, marine worms will appear to break in half and, as with lizards' tails, the missing part is regenerated.

In the accompanying photograph is shown a ragworm (*Nereis*) that has been caught by a sea anemone and escapes by breaking in two. The photograph shows the moment when the break has just occurred and the worm is swimming away. The tail portion can be seen in the anemone's mouth and tentacles. This photograph was taken in one of my marine tanks.

The tail of a lizard may be lost partly or completely. This depends usually upon where it is grasped.

Frequently only the terminal portion is lost. In the photograph a common lizard (*Lacerta vivipara*) is shown with the end of its tail regrowing, and a green lizard (*Lacerta viridis*) is pictured when it has just been deliberately grasped by the tail, which snapped in two. A fast shutter on the camera has stopped all motion, but the lizard

by ROBERT BUSTARD, B.Sc.

Photographs by the author

is making its getaway and the tail left in my hand is wriggling. The idea is that the wriggling tail occupies the attention of the predator just long enough for the animal to escape.

Tails are fairly readily lost by the members of the Lacertidae and also of the Anguillidae, to which our slow-worm belongs. Perhaps the best examples, however, are the geckos (*Geckonidae*). Many geckos drop their tails if severely frightened, without actually being touched. The naturalist in a hut in the tropics who thought he would secure a number of geckos quickly and easily by firing a blank cartridge in the confined space, thus causing them to release their grip, was most surprised. A shower of gecko tails fell to the floor instead of the lizards!

From the above we can see that the habit of breaking off the tail, which, incidentally, is an active process brought about at a rupture point in the middle of the vertebrae by muscular contraction, is of great survival value to the lizards concerned. There are also minor refinements such

so contraction at the wound which prevents excessive bleeding.

Lizards that have developed active and often important uses for their tails have lost the power to break them off and are unable to regrow them should they be cut or bitten off. Examples of this category are the chameleons (Chamaeleonidae), which use their tails as a fifth limb to grasp branches, and the monitor lizards (Varanidae), where in many species the tail is used like a whip-lash to defend the lizards. As usual in Nature, there is a complete intergrading series which is found in such families as the anoles (Cordylidae), spiny lizards from South Africa. The spiny tail has survival value and although they have the ability to practise autotomy or 'natural break' they are loath to do this.

How perfectly developed this is can be seen from the fact that less spiny species like *Cordylus polyzonus* shed their tails most readily, more spiny species like *Cordylus cordylus* are intermediary, and extremely spiny forms like the armadillo girdled anole (*Cordylus cataphractus*), which also has the protective habit from animals that might eat it of grasping its tail in the mouth, are most loath to part with their tails!



Skin shedding by the desert ground gecko. The old skin is detached in parts by the animal's mouth and is eaten.



Above, a green lizard escapes by breaking off its tail, which is left wriggling in the captor's hand. Below is shown a common lizard in which the tail stump is growing anew.



The Chain Sword Plant by JACK HEMS

THE chain sword plant from Cuba and Costa Rica warrants a place in every decorative tropical aquarium for both its attractive appearance and its ability to flourish in slight shade. Another of its attractions is the way no more than half a dozen plants of it will close-carpet the entire floor of a 2 ft. tank within the space of 3 or 4 months. And in this connection, it may be mentioned that once this delightful grassy carpet is formed, the water will usually stay beautifully clear (unless bottom-stirring fishes are introduced) because all the heavier sediment is trapped under the low-spreading canopy of leaves.

The leaves are roughly 5 in. long by 1 in. wide. They taper to a point and have a noticeable middle rib. New

plants arise every 3 in. or so along strawberry-like runners which spread in every direction over the compost. Nevertheless, there are always some runners that prefer to grow obliquely towards the surface. The plants that are produced on them can be left where they are to provide pleasant looking midwater retiring places for shy fishes, or stripped from their parent stems and planted afresh in the compost.

There is some confusion about the chain sword plant's correct botanical name. At one time it was formally known as *Echinodorus intermedius*, but we are now instructed to call it *E. Grisebachii*. There are forms in

Continued overpage

So You Want to Breed *Corydoras*?

by J. D. LOADER

IT'S not easy, let's face it, but having obtained your breeders and mastered the technique you will wonder why you hadn't bred them before. Let me make it clear at the start I am only writing about the easier *Corydoras* species, namely *C. paleatus*, *C. aeneus* and *C. hastatus*.

Firstly we must have some breeding stock. This is not as easy as it sounds; you just cannot go out and buy a breeding pair. One importer informed me that only one in 50 adult *Corydoras* imported was a female. This may be an exaggeration but it must be admitted the males will outnumber the females. It would be an advantage to purchase six to a dozen young fish. These may be placed in a 24 in. by 12 in. by 12 in. bare or planted aquarium. I prefer a bare tank as with the heavy feeding required to bring them on to sturdy breeding stock it will be easier to keep clean; the fish, however, naturally prefer a planted tank.

Sexing

After the age of about 1 year is reached with liberal feeding on Grindal worm, white worm, *Tubifex* and chopped earthworm, it should be possible to sex the breeding stock. My method is to place them in a bowl and look at them from above. It is hoped some should be noticeably wider behind the gill plates than others; these should be the females. At this stage the sexes are segregated and good feeding is continued. I have not heard of anybody who has been able to breed these fish before 17 months, but perhaps this article will prompt someone to write to me.

The breeding tank

It is easy to prepare a tank for breeding *Corydoras*. Use the largest tank available, unless you are prepared to risk moving some fry. Let us say a 36 in. by 15 in. by 12 in. is to be used. This should be cleaned out, freed of snails and filled with tap water. Some cover should be provided for the breeding team, which may consist of one female and two or three males. A flower-pot on its side, some old plants (free of snails), willow root, coconut fibre, nylon wool—anything will do for cover. A mass of only 4 inches cube is about right. No gravel is required and 25 watts of top light will be ample.

There is no doubt that if the fish are ready to spawn they will do so in the water in which they have been living. My fish live in Surrey tap water of 10° hardness and pH 6.8, for the record, and so a clean tank with 24 hour old tap water is used here. No aeration is necessary but feeding is continued in the breeding tank as *Corydoras* do not spawn immediately. Washed chopped garden worms, Grindal worms and chopped fresh shrimp are now fed in preference to *Tubifex*, which causes discoloration of the water and may prevent the eggs from hatching. 72° to 76° F (22-24.5° C) appears adequate; no rise or fall is necessary if the fish are in spawning condition.

Spawning

Whatever cover is provided, *Corydoras* almost always spawn on the glass sides and front of the aquarium. The

eggs are large, pale yellow and easily counted. The spawning may take place at any time up to 14 days after the breeding team has been introduced. The parents do not attempt to eat the eggs, but they should in any case be removed to the stock tanks. One drop of 5 per cent methylene blue (methylthionine chloride) solution in water is then added for every gallon in the breeding tank. This will kill any bacteria that would affect the eggs hatching, as they do in 5 or 6 days at 72° F (22° C).

Failure to spawn

This paragraph is included as it has been noticeably missing in other breeders' records! If no spawning has taken place after 2 weeks a different set of partners should be tried. Old *Corydoras* which have been living on scraps in a community tank may fail to spawn. The water in the breeding tank may discolour with feeding and discourage the breeders. Remedy: change half the water 2 days running. Check again that the female is a female.

Raising the fry

My procedure is to add a few drops of proprietary liquid fry food the first day after hatching and from then on alternate feeds of brine shrimp and micro worms for the first 10 days. Do not starve the fry; they will eat a tremendous amount and one should aim to keep food in front of them all the time.

After 10 days they can take Grindal worm and fine dried food, which should be wetted first so that it immediately sinks to the bottom where the fry feed. By the third week some of the water in the tank must be changed or growth will be inhibited. The fry obligingly keep well away from the siphon tube. Chopped, washed *Tubifex* can now be fed. I usually chop the worms on a piece of wood, using a razor blade in both directions, a mass of *Tubifex* about 3 inch square receiving approximately 200 choppings.

In 6 weeks *C. paleatus* and *C. aeneus* should reach ½ to ¾ in., *C. hastatus* unfortunately taking twice as long to get to this size. At this stage, for continued growth it is as well to divide the fry into two or three tanks of similar size, allowing not more than 100 fry per tank. Very few fry are lost and broods vary from one to four hundred.

The Chain Sword Plant

continued from page 113

cultivation with narrower, broader, or smaller leaves than this type. But the smallest chain sword plant of all is a distinct species which should be referred to as *E. tenuis*, but often masquerades under the name of *Sagittaria microfolia*. *E. tenuis* is a charming little foreground carpet that does best in a good light and seldom exceeds 1½ in. in height.

our readers

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



write

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

Economy Measure

I HAVE been keeping tropical fish for only 1 year, and although I have successfully reared four swordtails, I find that most of my fry are eaten if left in my one 24 in. community aquarium.

It is all very well for experienced aquarists with fish houses containing rows of aquaria to recommend breeding tanks at 24 in. even for livebearers, but for most aquarists this is completely out of the question. It is in my case because I am a schoolboy with only 5 shillings a week pocket money, and my parents have flatly refused to let me have another tank.

I am, however, fortunate enough to possess a small 12 in. by 6 in. by 6 in. tank and an air pump. I was not prepared to go to the expense of buying a heater and a thermostat for it, and its only use was to keep a few curiosities from a nearby pond. Then one day I had the idea of fixing the tank, by standing it on a box with its top about half an inch above my larger tank so that water could be added to it from the large tank by means of an air lift and then returned to the tank by means of a siphon. This had the effect of supplying the tank with warm water and at the same time aerating it. The temperature in the big tank was 75°F (24°C), and it only fell a few degrees in the small one.

I netted a gravid female guppy by catching her gently in a net, and, keeping the net in the water, placed a jar of water under her, and transferred her to the other tank, so that she was under the water during the whole of the operation. In a few days I had about 20 young fish on my hands, safe from the snapping jaws of the larger fish in my community aquarium!

L. KEELIANOVTEK,
Dover, Kent.

Tilapia from Fiji

REFERRING to your May issue, I was interested in the article on *Tilapia mossambica* and noticed that the author does not mention Fiji. For your information this species was first introduced into this Colony by the Agriculture Dept. a few years ago on an experimental basis. Specimens were brought in from New Caledonia and Hawaii (who originally got their stock from Malaya) and were put into the rivers of Fiji. It was hoped that they would breed and provide food for the Islanders—which they have.

I have kept and bred this species for the past 3 years and have found them unusually interesting and easy to breed in this climate. They also become very tame and

will surface and wait to be fed when you approach them. Mine have been very happy on a diet of finely chopped meat and dried food.

(Miss) SUSAN SMITH,
Suva, Fiji Islands.

Chemicals for the Aquarist

WITH reference to the two readers' letters (*The Aquarist*, July) about my article on the "Use of Chemicals for the Aquarist" in the May issue, I was pleased to know some interest on the subject had been raised but sorry to learn one reader had lost his plants. The intention was to give household measures (spoonfuls) as compared with the accuracy of the chemist's balance. I fully admit this system falls down when comparing substances of differing density, i.e., a spoonful of mercury must weigh heavier than a spoonful of water.

As the Table I gave covered liquids and solids I assumed it was obvious that you couldn't have a heaped spoonful of liquid and therefore all the measures were for level spoonfuls. I now realise I was wrong in this assumption and if the reader who lost his plants through too much salt will send me his address I shall be pleased to replace them for him (unless they were all Madagascar lace plants!).

Whilst on the subject of plants I feel it would have been of interest to other readers to know which ones succumbed to the salt treatment. Salt is used continuously at a concentration of half an ounce to the gallon in my mollie tanks where *Sagittaria subulata* and *Najas kuetzi* flourish.

The gentleman who can get 4 ounces of salt on to a tablespoon must be a magician; perhaps he can send me half a pound in a matchbox! Joking aside, I think his salt must be damp. The actual salt I use (for fishes and brine shrimp hatching) is now called broad salt and costs 1s. 9d. for 7 lb. (Boots Chemists). It is rather coarse salt (large crystals) and a level tablespoonful weighs as near to half an ounce as makes no difference (actually 30 level tablespoonfuls to the pound).

I trust this letter will clear up any misunderstanding and hope my article may have helped other readers to keep their fishes alive!

J. D. LOANER,
Sutton, Surrey.

Flukes and Tropical Fishes

WOULD any aquarist who suspects or knows that his fishes are suffering from the attentions of external "flukes" please send samples of infested fishes, dead (and in

Continued overpage

Book Review

Introduction to Herpetology by Coleman J. Goin and Olive B. Goin. 341 pages, 114 illustrations. Freeman, \$8.00.

THE Goins are to be congratulated on having produced a well-planned and balanced introductory text. The first five chapters discuss the structure, origin and evolution of the amphibians and reptiles and provide a good background. They are followed by chapters on reproduction and life history, relation to environment, behaviour, mechanisms of speciation, and geographic distribution. In these chapters much information has been brought together at an elementary and very readable level. The remainder of the book is a group by group account of the living forms of reptiles and amphibians. Each chapter includes selected references to further reading, and drawings and photographs are scattered throughout the text. The photographs are good but the quality of the drawings is variable and those of actual animals are less than satisfactory; for instance the natara, chameleon and rock python on page 75 are crude in the extreme.

As is always the case with an introduction, generalisations are made that do not hold good. For instance, it is not true (page 3) that the "reptile egg usually has a calcareous shell"; many, if not the majority, possess parchment shells, hence the problem of providing the correct humidity to prevent desiccation during incubation; nor is it true (page 115) that "the true chameleon (*Chamaeleo*) has horns or dermal appendages". Many chameleons lack any type of head ornamentation (e.g. *Chamaeleo chamaeleon* and *Microsaura punctata*). *Vipera aspis* is not the European common viper (page 113) nor does *Colonyx* (the desert ground gecko) in the reviewer's experience "lay calcareous-shelled eggs" (page 266) but parchment-shelled eggs. On page 166 it is stated that snakes will swallow glass nest eggs

and the deduction is wrongly made that snakes therefore rely largely on sight rather than smell in identifying eggs. Snakes will sometimes accept glass nest eggs if they have been in a nest and therefore smell of the bird. Eggs are tested by snakes by smell and an egg-eater (*Dasyatis acuber*) will not try to swallow an addled egg or even one that contains a well developed embryo.

Despite these minor criticisms *Introduction to Herpetology* proved most interesting and stimulating reading to the reviewer and it certainly fulfils the intention of its authors—to provide a balanced introductory account.

H.R.B.

Our Readers Write

continued from page 115

formalin) if necessary but preferably alive, to me?

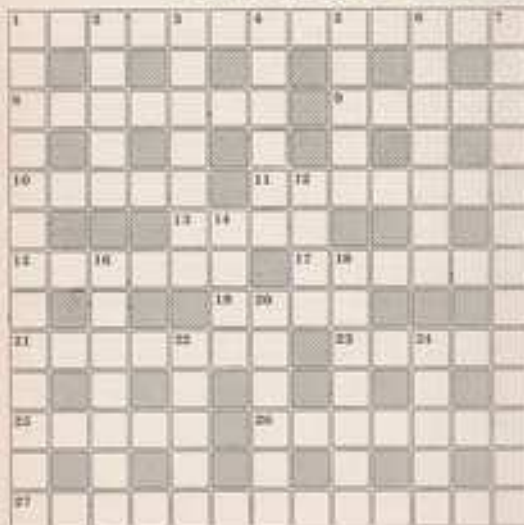
Two or three years ago I found an infested guppy, but the British Museum staff were unable to identify the fluke; it certainly was not *Gyrodactylus* or *Daryloperis*. My investigations ceased through the absence of further specimens.

C. E. C. COUS,
46, Vine Gardens,
Ilford, Essex.

Fish and Freshwater Biology

AN evening class course with this title is to be given for aquarists and anglers by Dr. M. Pugh Thomas this autumn at the Zoology Department, The University, Manchester, 13. There will be 20 meetings, on Monday evenings 7 to 8.30 p.m., the first being on 7th October. Fee for the course is £1. Topics such as fish anatomy, behaviour, classification etc. will be dealt with in a way suited to the non-specialist.

The AQUARIST Crossword



Compiled by L. BRADLEY

CLUES ACROSS

- At the show goldfish are in this class (5, 4)
- Bag coin (swag.) (7)
- Make dull (3)
- Scraped way that the river rounds the point (5)
- As in the French Royal Navy gives light (7)
- Dance for the angler (4)
- Dialike intensely (6)
- Burns superficially (6)
- Light of the aquarist (4)
- Arrange in order (7)
- Sea shore (5)
- Oblique (5)
- Leaves in the lurch (7)
- To become 3 down fish have to conform to these (4, 9)

CLUES DOWN

- Dasyatis acuber* (8, 7)
- Wreckage on the seabed (3)
- They take first place (7)
- The way to catch a trout? (6)
- The "Christmas card" bird (5)
- Floating mass of ice (7)
- Done, to see how soft the aquarium water is (8, 5)
- As well as in coal seam (8)
- Volcanic mountain (8)
- A violent storm (7)
- Blurred up the tin disc (7)
- Water plant that begins by putting up relief for the unemployed but ends with one start (6)
- Cads (5)
- To regard with disgust (5)

Solution on page 118

News from AQUARISTS' SOCIETIES

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

AN invitation is extended to anyone living in the Hastings-Bexhill district who is interested in tropical or subtropical fishkeeping to join the **Hastings and Bexhill Aquarists' Society**. Meetings are held on the last Friday of each month at The Foresters' Hall, 33, Wellington Square, Hastings, when lectures and slide shows of general interest to all aquarists, experts and beginners alike, are held.

The Club has also started a new idea of holding "At Home" Meetings in addition to the general meetings. These are held at various members' homes, and are of an informal nature, designed to help members to get to know one another better. Members unable to attend an evening can come to these meetings as they are held on Wednesdays or Thursdays. So far, some "At Home" have been held and are proving a great success.

Further details of the Club may be obtained from the Hon. Secretary, Mr. A. L. McErmick, 26, Chantry Avenue, Bexhill-on-Sea, or the Hon. Hon. Secretary, Miss V. M. Rogers, The Swaney House, 780, The Ridge, St. Leonards-on-Sea, Sussex.

AT the monthly meeting of the **Belle Vue Manchester Aquarists' Society** the main item on the agenda was a pre R.A.F. discussion. Several members brought along some fish for general criticism. The October meeting will be held on the first Wednesday in the month in the Palm Court Restaurant, Belle Vue Zoological Gardens, Manchester at 7.45 p.m.

THE **Cambridge and District A.S.** visited members' Show of 1963 attracted a total of 68 entries, the highest number for a considerable time. A new trend to take 18 small tanks,

concentrated for a number, Mr. F. Driver, allowed the show to be set up more quickly and neatly than has been possible before. An interesting selection of fish was on display. They were judged by Mrs. W. Meadows who commented that, in particular, the live-bearers were better than on her previous visit to Cambridge. Mr. A. Mason won the cup for best-in-show with an Angpt. Mr. Mason's total haul was 8 cups. Mr. Halsey won the cup for the best Live-bearer and Mr. Chapman the cup for the best Goldfish. It is proposed to hold one more Members' Show this year and also a Home Tank Competition.

A VERY enjoyable club meeting was held by **Bracknell A.S.** recently. High Woodville A.S. attended for a round on the "Drama Course". League for six best fish. Bracknell won this round and have now lost just and won two.

During the evening, by Mr. Forest Jones of Banbury A.S., the two clubs had first a discussion on "requirements of fish food," and then an **Any Questions** session.

The home club also held a bottle show for a residents club which was won by Mrs. Jordan. Bracknell A.S. have had also a very successful Open Show. The awards were presented by Mr. W. Mather, club president, and the best fish in the show was owned by Mr. Les Timms of Oxford A.S.

The Secretary is Mr. K. Phillips, 46, Fordmore Road, Bracknell, Berks.

THE **Belford and District A.S.** held a table show recently and the results were as follows: A.V. Characin: 1, Mr. Thompson (Bleeding Heart Tetra); 2, Mr. Smith (Guppy); 3, Mr. Combs (Serpae); A.V. Carps: 1, Mr. Thompson (Rory Barb); 2, Mr. Satterthwaite (Half-banded

Barb); 3 equal, Mrs. Bell (Rory Barb), Mr. Satterthwaite (Half-banded Barb), Mr. Thompson (Checker Barb); A.V. Catfish and Loach: 1, Mr. Thompson (Julia); 2, Mrs. Bell (Lionel-shin Cat); 3, Mr. Thompson (Pezomachus). The Bleeding Heart Tetra of Mr. Thompson gained 30 points and is the highest pointed tropical in this year's show. New members are always welcome and the secretary is Mr. Satterthwaite, 24, Rowell Drive, Belford.

FOLLOWING upon the Summer show, the **Preswick and Bury A.S.** recently revived its activities. The feature of the August meeting was a lecture and demonstration by Mr. A. Wardle on "Furnished Aquaria". All aspects of the subject were competently covered and whether one's interest was from a competitive or home decoration point of view Mr. Wardle's remarks must have proved very informative. After the lecture he was asked to judge the table show for A.V. Tropical Fish. The result was a win for Mr. B. Keatley with a Kribia and he also filled third place with a Soudan. Second was Mr. F. Jennings with a Halisagus. The prize for best Juvenile went to Master A. Markland.

THE Members of the **Tipton and District A.S.** staged their third Table Show recently. The Show was for Barbs and Catfish, and the results were as follows: Section A Barbs: 1, J. Cook (Cunningham); 2, G. Gadd (Arbuthnot); 3, J. Cook (Topsy); Catfish: 1, W. Denton (Sneyd Est); 2, G. Gadd (Bacon Cat); 3, J. Denton (C. Amers). Section B Barbs: 1, J. Markland (Cunningham); 2, G. Harding (Tiger); 3, D. Johnson (Nigare); Catfish: 1, E. Eden (C. Melanostictus); 2, J. Vickers; 3, A. Colburn (Nagare). Best Fish in Show: Mr. J. Satterthwaite's Cunningham Barb. Details regarding the Society can be obtained from Mr. W. Denton, 2, Shaw Road, Tipton, Staffs.

RESULTS of the second annual Open Table Show of the **Tadcaster and District Aquarists' Association** were as follows: Livebearers: 1, M. Bumbold (Tadcaster); 2, F. Phipps (Derby); 3, D. Machin (Thorne); Barbs: 1, A. Pugh (Bradford); 2, D. W. Altherton (Bradford); 3, B. Moss (Leeds); Characin: 1, F. Phipps (Derby); 2, C. Duckett (Skipton); 3, J. G. Hoy (North Eastern Federation); Guppies: 1, G. Walker (Mansfield); 2, C. Walker (Dunelm); 3, D. Machin (Thorne); A.P. Reynolds (Lund); Fighites: 1, W. Cannon (Tadcaster); 2, E. Whitlock (Tadcaster); 3, J. Baine (Tadcaster); Anabantids: 1, C. Duckett (Skipton);



Hounslow and Feltham Aquarists' Display

An exhibition stand jointly arranged by members of **Hounslow and District A.S.** and **Feltham A.S.** for **Feltham Carnival** recently. As well as three show tanks the stand included display jars with unusual fishes and the societies' trophies.

The society was highly successful at the Dagenham Trips Show, taking first and second prizes in the Furnished Aquaria Competition, among the individual entries. Miss Rita Berger won the prize for the best fish in the show and a black roach, and other winners were Mr. Manning and Mr. Berger.

Further information about the society may be obtained from the secretary, Mr. R. Koch, of 11, Donkeld Road, Dagenham.

SEVE aquatic clubs competing for the North West London Group Shield were given an evening's entertainment by the host club, Hampstead.

Willowden were back on form, winning most of the awards and making up a list of lost ground. Results were: Lovett's class—L. Mr. Rowland with a thick lip Gourami (Willowden); in the Catfish class Mr. Landon and Mr. D. Lamb, both of Willowden, gained third and second prizes, and in the tropical class Mr. W. Huxley, Willowden, gained a fourth place.

In the Characin class Mr. K. Hobbey, Willowden, gained first place and also best fish of the show award with an acanthurus acanthurus. Total points gained: Willowden, 34; Riverside, 29; Hampstead, 10; Independents, 8; and London, 4.

THE formation of a new society comes from Burywood Sports and Social Club (Aquarist Section), Central Electricity Generating Board, Burywood House, Portsmouth Road, Hatfield, Herts.

MEMBERS of the Leyton Aquarists attended a show of slides on tropical fish and tanks at a recent meeting.

A visit to Belle Vue Zoological Gardens for the British Aquarist Festival was discussed but details will be available later, and a table show of tropical fish will be held at the next meeting.

SUNDAY, 22nd September will see a gathering of the Fancy Guppy Association from all over Britain at the Herri Section Annual Open Show, at the Girl Guides Meeting Rooms, Watling Street, Basildon, Essex. A coach is to carry most of the northern members and their fish. Any aquarist interested in Guppies will find a welcome here, from 2 p.m.

A TALK on water and its effect on fish was given by Mr. I. Brown, assistant scientist of the Home Office and Youth, Sports and Water Commission, to a meeting of the Penrith and District A.S., in the Edenhill Community Centre.

Mr. Brown outlined techniques used in observing, rearing, storing and supplying water for domestic use. He also explained chemical properties and characteristics of different types of water, their effect on fish and answered a number of questions on hardness and softness and alkalinity and acidity.

The evening's competition was for fish breeding and each entrant exhibited four young fish from a recent brood.

The winners were: 1, Mr. D. Potts (angel fish); 2, Mr. I. Hearn (Hawanna moorheadbreeder); 3, Mr. D. Huxley (red swordtail).

The North East Federation of Aquarist Societies ran a tropical fish challenge competition during the 1962-63 winter season in which affiliated societies competed. It has been won by the Penrith Society with Tyneside Aquarist and Biological Society runners up.

SECRETARY CHANGES

DEAL and District A.S. (J. C. F. Baker, 13, Downs Road, Walsay, Kent).

AQUARIST CALENDAR

14th-15th September: Willowden and District A.S. Annual Show at Roundwood Park. Details from Mr. B. Sullivan, 130, Barry Road, Southridge Park, London, N.W.10.

14th September: East London Aquarist and Pondkeepers Association. Closed Annual Show to be held at Ripple School, Ripple Road, Barking, Essex. Open Classes for Breeders and Furnished Aquaria. Schedule from Mr. W. Romage, Show Secretary, 91, Boundary Road, Barking, Essex.

15th September: Nottingham & District A.S. Open Show at Drill Hall, Derby Road, Nottingham. Apply to Show Secretary, Mr. A. Linsley, 65, Sedgwick Street, Locksley, Nottingham.

15th-21st September: Leeds & District A.S. Annual Open Show. Details from R. Moss, 19 Hillen Road, Harrogate, Leeds 2.

20th-21st September: Bristol A.S. Open Show and Exhibition at Colfeys and Tropical Fish, Bishopscourt Parish Hall, Gloucester Road, Bristol, 2. Schedule obtainable from Mr. E. Durston, 11, Sandford, Westbury-on-Trym, Bristol.

27th-29th September: Three Counties Show, Gas Social Club, Goswink Road, Reading. Schedule from Mr. C. Mutton, 12, Pottick Road, Crowtham, Reading.

28th September: First Annual Dinner of the British Ichthyological Society in Glasgow. Information from the Secretary General.

28th September: Kingston and District A.S. Open Show.

29th September: Blackpool and Fylde A.S. Open Show at 67 Station Road, Blackpool.

10th-12th October: Scottish A.S. Annual Show at the McLaughlin Galleries, Sauchiehall Street, Glasgow. All information from Mr. S. McKinnon, 7, Mulben Crescent, Glasgow, S.W.1.

11th-13th October: North Eastern Federation of Aquarist Societies Annual Open Show, in Durham City. Details from the Secretary, Mr. Ian G. Hunt, 21, Frederick Street, Sunderland.

18th-17th November: B.A.F. Show, Belle Vue, Manchester. Schedule are now obtainable from Show Secretary, Mr. G. W. Cooke, "Spring Grove," Fieldhill, Batley, Yorkshire.

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64, King's Road, Reading
Telephone: Reading 55832
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11, Downs View,
Bude.
Telephone: Bude 154
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DEVON

Plymouth Tropicals
127, North Road, Plymouth
Telephone: Plymouth 62663
E.C.D. Tuesday. R. C.T.P.A.A.

DURHAM

Metcalf, G. R.
2, High Northgate (near A.B.C. Cinema)
(On main A.1 road) Darlington
Telephone: Darlington 5991
E.C.D. Wednesday. R. C.T.P.A.A. R.&A.

Powell, M.C.
The Honey Pot,
Claypath, Durham City
Telephone: Durham 2108
E.C.D. Wednesday (All day). R. C.T.P.A.A. R.&A.

The Fish Bowl
Burdon, Sunderland
Telephone: Sunderland 71026
E.C.D. Wednesday (All day). R. C.T.P.A.A. R.&A.

ESSEX

Goodmayes Aquaria
Shaftesbury Parade, High Road, Chadwell Heath
Telephone: Goodmayes 2594
E.C.D. Thursday. R. C.T.P.A.A.

Skilton, C. J., Aquarist
"Ridgeway", 139, Galleywood Road,
Chelmsford
Telephone: Chelmsford 56878. W. C.T.P.A.A.

The Hamlet Aquaria
14, Saint Helens Road,
Westcliff-on-Sea
Telephone: Southend-on-Sea 44724
E.C.D. Wednesday. R. C.T.P.A.A.

GLOUCESTERSHIRE

Patricia Preece (Prop. Mr. B. R. James)
10, Suffolk Parade, Cheltenham
Telephone: Cheltenham 24949
E.C.D. Wednesday. R. C.T.P.A.A. R.&A.

HAMPSHIRE

Arundel Aviaries & Fisheries
241/243, Arundel Street, Portsmouth
E.C.D. Wednesday. R. C.T.P.A.A. R.&A.

Wingate Zoological Supplies
7, Market Street, Winchester
Telephone: Winchester 2406
E.C.D. Thursday. R. C.T.P.A.A. R.&A.

HERTFORDSHIRE

Cura, L. & Sons
Water End, Hemel Hempstead
Telephone: Water End 44
E.C.D. Saturday. W. C.P. R.&A.

KENT

Kingsfisheries Aquarium
138, Croydon Road, Beckenham
Telephone: Beckenham 3716
E.C.D. Wednesday (all day). R. C.T.P.A.A.

Sherwood Pet Stores
(Proprietors, Fairbairns Aquaria, Ltd.),
252, Sherwood Park Avenue, Sidcup
Telephone: Bexley Heath 7217
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Hornby's
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Manchester, 16
Telephone: Trafford Park 2989
E.C.D. Wednesday. R. C.T.P.A.A. R.&A.

Letty Kremner
13, King Edward's Building,
Cheetham Hill Road,
(opp. Woolworths), Manchester, 8
Telephone: Cheetham Hill 3246
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Liverpool Aquaria Company
23, Sir Thomas Street, Whitechapel, Liverpool, 1
Telephone: Central 4891
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LONDON (East)

Wade Aquatics
333, High Street North,
Manor Park, E.12.
Telephone: Grangewood 6333
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LONDON (North)

Philip Castang Ltd.
91, Haverstock Hill,
Hampstead, N.W.3
Telephone: Primrose 1842 and 9452
E.C.D. Saturday. W. T.P.A.A. R.&A.

Paramount Aquarium
95, Haverstock Hill,
Hampstead, N.W.3
Telephone: Primrose 1842 and 9452
E.C.D. Thursday. R. C.T.P.A.A. R.&A.

LONDON (South)

Aquatic Suppliers Co. Ltd.
7, David's Road, Forest Hill, S.E.23
Telephone: Forest Hill 3816
(Open every afternoon and all day Saturday).
WR. C.T.P.A.A.

Fairbairns Aquaria, Ltd.
15, Well Hall Parade, Eltham, S.E.9
Telephone: Eltham 5859
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Upper Tooting, S.W.17
Telephone: Balham 7334
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Tachbrook Tropicals
244, Vauxhall Bridge Road, Victoria, S.W.1
Telephone: Victoria 5179
(Open all week except Sundays).
WR. C.T.P.A.A. R.&A.

LONDON (West)

Aquapets
17, Leeland Road,
West Ealing, W.13
Telephone: Ealing 2748
E.C.D. Wednesday. R. C.T.P.A.A. R.&A.

Owen Reid's, Aquarium Dept.
12, Spring Bridge Road, Ealing Broadway, W.5
Telephone: Ealing 3259
E.C.D. Wednesday. WR. C.T.P.A.A. R.&A.

NORTHAMPTONSHIRE

The Aquarium
192, Wellingborough Road,
Northampton
Telephone: Northampton 34610
E.C.D. Thursday. R. C.T.P.A.A. R.&A.

The Pet Shop
120, Kettering Road,
Northampton
Telephone: Northampton 841
E.C.D. Thursday. R.C.T.P.A.A.

OXFORDSHIRE

The Goldfish Bowl
9, East Avenue, Cowley Road,
Oxford
Telephone: Oxford 41825
E.C.D. Thursday. WR. C.T.P.A.A. R.&A.

STAFFORDSHIRE

Walsall & Wolverhampton Aquatics
46, Stafford Street, Walsall and
147, Horsley Fields, Wolverhampton
Telephone: Walsall 21783 and Wolverhampton 24147
E.C.D. Thursday. W.T. AA. R. C.T.P.A.A. R.&A.

SURREY

Thameside Tropicals and The Pet Shop
Brassey House, New Zealand Avenue,
Walton-on-Thames
Telephone: Walton 24076 R. C.T.P.A.A. R.&A.

SUSSEX

Fin and Feather
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49, Surrey Street (outside Brighton Station),
Brighton
Telephone: 29940. R. C.T.P.A.A.

WARWICKSHIRE

The Coventry Aquarist (Prop. W. Dymond)
43, Melbourne Road, Earlsdon, Coventry
Telephone: Coventry 72772
E.C.D. Thursday. WR. C.T.P.A.A.

Fanday Aquaria
Fanday House, 129, Stratford Road, Sparkbrook,
Birmingham
Telephone: Victoria 3537
E.C.D. Wednesday. WR. C.T.P.A.A. R.&A.

WORCESTERSHIRE

The City Aquaria, Bird and Pet Supplies
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34, Friar Street (opposite Union Street), Worcester
Telephone: Worcester 22005
E.C.D. Thursday. R. C.T.P.A.A. R.&A.

YORKSHIRE

The Corner Shop (Prop. J. Wilde)
526, Abbeydale Road, Sheffield, 7
Telephone: Sheffield 54172
E.C.D. Thursday. R. C.T.P.A.A. R.&A.

SCOTLAND

Aquarists' Rendezvous
164/168, Albert Drive, Pollokshields, Glasgow, S.1
Telephone: South 4258
E.C.D. Tuesday (1 p.m.) WR. C.T.P.A.A.

Forbes, James L. (Prop. P. N. Greening)
176, Blackness Road, Dundee, Co. Angus
Telephone: Dundee 66409
E.C.D. Wednesday. R. C.T.P.A.A.

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