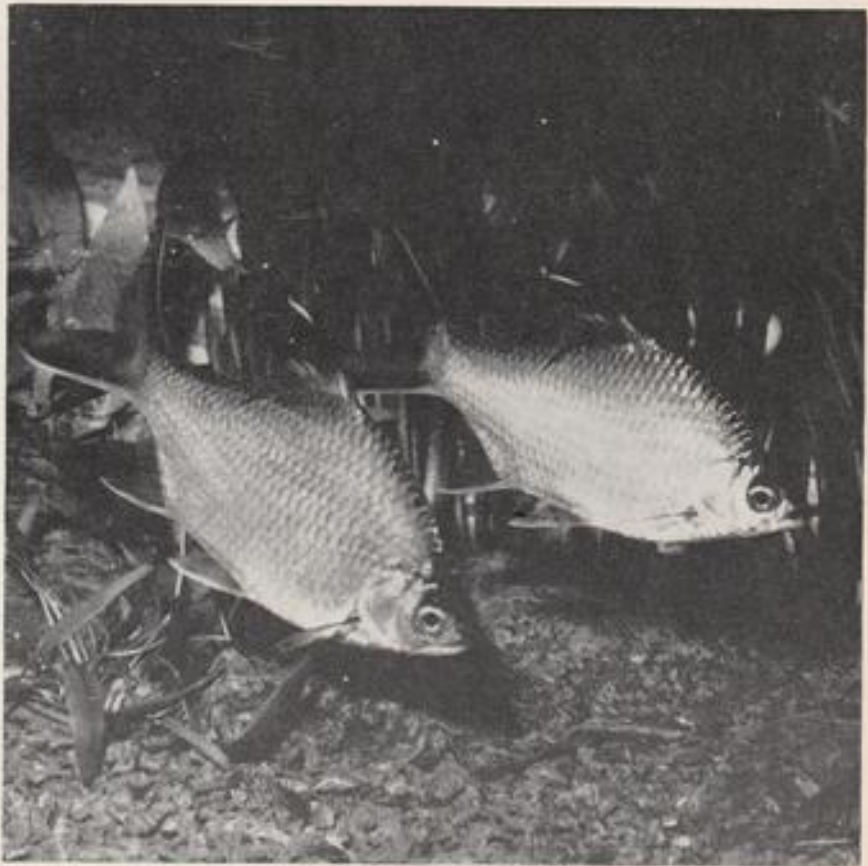


The aquarist

and Pondkeeper

SEPTEMBER 1964



MONTHLY
Vol. XXIX No. 6

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of feeding
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2s. 6d. per tube

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Healthy Variety of Tropical and Goldwater Fishes*

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FANTAILS 3-4"	12/6 to 17/6
TELESCOPE FANTAILS 3-4"	15/-
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RED HEADED LIONHEADS 2"	8/6
PEARL SCALES 2½"	8/6
ORANDAS 2"	6/6
BLACK MOORS 2"	7/6
BLACK MOORS 3-3½"	15/- to 17/6
GREEN TENCH 2½-5"	3/6 to 4/6
GOLDEN ORFE	3/- to 7/6
HIGOI	3/-
GOLDEN RUDD	3/6
GOLDFISH 2-3"	1/6
GOLDFISH 3-4"	3/6
SHUBUNKINS 2-3"	1/6
SHUBUNKINS 3-4"	3/6
SILVER RUDD	3/6

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(Fully wired for heating and lighting. Heater
and strip bulb only to be added)

18 x 12	68 5 0
24 x 12	69 17 6
24 x 15	612 17 6
36 x 12	616 19 6
36 x 15	622 10 0
CORNER CONCAVE FRONT	621 0 0

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PRESSED STEEL	ANGLE IRON	4" WIDE REFL'S	HOOD	STAND 36" HIGH
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12 x 6 x 6 11/6	18 x 10 x 12 36/-	12" 6/6	18 x 10 13/-	36/-
14 x 8 x 8 13/6	24 x 12 x 12 52/6	14" 7/-	24 x 12 27/6	47/6
16 x 8 x 8 15/-	24 x 12 x 15 57/6	16" 7/9	30 x 12 32/6	52/6
18 x 10 x 10 22/6	30 x 12 x 15 79/6	18" 8/-	36 x 12 35/6	57/6
24 x 12 x 12 36/-	36 x 12 x 15 104/3	24" 8/6	48 x 12 47/6	80/-
	48 x 12 x 15 127/6			

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1½ oz.	3/3d.
4 oz.	7/6d.
8 oz.	12/6d.
16 oz.	20/-

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All Standard Sizes of Aquaria in
Stock. Any sizes made to specifica-
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installations quoted for.

MINIMUM RAIL ORDER FOR FISH—
£2 10 0—10/- Carriage and Packing.
CARRIAGE ON AQUARIA AT COST.
TERMS: CASH WITH ORDER.

LIVE FOODS

WINGLESS FRUIT FLIES CULTURE	7/6
GRINDAL WORM CULTURE	3/-
MICRO WORM CULTURE	3/-
WHITE WORM CULTURE	3/-
WHITE WORM, 1 OZ.	6/-

Post Paid

DAPHNIA AND TUBIFEX ALWAYS IN STOCK

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APHYOSEMON AUSTRALE	15/- pair
BIVITTATUM	12/-
VEXILLIFER	25/-
CALLIURUM AHLI	22/6
GULARE COERULEUM	37/6
FILAMENTOSUM	21/-
NOTHOBRANCHIUS GUENTHERI	21/-

(Other varieties arriving frequently)

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OF LIVEBEARERS, CHARACINS, BARBS,
SHARKS, CICHLIDS, CATFISH, LOACHES,
TETRAS, SUCKER FISH AND MANY RARE
FISHES

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BACKING PAPERS—21" wide, 1/3 per ft.
STRATA ROCKWORK, PEBBLE BEACH, SEA
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ALL TYPES OF EQUIPMENT INCLUDING
THERMOSTATS, HEATERS, FILTERS,
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BOW-FRONTED AQUARIA

24 x 12 x 15 1/2" WITH	612 10 0
36 x 12 x 15 1/2" PLAIN	615 15 0
48 x 10 x 15 1/2" STAND	622 0 0
36 x 12 x 15 1/2" WITH WROUGHT-	619 19 0
48 x 10 x 15 1/2" IRON BOOKCASE	632 0 0

NYLON COATED	POLYTHENE COATED
18 x 10 x 10 40/-	10 x 6 x 8 14/6
18 x 10 x 12 45/-	12 x 6 x 6 15/-
24 x 12 x 12 55/-	14 x 8 x 8 18/-
24 x 12 x 15 90/-	16 x 8 x 8 20/-
36 x 12 x 12 129/6	18 x 10 x 10 27/6
36 x 12 x 15 148/6	18 x 12 x 12 37/6
48 x 12 x 15 202/6	24 x 12 x 12 48/-



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of feeding
your baby fishes

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and watch them GROW!

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This distinguished red fish food has been developed as a replacement for live food for professional and amateur use. It contains all essential ingredients to keep fish in peak condition and colour and to ensure rapid growth. It is a superb basic diet for coldwater, tropical and marine fish.

SPECIFICATION

Protein 47%; carbohydrate 29.7%; fat 4.9%; water 6.5%. Vitamins A, B₁, B₂, B₆, B₁₂, C, D, E, H, K, calcium pantothenate, choline, folic acid, inositol, niacin, p-aminobenzoic acid.

2/- and 10/- at all good dealers

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

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

WHOLESALE ORDERS EXECUTED IMMEDIATELY

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These famous German foods out-sell all other brands
The first Vacuum-Packed Fish-Foods



These fabulous fish-foods are manufactured by Vitakraft—
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Naturfütter } Breeders pack 6/9
Rosawil } Standard size 1/10
Vitawil } 1 litre drum 22/6
Vitakraft Extra }



Breeders size packed in these vacuum-sealed jars for perfect freshness price 6/9

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Brand new conditioning food for all tropical fish.

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Colour food which promotes coloration and spawning condition.

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Staple food to meet the basic requirements of tropical fish.

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18, Church Street,
Dorking, Surrey, England.

What the German experts say about NEW VITAKRAFT NATÜRFÜTTER

A. Müller. Weilburg.

My colleagues and I agree that New Vitakraft Natürlfütter is very, very good. I certainly do not sing a song of praise when I say that Natürlfütter is very much preferred by fish.

G. Jansen. Düsseldorf.

I receive anything new with scepticism, so much is being given high praise. I did not wish to know till now about dry food. I have now become converted through Natürlfütter. Vitakraft does certainly contain something.

H. Pfeiffer. Frankfurt.

My trials with Natürlfütter have been 100% successful—no water turbidity occurred. It is liked by all fish, even *Scalares*. My young fish have grown considerably. Also my colleagues who collaborated in these trials confirm nothing but the best.

H. Meyer. Walsdorf.

This is a 100% food, which I heartily recommend to all aquarists. Natürlfütter is safe for amateurs. In my special trial: 20% of the flakes were still floating after 48 hours. Only after more than 62 hours, the water became slightly opaque. After 64 hours the pH value was almost unchanged. Also my *Pterophyllum scalares* and *Haplochromis multicolor* which receive only live food, liked Vitakraft equally well.

G. Ramm. Hamburg.

I completed my trials with 73 tanks. Natürlfütter is first class. It is very much liked. Ability to float is excellent.

H. J. Nolte. Herford.

I am very critical, but have been astounded to find that in every respect new Vitakraft Natürlfütter is much better than I would have even dreamt. To my great surprise it is not only accepted by the usual dry-food consuming fish, but also by *Cichlids*, *Macropodes* and young pike, even though they had an adequate amount of water fleas.

H. Stasius. Herford.

With new Vitakraft Natürlfütter I feed *Cichlids*, *Labyrinth* fish, fish of the *salmo* and *barbus* geni and live-bearing and egg-laying toothed carps. It is well accepted in spite of water fleas and *tubifex*. If fed alone, it has throughout a good acceptance without any exception. I did not find any water turbidity.

Herman Meinken. Bremen.

My trials with new Vitakraft Natürlfütter have progressed very well, and I am more than pleased. The food is liked by almost all fish, also pure meat-eaters, and on repeated use. A great advantage is its considerable floating capacity. Its composition is a guarantee of good nutrition.

Herbert Mischke. Düsseldorf.

The *Congo-Salmo* genus which reputedly do not eat any dry food, snatch at the food floating on the water surface, as do all the *Indian Barbus* fish and also *Bedotia geyi*. After abundant feeding with Natürlfütter, fruit flies were no longer acceptable. This is an astounding finding since these are even being snatched at when the aquarium is full of water fleas and gnat larvae, hence according to that they must be completely satisfied.

In conclusion, I should like to say that the food is something entirely new, a non-sinking dry food, acceptable to the most fastidious fish, which will establish itself.

Wilhelm Voigt. Berlin-Steglitz.

New Vitakraft Natürlfütter is most excellent, and I believe that you have provided most aquarists with one of the best foods. All my fish, including *Coral-fish*, take this food avidly.

Heinz Zufall. Kassel.

In spite of deliberate overfeeding, no water turbidity occurred. Also young fish developed well. New Vitakraft Natürlfütter is in my opinion the best I ever had.



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Guppies	
Fancy	10/- pair
Black Veil	12/6
Delta	12/6
Black	4/-
Assorted	3/-
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Red Standard ..	2/6 each
Red Large	3/6
Green	2/6
Red Eye Red ..	3/6
Albino	3/6
Black	5/-
Green Wagtail ..	3/6
Tuxedo	3/6
Simpsons Red ..	12/6 pair
Simpsons Tuxedo	12/6
Half Beaks	3/6 each
Platies	
Red	3/- each
Black	3/-
Tuxedo	3/-
Cornet Tail Yellow	3/-
Yellow Wagtail ..	3/-
Red Wagtail	3/-
Florida Blue	3/6
Various	4/-
Mollies	
Liberty	4/- each
Green Sailfin ..	4/6
Green Lyretail ..	6/-
Black Lyretail ..	5/-
Black	3/-
Speckled	2/6
Black Sailfin ..	2/6
Mosquito Fish ..	2/6

CHARACINS	
Tetras	
Glowlight G.S. ..	3/6 each
Neon	3/6
Neon	six for 17/6
Neon (king size) ..	5/- each
Blue	7/6
Black Neon	5/-
Flame	2/6
Phantom	6/6
Cardinal	7/6
Red Eye G. S. ..	3/6
Dawn	3/6
Diamond	3/6
Emperor	10/-
Lorretto	7/6
Black Line	2/6
Serpae	5/-
Silver Tip	3/6
Red Nose	8/-
Silver	3/-
Feather Fin	3/6
X-Ray Fish	2/6
Rosaceus	4/6
Bescons G.S. .. .	2/6
Swordtail Characin	4/-
Black Widows G.S.	2/6
Belgium Flags ..	4/6

Bloodfins	3/- each
Penguins (Bohiki) ..	4/6
.. (Oblique)	8/6
Leporelus Species ..	27/6
Blind Cave Fish ..	3/-
Marble Hatchets ..	7/6
Silver Hatchets ..	6/6
Nannostomus	
Marginatus	4/-
Anomalous	5/-
Beckfordi	5/6
Salmon Discus ..	5/6
(Silver Dollar) ..	5/6
Copinia Arnaldi ..	4/6
Copinia Guttata ..	3/6
Anostomus	35/-

LABYRINTHS	
Siamese Fighter males	10/- each
.. females	4/-
Gourami	
Thick Lip	3/-
Dwarf	3/-
Dwarf (adult) .. .	5/-
Three Spot	2/6
Opaline	3/6

Rasbora Dorsicelesta	2/6 each
Microrasbora .. .	
Rubrescens	2/6
BARBS	
Tiger	2/6 each
Tiger (large)	4/6
Nigger	2/6
Nigger (adult full col.)	7/6
Ticto	2/6
Ticto (adult)	6/-
Cherry	3/-
Cherry (Adult full col.)	7/6
Cummingi (adult) ..	6/-
Nigger (medium) ..	5/-
Chequer G.S.	3/-
Ember	15/6
Tinfoil	5/-
Tinfoil (larger) ..	10/-
Roxy	2/6
Half Banded	3/6
Golden	2/6
Spanner G.S.	4/6
Clown G.S.	5/6
Albino Tiger	7/6
African Red Eye ..	6/-
Hessius (Red Eye) ..	5/-

CICHLIDS	
Angels	
Standard	3/- each
Larger	10/-
Lace Veiltail	3/6
Veil	7/6
Black	6/6
Black Veil	10/-
Jack Dempsey .. .	3/6
Blue Acaras	2/6
Brown Acaras .. .	2/6
Silver Chromides G.S.	8/6
Keyhole	5/6
Discus (Pompadour)	
3 in.	£3 10 0 each
4 in.	£12 12 0 pair
5 in.	£15 15 0 pair
Cichlids	
Convict	3/6 each
Festive	6/6
Marble	7/6
Firemouth	3/9

DWARF CICHLIDS	
Kribia	10/- & 14/- each
Egyptian Mouthbreeder	3/-
Apistogramma	
Agassiz	8/6 each
Retzi	9/-
Ramirezi	5/6

DANIOS	
Spotted	2/6 each
Giant	3/6
Pearl	2/-
Franki	2/6
Zebra	3/-
Danio Devario .. .	2/6
Danio Regis	2/6
Labura labura .. .	2/6

SHARKS	
Silver G.S.	21/- each
Black	6/-
Diamond	12/6
Red Fin	5/-
Red Tail (v. small) ..	3/6
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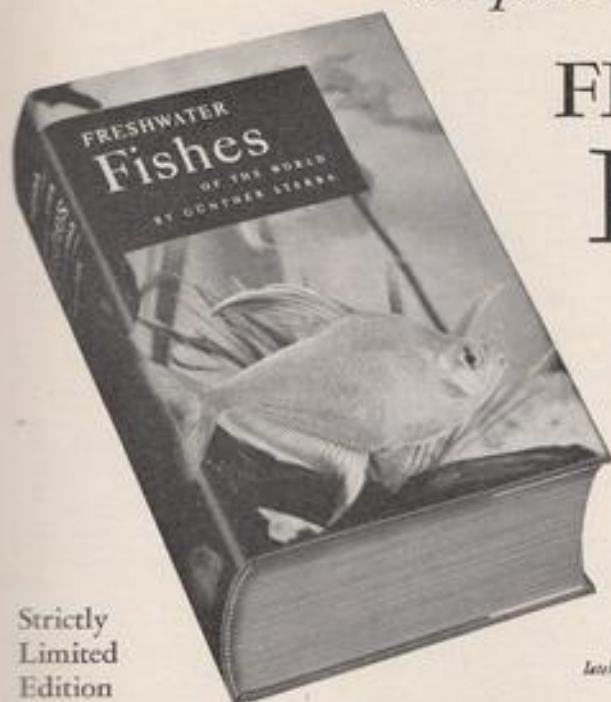
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Contents

	Page
Cloudy Water	97
Treatments for White-Spot Disease	98
Swim-Bladder Disorder	100
Marineland, Morecambe	101
Keeping Spanish Terrapins Out of Doors	102
Schubert's Barb	103
Is the Sea-Cow Still Alive?	103
Proposed Additions to the Vancouver Aquarium	104
Aeration and Filtration	105
Home-made Corner Filter	107
Two British Species for the Coldwater Fishkeeper	108
Readers' Queries Answered	109
Our Readers Write	110
Book Review	111
The <i>Aquarist</i> Crossword	111
News from Aquarium Societies	112

Cloudy Water

NOTHING is more harmful to successful aquarium keeping than water made cloudy by swirling particles of sediment. For not only does a constant rain of sediment choke the pores of the plants, and cause the foliage (and this goes for even the toughest) to rot away, but it also dulls the colours of the fishes and shortens their lives; few fishes can remain in good health for long in habitually dirty water.

But what causes excessive sediment in the first place? There are several reasons. Perhaps one of the commonest is insufficiently washed compost. A sand or grit that gives out yellowish cloud every time it is shaken up in a glass of freshly drawn water is definitely not clean enough for aquarium use. In short, all compost should be washed so thoroughly that water poured on to it will run away perfectly clean. Another reason for too much sediment is overfeeding. Never give more dried food than the fishes can clear up in a minute or two. As for live food, always see that worms of all sorts are free of any clinging mud or mould before feeding them to the fishes.

Too many floor-haunting scavengers such as catfish and loaches are another reason for too much sediment drifting about. You should always limit your bottom scavengers to about two fish for every 24 in. tank; for nothing clouds the water faster than a constant turning up of the planting medium. Rockwork, too, must be chosen with care. It is no use hoping for sediment-free water if the rockwork just crumbles away. More than that, soft rockwork is usually of an alkaline nature, and this is another thing to guard against.

Still another point to consider is the size and appetites of the fishes. Cichlids and large barbs, which need heavy meals of earthworms, meat or coarse-grained dried foods twice or thrice every day, produce bulky droppings. Unless the tank is a very large one, or is a smallish one dip-tubed frequently, the chances are that an increasing haziness will spoil the whole set-up and soon lead to pollution and disease.

Filtration and adequate plant life will help to keep aquarium water clean, but even filtration and masses of submerged vegetation will not protect the hobbyist against the dangers of overfeeding or sheer neglect. The answer, then, to the problem of too much sediment is this: choose the right fishes in the right numbers and the right size for the size of the tank, see that all live food is clear of mud and other debris, and dip-tube all uneaten dried food away as soon as it is noticed.

B. Fry

Treatments for White-Spot Disease

by Dr. F. N. GHADIALLY

TREATMENT of white-spot disease can be considered under two headings: (a) preventive; (b) curative.

(a) Preventive

As any wet object can introduce white-spot infestation into a tank all such objects need some form of pre-treatment before introduction into a healthy tank known to be free from the disease.

Quarantining fishes. The common form of pre-treatment employed for fishes is quarantine. By this we mean the complete segregation of an individual suspected of carrying a disease from the healthy population to which it is to be introduced for a duration longer than the known incubation period of the disease, so as to find out definitely whether the individual is free from the disease or not. Successful quarantine of new fishes sounds easy, too easy, but as a matter of fact it is a prolonged procedure requiring a thorough knowledge of the subject, and also, a spare tank if possible. Unfortunately, the beginner usually lacks both, and hence not infrequently loses his fishes. The closer you can approach the ideal the less likelihood of your fishes getting white spot. Here are some of the ideals of quarantine.

(1) Any and every fish obtained from outside, either from a dealer or from your closest friend, is suspect and must be quarantined. There must be no exception whatsoever to this rule. For though nobody wants knowingly to pass the disease on, it may happen that an odd spot or two may have passed undetected in your friends' or dealers' tank, or that his fishes are incubating the disease without his, of course, knowing this. If you now ignore this advice and get into trouble, blame yourself and not your friends.

(2) However fit a specimen may appear it may still be incubating white spot. Do not be led astray by this; quarantine it.

(3) Keep a small spare tank fitted with a heater, thermostat and thermometer, ready all the time to quarantine any new arrivals. Such a tank should have just a very thin layer of gravel at the bottom and preferably should not be planted so as to facilitate treatment if it proves necessary. Maintain the temperature at 80°F (27°C).

(4) Place the quarantine tank as far away as possible from the main tank or tanks housing your collection, preferably in another room. In a fish house the tank is best placed on the lowest shelf of the staging, so that any accidental drippings from the tank fall to the ground and not on to another tank, Infusoria culture or any other gadget or paraphernalia in the fish house.

(5) It is best to have a different set of aquarium accessories such as algae scrapers, siphon, net, feeding ring etc., for this tank. These should not be carried to and fro from the quarantine tank to the main aquarium, for though such articles can be rendered safe by thorough drying, one day you may slip up and contaminate the main tank.

(6) Follow a strict feeding and inspection routine. Feed fish in the healthy tanks first, quarantine tank last. After you have touched your quarantine tank resist all temptation to start playing with the main tank or tanks. Algae scraping, siphoning, plant trimming, transferring fishes from one tank to another, all these sort of things should be done before and never, never after attending to the needs of the

quarantine tank. If you have forgotten one of these operations it can surely keep for another day.

(7) Inspect the new arrival daily with a strong light, and if it shows signs of white spot treat it at once.

(8) If after eight days at 80°F the fish does not show signs of white spot it may be transferred to the main tank. The eight-day period mentioned is a somewhat arbitrarily chosen period which has proved reasonably safe in the experience of many aquarists. As already mentioned the usual incubation period of the disease is approximately three to four days, hence on theoretical grounds a quarantine period of approximately similar magnitude should prove adequate. Though this would work in many cases one finds that every now and again even when the temperature is maintained at 80°F a quarantine period of even six to seven days proves inadequate, and on very, very rare occasions an even longer period may prove inadequate. Hence, to be on the reasonably safe side an arbitrary quarantine period of approximately eight days, i.e., twice the average incubation period, has gained popular acceptance.

Only once in approximately seven years of fish-keeping now have I found a case where even a 15-days' quarantine period proved inadequate. It might be of interest to relate this case in some detail. On visiting my local dealer I saw him just unloading a consignment of fishes that had arrived that day. I noticed a dozen *Barbus filamentosus* swimming about with some other fishes in one of his tanks and I decided to buy six of these fish. I took them home and placed them in my quarantine tank, which had been cleaned out about a week ago and filled with tap water. Temperature was maintained at 80°F.

Next day I called on the dealer again to acquire some diffuser stones which I had forgotten to purchase the previous day. He then informed me that four of the six *B. filamentosus* left in his possession were showing a fair number of white spots. I inspected the fish myself and confirmed the diagnosis. None of the other fishes in the tank was showing signs of the disease. I went home and inspected my fish thoroughly; they showed no sign of the disease but I was confident that in a day or two they would be down with white spot. However, when I could see no sign of the disease even a week after purchasing the fish I once more went to see the dealer to find out how his fish were getting on. I found that the disease had been brought under control and the four *B. filamentosus* were now free from white spot.

I pondered on the problem and decided not to be in a hurry to release my *B. filamentosus* from quarantine, but to chill them in order to bring the attack on, if possible. So I poured cold water into the tank and cut the current off for approximately four hours. The temperature was down to approximately 60°F during that time, but still no white spots appeared. I repeated the performance two days later, and when after all this at the end of a fortnight no white spot could be seen even when each fish was individually examined under a magnifying glass in separate, small flat-sided jars, I decided that I could not keep these fish in quarantine for ever and released them in one of my large conditioning tanks.

The next day five of the six *B. filamentosus* were showing unmistakable evidence of white spot. Needless to say,

none of the other fishes in the tank was showing any sign of the disease. All the fishes in the tank were treated with methylene blue, and a cure was ultimately effected. Can we then explain this phenomenon? One can rule out the possibility of free-swimming stages of the parasites lasting for such a long period in the water. As both the dealer's fish and mine suffered ultimately it is very likely that they were all infested at the same place at approximately the same time.

The most likely explanation then would be that the fish were already infested, that the parasites were already in the skin of the fish but for some unknown reason the actual appearance of the disease was delayed; i.e., there was a prolongation of the incubation period. If we try to explain the phenomenon by the delayed hatching of a cyst in my tank, then we would have to presume that the dealer's fish were infested from another brood of parasites from another cyst, and not only that but even though all 12 had been together at the time all mine had escaped entirely from the attack, while only some of the ones kept back by the dealer were infested. This seems very unlikely indeed; at least on statistical grounds.

Whatever may be the technical explanation of the phenomenon one thing is certain: that once in a blue moon you will find that even a fortnight's quarantining of a new arrival may prove inadequate. In spite of this experience I quarantine new arrivals for eight days only, as after this time the risk involved is very small indeed.

Could the incubation period be prolonged for months or indefinitely and thus explain the mysterious outbreaks of disease reported by some in isolated tanks where no fishes or other suspicious objects have been recently introduced? There is no way of answering this question, we just do not know. At least, I have never had an outbreak of disease in my tanks where one would have to evoke such a hypothesis to explain it. Though there may be some genuine cases, in most instances such reports fall down hopelessly on closer scrutiny.

Let us now consider how the man with one tank can quarantine new arrivals. Let us say straight away that floating open jars containing new arrivals in a well-furnished aquarium is only very slightly better than putting them into the tank straight away. It would need great skill and luck repeatedly to produce satisfactory results under such unfavourable conditions, for water can so easily be splashed from the jar, either by the aquarist or the new fishes, into the main tank. If you are forced by lack of suitable facilities to use a jar for quarantining a new arrival, use one with a tightly fitting lid in the following manner.

Half fill the jar with water. Place the fish in the container and screw the lid tightly on, wipe the outside with a towel and let it stand in a dry warm place till the outside is thoroughly dry, and then float the jar into the main tank. Every day before feeding the fish remove the jar from the tank, and after feeding put the lid on again and wipe and dry as described above before refloating the jar in the main tank. The wiping and drying is to ensure that any parasites accidentally deposited on the outside of the jar will be killed and not introduced into the main tank. Incidentally, the novice need have no worry about suffocating the fish by placing it in a tightly closed container; there will be enough oxygen to last for a very long time indeed.

Pre-treatment of plants and snails. Newly acquired plants, snails etc., are best isolated for a week at 80°F without any fishes being present in the container. Any cysts, if present, will hatch out and the free-swimming parasites will perish by that time. Chemicals strong enough to disinfect plants efficiently are likely to damage them and hence are not recommended. It is no use just leaving them lying in a basin of water for a week; it is most important to be certain that the temperature is at or above

80°F all the time. Nets used in infested tanks can be rendered safe once more by allowing them to dry out thoroughly. This can be accomplished quite quickly in front of a fire.

(b) Curative Treatment

Numerous first-class methods of treatment are available to the aquarist to-day. Let us clearly state from the start that if the disease is diagnosed early and efficient treatment started at once, one can guarantee to eradicate the disease from an infested tank in eight to 10 days without loss of any or at the most one or two aged or debilitated fishes. Any further loss or prolongation of the complaint is usually due to inefficient handling of the situation, due in turn either to lack of knowledge or facilities or both. The prognosis (forecast of the course and outcome of a disease) with early treatment is therefore excellent, and to-day white spot is no more a menace to the experienced and knowledgeable aquarist; it only constitutes a minor nuisance which involves a bit of extra work and may hold up other pleasant activities such as breeding.

On the other hand, if the disease is not diagnosed early it will spread rapidly, as in the confines of our little tanks the free-swimming forms of the parasite have not far to go before they will find a fish to infest. Hence, even if one or two cycles are completed in the tank the fishes will be literally peppered with hundreds of spots. Even then efficient treatment will save some, but the bulk of them will most probably perish from the intense toxæmia produced. Thus one cannot stress too much the importance of early diagnosis. But this, of course, comes only with knowledge and experience.

At the first sign of the disease, as soon as one or two definite spots are sighted on any fish, treatment of each and every fish in the tank and not just the obviously infested ones should be started at once. To do this one must have a planned line of attack, and the drugs ready and waiting. To the beginner I would particularly strongly urge not to wait until the blow falls, but right now to see to it that he is prepared and has an efficient plan of action ready to be put into operation at a moment's notice. True, with efficient quarantine on theoretical grounds such a calamity need never occur, but we are all human and sooner or later bound to slip up, so the next line of defence should be ready.

It is so easy to fall into the common error of believing that a method of breeding some particular fish or treating this or that disease as practised by oneself is better and more fool-proof than any other known. Perhaps no other subject has suffered more from this type of attitude than the treatment of white spot. The simple fact, however, is that we have now in our possession a number of first-class drugs, any one of them certain to eradicate the disease from the tank if their use is backed by knowledge and experience.

Choice of Treatment

There is no such thing as the best drug for the job, each has its merits and its limitations and unless these are thoroughly appreciated failure can easily result. A drug which ideally meets one set of aquatic conditions may be hopelessly inadequate in another, hence I cannot just simply tell you to use this particular drug in this particular manner and all will be well. The only logical approach to the problem is to study once more the principles involved so that any given drug will be used in an intelligent manner.

Briefly, the main principle behind the treatment of white spot is to introduce some suitable chemical compound in the water in a dose which will kill the free-swimming forms of the parasite without adversely affecting the fishes and any plants present. Let us remember that no attempt is made to treat the spots on the fishes themselves, as the

parasite is neatly tucked away under the skin of the fish out of harm's way. We just have to wait till during the natural life cycle of the parasite the spots rupture, and hope to kill the parasite as it emerges from the fish. The parasite within the cysts attached to plants, rockwork etc., are also somewhat protected by the wall of the cyst and hence they may or may not be killed outright by the drug, but once again we are in no hurry. We can wait for the cyst to rupture and kill the parasites as they emerge from the cyst before they can find a fish to infest.

An important point emerges from such a conception. *Not only must a lethal concentration of the drug be produced in the water, but this adequate concentration must be maintained during the entire period of treatment, so that the drug is always present waiting to kill any free-swimming forms as and when they appear, for obviously not all the spots on*

the fish will rupture at the same time. No form of therapy which fails to meet this requirement can hope to produce 100 per cent successful results, for if at some vital time during treatment the concentration of the drug falls below the critical lethal level for the parasite there is danger that some parasites may break through the drug barrier and finally succeed in re-infesting the fish.

Though a large variety of drugs are no doubt effective against white spot, they do not offer any great advantage over the four drugs commonly employed, so let us for the sake of brevity restrict our attention to these drugs, quinine, acriflavine, mercurochrome and methylene blue, and see how far they fulfil these requirements, and note their powers and their limitations.

To be concluded next month

DISEASES OF COLDWATER FISHES

Swim-Bladder Disorder

by A. BOARDER

DISORDER of a fish's swim bladder is usually fairly easy to recognise as the affected fish will be unable to remain on an even keel. It may float upside down or even lie on the bottom of the tank in the same position. A fish will sometimes hang head down in the water and when it does try to swim about the actions are very uneven. If a fish develops this trouble when it is fairly young there is little hope of obtaining a permanent cure. In some cases this is caused by a hereditary weakness and so it is useless to try to keep such a fish for breeding purposes. It has been noticed that certain types of fancy goldfish will develop this trouble more than other types. The deep bodied ones are the worst, especially the veiltails. It has also been observed that the deep bodied fishes which lack red colour are among the types which appear to contract the disorder more than normal ones.

There are several reasons why a fish can suddenly suffer from the trouble. A sudden chill can do the trick, although a gradual lessening of the temperature of the water does not have any adverse affect on a fish. It is when a fish which has been kept in fairly warm water is suddenly placed in much colder water that the trouble can occur. On one occasion I saw a young fish dropped into an icy cold tank from a warm carrying can, and it went to the bottom in a spiral and was evidently very distressed.

The swim bladder can also be affected by the presence of many eggs in a female fish. The roe swells up considerably, especially towards the time for spawning. In the short bodied types of fancy goldfish, the intestines are restricted quite a lot and so anything which decreases the space occupied by the swim bladder will certainly upset the bladder, which should be free to regulate the position of the fish in the water. The bladder should be free to expand or contract as necessary to maintain the position in the water desired by the fish and so anything which constricts its action will mean that the fish cannot maintain that position.

If one of the short bodied types has had a heavy meal,

and if it is a female with an enlarged roe, the fish can suffer from swim bladder trouble. If this has been the cause it is probable that the fish may soon get over the discomfort as the food is digested. If an old fish suddenly develops the trouble there is a good possibility that a cure can be secured, but if it is a young fish it may not be at all possible to effect a permanent cure. In such a case it is better to destroy the fish at once. Swim bladder trouble sometimes occurs when a fish has been kept too long in very cold water, especially if the fish is one which has been reared in fairly warm conditions.

Whatever the causes it is possible to cure many cases. One of the best treatments is to place the fish in very shallow water, say, so that the extended dorsal fin is only about an inch below the top of the water. The water should be kept warmer than usual, up to 70°F (21°C), if the fish has been at or below 60°F (15°C). A little sea or rock salt can be added to the water (about a dessert spoon of salt to each gallon). No food must be given whilst the fish is under treatment. After a day or two the fish should show signs of recovery. It is then possible to offer a few pieces of garden worm. Do not be in a hurry to return the fish to the tank or pond until it is seen that the fish is swimming normally. The water can then be allowed to cool off gradually to the normal and fresh water added to decrease the salt concentration.

It is well to go over all the general conditions of the tank or pond as anything abnormal in the water can help to cause the swim bladder trouble. Good healthy conditions in the tank or pond will mean that there is less likelihood of this trouble occurring. If a fish is seen floating on its side on top of the pond or tank in the early morning, especially after a thundery night, do not suspect swim bladder trouble at first but give fresh water, when it is probable that the fish will soon recover. This condition is brought on by lack of oxygen in the water and as soon as fresh well-oxygenated water is added the fish will recover and be none the worse for its experience.

Marineland, Morecambe

by JAS. STOTT

THE development of the Lancashire coastal resort of Morecambe has been, over the years, gradual and, it would seem, whatever the changes and improvements, these have been influenced by the local authority's keeping firmly in mind the close proximity of some of England's most beautiful scenery. For the town is, of course, close to the Lake District and the Western Dales. A fine, clear day reveals a view across the bay that is most impressive and it is against this setting that Morecambe's newest attraction is to be seen: Marineland, claimed to be Europe's first oceanarium.

The idea for such a project was evolved some years ago by Mr. Robert Jackson, whose name will be known to many readers of this magazine, and Mr. Battersby, the publicity officer for Morecambe. It occurred to them while discussing what could be done about the old Stone Jetty, centrally placed on the front and in need of some form of development which would be advantageous to the town and more attractive in appearance. From what I saw of the result of this idea on my recent visit to Marineland I would say they have achieved just that, with the possibility of even greater development in the future.

While the building has obviously been designed and built with the practical needs uppermost in the minds of the planners the architects have, nevertheless, succeeded in getting a pleasing style to the structure. A restaurant is included which is approached by a door to the left of the foyer after passing through an entrance way adequately designed to admit large numbers of people with comfort and speed.

Visitors first pass into the inner building of Marineland, where large tanks contain a variety of fish life and other aquatic life ranging from marine species found in Morecambe bay and off the immediate shore, such as flounders, plaice, sole, blennies, gobies and scorpion fish, to crawfish, lobsters and the edible crab. Then on to the larger tanks containing the turtles, among which were the green (*Chelonia mydas*), Kemp's loggerhead (*Caretta caretta*)



Fleming pool and palms



Photos: J. Stott
Marineland and the old stone jetty seen from Morecambe's promenade

and hawksbill (*Eretmochelys imbricata*); the last named was extremely active when I was there and was attracting considerable attention.

At the far end of the inner hall is an extremely large tank set up rather on the lines of the aqua-terrarium and contains, of all things, penguins, which gave me something of a surprise. But I soon realised it was a very clever and unusual exhibit, for here the visitors can see these birds, not only as they appear out of water on the rockwork at the back of the tank, but also in and under the water as they dive, where they become extremely agile, so unlike their rather humorous and stilted movements when on land. This tank contained two species, the king penguin and Humboldt's penguin. This tank or container has its own refrigeration plant to provide and maintain the required temperature for the water and also air-conditioning to provide the right atmosphere. Times of feeding are shown so the public can see the penguins dive for food, which is quite an interesting sight.

Next is the flamingo pool set in a fenced-off section from the hall laid out with palms and other plant life. The pool can be heated and maintained at the correct temperature for the birds and the general effect makes an attractive exhibit. Top natural light to the area shows the colour of the birds to advantage.

Opposite this display, in the centre of the hall, is the crocodile beach, another fenced-off area thickly planted in the background complete with pool and natural top lighting.

Further down the hall are to be seen tanks containing the freshwater species of fishes to be found in the Morecambe district, such as pike, perch, minnows, trout and char, and then a section of tropical marine and freshwater species follows. Among these I noticed at random our old friends Malayan angel fish, African knife fish, cardinal tetra and the angel fish.

* The last exhibit I looked at in this part of the establishment was another very large tank containing the grey seals. Here again it is so arranged that they can be seen swimming under the water as well as moving about out of the water on the rockwork behind.

Moving to the outside enclosure through a door from the side of the main hall in the inner building, the visitor sees



Mr. P. Williams and the dolphins at training

the dolphins and sea-lions in their respective pools, which are situated side by side but separated by railings. Both dolphins and sea-lions were, at the time of my visit, under training to do various tricks and, what was most interesting, the public performances given at announced, regular intervals during the day were, in actual fact, training sessions and therefore the audience were able to see how the actual training procedure is carried out.

The trainer of the sea-lions is Captain Fleming, who is Danish and, incidentally, quite a linguist, for he speaks six languages fluently. The dolphins are trained by Mr. Peter

Williams, who hails from London, and was very helpful when I made my visit. He explained to me how the sea water is pumped into the Oceanarium, where it goes into the settling and storage tanks at high tide and is brought into circulation through pools and marine tanks as required. Tanks and filter plant are situated under the forecourt of the outside enclosure between the dolphin and sea-lion pools and the auditorium. The general lay-out of this section of Marineland was, I thought, quite attractive.

The covered auditorium seats several hundred people, all of whom can see the performances easily from any position. Training of these creatures is, I understand, progressing satisfactorily and from what I could see quite a fascinating performance will eventually be offered. However, at the time of my visit, the actual process of training seemed to be just as interesting to the public as were those parts of the performance already established.



Marineland's outside enclosure and auditorium with dolphin (left) and sea-lion (right) pools

Keeping Spanish Terrapins Out of Doors

by JOHN L. ADAMS

ACCORDING to many authorities the species of terrapin usually sold in this country is the European pond tortoise. However, I have found that the Spanish terrapin is more easily obtainable.

The Spanish terrapin (*Emyda caspica*) has a brown shell, which is often rough and unattractive, but well marked in some specimens, and yellow-striped head and legs.

Although 1 inch long babies are sometimes offered for sale buy a specimen about 3½ to 4 inches long, as newly hatched terrapins are not easy to keep successfully and cannot be kept out of doors all the year round. A good sized terrapin will cost 7s. 6d. Try to buy a pair, as they seem to enjoy basking together. Terrapins can be sexed by a similar method to tortoises: the females have flat plastrons (under shell) and the males slightly concave ones.

Far too often terrapins are seen in small tanks, with no shade and only a few inches of water. The ideal accommodation is a garden pool.

A great deal of nonsense has been written about keeping terrapins in an outside pool—the commoner fallacies are that they will kill and eat goldfish, nibble water lilies, pollute the water and be for ever escaping.

The pool in which I keep my Spanish terrapins is stocked with fish (of various species and sizes from 1 inch upwards) and water lilies and other aquatic plants. The terrapins have done no damage at all.

Only three things are needed to keep terrapins well: sufficient food, water and a place to bask in the sun.

The last requirement may easily be met by constructing a small island in the pond. The simplest way to do this is to place a large rock on a pillar of bricks so that most of the rock is above the water surface. They may also have access to a rockery at the back of the pond.

The pond itself should be 2 feet deep at the deepest part and have a layer of mud over the bottom if the terrapins are to hibernate naturally in the winter.

Three terrapins may be kept in a pond with a surface area of 48 square feet. This may seem a lot of room but terrapins are active creatures and like plenty of space.

When they are first put in the pool they are usually nervous and disappear into the mud at the slightest movement. It is only during the first few weeks that the reptiles may wander—and it is wise to put a temporary wire

Please turn to page 104

Schubert's Barb

by JACK HEMS

OPINIONS differ among the authorities as to whether or no this quietly attractive 2½ in. cyprinid is a golden mutation of *Barbus semifasciatus* from southern China, or the little known *B. sachsi* from Singapore. But what we are certain about is that Thomas Schubert of Camden, New Jersey, developed the fish as a true-breeding strain and put it on the market not many years before the outbreak of the second World War.

It is an ideal beginner's fish, this Schubert's barb; for it is peaceful, has a temperature range of about 65°F (16°C) to 86°F (30°C), is seldom still, frequents the middle and lower levels of the water, is easy to feed on any live or dried food, and has a life span of upward of 4 or 5 years.

In general appearance the fish is sunny gold, flecked here and there with some dark specks and irregular-shaped markings. In some individuals these markings assume a broken horizontal band. The gold below the lateral line melts into a silvery white belly. There is a bold black marking at the root of the tail, and sometimes a similar marking near the anterior base of the dorsal fin. The fins are brownish pink to red, with clear margins. The sexes may be distinguished by the fact that the male is smaller, more richly marked and flatter-sided than the female.

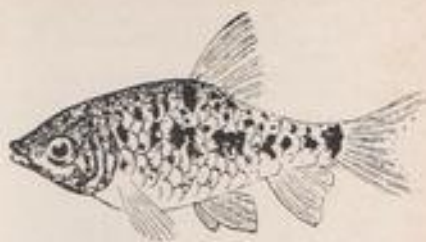
Owing to its small size, Schubert's barb can be accommodated with other diminutive fishes in quite a small tank where, apart from its decorative value, it gives good service as a bottom scavenger and algae remover. It will breed, too, in only a few gallons of water, though a tank about 24 inches long or longer is recommended if you wish to save an appreciable number of fry.

The barb lays sticky eggs, so plenty of plants with ferny or finely divided foliage are essential. These plants should be bunched and anchored to the floor of the aquarium with stones or lead collars. There should be a scattering of thoroughly washed grit or sand on the bottom, and the water should be tap-pure, but matured for a few days, some of it preferably in glass or china vessels stood outdoors. The interior of the tank should be bright. If some sunshine can reach it so much the better. Failing this, a 75 or 100 watt electric lamp fixed just above the surface of the water, which should not be more than 9 in. deep, will answer as a substitute. A temperature of 78°F (26°C) is advised.

It is a good plan to separate the sexes for 14 days or so before breeding is attempted because the temporary parting makes them all the more interested in each other when they are brought together again. During the separation, the fish should be put on a diet of energy-providing and stimulating food such as chopped earthworms, scraped red meat, live *Daphnia* etc.

The result of this treatment should be richer colours in the body and fins of the male and an extra fullness in the sides of the female. If the couple are reunited last thing at night, it is not unlikely that they will spawn the following morning. But do see that the temperature of the spawning tank is the same as that of the divided tank, or tanks, from which the fish are taken. If the temperature of the conditioning quarters is not as high as is suggested for spawning, then a gradual increase should be allowed to take place after the couple have been brought together again. Attention to such matters safeguards the fish from any shock.

You will know when the fish are spawning because of their behaviour. The male pursues the female all over the



aquarium and begrudges her the slightest rest. Every now and then, as she is pushed and nuzzled by the male, she scatters some eggs in or close to the plant life.

When spawning is over, the parent fish must be placed in another aquarium before they do what most fishes do—make a meal from their eggs. So after removing the parent fish to their old or new home, the next thing to do is to think about food for the fry.

If you cannot keep up a steady supply of Infusoria for the first 9 days or so after the babies have hatched out (usually within the space of 48 hours), then flour-fine dried food must be resorted to. Better still, use one of the manufactured fry foods on the market. Another excellent first food is an infusion of hard-boiled yolk of fowl's egg shaken up in a small quantity of water. Only a few crumbs of the yolk need be used at a time.

Should you be away from home most of the day, a siphon drip-feeder for liquid food is quite easy to rig up above the surface of the water. As a matter of fact this method of feeding is conducive to rapid and healthy growth, as it means that the ever-hungry fry have food available all the light hours. Soon, however, larger food, alive or dried must be given. If dried food features prominently on the menu make sure that every noticeable scrap of it that reaches the bottom and stays uneaten is removed daily with a dip-tube. For nothing is so likely to kill off lots of the fry at this stage as decaying food in the water.

As a rule the baby fish will be showing some golden lights on their bodies before 2 months are out, and at 9 months to a year they should be fully grown.

Altogether, then, this charming little fish is quite easy to breed if a small amount of care and patience are exercised from the start.

Is the Sea-Cow Still Alive?

ALL the books say that Steller's sea-cow, a relative of the dugong and manatees, became extinct in 1768. Though hunters and fishermen have at intervals since reported its continued existence, zoologists have not believed them. Now they may have to, for according to a report which originally appeared in the Russian publication *Privoda*, the crew of a Russian whaler saw six animals in the sea off Cape Navarin, on the Bering Sea coast of Siberia, which can only have been Steller's sea-cows, which formerly inhabited this part of the world. They in no way resembled seals, sea-lions, whales or dolphins, and dugongs and manatees inhabit only tropical waters.—*World Wildlife News*.

Keeping Spanish Terrapins

continued from page 102

netting fence around the pool for that time.

They will quickly become tame, and the wire may be removed as they will seldom if ever stray more than a foot away from the water.

Feed the terrapins by hand; earth worms are the best food. A 3 inch terrapin will gobble up 20 small worms at one meal! *Tubifex* worms, raw meat and liver and sometimes raw white fish will be eaten. Be very careful when feeding with meats as any uneaten food will foul the water. Ter-

rapins need be fed only twice a week, when they should be allowed to eat as much as they want. Remember that they eat only under water.

Feed them well in August and September so that they will be fit when they hibernate. Let them hibernate in the pond (provided it is deep enough) and do not disturb them. Terrapins seem to hibernate for a longer period than tortoises (October to the middle of March). After hibernation they are as active as ever, unlike tortoises which often have gummy eyes and take a time to feed properly.

Spanish terrapins will double the interest of any garden pond.

Proposed Additions to the Vancouver Aquarium



An artist's impression of the new glass-sided foyer addition to the Vancouver Public Aquarium. A 75,000-gallon pond behind the foyer will house local porpoises and other North Pacific marine life, and full-scale replicas of a killer whale and basking shark will hang from the foyer ceiling



The Rufe Gibbs Hall of aquaria will also be capable of seating an audience of 200 for evening lectures

Aeration and Filtration

by A. JENNO

THE usual means of aerating the water in an aquarium is to allow a stream of fine bubbles of air to rise through the water and to break at the surface. This action performs two main functions; the bubbles rising through the water create a circulation and mixing of the water in the aquarium and the bursting of the bubbles at the water's surface creates a turbulence which increases the effective surface area of the water.

By inducing the water in the aquarium to move and therefore to mix, we ensure that no great temperature changes develop. In large aquaria, or those containing inactive fishes, a condition known as 'stratification' is likely to occur, which results in the water at different levels in the aquarium being at different temperatures. Stratification does, of course, occur in Nature, but should not be encouraged to develop in aquaria because even a large tank does not contain anything like the volume of water found in natural ponds and lakes, and the effects of stratification are therefore more severe on fishes kept in aquaria. Some fish species are known to be particularly sensitive to stratification and this can be an indirect cause of many troubles, as a fish which is not suited to the prevailing water conditions in its particular aquarium is always prone to infection and parasitic diseases.

Aeration

Fishes, like other living creatures, require oxygen to live and they obtain this by taking dissolved oxygen from the water by means of their gills. In return the fish puts its waste gases back into the water in the form of carbon dioxide. It therefore follows that for the fishes to thrive, an aquarium must always contain more dissolved oxygen than the fishes require at any given time. In reasonable sized aquaria, containing only a few fishes, this is no problem, but it will be found that where an aquarium is overcrowded, i.e., it has a small surface area relative to the number of fishes kept in it, then the fishes will be unable to obtain enough dissolved oxygen from the water and will be forced to take in atmospheric oxygen at the surface. The rate at which carbon dioxide can be expelled to the atmosphere is slow, and in the overcrowded aquarium the water contains a high proportion of carbon dioxide and hardly any oxygen, until finally the fishes are literally in danger of suffocation. They will then attempt to take in atmospheric oxygen, but after a time the excess of carbon dioxide causes discomfort and, eventually, death.

It is important then, that where the aquarist wishes to fill the aquarium with fishes, he must provide some means of helping the excess of carbon dioxide in the water to escape to the atmosphere, and thus indirectly help to increase the rate at which the water dissolves oxygen. By allowing a stream of fine bubbles to break at the water's surface a turbulence is caused which greatly increases the surface area of the water, and as the rate at which carbon dioxide is expelled to the atmosphere depends to a large extent on the effective water surface area, this method allows the aquarium to be slightly overcrowded without the fishes showing any ill effects from shortage of oxygen.

The only trouble is that if the aquarium is overcrowded the fishes will not thrive for other reasons, anyway, so this is not a recommended feature of aeration.

The main advantage of aeration then, is that it mixes the water in the aquarium and equalises temperature variations. It is also a useful means of ensuring that the fishes always have enough oxygen available, but in my opinion should not be used as a means of crowding more fishes into the aquarium than it will normally hold.

It has been found that aeration is more effective if the air stream consists of many small bubbles rather than a few large ones. The air is therefore usually forced through a small porous block which splits it up into fine bubbles. These are known as diffuser stones and are very cheap. When connecting diffuser stones to the air supply pipe take care not to put any strain on the short connecting tube cemented into the stone, as it is liable to break off. Small adjustable clamps are usually used to regulate the air supply to the stone, so that a gentle stream of bubbles results. Aeration which is too violent will disturb the contents of the aquarium and cause any mulm present to cloud the water.

Filtration

One of the greatest controversies among aquarists is on the subject of filtration and the type of filters to use. Filters keep the water free of suspended matter and in some cases they also take harmful chemical substances from the water or can be used to add to or alter the properties of the water.

There are two main types in common use: the sub-gravel filter and the box filter which uses a filtering medium. Both types are very good when properly used but should not be expected to work in the same way.

Sub-gravel filters. These are fitted beneath the gravel and their main object is to suck down into the gravel any mulm etc. which settles on the gravel. This they do very efficiently when correctly adjusted, and this keeps the gravel and the general appearance of the tank clean. To a certain extent they will also draw down suspended matter from the water itself but they are not particularly efficient at this. The theory is that the mulm drawn down into the gravel is then absorbed by the bacteria etc. living there.

In my experience the main disadvantage with sub-gravel filters is that they become clogged up eventually and cannot be cleaned out, owing to their position. In all fairness, it should be stated that this clogging usually occurs only after a considerable period of time, unless the aquarium is very dirty.

The effect of sub-gravel filters on plant life is the favoured subject of argument in aquatic circles. It has been said that it is not natural for plants to have water currents flowing round their roots; on the other hand, many aquarists maintain that the mulm drawn down into the gravel is beneficial to the plants, particularly to heavy feeders such as the *Cryptocoryne*. In my opinion a sub-gravel filter will keep the floor of a decorative aquarium spotless, provided it is correctly adjusted and the gravel is not too small to

prevent the suction from having its effect. But where a lot of suspended matter is present in the water or where chemical action is required, then the box filter must be used. A combination of the two is very good but also expensive, of course.

Box filters. These consist of a container filled with a filtering medium and the aquarium water is made to flow through this and thus rid itself of unwanted dirt and other matter. Simple box filters are filled with the filtering medium and dropped into the aquarium; the more complex ones hang outside the aquarium and are provided with separate compartments to enable the use of two or three different filtering media.

Media used are mainly gravel, glass wool and activated charcoal. Gravel will catch any large particles of suspended matter and the glass wool will deal with fine particles. Activated charcoal is used to remove unwanted chemicals from the water. The most common mistake made by users of box filters is not to clean them out often enough. The filter will not work efficiently if left dirty too long and outside filters will eventually give off an unpleasant smell. When cleaning, the filter medium should be washed or changed completely, depending upon its condition. To test activated charcoal, a few drops of methylene blue added to the filter will soon show whether the charcoal is still active, as it should absorb the dye.

Filters in general. Of the two types of filter, a large outside type with separate compartments is, in my opinion, the best. In a healthy aquarium, growing plants will absorb most of the mulm from the bottom, but if suspended matter is present or if the particular fishes kept are the type which stir up the mulm a lot, then only a large box filter will be effective in cleaning the tank.

There are on the market some very inexpensive filters which draw the water through a block of expanded plastic. These are simple to use and very effective in small aquaria. The main difficulty is that when the plastic block is removed for cleaning, care must be taken to see that the dirt trapped in it is not accidentally squeezed back into the water.

Most aquarists, particularly beginners, do not bother with filtration, probably because of the comparatively high cost of most filters and the inconvenience of cleaning the box filters. It is, of course, impossible to fit a sub-gravel filter into an established aquarium, without disturbing everything.

Some aquarists seem to believe that filters are absolutely necessary, but they are after all only an artificial method of carrying out the natural functions of healthy aquatic plants. If the aquarium contains a large number of healthy, growing plants, then a filter should not really be necessary as the plants will keep the water clean and sweet. If, however, the plants are not doing well or there are not enough of them, as is usually the case, then a filter will help to keep the aquarium clean and in many cases will make all the difference between eventual success and failure.

Air-lifts. The air-lift is the universal method of forcing aquarium water through any type of air-operated filter. It consists of two tubes joined at the bottom end so that air bubbles forced down one tube will flow up the other, carrying water with them. The air-lift is fitted in all cases so that it removes water from the filter and the natural actions of gravity and water pressure then cause more water to flow into the filter to replace that removed by the air-lift, carrying the dirt etc. with it. With outside box filters it is necessary to position the filter at the correct height relative to the water surface level for efficient working.

A common fallacy among users of air-lifts is that the more air that is forced through the filter the better it works. This is not true and a moment's thought will show why. If the stream of bubbles going up the air-lift is regulated

so that there is about a quarter to half an inch between the bubbles, then each will be carrying with it a fair amount of water, but if there is no space, or hardly any, between the bubbles, then less water will be carried and a lot of air wasted. When correctly adjusted, air-lifts are very efficient and do not require a large air supply.

Air Pumps

To apply aeration or filtration to an aquarium, a supply of compressed air is needed. The pressure at which the air is supplied is only low, so aquarium pumps are quite simple in design and construction. There are two main types: vibrator pumps and piston pumps. Both are electrically powered.

Vibrator pumps. Vibrator pumps nowadays come in a range of shapes and sizes and the majority of them are very well made and can be relied on for a number of years. The principle of operation is quite simple; a steel plate is made to vibrate by the magnetic action of a coil, energized by the domestic mains supply. The end of the vibrating plate carries a diaphragm which forces air through a non-return valve system each time the plate is attracted by the magnetic coil. The output of the pump depends upon the distance travelled by the vibrating plate and the area of the diaphragm.

Larger and more expensive vibrator pumps have a greater air output and consequently can supply more aquaria. They are also a lot quieter than smaller pumps. This is the main disadvantage of vibrator pumps. Because the steel plate vibrates very quickly, usually 50 times a second, there is a tendency for the pump to hum, especially the smaller ones. This effect will be accentuated if the pump is stood on anything sensitive to vibration, and for this reason some attention should be paid to the positioning of the pump. In some cases it may be necessary to mount the pump on thick foam rubber or similar material, or suspend it with thick rubber bands. Usually it will be found that the more work the pump is required to do the quieter it will be. All vibrator pumps work best when a back pressure exists in the supply system, and for this reason excess of air produced by the pump should not be bled off, as is the practice with piston pumps.

Vibrator pumps require no regular maintaining, but if used in a dusty or dirty atmosphere their life will be prolonged if a small piece of felt is fitted over the air intake hole to prevent the entrance of small particles which would damage the valve system. Occasionally a new diaphragm is required, but this is a simple job which can usually be carried out by the aquarist in only a few minutes. Most pumps are fitted with some form of output adjustment and reference to the manufacturer's instructions will show how this is done. Electrical consumption is low on all types, the largest only drawing about 5 watts.

A top quality vibrator pump of modern design will be found to last many years and will be absolutely silent in use. Up to about a dozen aquaria, with both air stones and filters, can easily be supplied, and the cost is just about half that of a small piston pump. Unless the aquarist has a large number of aquaria, a good vibrator is sufficient for all his needs and has the advantage of requiring no regular maintenance. The other advantage over piston pumps is that the air flow from a vibrator pump is an even flow, whereas that from a piston pump pulsates with the thrust of the piston and usually requires the fitting of a capacity chamber in the system to obtain an even flow.

Air is usually taken from the pumps to the aquarium by small bore flexible rubber or plastic tubing. It is important to create a back pressure in the system so that the pump works at its best and is as silent as possible. This back pressure is best maintained by keeping all supply tubing as short as possible, within reason, and by using only small bore tubing. It is usual to run the tubing straight

from the pump to the most distant point at which air is to be supplied, and then to tap off at intervals with small junction pieces wherever other supplies are required. Each individual air stone or filter is then fitted with its own regulating clamp, by means of which each particular air flow can be adjusted. Clamps, junction pieces and air tubing are all inexpensive and sizes are standardised so that combinations of different manufacturer's products can be used together. Air tubing may be plastic or rubber. Plastic tubing goes hard after a time and makes clamping difficult, while rubber tends to perish and this causes it to stick to connecting tubes and junction pieces. Small control cocks are made in plastic, which can be used to advantage with plastic tubing.

Piston pumps. As has already been stated, piston pumps are nowadays a luxury unless a very large air supply is required. They are expensive because the pistons and cylinders require precise machining during manufacture, and because they are produced to a high standard of reliability and workmanship. The aquarist who does use a good quality piston pump will find that he has an instrument which will last a lifetime if properly cared for, but which requires to be studied and understood a little to obtain the most satisfaction from its use.

Piston pumps work on the same principle as a child's miniature steam engine, only in reverse. Instead of supplying pressurised steam to the pistons and thus making them turn a wheel, the wheel is turned electrically and the pistons will then, with a suitable valve system, produce a supply of compressed air. The pump depends on its lubrication to maintain the joints between piston and cylinder and distributor block airtight, and it is therefore important that the pump be regularly attended to as recommended by the manufacturers. Piston pumps do tend to run rather warm when in continuous use, but this is provided for in their design so it should not worry the owner. As with vibrator pumps, filters should be fitted on the air intakes if used in a dusty atmosphere.

One of the most important points regarding the proper use of piston pumps is that back pressure must not be allowed to build up in the system and act on the pistons. This will cause the pump to run hotter than usual and if the condition exists for a long time will cause extra wear on the moving parts, as these will be working against unnecessary resistance. Piston pumps are usually noisy when subjected to back pressure, but otherwise run practically silent.

Electrical consumption is higher than that of most vibrator pumps, but is still small enough to be considered negligible, in all but the largest pumps. Most piston pumps are self-starting but there is one type in particular which requires to be spun by hand to start it. This can be a nuisance if the aquarist has overcrowded tanks and relies on aeration to keep the fishes comfortable, should the pump stop for some reason during his absence. This type will be stopped if back pressure builds up in its supply system.

The distribution system recommended for use with piston pumps is necessarily more complicated than that used with vibrators, due to the need to ensure that all excess of air produced is bled away, so as to reduce back pressure. Also some form of filtering is needed to prevent oil from the pump finding its way into the aquaria.

The air output tubes on the pump should be connected, by a short length of tubing, to a large airtight container. This is known as a capacity chamber and the effect of this is to even out the pulsations in the air flow caused by the thrust of the pistons. The air can then be fed to another container filled with cotton wool or similar material, which will filter out any oil or other matter present. This oil filter works best if the input is at one end and the output at the other so that the air is forced to find its way through

the filtering medium. After filtering, the air should then be fed to a main supply pipeline, which should run all around the aquaria to be supplied. Individual supplies can then be tapped off from this and regulated by means of clamps. The end of the main pipeline should be fitted with a bleed valve for ridding the system of excess of air, and it may also be advantageous to fit another bleed valve in the capacity chamber.

It will be found, when adjusting a particular air supply, that this sometimes has an effect on others, so when first setting up the system a certain amount of trial and error is necessary to get all the air stones and filters working together as required. The bleed valves must be correctly adjusted so that all excess of air produced by the pump leaves the system. It should be found, however, that once the balance of pressures has been set up correctly, the system will function consistently as long as the pump is in good condition, and as long as extra appliances are not added or any individual lines closed off.

When air pumps break down or stop because of interruption of the electrical supply, it is quite possible with many types, particularly vibrator pump and non-self-starting piston pumps, that a very small suction will be started in the supply piping. If the pump is situated below the aquaria and the tubing runs more or less level with, or below, the water's surface, then there is a possibility that a siphoning action will start which will result in a ruined pump and possibly a few empty tanks. To avoid this, either situate the pump about a foot above the highest water level, or at least run the supply pipeline to the tanks at this height for the first part of its run. Vibrator pumps particularly have been known to explode when switched on by an unsuspecting owner after having become filled with water in this manner.

Home-Made Corner Filter

YOU will find this corner filter very useful. Use it to clear effectively, and within a very short time, a tank that has become cloudy.

To make it you will need an old plastic beaker (a narrow one with a rim) and two longish pieces of plastic tubing. Aquarists always seem to collect odd lengths of this. My pieces were $\frac{1}{4}$ in. and $\frac{1}{2}$ in. in diameter, and so I shall quote these sizes.

Perforate the bottom of the beaker with a number of holes. Do this with a drill, or a penknife, or even a skewer.

Then just under the rim of the beaker bore a hole $\frac{1}{4}$ in. in diameter (or the width of your wider length of tubing). Insert the piece of $\frac{1}{4}$ in. tubing into this and make sure it fits tightly. Now make another hole $\frac{1}{4}$ in. in diameter at the bottom end of the $\frac{1}{2}$ in. tubing about an inch from its end, and fit in the $\frac{1}{4}$ in. tubing into this.

Tie a piece of white nylon wool round the neck of the beaker, and fill the beaker with your filter medium: nylon or glass wool, gravel, carbon. Now suspend the beaker in a corner at the back of the tank, and bring the loose end of nylon wool up under the glass covering your tank, and tie it to your stand. Connect the remaining end of the $\frac{1}{4}$ in. tubing to the air pump, and let the tubes curve downwards in the water behind your plants so that the filter is concealed.

When the filter becomes dirty wash the medium, if it is gravel or nylon wool. If it is glass wool and carbon, replace it.

P.E.P.

Two British Species for the Coldwater Fishkeeper

by BORIS FRY

1. The Minnow

THE minnow (*Phoxinus phoxinus*), a barbless member of the family Cyprinidae, is a fish that can be recommended to any aquarist interested in coldwater species. It does not fight or bully, is so responsive to sounds that it can be trained to come to a call or whistle, has an insatiable appetite for small or chopped earthworms, pieces of meat or even breadcrumbs, and is interesting to watch because it combines great activity with attractive coloration.

Although *P. phoxinus* is native to most parts of Britain it is also found over the whole of Europe, with the exception of southern Spain and Iceland. It occurs most abundantly in medium to fast-flowing waters over a sandy to stony bed. In such waters minnows swim in large attenuated shoals. Ordinarily the species averages 3 in. in length, but exceptional specimens may attain nearly twice that size. It is not a pleasant thought to realise that large numbers of minnows are caught in traps—the fish's inquisitiveness is its undoing—or netted to be used as live-bait.

Generally speaking, the minnow is greenish grey to olive, overlaid with a silvery to clayey coloured sheen. The sides are adorned with a golden stripe and a jazzy pattern of blackish blobs and bars. The fins are yellowish to grey

with a reddish tinge (sometimes absent) in the pectorals and ventrals. The upper jaw is longer than the lower jaw, and the scales are so small that the great Izaak Walton believed the fish, which he said made good eating when fried in a batter of egg yolks and the flowers of cowslips and primroses, to be scaleless.

Unless the sexes are ripe for spawning they are difficult to tell apart, but from late spring to about the middle of the summer, when adhesive eggs are deposited on stones, the male's normally silvery underparts are flushed with pink, and the female's sides become bloated with spawn.

The minnow's eggs, about a thousand of them are laid at a spawning, hatch out in about 6 days, and the fry grow slowly on a diet of minute crustaceans and, for that matter, practically anything else small enough to be swallowed. It is said that at least 3 years pass before a minnow is ready to breed. On odd occasions spawning will take place in a well cared-for garden pond, or a really large aquarium.

Plenty of swimming space in well-aerated water is a "must" where *P. phoxinus* is concerned, and of equal importance is absolute cleanliness. Given these essentials, a good growth of submerged vegetation, a temperature not above 65°F (16°C) and sufficient nourishing food, the minnow has a life-expectancy of several years.

2. The Rudd

THE rudd (*Scardinius erythrophthalmus*) is one of the handsomest of freshwater fishes. It belongs to the family Cyprinidae and is found in the wild in England, Wales and Ireland, and across the whole of Europe with the exceptions of Spain and southern Italy, as far as Asia Minor. It attains a length of about a foot, and at this size it may weigh more than 2 lb. Nevertheless, larger specimens have been recorded from time to time. One rudd, taken on a line at Thetford, Norfolk, in 1933, turned the scales at 4½ lb.

In general appearance the rudd has a brownish back, shading down to silvery underparts. The flanks have a golden to brassy sheen. The fins are golden red. (A variety with black fins is said to inhabit certain waters in northern Italy.) At a quick glance it is quite easy to mistake a rudd for a roach, but the apparent differences between the two fish are the deeper body and keeled belly of the former species, and the position of the dorsal fin which, in the rudd, is situated at a point midway above the ventral and anal fins. The rudd also has a projecting lower lip, which is sometimes marked with bright red.

The rudd is a shoaling bottom-liver (though it will rise to the surface for flies and breadcrumbs) and feeds on any small live food it can find as well as some vegetable matter. It usually haunts the weediest parts of lakes and streams. It spawns in the tangled shallows in late spring and early summer, and a large female with bulging sides will lay scores of thousands of adhesive eggs. During the breeding

season, the male rudd develops roughened scales and spawning tubercles. It will not breed in the aquarium.

Although small specimens of the common rudd make ideal occupants of a coldwater tank, it is as well to hunt around the dealers for the golden variety. This is a slightly smaller fish and is a real beauty, with red fins and rich golden sides.



"Must you bring your fish every time we go away?"

OUR EXPERTS' ANSWERS TO TROPICAL AQUARIUM QUERIES

I have just added a catfish called *Synodontis angelicus* to my community aquarium and would very much like to know its country of origin, the maximum length it will attain, its temperature range, its requirements in the way of food, and whether it is trustworthy in the company of other fishes?

S. angelicus is a West African species and, in the wild, grows to about 7 in. in length, but less in captivity. It does best at a temperature range of about 73°F (23°C) to 78°F (26°C). It is omnivorous by nature, and besides the usual live and dried foods it will browse on most green algal growths and algae substitutes such as cooked spinach, mung bean sprouts and fragments of bruised lettuce. It is peaceful.

I am a beginner and wish to stock my 2ft. tank with fishes that are small, attractively coloured, reasonably long-lived if properly cared for, easy to feed, and really inoffensive. Please give me the names of a few such desirable species.

You can hardly do better than stock your aquarium with leopard danios, neon tetras, lemon tetras, platinum tetras, penguin tetras, penguin fish and, say, Schubert's or Cummings' barb.

Is it possible to keep tropical fishes successfully without a thermostat to regulate the temperature of the water?

Yes, so long as the temperature of the water does not rise or fall more than about 5°F (3°C) in every 24 hrs. To guarantee this, a largish tank and a position out of a situation where it is likely to have long periods of sunlight is called for.

I should like to keep some catfish in my community tank, but fear that if I do they will disturb the compost too much and cloud the, at present, crystal clear water. My question, then, is: are there any catfish with tidy habits?

Well, there are *Corydoras hastatus*, *Etroplus debauvi* and *Kryptopterus bicirrhus*, all of which swim in mid-water and do not rake up the bottom. Then there are *Otocinclus* spp., which, though they spend lots of time near or on the bottom, are not given to violent burrowings or boisterous dashes over the sand. In short, they are not great disturbers of sediment.

What species of cichlid are long-lived, peaceful enough to live with other fishes smaller than themselves, are gentle with the plants and are not difficult to feed?

Perhaps the cichlids most noted for these virtues are *Aequidens maroni*, *A. curviceps*, *Cichlasoma cutteri* and *C. jaculum*. It must be mentioned, however, that most if not all cichlids in spawning condition can quickly turn into plant-disturbing spiteful tyrants.

I have just bought an elephant-nosed fish (*Gnathopoma petersi*). Please give me some information about this fish's behaviour in captivity and its requirements in the matter of temperature and food.

G. petersi, a bottom-haunting species, is mild-mannered and prefers a well-planted tank maintained at about 75°F (24°C) to 78°F (26°C). It flourishes best on a diet of small red or white worms, live *Daphnia* and meaty dried food. If it is introduced into a community tank make sure that its companions are as quiet living and as inoffensive as itself.

I should like to breed the cardinal tetra and would appreciate any information you can give me which would result in the maximum number of fry.

The cardinal tetra is not among the easiest of fishes to breed. Scrupulous cleanliness is called for because the newly hatched fry are quickly killed by bacteria. So the essential requirements are a spotless, preferably all-glass tank, and filtered, soft, acid water. Before any plants are introduced they must be thoroughly washed and sterilised. Temperature should not exceed 75°F (24°C), and the tank

Many queries from readers of *The Aquarist* are answered by post each month, all aspects of the fancy 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.

should be darkened after the eggs have been laid. Furthermore, great care must be taken to feed the fry on fresh cultures (strained through fine nylon) of Infusoria, and clean larger live food.

I have just bought a young pair of *Apocheilichthys lineatus*, but have since been told that when these fish reach full size they will attack and eat the other fishes in my aquarium. Is this true?

The *lineatus* or striped panchax makes a perfectly satisfactory community fish so long as its companions are bulkier in the body and longer than a three-quarters grown male guppy. Moreover, as the *lineatus* is a surface frequenter it seldom interests itself in any fishes which keep to the middle and lower levels of the water. At any rate, it would not interfere with the general run of full grown community barbs, livebearers or tetras.

Are tinfoil barbs suitable for a community aquarium containing other barbs and small characins?

Tinfoil barbs (*Barbus schwanenfeldi*) can reach a large size even in quite a small aquarium and then not only do they look out of place in a community of small fishes but they will also eat their smallest tank-mates. It is also an unfortunate fact that this most attractive barb is apt to strip the leaves from plants, so that it cannot be considered a good community tank fish except when very small.

Please turn to page 111



Photo:

W. J. Howes

Tinfoil barbs grow very quickly to a size which makes them unsuitable for the small aquarium

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.



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

Marine Tropics

THE damsel fish depicted inside your May issue and on the cover is not *Dascyllus auratus* but rather it should be *Dascyllus reticulatus*. I have collected this fish from the Philippines many times. Before that I had imported them from Ceylon. *D. auratus* is totally different. It has a white body with three black vertical stripes on it. Another *Dascyllus* very similar to *D. auratus* is *D. melanurus*, with four black stripes instead of three.

With regard to your article "When Marine Tropics?" feeding marine fishes is no problem at all. If you can get frozen brine shrimp in England that is so much the better, but if not, the second best food is crab meat. They eat readily and a crab (stored in the freezer in one's ice-box at home) can last over a week if kept frozen. You also mentioned that marine plants do not survive in the aquarium. This is not true. We have had extremely good success with a type of very pretty alga (looks more like a plant) found around Brisbane.

P. TSANG,
Brisbane, Australia.

MARINE aquaria are becoming quite popular with many of my fellow tropical fish-keeper friends, but oh, dear me, how the tanks that contain these gorgeous coloured fish seem to be lacking in plants.

I think that this is one of the fields in this wonderful new range that should be explored as much as is possible, for surely if marine tropicals can be kept in a tank then why not a few of the plants as well? I am sure those interested enough in marine aquaria would welcome the opinions of a marine botanist, who might at least throw a little light on this probably little explored subject.

As a keeper of cold and tropical fishes I must admit there is almost as much pleasure in keeping and looking after the plants as there is in the fishes.

A great many of the marine fish-keepers may say that the sand and the beautiful corals that can be purchased may in some way compensate for what is lacking in plants, but somehow I don't think they will ever take the place of a few plants.

N. B. HOLBERTON,
Bredon, Glos.

Breeding Neons

I WAS interested in the article "Breeding the Neon Tetra" (*The Aquarist*, August). I have a few comments

to make. Mr. D. W. Amis states: "Conditions in the breeding tank should be as near as possible to their natural environment".

Keeping this statement in mind, Mr. Amis then describes the phantom furrier, who working by night supplies various eggs with fur coats (presumably only the coldest of the eggs qualify for a coat). Mr. Amis himself supplies the acriflavine and beverage; really, does Mr. Amis expect us to believe that neons like a cuppa? He will be saying next that instead of plants growing in the streams of the Amazon there are nylon mops—wait, he *does*! Well, really, this is too much.

I fail to see how the addition of acriflavine, tea and nylon mops is consistent with "natural environment". Mr. Amis does not explain what purpose the tea has, nor the addition of acriflavine to boiling water when dipping his nets, or are the reasons so obvious?

Perhaps Mr. Amis has a definition for water conditions which does not include hardness, for he gives no figure for natural or tank water.

Finally, I accuse Mr. Amis of being gravely un sporting for he neglects to say whether his neons take milk and/or sugar with their tea.

E. R. WARD,
Cheadle, Cheshire.

Breeders' Recognition

WITH reference to the correspondence on breeding new or difficult fishes it would be a good idea if every club had a breeders' class at the end of each year. The Harrow Aquarist Club, when at their zenith in about 1947, had such a class. When unusual fishes were bred the breeder notified the Club within 28 days. The fishes were open for inspection and entered at a show in the late autumn for a breeder's cup. In the year 1947 I bred some green tench and entered a team of six. Mr. W. Bone entered a fine team of angel fish, which were then difficult to breed. He won the cup, but the judge was so impressed with my team of tench that he thought they should have some recognition. When told there was nothing he promised to provide a coldwater cup himself, which he did, and I now have the duplicate miniature. Who was the judge? None other than Mr. L. B. Katters, who has written about such breeding efforts in *The Aquarist*.

A. BOARDER,
Ruislip, Middlesex.

Tropical Aquarium Queries

continued from page 109

Is it true that catfish can be killed by introducing salt into their aquarium water?

Although some catfish can stand slightly saline conditions with no ill-effects, the majority of them dislike salt intensely and can be made ill or killed by too strong a concentration of it in the water. Therefore it is not recommended to treat a diseased catfish with salt.

Is it beneficial to fishes and plants to siphon away some of the water from the bottom of the aquarium every week, and make good the loss with water fresh from the tap?

It is a very good idea to siphon some of the water from the bottom of an aquarium every now and again, but not so frequently as once a week. Further, the water added to make good the loss should be matured in a glass or china vessel for a few days before it is emptied into the tank. It can be brought to the proper temperature by the addition of some boiling water.

A greyish white to ivory coloured mould has developed in one of the corners of my aquarium. Can you tell me the cause of this, and will it prove dangerous to the occupants of the aquarium?

The mould could be caused by permitting uneaten dried food to accumulate on the bottom and decay. On the other hand, the mould might not be a mould at all but a freshwater sponge. However, so long as the fishes remain healthy do not worry too much about it. Just scrape the growth away and siphon or dip-tube it out of the aquarium.

Book Review

Aquarium Plants by Professor H. C. D. De Wit, Ph.D.
Translated by J. A. Schuurman. English edition prepared by Vera Higgins. Blandford Press Ltd. London. 35s.

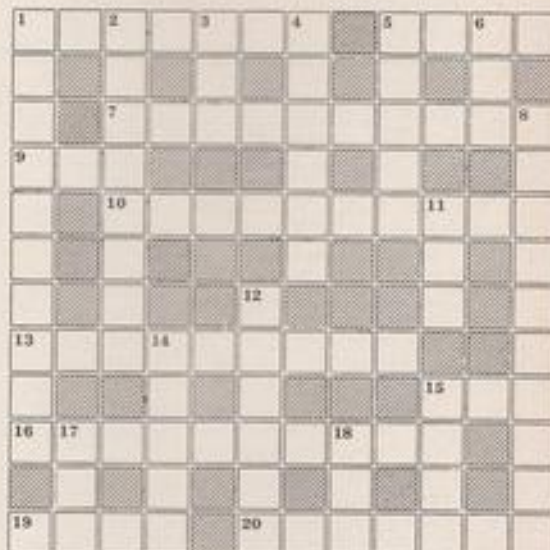
LIKE human beings, no book is perfect. But like human beings again, some books are closer to perfection than others. This book is one of them. For within the hard, plum-coloured covers which bind the 255 pages of text, Professor De Wit of the University of Wageningen has succeeded in giving us a great deal of really valuable information about 250 or more tropical and coldwater aquarium plants. We are told the sort of rooting medium the plants prefer, the temperatures they need to bring success, and the sort of lighting necessary to ensure proper growth. Such obviously needed information has been sadly lacking in previous writings on this subject. It is a pity, though, that the book, first published in Holland in 1957, was written before the introduction of several plants from far-away places which have since proved so easy of culture in our tanks. Among the first of these plants to come to mind is *Cryptocoryne blasioi*, perhaps one of the loveliest and the easiest to grow of the larger members of the genus, and the even taller-growing and bright green *C. aposogenifolia*. Another omission is the failure to stress the importance of setting up an aquarium in the first place with a non-calcareous grit or sand. For so many plants fail to grow, and so many fishes look unhappy, just because the wrong compost lies on the bottom of a tank. But to make up for these omissions we have an important chapter on "Algae in the Aquarium", contributed by no less an authority than A. van der Werff, which tells us much that we have not read in print before.

Altogether this book, which is well illustrated throughout in line and photographs, deserves to be on the shelves of every keen aquarium lover.

Jack Hems

The AQUARIST Crossword

Compiled by M. W. SAUNDERS



CLUES ACROSS

1. Our field of action (7)
5. Domestic animals with four legs and no legs (4)
7. Would you find these on the bed of tropical fish tanks? (3,7)
9. Eskimos find it very warming (3)
10. Would this water dweller feel more at home in bowed tank? (6,4)
13. Produced in water by an earthquake (5,4)
15. A bramble (3)
16. The glass fish is of this family (10)
19. Copied somebody's monkey tricks (4)
20. Do daydreams occur during these rest periods? (7)

CLUES DOWN

1. The water variety adds beauty to your tank (10)
2. This tank is highly unsuitable for tropical fish (8)
3. When dry is due to the wet (3)
4. Too many of these may put a doctor out of work (6)
5. Found on a sea shore—during a "Summer holiday" perhaps? (5)
6. Heave the ship (3)
8. Experienced by fish and children (10)
11. Charged particle in water (3)
12. *Pallmeria* does, occasionally (6)
14. Prize for a fish tank in a hospital! (5)
15. A water — may be needed before breeding some fish (4)
17. Might show you where to go (3)
18. Useful for changing the colour of something (3)

Solution on page 113

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

AT the 11th annual meeting of the **Llanwit Major A.S.**, the following officers were elected: Chairman, K. Farrant; vice-chairman, M. Skotchly; show secretary, D. Songhurst; librarian, Mrs. M. Skotchly; secretary and treasurer, R. Wigg.

Mr. Songhurst gave a talk on his holiday in Belgium at the August meeting. Although he was out of luck with trying to contact an aquarist he did manage to see many species of tropical fish. He visited the Aquarama in Blankenberghe, and saw quite a number of fish. He was disappointed in the quality of most of the fish, as they were very much neglected, and were in some cases in a very poor condition.

There was, however, a wonderful artificial setting of the world of life in the depth of the ocean, depicting underwater exploration as a mere routine by divers.

THE coldwater table show of the **Bradford and District A.S.** for July resulted in a win for Mr. L. Booth. Second and third places were won by Mrs. M. Firth. Table show placings are as follows: H. Fletcher, 21 pts.; A. First, 21 pts.; J. Holmes, 16 pts.; P. Moorhouse, 10 pts.; J. R. Smith, 10 pts.; J. Hooper, 9 pts. The home aquaria competition will probably begin early in October.

RECENTLY, the **Willesden and District A.S.** held a table show in four classes for members of the coldwater section. Entries were well above average, due mainly to the increased number of juniors taking an active part in these shows. The judge for the evening, Mr. Jack Wilson, had a word of praise for all who had taken the trouble to bring along their fish, and thanked them for presenting him with a large number of top quality fish for judging.

The evening's entertainment was provided by Mr. Stan Wingrove, a senior club member, who gave a short, amusing, interesting and enjoyable lecture on "Amphibia as pets," with the aid of a few of his specimens which he brought along.

The results of the show were as follows: Common coldwater class: 1 and 2, Mr. R. Sanderson (rudds); 3, Master B. Maisey (bronze carp). Fancy class: 1 and 3, Mr. S. Wingrove (vittails); 2 and 4, Master G. Brown (black moor and sun bass). Common goldfish class: 1, Mr. T. Glass; 2, Mr. R. Sanderson; 3, Master G. Brown; 4, Miss M. Sherwin. Shubunkins class: 1, Mr. S. Wingrove; 2, Master G. Brown. Mr. T. Glass also won the special award for "Best fish in the show" with his entry in the common goldfish class.

AT the 1st annual general meeting of the **Halifax A.S.**, the following officers were elected: Chairman, Mr. R. Wilkinson; vice-chairman, Mr. J. B. Wake; secretary, Mr. D. Priestley; treasurer, Mr. D. Honour; social and press officers, Messrs. Springthorpe and Walters.

Summing up on the first year's working the retiring chairman, Mr. Barlow, thanked members for their support. Membership had increased and the financial position was sound. It was decided that meetings should continue fortnightly during the season 1964-65. New

members would be welcome. Details could be obtained from the secretary, Mr. D. Priestley, 2, Rose Terrace, Battinson Road, Halifax.

Winner of the Plaque for most points gained in table shows during 1963-64 was Mr. Wilkinson with Mr. Priestley runner-up.

Results of the first two table shows for 1964-65: Livebearers—1, Mr. Nevison; 2, Mr. Wilkinson; 3, Mr. Priestley. Barbs—1 and 2, Mr. Wilkinson; 3, Mr. Nevison.

THE annual convention of the **Hendon and District A.S.** will be held in the latter part of the year at the usual venue of Whitefields Secondary Modern School, Clarendon Road, Hendon, N.W.2. Following the success of last year's Convention lecture when Mr. A. van den Nieuwenhuizen of Holland amazed the audience with his slides of spawning fishes, the Society plans to have another eminent speaker from the Continent. Further details of the date, subject, etc., will be published by circular letter and through these columns.

Newcomers to the hobby are invited to write to the secretary, Mr. A. E. Stevens, 2, Dallas Road, Hendon, N.W.4, who will be pleased to send details of the society. Visitors to the society's meetings which are held every Thursday evening, 8 p.m. at the Brotherhood Hall, The Broadway, West Hendon, N.W.9, will be made welcome.

AT the inaugural meeting of the **Cardiff A.S.** the following officers were elected: Chairman, Mr. D. K. Bitch; secretary, Mr. N. A. Counsell; treasurer, Mr. R. Coslett; show secretary, Mr. N. J. Counsell. Meetings are held at the "Old Arcade Inn," Church Street, Cardiff, on the 2nd and 4th Thursdays of each month. Further details can be obtained from the secretary, Mr. N. A. Counsell, 29, Llanmorlais Road, Gabafta, Cardiff, and new members and visitors can be assured of a warm welcome.

THE Eastern Counties Section of the **F.G.B.S.** will hold its annual show on 19th September at Ripple Road School, Barking, Essex. This is in conjunction with the East London Aquarists and Pondkeepers annual show. Show secretary, P. Jenkinson, 11, Cranbourn Road, Leyton, E.10.

It is hoped to start a Section of the **F.G.B.S.** in the North West Kent area. Will all people interested in the guppy please contact Mr. L. Randall, 118, Brook Street, Erith, Kent.

THE **Hasildon and District A.S.**, which was formed earlier this year, has a membership of over 30 members. At the 1st annual general meeting, the following officers were elected: Chairman, Mr. B. Lupton; secretary, Mr. A. J. Le Boutilier, 11, Marlborough Road, Brentwood, Essex; assistant secretary, Mr. H. Furneaux; treasurer, Mr. D. Smith; show secretary, Mr. G. Clark; magazine editor, Mr. E. Hyatt; programme secretary, Mrs. D. Lupton; committee members, Mr. E. Gash, Mr. D. Stockwell, Mr. D. Browell.

The society has been accepted into the **F.R.A.S.**, and several interesting visits are planned for the near future. Meetings are held fortnightly on Monday evenings at 8 p.m., at the Laindon Community Centre, Aston Road,

Laindon, and any persons interested will be very welcome. Further information may be obtained from the secretary, Mr. A. J. Le Boutilier, at the above address.

AT the recent meeting of the **Nottingham and District A.S.**, the members of Nottingham Tropicals attended, offering assistance to members in their efforts to stage a two-day National show this month. The entire evening was given over to the show secretary to outline the plans for the show and to help iron out any misunderstandings which may have arisen. All the members available at the crucial time offered assistance to the show committee for which the show secretary was very grateful. All plans are now going ahead smoothly and a great turn-out is expected for the event. Thanks were given to all members and non-members for the help given in the organisation involved. In view of the tremendous amount of time required for show needs this month, there was no table show. The raffle prize a bag of groceries donated by Mr. Bates was won by Mr. A. Saxton. The meeting room has changed and from August the general meetings will be held in the People's Hall on Heathcote Street. The secretary raised the matter of a possible visit to Sudbrooke Aquatics and this trip will be held in conjunction with Nottingham Tropicals after the September show.

MEMBERS of the **Loyne Aquarists** enjoyed a talk given by Mr. B. Hamnett at their recent meeting. Mr. Hamnett spoke of his personal experiences on keeping fish and created amusement by telling members what they should not do rather than what they should do. Mr. Hamnett told members of keeping fish in the early days when tanks had to be heated with small paraffin lamps under them and pointed out the advantages of keeping fish at the present time with all the modern aids. He also stressed to members the dangers of trying to cure fish ailments with chemicals. Unless members understood the action of the chemical a reaction may be set up that could prove fatal to the fish.

A table show was then held and three members, Mr. Ostoby, Mr. Aveyard and Mr. Sallis, judged the entries with the following results: 1st, Mr. J. Mills with a sailfin mollie; 2nd, Mr. J. Mills with a red swordtail; 3rd, Mr. B. Hamnett with an *Aphyoseiichthys californis*.

AT the annual general meeting of the **Smethwick and District A.S.**, new officers were duly elected and are as follows: Chairman, Mr. J. Nicklin; chairman-elect, Mr. W. Downes; secretary, Mr. R. Holdall, 90, Ada Road, Smethwick, Staffs.; treasurer, Mr. W. Parr. The society is continuing to flourish and membership is gradually increasing.

BECAUSE of the Bank Holiday, the August meeting of **Coalville and District A.S.** was brought forward. In their first inter-society show, this recently-formed society had outstanding success against the much established Burton-on-Trent Society. The show, the first in a two-leg match with Burton, was divided into five classes and the result was: Coalville 724 points; Burton 367 points. Judge was Mr. P. Fibiger, of Derby, and of the 15 awards, Coalville won ten. Class results were: A.V. barb: 1, Mr. D. W. G. Fretwell (Coalville); 2, Mr. J. A. Reed (Coalville); 3, Mr. D. W. G. Fretwell (Coalville). Characins: 1, Mr. A. G. Ings (Coalville); 2, Mr. P. Strenson (Coalville); 3, Mr. Tilley (Burton). Rasboras, Danios and White Cloud Minnows: 1, Mr. M. Yeomans (Coalville); 2, Mr. Inwood (Burton); 3, Mr. C. Garratt (Coalville). A.V. Livebearer except Guppies: 1, Mr. E. Salt (Burton); 2, Mr. G. Brown (Burton); 3, Mr. D. W. G. Fretwell (Coalville). Catfish, Loaches and Labros: 1, Mr. T. Moses (Burton); 2, Mr. A. G. Ings (Coalville); 3, Mr. G. Deag (Coalville). It is hoped to make the match between the two societies an annual event. While the judging was taking place, a programme of film slides and tape recording, loaned by the Coventry Pool and Aquarium Society, was shown. After the inaugural and two other meetings, the society membership is now 49.

THE results of the Prestwich and Bury A.S. open show were as follows: Guppies—1, Messrs. Berrisford and Jeffery (P.G.A.); 2, Mr. Brownhill (P.G.A.); 3, Mr. Wolstencroft (Heywood). Swordtails—1, Mr. Bradley (Macclesfield); 2, Mr. Davies (Heywood); 3, Mr. Day (Bury). A.O.V. Livebearer—1 and 2, Mr. Bradley; 3, Mr. Hughes (Belle Vue). Cichlids—1, Mr. Harper (Macclesfield); 2, Mr. Coope (Oldham); 3, Mr. Hughes. Pigeons—1, Mrs. Spencer (Heywood); 2, Mr. Jennings (Bury). Labyrinth—1, Mr. Campbell (Bury); 2, Mr. Hill (Lancs. Breeders); 3, Mr. Hughes. Barbs—1, Mr. Hill; 2, Mr. Hughes; 3, Mr. Davins. Minnows—1, Mrs. Spencer; 2, Mr. Willan (Bury); 3, Mr. Gaffney (Heywood). Characins—1, Mr. Bolton (Lancs. Breeders); 2, Mr. Harper; 3, Mr. Hughes. Catfish and Loach—1, Mr. Coope; 2, Mrs. Davies (Heywood); 3, Mr. Wolstencroft. A.O.V. Tropical—1 and 2, Mr. Buckley (Bury). Breeders (livebearers)—1, Messrs. Berrisford and Jeffery; 2, Mr. Hill; 3, Mr. Wolstencroft. Breeders (egglayers)—1 and 2, Mr. Tatlock (Lancs. Breeders). Best fish in show—Mr. Harper. Best livebearer—Messrs. Berrisford and Jeffery. Best egglayer—Mr. Harper. Best breeders—Messrs. Berrisford and Jeffery. The Inter-Society Shield, awarded to the society gaining most points resulted in a tie between Heywood and Lancashire breeders with 15 points each. They agreed to hold the Shield for six months each.

THE Merseyside A.S. newsletter contains the Liverpool show results and these were as follows:—Purchased aquaria: 1, J. Robinson; 2, R. Ory; 3, P. Mulla. Guppies: 1, B. Parks; 2, R. Simkin; 3, R. Stamer. Plants: 1, B. Pillinger; 2, D. Thomella; 3, D. Thomella. Mollies: 1, J. P. McConville; 2, T. Lambert; 3, K. Moorcroft. Swordtails: 1, K. Parks (best livebearer); 2, C. Turner; 3, H. Stamper. Labyrinth (fishers): 1, D. Thomella; 2, R. Stamper; 3, H. Stamper. Labyrinth (A.O.V.): 1 and 2, P. Mulla (best labyrinth); 3, D. Thomella. Characins (small): 1 and 2, R. Stamper; 3, P. Mulla. Characins (large): 1, H. Stamper (best characin); 2, H. Pillinger; 3, H. Stamper. Barbs (small): 1, H. Stamper; 2, K. Parks; 3, H. Stamper. Barbs (large): 1 and 2, K. Parks (best barb); 3, I. Poole. Cichlids (dwarf): 1 and 2, J. P. McConville; 3, R. Simpson. Cichlids (large): 1, P. Mulla (best cichlid); 2, Miss A. Collins; 3, H. Pillinger. Top Minnow: 1 and 2, H. Swanson; 3, P. Mulla. A.O.V.: 1, J. P. McConville (best

fish in show); 2, J. Beck; 3, R. Moorcroft. Breeders class (livebearer): 1, R. Stamper; 2, Master C. M. Turner; 3, C. K. Turner. Breeders class (egglayer): 1, H. Swanson (best breeder); 2, R. Moorcroft.

RECENTLY Kingston and District A.S. were hosts to **Crawley A.S.** in an inter-society contest. During the judging, a most interesting talk was given by Dr. J. N. Carrington of Inter-Pet Supplies Co., on fish houses and fish-keeping in Holland. The talk was illustrated with slides taken during his recent visit and showed the layouts of some of the top breeders there, with particular reference to their methods of tank heating and lighting. The result of the show was a win for Kingston with 597 points, against Crawley's 572.

THE August meeting of the Dundee A.S. was attended by 22 members. The table shows were: Scott Trophy (angel fish and pompadours) and Scott Trophy (large cichlids) except angel fish and pompadours—Both classes were judged by Alan D. Christie and the results were:—Angel fish and pompadours: 1 and Pat Strachan Trophy, J. McGeoghie; 2 and 3, P. N. Greening; 4, Brian Craig. Large cichlids: 1 and 2, Alex. Cross; 3, Pat Strachan. The Scott Trophy points leading positions are as follows: A. Cross, 10 pts.; Wallace S. Russell, 8 pts.; Jas. McGeoghie, 7 pts.; Ed. J. Seymour, 5 pts.; Albert L. Hamie, 4 pts.; Pergus McNaughton, 4 pts. The leading positions in the Tayside Trophy are: B. J. Seymour, 70 pts.; Brian Craig, 65 pts.; Bernard Robertson, 40 pts.; W. M. Lowdon and Ronald Kemp, 35 pts.; A. D. Christie, John Counts and Ian Brad, 30 pts. The programme which followed was provided by the Federation of Northern Ireland Aquarist Societies and comprised a coloured slide show and snipoid talk on "Barbs".

AT the monthly meeting of Ilford and District Aquarists' and Pondkeepers' Society a "visual quiz" competition was held. This was organised by Mr. Bell and Mr. Ruth and included the recognition of fish, their country of origin, and the naming of water plants. The competition was won by Mr. Stebbing, the society's chairman.

The society's annual pond competition was held in July. Results, announced at the meeting, were: 1, Mr. Nott; 2, Mr. Cook; 3, Mr. Braham.

Anyone interested in joining the society is asked to contact the secretary, Mr. R. Ruth, 13, Dunkeld Road, Dagenham.

AN Aquarium Club is the latest addition to the societies and clubs at King Edward VI School, Stourbridge. It has a fully equipped tropical aquarium, a collection of fish, some sticklebacks and a young perch. Next term the club hopes to acquire a second tropical tank which could be used for breeding fish.

RECENTLY the Lanarkshire A.S. held its second annual open table show. This was one of the largest of its kind held in Scotland with a total of almost 450 entries.

The Paisley Tropical Fish Society was well to the fore when the awards were being made. Mr. Hans Ludwig received the following awards: Male guppies, 1st; mollies, 1st; female guppies, 1st and 2nd. Mr. Robert Lees received the following awards: Large cichlid, 1st; loaches, 3rd. The trophies for the "Best fish in the show" and the "Best tropical fish in the show," were both awarded to Mr. Robert Lees for his large cichlid (*Astronotus ocellatus*).

Crossword Solution

A	Q	U	A	R	I	A	C	A	T	S
S	N	O	P	L	U					
P	H	O	T	S	P	R	I	N	G	S
I	C	E		L	F					C
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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

Aquapets
1, Grand Parade,
Tolworth
Telephone: Elmbridge 0678
E.C.D. Wednesday. R. C.T.P.A.A. R.&A.

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

Dowding, Conrad A.
1, St. John's Terrace,
Lewes
Telephone: Lewes 3970
E.C.D. Wednesday. R. C.T.P.A.A. R.&A.

Preston Aquarium
44, Beaconsfield Road, Brighton
Telephone: Brighton 681602
(Open all week). R. C.T.P.A.A.

Regency Aquaria (Prop. R. A. Bassett)
49, Surrey Street (outside Brighton Station),
Brighton
Telephone: 29940 R. C.T.P.A.A. R.&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
(Proprietor: Mrs. M. Hemming)
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.

Victoria Aquatics
Bank Top, Staithes,
Saltburn-by-the-Sea
Telephone: Hinderwell 322
Open All Week. R.T.C.P.A.A.

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Aquarists' Rendezvous
164/168, Albert Drive, Pollokshields, Glasgow, S.1
Telephone: South 4258
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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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continued on page xvii

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