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and equipment including Gro-lux lighting. We also
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Fifteen Stainless steel tanks filled with beautiful marine fish from faraway seas. All kept crystal clear the M & R way (every tank has its own power filter). No dirt collecting in uncleanable under-gravel filters used on our premises.
We have kept and stocked marine fish for nine years.
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  + Readily acceptable
  + Reconstitutes immediately
  + High protein value 53.7%
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Interpet's largest and most popular air operated filter.

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April, 1971
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20p and 35p per bottle +5p p. & p.

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<thead>
<tr>
<th>THERMOSTATS</th>
<th>each</th>
<th>£1-25</th>
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<tbody>
<tr>
<td>Centaur &amp; External, 10 amp</td>
<td>£2-00</td>
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<tr>
<td>Digital</td>
<td>£2-50</td>
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<tr>
<td>Waxed External</td>
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<td>UNO</td>
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<td>InnsAdju. “Popular”</td>
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<tr>
<td>“Popular” with neon indicator</td>
<td>£8-00</td>
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<tr>
<td>Presta Metric</td>
<td>£8-50</td>
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- Flakes 15g
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- Dried Daphnia 10g
- Livestock 10g
- Insects 10g
- Freeze Thawed 10g
- Tetra Mini 10g
- Tetra Min 10g
- Tetra Fin 10g

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- Eneric Flakes 11g
- Flakes 15g
- Turtles Granular 10g
- Dried Daphnia 10g
- Livestock 10g
- Insects 10g
- Freeze Thawed 10g
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- Close-grained foam block filters fine particles that can cloud tank.
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- Comes complete, ready to run. No extras to buy.
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We have approximately 150 tanks always in use ON TWO FLOORS

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Neons, Black Neons,
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INCOMPARABLE FILIPINO MARINE FISHES
(Prepared and handled with that "Kennedy touch")

FANTASTIC CORAL SAND
collected from a special location and selected for its particular qualities. An unbeatable medium for use in conjunction with sub-gravel filtering in marine aquaria.

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April, 1971
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Majestic, Blue-faced, Regal (Pygoplites), Imperator and other heavenly Angels, Triggers, Porcupines, Boxfish, Morays, Butterflies, Damsels, Surgeons, Batfish, Groupers, Cardinals, Catfish, Firefish, Hogfish, a host of other lovelies and a wide variety of Invertebrates.

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Closed Mondays and Thursdays
(until 4 p.m.)
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OVER 60 SPECIES IN STOCK FOR TROPICAL AND COLDWATER AQUARIUM.

<table>
<thead>
<tr>
<th>Pond Plants — Complete collection for Garden Pools</th>
<th>Bunch Plants per five</th>
<th>Specimen Plants per each</th>
</tr>
</thead>
<tbody>
<tr>
<td>(AX) surface area 15 sq. feet £2-75</td>
<td>Ambulia 25p</td>
<td>Amazon Swords 12p &amp;</td>
</tr>
<tr>
<td>(BX) surface area 25 sq. feet £3-92</td>
<td>Bacopa small 20p</td>
<td>Variegated Rush 22p</td>
</tr>
<tr>
<td>(CX) surface area 40 sq. feet £5-12</td>
<td>Bacopa large 20p</td>
<td>Aponogeton 22p</td>
</tr>
<tr>
<td>(EX) surface area 60 sq. feet £8-12</td>
<td>Cabomba Green 25p</td>
<td>Crispus 12p &amp; 17p</td>
</tr>
<tr>
<td>Special collection for miniature pools £2-80</td>
<td>Cabomba Red 25p</td>
<td>Dundulais 12p &amp; 17p</td>
</tr>
<tr>
<td>All the above contain water lily species, marginals, oxygenating and floating plants, and snails.</td>
<td>Alternanthera 60p</td>
<td>Barclaya species 60p</td>
</tr>
<tr>
<td></td>
<td>Elodea densa 17p</td>
<td>Indian Fern 12p</td>
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<tr>
<td></td>
<td>Hygrophila 20p</td>
<td>Cryptocorynes 12p</td>
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<td></td>
<td>Ludwigia 20p</td>
<td>balansae 12p &amp; 17p</td>
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<td>Myriophyllum 20p</td>
<td>blasi 60p</td>
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<td></td>
<td>Giant Hygrophila 60p</td>
<td>cryptanthus 12p</td>
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<td></td>
<td>Sagittaria natans 20p</td>
<td>griffithii 12p</td>
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<td></td>
<td>Water Wisteria 60p</td>
<td>ciliata 12p</td>
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<td>Vallisneria 20p</td>
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- Elodea Densa
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- Cabomba (Red)
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The Editor accepts no responsibility for views expressed by contributors.
Results of Breeding Koi

by Lionel Vanderplank

During 1970 I bred a single pair of Koi, rearing and keeping their offspring separate. Although the spawning was well in excess of 3,000 eggs, only a thousand offspring have been raised which provides a good assessment of the colours that have been obtained and are likely to occur in similar crosses. The female Koi is a red and black patterned individual with white fins and silver undersides, what is classified as a tricoloured “Sanke”; the male is a mixture of Black, Greys, White, Blue and red, blacks and blues being most prominent; unfortunately, although nicely coloured, it is not a well patterned fish; this male is also a modern or “Sanke” koi variety.

From the thousand offspring produced in this particular spawning, roughly half or 500 are either White or Red or a mixture of the two colours. There are 3 or 4 pure white, but no pure red, the rest varying in portions of white to red with some very nicely patterned “Kohaku” and 3 or 4 Red Caps or white fish with a simple red spot which should be on the head, but none have the red spot exactly on the head, so none are exhibition quality. Of the remaining 50 per cent or 500, about 300 are Red and Black with 3 or 4 different shades of red and the proportions of black varying from some 80 per cent of the body surface to just 2 or 3 black spots or markings. These would be classified as Aka-bekko which are black on red markings and Hi-utsuri which has red blotches on black. The remaining 20 per cent or 200 are the most interesting, there are 4 pure yellows, 3 yellow and black, 1 yellow, black and white, 3 or 4 white, black and red (like the female parent) 3 or 4 white, red with some black; none of these fish show any blue or grey markings like the male parent and no pure black and white fish have appeared either. Although amongst the 200 which are all tri-coloured, although often one colour is present only as a spot of white, red, yellow or black, there are some nicely coloured and interesting fish, none are up to exhibition standard and none show any large scales, browns or very small scales of the German Mirror or Doitsu varieties and since some of these characters are dominant I can conclude that the pair I bred from my 1968 breeding are free of this variety.

The same male was crossed in September with a female shubunkin of the Cambridge Blue type; only a few eggs were produced and about 150 young have been reared; roughly half of these appear to be like normal shubunkins with slightly enhanced colours and have grown much slower and only half the size of the others which are now 2 inches long, silver fish with dark top sides and top of head, no barbels but otherwise like normal carp. Whether these fish will colour and what colours they will show remains to be seen, also whether either batches are fertile or not, or whether they can be bred amongst themselves or back-crossed to either parental type. As scaleless Koi are known it would appear that this cross has already been made and the “scalelessness” of Shubunkins transferred into carp with their colours as well.

Again this particular male Koi as described at the beginning of this article has been crossed with female goldfish producing offspring that start life uncoloured like all goldfish do; however some 50 per cent still remain uncoloured and the other 50 per cent have coloured mostly into fish of various red, orange and yellow shades and quite a few with black markings. The interesting points with these hybrids are whether they will be sterile, partly sterile (i.e., back cross with parental types) or fertile, and whether the black markings which are permanent in Koi and non-permanent in Goldfish will be permanent or not? The offspring are shaped like common carp but do not have any barbels.

Another cross made was that of a female Sanke white, black and red Koi with a pure white male Oranda. Mortality in the young fish has been very high and those that are still surviving (about 50) are weird. Several have no air bladder and rest on the bottom when not swimming about; they have considerable difficulty in swimming. Many lack a pigmented iris to their eyes which look like large black blobs, some have small mouths and have difficulty in feeding properly and only a few have tri-tails, but it is still rather early to see whether anything worthwhile comes of such a cross. Some readers will ask why attempt such a cross? The reason is that it may well be possible to transfer the genes for large fins and tail to the Koi and produce a large Oranda-Koi which is theoretically quite possible and these would have a place in large ornamental ponds. Some people have ideas that man should not attempt to produce hybrid plants and animals, but nature has been doing this for a hundred million years with some pretty weird or hideous results and I doubt whether man’s efforts will be any worse than nature’s.
The Pygmy Angelfish

by A. R. G. Drayson

ONE OF THE MOST spectacular group of marine fishes is surely the Angelfish family. However, for the average marine aquarist they possess two distinct disadvantages. First, they grow to a large size, and secondly, largely because of length and bulk, they tend to be expensive. Any fish, therefore, that manages to combine the majestic splendour and individuality of the Angelfish with a more reasonable size and a more acceptable price, is bound to attract attention. Such a fish may be found amongst a group called the "Pygmy" Angelfish.

The generic name of the "Pygmy" Angelfish is Centropyge, and they are members of the Chaetodontidae family, the family which also includes the popular Butterfly fishes. There are reportedly more than 150 species of Centropyge, but I have only been able to find references to seven of them:

Centropyge argi (Woods and Kanazawa, 1951), is sometimes called the "Cherubfish". It has a deep blue body with an orange-yellow head and chest. The eyes are ringed in blue and the fins are deep blue, with a pale blue margin. There is a large spine on the lower half of the gill cover and a smaller spine is situated just below the eye. Range: West Indies and the Southern Gulf of Mexico.

C. bicolor (Bloch). The front half of this fish and the tail are bright yellow, whilst the back half, up to the tail, is a very deep blue. There is a wide black patch situated on the forehead. Range: East Indies, Melanesia, and Polynesia.

C. bispinosus (Gunter). Sometimes erroneously referred to as C. multispinis. This fish is basically a deep blue, but the centre of the body appears to be red, because it is crossed, vertically, by about twenty narrow flame-red bands. The fins are deep blue with a pale blue margin, and the lips are also pale blue. Range: Melanesia and Polynesia.

C. fisheri (Snyder). A bright orange fish with a deep blue oval patch covering a large proportion of the back below the dorsal fin. The pelvic and ventral fins are also deep blue. There is a smudge of blue on the chest and the eyes are ringed in blue. The tail is lemon. Range: Hawaiian Islands, and has even been found around the coasts of South Africa and China.

C. flamentosus. This is a very rare species. The whole of the body and the fins are flame red, except for four black vertical bars, three black blotches and an orange tail. Range: Hawaii.

C. flavissimus. This fish is sometimes known as the "Lemon Peel". It is a brilliant chrome-yellow with a bright blue ring around the eye and a short blue line running vertically down the gill cover. Juvenile specimens possess a small blue blotch on the middle of the side. Range: Indo-Pacific.

C. potteri (Jordan and Metz), has red-brown and blue vertical, erratic barring on the sides of the body, the front half of which is predominantly red whilst the rear half is predominantly blue. This is another species which possesses a spine on the gill cover. Range: Indo-Pacific.

With the exception of C. bispinosus, which may grow to a length of eight inches, all of these fish are fully grown at between three and four inches. They are chunky, sturdily built fish with fairly prominent lips. They have an equable disposition and get along well with both larger and smaller specimens of their own and other species, although C. argi, the only deep-water member of a predominantly shallow-water family, sometimes tend to be a bit scrappy amongst themselves.

To my way of thinking, Centropyge members are among the most satisfactory of aquarium specimens; in addition to their size, disposition, and coloration, they possess the added advantage of being very hardy. Against them it must be said that they may be reluctant feeders until they have settled down, and they are inclined to be somewhat shy and retiring unless supplied with numerous hiding places.

My experiences with this family have been with C. fisheri and C. bispinosus, and it is C. fisheri that I should like to discuss in more detail.

In January 1969 I set up a community aquarium of about 20 gallons capacity. It was stocked with one each of the following: Thalasoma lunare (Wrasse), Chaetodon kleinii (Butterfly), Pomacentrus melanocharis (Damsel), and Centropyge fisheri. The water, which has since remained unchanged, is "Synthetic", maintained at a specific gravity of 1.024 and the temperature is kept at 76°F. Filtration is carried out by means of an undergravel filter, corrugated type, connected up at one end of the aquarium to a Dynaflow external filter containing nylon wool and activated charcoal. A length of tubing carries the outlet from the Dynaflow to the opposite end of the aquarium.

Continued on page 23
STARTING with the LAST

by R. C. Mills

The newcomer to fishkeeping usually starts off with a community collection containing both livebearers and egglaying species—livebearers for their colours and hardiness, egglayers for their flowing fins and gracefulness.

After the livebearers' fry are noticed, the aquarist is bound up with the prospects of breeding his fishes and during the first few months the livebearers bear the brunt of the breeding phase. When this novelty wears off (the aquarist having found that there is more to breeding the livebearers than just letting them get on with it!), the idea of trying to propagate the egglaying species comes as the next logical step to take.

Similar skills, on the aquarist's part, are needed in spawning the oviparous species; the selection of the adults for spawning, raising the fry, etc. One thing you don't have to worry about—the egglayers usually breed true! Sexing the parents-to-be can be slightly more difficult than with the livebearers but the rule is usually that the males have more colour, longer fins and slimmer figures; other hints may be given by the actions of the fish themselves—driving of the females, nest-building activities and territory-guarding, for instance.

The choice of what to breed is very wide—barbs, characins, cichlids, labyrinths, killis and so on. However, certain species may be ruled out for the newcomer as being "specialist" species and usually the novice is exhorted to start with a simple, hardy fish for his first attempt. This is often one of the egg-scattering types and most reference books recommend, paradoxically, a fish right at the end of the alphabet, the Zebra Danio, Brachydanio rerio. This active fish, with its blue and gold horizontal stripes, is often included in a basic collection so how do we go about spawning such a fish?

The first step is to determine the sexes prior to isolating them for conditioning, and this is fairly easily done (Fig. 1). The females are usually more plump and when viewed "head on" there is a distinct bend in the stripes (almost like a waist) just in front of the anal fin. Another pointer to the sex of the fish is that the outline of the female's body is more curved, even humped, between the snout and the dorsal fin. The male is usually much slimmer and his stripes are more evident in his fins; also, as the fish mature the males can be seen chasing the females and showing off their fins.

The sexes should be isolated and kept in separate tanks; they should be fed generously with live foods—Daphnia, Tubifex and mosquito larvae are readily taken. This "conditioning" period can take up to ten days or a fortnight, during which time the females fill up with roe, the males take on their breeding colours and the aquarist must turn his thoughts to preparing the spawning tank.

The Zebra Danio is a very active fish and does a fair amount of driving and chasing of the female during spawning, therefore a reasonably sized tank should be used, an 18 in. x 10 in. x 10 in. being the smallest for comfort, a 24 in. x 12 in. x 12 in. much better. As well as being an active fish the Zebra is also a spawn eater, so to ensure that there will be offspring from the spawning, steps must be taken to prevent the fish from getting at their own newly-laid eggs.

In nature this is taken care of by the fact that these fish inhabit fast flowing waters which sweep the eggs away from the fish as soon as they are laid.

In our tank, a static body of water, various methods can be employed to save the eggs and all contrive to separate the eggs from the parents as quickly as possible. A couple of layers of glass marbles on the tank floor will provide a fish-proof trap for the eggs and this
arrangement, together with a shallow depth of water, is often suggested; thickets of dense, bushy plants will also trap the eggs but may also harbour hungry snails! Breeding cages can be built of plastic mesh into which the adults are put to spawn. The method I use achieves the desired result in saving the eggs and also has one or two other bonuses.

Next time spring cleaning comes around "acquire" a yard of redundant nylon or terylene curtaining and you have the perfect egg screen. A first bonus is now apparent—any ordinary, set up tank can be used for spawning without any need for shallow water, marbles or any other paraphernalia, although any other fishes must be removed! The modus operandi is as follows:

The material is draped in the top of the tank so as to give a water depth of about 2-3 inches as swimming room for the adult fishes; it may be necessary to weight the material slightly to keep it below the surface. The conditioned pair, or pairs, are put into the shallow water above the netting. If this is done when one has time to watch events, the male will be seen to drive the female up and down the length of the tank, pressing his body against hers in an S-shaped curve and trembling violently; under this stimulation the female releases her eggs which are immediately fertilised by the male. Due to the very shallow water depth the eggs fall quickly through the curtaining into the tank below before the adults realise it, and are thus saved (Fig. 2(a)).

Meanwhile the eggs hatch, usually within 36 hours depending upon the temperature, and the fry can be seen hanging on the glass and plants like tiny splinters. After a further day or two they become free-swimming and look like tiny, horizontal, shining lines on the move.

Food at this stage must be small; green water is excellent and infusoria may be cultured or liquid fry food can be given (take care not to pollute the tank!). Growth is rapid and soon newly-hatched brine shrimp, screened daphnia and mashed tubifex can be added to the fishes' diet.

Reverting to the method used as an egg-saving device, the system is obviously usable for any of the danios (although the larger species will need larger tanks) and other driving fish that laid non- or semi-adhesive eggs; one could add a few plants into the shallow area to make the fish feel more at home, and even green coloured netting could be used (make sure that the dye is fast). Whether characins can be spawned in this way poses an interesting problem, maybe those "characin hooks" of the males might get hooked up in the material—if they do it may prove your sexing ability!

It could be used with livebearers, although the mesh may need to be larger, in which case there is no guarantee that the fry might not re-enter the netting thus defeating its purpose. I suppose for this use only a portion of the tank need be "netted off".

A final note of warning—as the fish are confined to the uppermost layers of the water there may be a danger of them jumping out of the tank in their excitement during spawning; so, either drop the water level a little, use a cover glass or, pinch another yard of material.

April, 1971
PRACTICAL GUPPY GENETICS (Part 2)

by F. L. Vanderplank, B.Sc., PH.D.

In the diagrammatic illustrations of Guppy genetics, only males are shown, but naturally you cannot cross males and in pure crosses one of the two has to be a female which has the same particular male characteristics as shown. Diagram 1 shows single gene dominance such as black pigmentation, large black eyes and small wild type tail and fin. Such diagrams over simplify matters as these two dominant characters are most probably controlled by several genes and not just by one gene and the distribution of these genes may be on several chromosomes and not just on one. In practice, however, like Mendel's peas, the results of these crosses work out roughly as illustrated, with a one to ten per cent error, which used to be considered due to variation expected with small numbers, but even when very large numbers of crosses are carried out there is still a variation and this is due to other factors, such as chiasmata crossing over the chromosomes. It is this exception to the rules which gives breeders their opportunities to discover and make use of new forms and colours.

Diagram 2 demonstrates incomplete dominance or blending and this occurs with normal and either Golden (yellow) White and Albino coloured guppies, with various tail and other body colours. White guppies have black eyes, albino guppies pink, so these are in separate categories and not the same. Blending can occur with tail shape and size and with shape and size of dorsal fin. Again such a diagram over simplifies matters as many genes situated on several chromosomes may be involved.

Diagram 3 shows the simplified scheme for in-breeding of hybrids, and Diagram 4 back crossing or line breeding. Although in practice the proportion obtained work out roughly to the theoretical predictions some 10 per cent error is caused by chiasmata and other irregular chromosome behaviour. In Diagram 5 the theoretical results of what would happen if the 3 groups of genes shown were all situated on the same chromosome and therefore linked together, further selfing or inbreeding would only result in producing more of the types shown but would not result in a black-eyed pure yellow occurring. In actual fact these particular genes are not linked and occur on three separate chromosomes so the results shown in Diagram 6 are obtained. The percentages of each cross prove (incorrectly) that there is a random exchange of chromosomes from each parent, but this is not true and so the percentages in the last cross will not be an equal 12½ per cent but more like 3 per cent and 22½ per cent. Even then breeding is not as simple as shown in this more complicated diagram and as many hundreds, or even thousands of genes are involved I leave it to the reader to work out the more complicated diagrams and possibilities based on the principles shown. Diagram 7 shows diagrammatically a pair of chromosomes, one from the female parent and one from the male. In the first example 3 genes are shown R for dominant red, Y for recessive yellow, E for the recessive blue-black "iris" or black-eyed guppy and e for the dominant normal light-coloured iris or normal eye appearance. In the first chiasmata or cross-over of chromosomes no change in the genetics occurs as a result, but if the cross-over had been between R and r then a marked change would have occurred. In the second example the chiasmata results in an eye colour change in the next generation. Chiasmata have no effect on the individuals they occur in, but only when they occur in germinial cells and then only if they become part of a fertilised egg. It is these cross-overs that are more important genetically than any mutations either natural, chemical or by radio-activity, that might occur. Chiasmata rate varies with the species and conditions, and is as high as 3 per cent in some species of animals, and knowing the large variability that occurs in guppies it must be quite high in this species.

THE AQUARIIST
Dominance

One possible result of crossing a dominant set of genes with an individual with a recessive set of the same gene.

Blending or incomplete dominance

Result of crossing a normal coloured guppy with a yellow or golden guppy, results in blending each gene exerting equal influence resulting in a Bronze coloured guppy.

Selfing or inbreeding

When two hybrids of the Blended ny type are crossed, on average 25% will revert to normal (nn) 50% remain hybrid bronzes (ny) and 25% revert to pure yellows (yy).

Back-cross or line breeding

Back-crossing a bronze guppy with a golden or yellow results in 50% bronze and 50% yellows. Proportions are on average over many thousands of individual offspring.

Linked genes or genes on the same chromosome

Unlinked genes on separate chromosomes

April, 1971
The Perils of the Inexperienced Aquarist

by Julie Wilcox

Every pet shop worth its salt displays a wealth of text-books designed to help aquarists, old and new, to solve their problems, and for the most part they fulfil their purpose admirably. There are times, however, when they are completely useless, particularly if the reader is a person relatively new to the hobby. Certainly, there is a valid reason for this; these books are written by experienced aquarists who have, presumably, kept fish for many years. It is quite natural that these people will have forgotten many of the difficulties they had to face when they set up their first aquarium. I, myself, have only been keeping fish for two years, if that, but even after such a short time I realise that I now do, automatically, many things to which I had to give considerable thought a few months ago.

Let us go right back to the beginning. Young, never-seen-a-fish-in-his-life-before Mr. Algry Green goes into his friendly neighbourhood pet shop. He buys his tank, heater, thermostat, etc., and also pays some extortionate price for a gaudy, glossy and highly technical encyclopaedia. It seems to me that such books are far too vague to be of any use to the totally inexperienced aquarist. “When setting up the tank” the book might say blithely, “put in enough gravel or sand”—but how much is enough? “Do not include too many plants in the tank”—how many plants are too many? I was faced with this problem myself, and found that there was such a profuse growth of vegetation that it was almost necessary to supply each fish with a machete and let them do a “Stanley-and-Livingstone” act. This problem dealt with, and my fish visible again, yet another difficulty cropped up. Have you ever noticed how every drum of fish-food you buy gives such obscure directions about the quantities to be used that they might almost have been written by a politician? “Use just enough that the fish can clear the food from the water in ten minutes.” The poor ignorant aquarist stoops over his tank, peering through the water, his watch in his hand, searching for minute crumbs of soggy food.

Professional authorities, and their so-called good advice, can cause domestic strife, and are probably responsible for the high divorce rate. One expert actually advocated the keeping of tubifex and other live foods in the family refrigerator. When I tried that the consequence was that I almost had to leave home!

Please, all you experts, please spare a thought for we novices!

THE AQUARIST
Blanus cinereus

by H. G. B. Gilpin

Amongst a small collection of mixed reptiles I received from Benidorm, on the south east coast of Spain, were six examples of Blanus cinereus, the only known member of its genus to be found in Europe. Commonly known as worm-lizards, or ringed lizards, they were found on the damp earth underneath stones and although completely without legs were by no means easy to capture. As soon as the stones were raised, they began burying themselves in the earth and, unless picked up without delay, soon disappeared from sight.

Worm-lizards are said to show a considerable variation in colour, ranging from yellow to pink through shades of violet and reddish grey, grey or brown on the upper sides, with yellow or pink undersides. All six of mine however are uniform in hue, doubtless because they were all found living under similar conditions, with a limited area of ground. Although their underparts are slightly paler than the dorsal surface, they are pinkish-brown all over. The smallest is about four inches long and the longest eight and a half inches. The tails are extremely short in relation to the length of the bodies, that of my biggest lizard being no more than one inch. It extends smoothly from the body, the end being rounded and showing little diminution in diameter.

The muzzle too is blunt and rounded, the small head being roughly triangular, and separated from the body by a narrow groove. Worm-lizards are quite blind, the position of the vestigial eyes being marked by minute dark spots, visible through the surface of the skin. The forked tongue continually darts in and out of the mouth seeking sensations denied to the animal by its lack of eyes.

The rounded body is ringed throughout with furrows. Its surface is smooth and shiny and a long lateral groove extends along each side, reaching from just behind the head to the beginning of the tail. Painter longitudinal furrows divide the surface into small, neat rectangular plates.

Cinereus differs from its near relative, Blanus strauchi, in possessing jaws of equal length, the upper jaw of the latter species extending beyond the lower. Its nostrils too are placed above the lip shield, whilst those of B. strauchi lie within it.

On arrival my specimens were placed in a small vivarium, heated to 70°-75°F by an electric light bulb, together with a four inch long skink—confined with them temporarily until more suitable accommodation could be found for it. The floor was covered with several inches of sandy soil and furnished with a number of large, flat bottomed stones, a small log and a clump of coarse grass. The worm-lizards were somewhat lethargic as a result of their long journey but within less than a minute all six of them had disappeared below the surface. It was interesting to find subsequently that they always buried under a stone. When searching for them on several occasions, weeks after their introduction, not once has one been found beneath the soil in the open part of the vivarium. They always curl up, usually under a stone but sometimes under the log, either on the surface of the soil or an inch or so beneath it.

According to the references, these creatures, under natural conditions, feed upon insects and earthworms. I was anxious to give mine every opportunity to feed as soon as possible, as two of them were distinctly flattened in appearance, suggesting that a meal was overdue. Consequently I provided them with as wide a range of food as I could, including blow flies, newly hatched locusts, woodlice, gentles, mealworms and earthworms. That they started feeding almost immediately became apparent after a couple of days, by which time they had filled out and their bodies became rounded and firm to the touch. They seemed to have made little or no inroads on the insects but the earthworms disappeared at a great rate.

Since a heated tank is rapidly fatal to earthworms, these are not simply tossed into the vivarium but placed in a shallow dish of damp earth, sunk almost to the rim in the floor covering. Fresh supplies of worms, each two inches or less in length, are supplied every other day and the soil in their dish is kept permanently moist.

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British Freshwater Fish

THE BLEAK by A. Boarder

The Bleak is a small bright little fish which rarely exceeds 8 in. in length, nor a weight of more than 3 oz. 8 drms. It has a long narrow body and so is able to swim at a fast rate. Although it may be found in still waters it prefers a slow running stream or river. The general colour of the fish is silvery white with a greenish back. The fins are only slightly tinged with red and the whole fish is pale in colour. The head of the fish is small and pointed with a protruding lower jaw. The anal fin starts under the end of the dorsal fin. The caudal fin is well forked and the other fins are of normal size for such a small fish.

The food of the bleak consists of small live foods such as worms, tubifics, daphnia, other crustaceas and the larvae of various insects. It can often be seen at or near the surface of the water where it hunts for flies, etc., which drop on the water. In captivity the fish can be brought to take fly food but a fair amount of small live foods is essential to keep the fish in good condition. A well aerated water is necessary and overcrowding must be avoided. This fish can be kept in a community coldwater tank, as long as no predators are present.

The bleak is not a food fish, the flesh being rather muddy and the presence of many small bones detract from its value as a succulent dish. However, it used to be considered valuable on the Continent as the brilliant scales were used in the making of artificial pearls. There is a coating on the scales which is scraped off after the scales have been prepared by salting for some time. This powder is then coated on the inside of hollow glass beads which are then filled with wax. When expertly manufactured they are very like real pearls.

The bleak congregate in spring, from April to June, in shallow waters to spawn, and the small eggs adhere to water plants and stones. The usual hatching time is taken as for most of the carp family, always according to the temperature of the water.

As a sporting fish the bleak has little to recommend it but it used to be a favourite bait for perch and pike with some anglers. It is too small to put up much of a fight but it is a good fish for the beginner at fly fishing, as being a mainly surface feeder, it can be taken with fly and offers good practice for casting. The bleak can be mistaken for the dace, as in different waters the former can be of a varied colour to others in varied parts of the country. However, the dace has fins which show some red, far more than on the bleak, but the latter fish is rather deeper in the body than the dace. On closer examination of the position of the anal fins of the two species, it will be noticed that that of the dace starts farther back from the end of the dorsal, whereas the anal fin of the bleak starts right under the base of the dorsal fin.

The bleak is found in many waters of Central Europe and in England south of the River Tees. It is not a native of Ireland.
From a Naturalist's Notebook

by Eric Hardy

The sex life of fishes has aroused the attention of biologists with their new knowledge of hormones as much as the sex life of Homo sapiens. By injecting gonadotropins and salmon pituitary extract into anchovies at 2-day intervals, a La Jolla, California, marine laboratory staff recently succeeded in getting these fish to spawn in their aquarium—between 3 and 4 days after the first injection. They trapped the eggs in an outflow of the tank and, out of 5,000 eggs spawned, about a score of floating eggs were detected with developing embryos.

Equally important in this success was a rigid control of 4 hours daylight to 20 hours darkness prior to the hormone injections, in order to bring the anchovy gonads into near-spawning ripeness. Larvae hatched from these eggs then developed normally in the fish tanks.

Western Australia has banned for 10 years the sport-shooting of its saltwater crocodiles. This brings them into line with a similar 8-years-old ban on shooting its freshwater crocodiles which had been threatened with extinction by hunters. Australia isn't the only place where these great reptiles which can burrow as well as swim need conservation. T. E. Phelps of Windsor, chairman of the International Herpetological Society, told me recently that he was leaving for Singapore where he is establishing a crocodile-reserve. Far from extinct, the Nile crocodile still breeds in Zululand.

Homing instincts are not confined to pigeons and birds. I've mentioned before how well developed this sense of orientation is with molluscs like limpet and periwinkle in the seashore pools, with frogs and newts in freshwater, and several fishes of which the salmon returning by mainly a sense of smell, is best known. Tagged yellowtail rockfish in Alaska have recently shown remarkable abilities in this line. Out of 34 fish marked in Auke Bay, 10 have so far returned the 6 miles home to an old wreck from release point. One of them crossed a channel a mile wide and 300 feet deep, so it probably didn't orientate by contours of the seabed. These fish had been captive in an aquarium for 3 months before release so that they had a well developed memory of their homing cues.

Green turtles and spotted turtles have shown their sense of orientation like the former's open sea migration to Ascension Island, maybe by sun-position.

There's evidence of it in salamanders. However, a recent study of the eastern American wormsnake, Carphophis amoeneus amoeneus by Barbour, Harvey and Hardin at Memphis State University, found no tendency to home when these were displaced outside their normal range of 253 square metres. They normally move about 45 metres a day, chiefly in the late afternoon. But Tracey and Dole recently showed that displaced Californian toads orientated to their breeding sites.

Modern aquarists who are also microscopists seldom use a camera lucida, if they have even seen one. This was a prism with an attachment to slide on to the eyepiece, which, turned horizontal, threw a reflection of the subject on to a sheet of drawing paper so that one could look close to the prism and sketch in its details. Thus, comparatively good drawings could be made by the unskilled. It still has, however, an important new application which a distinguished research scientist, on the medical staff at University College, London, explained to me recently. With the aid of the camera lucida the counting of certain features in the blood and tissue from cancer patients is considerably speeded up. The reflections on the paper are cut out and weighed, to save time. Unfortunately, there is difficulty in obtaining camera lucidas of the old type. A few optical firms make a modern version to fasten elsewhere on the microscope, which is unsuitable; and to make the old type especially for them is too costly. If any readers who have an old camera lucida they are willing to give, or sell, would let me know, with the price required (to 47 Woodseer Road, Liverpool L15 6UB), I'll pass their offer on to the research leader concerned. It could save hours of burning the midnight oil into the early hours where counting has to be done visually immediately specimens are received.

Using a camera lucida made one envy the famous "four-eyed" loach of tropical America, whose divided eyes enable it to see above and below the surface as it swims. Sketching from the camera lucida, one almost has half one's pupil over the edge of the prism and half looking down onto the paper.

Quite different research in a different part of the world, the coral-reefs of marine life in the Caribbean, may provide Rhode Island and other university

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April, 1971
BREEDER’S DIARY

by Steve Forster

Thick Lip Gouramis
IN THE LAST DIARY I left you at the stage where the eggs were being deposited in the bubble nest.

The eggs hatched in approximately 48 hours (water temperature 82°F) and the fry, which are almost devoid of all colour, could be seen adhering to the plants and the glass sides of the breeding tank.

The fry became free-swimming during the second day after hatching and from visual estimates seemed to number between 300 and 400. Viewed from the underside the fry are darker in colour. First feedings consisted of liquid fry foods and at the age of six days finely powdered flake-foods were also given.

I must have fallen into the usual pitfall of overfeeding and on the eighth day after becoming free swimming, many of the young were seen to be moving in an erratic manner. After laboriously making their way to the surface of the water the fry spiralled back down to the bottom of the tank where they lay and, apart from spasmodic jerking, looked to be quite dead. Partial water changes rectified the problem although before the exercise was completed a large number of the fry had been lost.

Unlike cichlid fry, which are fed by parental assistance or can be seen by their owner to be eating, the young thick-lips seemed only to eat if they were actually swimming amongst their food so aeration was applied during feeding in order to keep the food on the move.

At the age of two weeks the fry were growing visibly and I was advised by a local “gourami expert” to select about 50 fry for continued growth and feed the remainder to my other fish. Despite my initial reservations I was swayed by his arguments on overcrowding and growth, so 180 of the fry were disposed of (fed to the leaf fish).

The remaining lucky ones continued to grow well and at the age of five weeks show the compressed body shape of the adults. The fry now eat anything that is offered to them and as they grow larger it is much easier to estimate the correct quantities of food to be given. One point I will make is that the fry tank was not covered at any stage of their development but as I have my tanks in a small windowless fishroom which is not subject to draughts and is always quite humid, the many warnings given in reference books regarding development of the labyrinth, probably still apply.

Although I have previously kept and bred smaller gouramis such as C. latia, C. chuna and T. puni, this was the first occasion on which I had bred Thick Lips. Apart from coping with a larger number of fry, the care and raising of the fry does not seem to differ greatly from that of their smaller cousins.

Danios, Flame Tetras, Silver Tips and Pencil Fish
Unlike the breeding attempts with C. labiosa where I at least had bred related species, with the danios and characins I was a complete novice. Apart from a hazy recollection of keeping species of these families in the dim distant days of my first community tank, I really knew nothing at all about them, other than the knowledge one accumulates reading literature and hobby magazines. Perhaps it is more correct to say my experience with these fish was absolutely nil.

I would like, therefore, to be able to confirm that the supposedly easy spawners were easy and that with the usual amount of beginner’s luck I was soon surrounded by tanks brimming with fry. This could not be further from the truth!

As a breeding novice I referred to my collection of books and they all seemed to agree that I should feed my fish copious amounts of live food, bring them into breeding condition, separate the sexes for a week, place the breeders in a tank filled with fresh tap-water and fine leafed plants covered on the bottom with marbles, glass rods or a bedding of some spawning medium. All I had to do then was sit back and wait.

I followed all these recommendations and I first tried the flame tetras in the tank, the water temperature was 76°F. I then sat back and waited and waited and waited. After three days I refilled the tank, rewatched the plants and spawning medium and brought the danios together. Again the same result, absolutely nothing.

By this time I was becoming disillusioned so back I went to the reference books. One recommendation which appeared in some of them was that the tank should be placed near a window. The reason given for this was that the first rays of the morning sun started the magic which led to the spawning. Out of the fishroom came the tank and into an unused bedroom. After refilling and rewatching my hopes were renewed. The trio of flames were again tried and although there was little doubt in my mind, I sought...
the opinion of two fellow aquarists who confirmed that I had two males and one female.

Next morning, after setting my alarm clock, I arose fully expecting to witness the spawning. After a quick breakfast I crept into the bedroom to find the fish motionless, doing nothing other than looking at each other.

Back to the books again, a quarter of the water was removed from the tank and replaced with water about 10 degrees cooler. Still nothing happened and after another fruitless day I was beginning to think that all flame tетas in the world must be spawned from one “Big Daddy” who is somewhere in Brazil, rubbing his fins together and getting visibly older by the minute.

The rewash, refill routine was becoming second nature by now but after another fruitless attempt I had no option but to do it again. This time the silver tip tетas were used.

At last Hemigrammus nana gave me a break. Next morning the male, resplendent in a copper coloured body and brilliant silver tips, could be seen darting in and out of the ambula plants with his less colourful but equally enthusiastic partner.

Adhesive eggs were laid, about a dozen at a time, amongst the plants. Viewed against the window they could be seen quite easily and, although quite a number had fallen into the washed peat, many were still stuck to the plants.

On one point the books agreed; characins are egg-eaters. For once the books were absolutely right, the female, especially, seemed to be determined to eat the eggs as fast as she laid them. During one run I watched her frisk about with her partner just below the surface of the water, drop her eggs and then eat the fallers before they reached the dubious safety of the peat.

When the pair seemed to be eating more than they were laying I removed them. Within 24 hours many of the eggs had fungused so there also seems to be a basis for the opinion of using a higher ratio of males to females. More about the hatching and raising later.

After all this trouble with “easy spawners” I have not yet had the courage to try the N. marginitas which are reputed difficult to induce to spawn.

I have just found an article in breeding flame tetras in The Aquarist dated 1955. This article was written by someone using the pen name Pisces so I will follow the recommendations of 15 years ago and see what happens.

Leaf Fish and Tiger Barbs

Since the last Diary, being busy with the newly-formed British Cichlid Association, I have done nothing with the two subject species other than feed them. The barbs are looking splendid and are now in full colour and all have good finnage and deportment. The Leaf Fish, P. schomburgki, are proving more of a problem as daphnia and fresh water shrimp are hard to come by due to frosts and low water levels in the local ponds.

The gourami fry were quickly dispatched but although the leaf fish pick at tubifex and whiteworm, they don’t seem to have great enthusiasm for them as a food. In addition, I have lost another of them which managed to jump through a small gap between the cover glass and the tank frame.

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From a Naturalist’s Notebook

biologists with new drug sources comparable with the modern developments of antiseptics from moulds. This is because most plant-drugs are now known. For example, the poison secreted by the famous stonefish of the Australian barrier reef reduces blood pressure; an extract from the sea-cucumber inhibits the growth of malignant tumours in mice; and another from a green sponge has antibiotic capabilities. Similar control of tumours is shown by drugs from sea-urchins and the American quahog clam (Arctica). Corals, sponges and algae (seaweeds), and bacteria that inhabit them, are expected to provide most new sources. Specimens collected in the Caribbean are either dried, frozen or preserved in ethanol, then shipped to the Lederle Labs. in New York. Extracts are purified, their chemical components separated, and identified by X-ray crystallography, nuclear magnetic resonance, high resolution mass spectroscopy and other means. Successful ones might have to be synthesized after long periods of testing on animals. Less than one per cent have so far been examined out of thousands of marine species known to contain biotoxic substances.

The 2nd volume of Bucherl and Buckley’s 3-vols. work on “Venomous Animals and their Venoms” (Academic Press, 706 pages, £16 7s.) continues the venomous vertebrates: snakes and their pharmacology, saurians and batrachians like the gila monster, toads, frogs, salamanders and fishes. The third volume, due in May, will cover venomous invertebrates.

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The Madagascan Lace Plant

By S. M. H. Loquens

Native to the Island of Madagascar, Aponogeton fenestratus is probably the most unusual and beautiful of the Aponogetons. It is generally imported as a tuberous rootstock, with few, if any shoots. Those obtaining the plant in this form can either plant it in the aquarium and hope for the best or place the tuber in a separate container of warm water, until it shows signs of sprouting. Having thus induced the tuber to produce leaves, it can be planted. Planting should be done preferably in a mixture of soil and gravel, as the plant does not always thrive in a plain gravel medium.

The leaves, when mature, can reach a length of from 15-18 inches and 3-4 inches wide. They are characteristic in that they possess no mesophyll, i.e., the area between the intersecting veins is completely devoid of tissue, thus giving the interesting lattice effect of this species.

In my experience, the plant does not normally do well in the mixed collection as its requirements are specific. Ideally, it should be kept in a separate aquarium at about 65-70°F. It will be found that if the plant is exposed to higher temperatures (75-80°F) for any length of time, it will begin to lose its leaves and eventually die. It is probably for this particular reason that many aquarists have trouble when including it in the average set-up. I have found filtered rainwater most suitable, although tapwater not exceeding pH 7 can be used. A little peat present in the growing medium or in a porous container, will
ensure the slightly acid conditions desirable for optimum growth. The water should also be partially changed every 2-3 weeks, although plants will remain in fair condition if these changes cannot be made quite as often. A rough guide to the time when a water change is needed, is when the young leaf shoots first appear. In a healthy plant they will tend to have a slightly pinkish hue, while a plant in need of fresh water produces shoots of yellowish or white coloration. This is of course a rather “Rule of Thumb” method, but one that seems to hold true, with this species at any rate. In spite of this guide, it is advisable to make the water changes regularly and before the plant takes on a “tired” appearance.

The plant is essentially a shade-lover and is intolerant of strong light or side light. For this reason the best plants I have produced have been in solid-sided containers, screened with Riccia or Duckweed during the summer months. Alternatively, an aquarium with its sides covered with brown paper and the top draped with a layer or two of polythene, will do equally well. When carrying out routine cleaning operations in a tank of Lace Plants, it is essential that disturbance of sediment be kept to a minimum, as removal of it once it has fallen upon the lattice of the leaves can be difficult. For this reason filtration is advantageous when growing this species but not essential.

As with other Aponogetons, A. fenestratus is affected by a definite growth rhythm (see graph). This change in its growth coincides with what would be a seasonal change in its native habitat. For this reason it will be found from time to time that plants will lose most of their leaves and apparently die off. This occurrence is the equivalent of the dry season when native waters often go through drastic physical and chemical changes. The plant does not, in fact, die but merely enters a dormant or rest-period lasting several months. During this period it is advisable to lower the temperature to about 60°F. The plant’s apparent revival following the rest period is equivalent to the wet season, when growth is rapid due to the great influx of fresh rainwater. It is at the time of rapid growth that the plant is most likely to flower.

Propagation of this species is by seeds or severance of the rootstock. Unfortunately, plants are easily lost after the latter operation, as decay can set in. To encourage root-growth from a freshly divided rootstock I have, in the past, applied a commercial brand of hormone rooting powder with some success, but would not advocate its general use. Hybridization between A. fenestratus, A. bernierianus and A. henkelianus is possible by cross pollination, but the resulting plants are generally sterile.

It is only really by trial and error and learning from mistakes made that the individual can hope to be successful in cultivating this plant. My advice to would-be growers is, therefore, to be patient and above all, continue experimenting until perseverance brings success.
WHAT IS YOUR OPINION?

by B. Whiteside

A letter from Mr. J. M. Pearson, of 25 Glendale Avenue, North Shields, Northumberland, concerns Mr. Bigwood's letter in the January issue, in which he questioned the veracity of my articles. Mr. Pearson informs me that Mr. S. Jackson lives at 11 The Rally, Arlesley, Bedfordshire. Mr. Pearson says that he has always found my information to be correct, my articles easy to read and very pleasing, and he looks forward to many more of them. Mr. Pearson wrote to Mr. Jackson and he forwarded the information in the reply which he received, plus the full address, to Mr. Bigwood.

"If Mr. Whatisname thought you were a fictitious body, why did he write to you? It's a nice reward for your hard work in getting W.I.Y.O.? to the top popular spot in the magazine. Serves him right if nobody takes much notice of his opinions." Thus writes Mr. R. C. Mills, of 70 Lee Road, Perivale, Middlesex. (In fact Mr. Bigwood wrote to Mr. Perkins, who forwarded the letter to me.) The main body of Mr. Mills' letter consists of an answer to my question about the success of his idea, along with that of Mr. Jordan, about an exchange system for aquarium society magazines, about which I wrote in a previous column. Since I used Mr. Mills' letter he has had quite a few letters on the subject of newsletters, some from societies wishing to start their own magazine, and some from established editors who sent copies of their magazines. Mr. Mills sends out about a dozen copies of his newsletter and, in return, gets about six or seven. He hopes that societies which are starting their own magazines will include him on their list when publication begins. He is sure that Mr. Jordan has had a similar response, and both are grateful for the publicity given to their little scheme. The magazine exchange has helped to shed a little more light on fishy goings-on around the country.

Mr. S. Knox, of "Grasshoppers", 9 St. John's Road, Warminster, Wiltshire, wrote to ask about the motor filter which was shown on the end of the aquarium in my photograph on page 297 of the December 1970 issue. It was an Inter-Pet "Powerstream Slimline" motor filter. (I reviewed this filter in a previous issue). The filter costs £6-45.

Mr. C. H. Smith and his wife live at 34 St. Leonard's Road, Harrogate, Yorkshire HG2 8NX and they have had a 36½ in. x 15 in. x 12 in. community aquarium for four and a half years. The tank has two undergravel filters in it. The tank settled down well but it has taken four years to come to the point where almost everything which they plant in it grows really well straight away. They have found that 1½ in.-2 in. of gravel, on top of the filters, is essential for efficient working. Although the water was always crystal clear, a certain amount of dirt was taken from the bottom of the tank, by the air stone, and deposited on the plants. A recently installed bottom corner filter has solved that problem. The tank contains the usual community fishes, including a fully grown red-finned shark and a corydoras which was bought when the tank was set up. As a point of interest Mr. Smith recently sent a small order, amounting to only 25p, including postage, for some of the plant riccia, to an advertiser, Mr. D. Smith, of Kidderminster (no relation). The care which was taken to ensure that such a small order reached Mr. Smith in good condition was really exceptional, and deserves the highest recommendation, he thinks. (Previous writers have said the same, and I, too, have found Mr. D. Smith to take good care with the packing of plant orders. This brings to mind a previous letter which concerned a very large plant firm which refused to supply another reader with "a small plant order for £2", without cash. I recently had an identical experience with the same firm when I twice sent a £2 credit plant order, for the school in which I teach. My order, without cash, was refused twice. I shall not be sending any more orders to this firm—either personal, or from school! I was left wondering why the firm would not supply a £2 order without cash. I had to go elsewhere for a possible answer.)

I posed the problem to Dr. J. N. Carrington, of Inter-Pet, who is always very helpful with his expert advice. He pointed out that, from his own firm's findings, it costs about 37p to send out a statement, and about 50p to process an invoice through his firm's books. Assuming that the plant firm's costs were something similar, a credit order for £2 would produce a loss, if administration costs amounted to something in the region of 87p. After Dr. Carrington's explanation I can see the point of view of the plant firm concerned, but wonder why they could not have pointed this out to me, instead of their two letters of refusal.
Dr. Carrington goes on to say that he is not aware of anyone in the aquatic field making more than a fair profit. He has also some views to express on the recent topic of light bulbs burning out rather quickly in aquarium use. In his experience bulbs burn out quickly if subjected to any vibration whatever, for which they are not designed. He gives, as an instance, vibrations transmitted by the air pump to the hood. His firm used to have a number of complaints when they sold aquarium hoods with a storage compartment in the back. People used to leave their air pump in there and this caused the lights to fail very quickly. Dr. Carrington says that, if the air pump is hung on the back of the tank, it can also cause this trouble—and may even cause the glass to crack due to vibration. Similar trouble can be had with bulbs if the pump is placed on the hood, or if the air line is causing vibration onto the hood. (These are specifically interesting points which some of us may not have considered).

I have two letters in front of me from Mr. M. B. Rowland. The earlier one reached me too late for the last issue and so I have it and his latest one, both of which I will now use. He writes from 35 The Chilterns, Kensworth, Dunstable, Beds. LU6 3RJ. His first letter deals with partial changes of aquarium water, which he finds works well with a storage compartment. He has a 50 per cent water change every two weeks, and his 18 in. \times 10 in. \times 10 in. tank gets 25 per cent of the water changed. He replaces the removed water with 50 per cent tap water and 50 per cent glass-distilled water. Although he cannot make any specific beneficial claims, he feels that, without the changes, the fish would eventually be swimming in their own waste. Mr. Rowland has not deliberately tried to breed killifish but he does have a pair of Australe which he has witnessed spawning on many occasions. The female always turns and eats the eggs. He asks how this problem could be overcome. Mr. Rowland has also been having problems with Vallisneria which grew well for twelve months but have now started to rot away at the crowns, the leaves floating to the surface in bundles. Mr. Rowland asks if, after having posed the question before, I have found the answer. (I can't say that we have. Several people have expressed their views but no final conclusions have really been reached. I would say. I had an idea or two on the subject myself, but, having included these in a book manuscript, which has been with a publisher for six months, I cannot use them until the publisher makes his final decision about the book).

In his second letter he discusses how to separate white worms from their culture medium. He breeds the worms in plastic lunch boxes and has two in use at the moment. He finds that the worms collect on the sides of the boxes and all he has to do is scrape them off, this disturbing the medium very little. He suggests using a box which is coloured as he has found, from experience, that it is difficult trying to spot the worms on a white box. Mr. Rowland ends by making the suggestion that I pose some questions, for discussion, on cold and tropical marine subjects as he finds this side of the hobby to be neglected. He says that the only information on these subjects seem to come from the experts and he would like to hear the views of the average aquarist. (I could possibly make a point or two here. I first conceived the idea for this feature several years ago. Little did I know how popular it would become! Trying to read, sort, type and comment upon the letters is quite a task—but so is thinking up new problems for discussion. I hope that my recent photographic attempts have added a further dimension to the feature. It's difficult to ask useful questions on subjects about which one knows only a limited amount. I have no real knowledge of tropical marine temperatures, and my experience of local, coldwater marine life is limited to university and college field trips to shore, and my experience of local, coldwater marine life is limited to university and college field trips to sea-shore habitats and a marine biology station—as well as the limited number of visits made to beach habitats with my G.C.E. biology pupils. My closest studies of marine animals have been in the dissecting dish, or under the microscope. However, I have a few marine problems lined up and some of these will have appeared before this particular article. I'll include at least one marine topic at the end of this article. Remember, you the reader, are very welcome to send suitable questions for this feature, as well as opinions. If there are any particular topics on which you would like to have the opinions of other readers, please send them to me. Unless such questions are very technical or specialised, there is usually at least one reader who has an opinion to express).

"Foxley", Perry Green, Much Hadham, Herts., appears at the top of Mr. G. Tingley's letter, and he writes: "In the January '71 edition, there is an article by Mr. A. Boarder on breeding goldfish. He states that the black marks on goldfish are either due to the fact that the goldfish are not mature, or that they are marks left after some damage has been done to the fish." Mr. Tingley continues: "I have kept goldfish with no black marks in a small sink at the bottom of my garden, over winter. The following Spring, after clearing out the rotting leaves, the goldfish have black fins and black blotches on their bodies. This, I presumed, was camouflage, due to the habitat and the black leaves". (Since Mr. Boarder is THE expert on coldwater fishes, and I have been reading many of his articles since I was a young school boy, I would not even presume to comment). Mr. Tingley asks for information on the breeding of *P. hibernis*.

I might be allowed to put in a request here. I usually get a number of letters each month from readers with queries, requests for information, or complaints about bad service from the odd firm. I would ask you to include a stamped addressed envelope if your letter requires a reply, and one or two stamped
envelopes if you want me to contact firms which have given unsatisfactory service, etc. Postage costs soon mount up and are being increased—assuming that we still have a postal service. O.K.?

Mr. P. Mason, of 143 Tonge Road, Murston, Sittingbourne, Kent, sent me a complaint about two "non-leak" aquariums which he purchased from a large concern. He received no satisfaction when he contacted the firm several times and asked me to have a go. I have had no reply yet to my letter, but will report any or no progress, in a future issue.

Mr. B. C. Deanes lives at 74 Everdon Way, Peterborough PE3 7BN, and he read my item in the January issue, about Aponogeton plants in flower. He has always pollinated Aponogeton flower-heads and let the plants "get on with it". Some have produced seeds (fruit) as big as garden peas, while others have produced some which have barely been a quarter of that size. Recently, while waiting for the small ones to mature, they just started to sink, one by one, to the bottom of the tank, producing three small leaves, about ½ in. long, with roots about the same length. He pressed these into the gravel and they are getting along quite nicely, being at varying heights up to 2 in. Excluding those which he has given away, he has about two dozen plants left, plus the three adult plants, grown from "bulbs" purchased in July, 1970. Mr. Deanes has had success with giant Hygrophila (Nanophila), setting seeds in an ordinary flower pot, in the garden, this summer. These will grow, but as soon as he puts them into a tank, they seem to rot away, and if he takes the seedlings into the tank, the fish think that they are wonderful food; however he will try more experiments this Summer. Regarding Amazon sword plantlets he says that these form underwater. If the runner is not submerged, it forms flowers which, to date, he has not had any success with, no seeds being formed. Concerning plantlets, Mr. Deanes says that these form at every node on the runner. When grown on, and severed from the parent plant's runner, they should be carefully inspected before they have reached 6 in. in height. It will be seen that what appears to be one plant is really two, three or four plants, growing in a close clump. Careful surgery, with a razor blade, will give a three to four fold increase in stock.

"Willowpond", 41 Meadowcroft Drive, Kings steinton, Newton Abbot, Devon TQ12 3PB, is the part of England from which Mr. R. J. King writes. In my January feature I mentioned an item about an operation on an oranda, which I had read in "Toras Topics". The fish, in question, belonged to Mr. King and he thinks that my wording might have given the impression to readers that the growth, on which the vet operated, was the one which is normal with this type of fish. (I hope that I did not give this impression?). Mr. King says that the growth in question, was a large polypus-type of growth, formed above the eye, and which wobbled about, as if hanging on a thread, when the fish was swimming. He says that his oranda has one of the best head growths that he has seen on this type of fish, and states that one can imagine what the fish looked like with the polypus-type lump hanging down. Mr. King has been growing a large number of tropical plants in cold water in his fish house, where the temperature is around 55-58°F. He has some really large Amazon sword plants which he has grown at this temperature. He wonders if other readers have had success at growing so-called tropical plants at low temperatures. (Any experiences?).

I asked for readers’ selections for fully planting a 24 in. x 12 in. x 12 in. tank. Mr. P. Easby lives at 122 St. Peter's Road, Edmonton, London, N.9. He would start with an Amazon sword plant because of its popularity, size and beauty, and would include a Cape Fear Spatterdock for its nice, light green colour and size. A dozen Cryptocoryne nevelli would be used, bunched closely, to form a green carpet over the gravel. A few more Cryptos. would be added for beauty and variety, and, lastly, he would use some eel grass—for hiding the back of the aquarium. To separate white worms from their culture medium he would place a quantity of worms and medium in a net, place it in water, allow the worms time to crawl through the net, and return the culture medium to the culture box. (Quite a good idea, if one has trouble with separating worms and medium). He has never had any Cryptos. flower. He once had two young Oscars in a 24 in. tank and, at one time, the water dropped to 60°F, by accident, due to a broken window pane. The fish were a bit sluggish but their health was not affected. Mr. Easby has used two types of light metal aquarium hoods. The only difference was that one had a hinged flap at the front. This had the advantage that one could get at the aquarium without removing the hood. He does not know of any coldwater fish breeders and has not, as yet, tried any home-made aquarium gadgets.

David Ransom is 15 years old and lives at 86 Park Road, Burgess Hill, Sussex. His selection of plants would consist of seven varieties. To give the tank depth, and make it look natural, he would plant a forest of Vallisneria, interspersed with small groups of Hygrophila—being careful not to make it look too geometrical. He would then use two large Amazon swords to give the tank a "solid" look and to show people that it is not just a fancy decoration. In between these he would put plenty of Ludwigia, and he would hide the heater behind these plants as he has found that they can stand a wide temperature range. He would put plenty of small plants in front of these tall plants—pigm chain swords and Indian fern (but would it stay small?). On the water surface he would have several floating plants—Indian fern. He has found that floating fern grows very quickly under good light. At one time he was selling six bags per month at a local aquarium society auction. He finds the plants to be attractive, and they provide shade and shelter for
fish. In the metalwork room at school he made a useful gadget. It consists of a 18 in. brass rod, with a miniature shovel soldered on to the end. The shovel has a gauze bottom, to let water escape. The gadget can be used to move stones about in the tank, to cover plant roots which are showing, and to form slopes and dips in the gravel. It can also be used to remove dead fish from the tank’s base, saving the wetting of one’s arms. Master Ransom would be interested to hear of readers whose fish like unusual foods. His rosly barbs are fond of cornflakes!

Mr. M. Baines has a lengthy address—“Delmont”, Combs, Chapel-en-le-Frith, via Stockport, Cheshire. He would decorate our proposed tank with nothing but Cryptocorynes. He thinks this to be the most attractive plant family and their appearance is very varied—but all require the same water conditions (?) and need less light than most other plants. He has seen these plants under Gro-Lux and he thinks that this form of illumination is extremely beneficial to them. He considers C. ciliata to be an ideal centre plant and he says that it comes in two varieties—the broad leaf variety which grows to a height of 18 in. but could tailor its height to 12 in. in the aquarium. He states that there is the smaller 6 in. variety which looks just the same as its big brother, and has smooth, pale green, spear-like leaves. This is, he says, one of the easiest Cryptos. to maintain. Mr. Baines’ other great favourite is C. griffithii, a plant of about 11 in., sometimes more, which has heart-shaped leaves, glossy green on the upper surface, and reddish on the underside. This plant is easily killed by too much light. A similar plant, but slightly more colourful, is C. cordata. For the foreground he would use the smaller form of C. nevillii, and C. beckettii. For the centre he would use the very colourful C. willissii. The larger plants should be potted in peat and like soft, acid water, as do most fish, he says. To separate white worms he suggests that a mass is placed in a saucer of water, where the worms soon leave the peat. Mr. Baines also points out that these worms crawl away from light and, if a few are placed in the centre of a dry, round brine shrimp hatchery, they will crawl into the darkness. He has never had any Cryptos. bloom but his have reproduced by runners.

Mr. Baines has kept a few tropical fish in cold water tanks, indoors, in Summer—temperature between 60-75°F. The main aim was to see if the fish would survive and maintain a healthy state. He has tried it with zebras, leopard danios, giant danios, blind cave fish, white clouds and guppies. All lived well; the guppies bred; some of the others may have done so but he did not notice any young. Next summer he is going to try breeding white clouds and medakas outdoors. He would like to hear of other people’s experiences. (Let me have your views, please, if you have any). He likes aluminium hoods best as they are light, rustproof and easily accommodate light fixtures. They are also cheap. Mr. Baines obtained some very good cold water fish from a pet-shop in Codnor, near Ripley, Derbyshire, but it was about two years ago. A little gadget which he uses is a piece of air-pipe, used for aquaria, with one end pushed into the other, to form a ring of about 5 in. in diameter. It is floated on the tank surface, with a couple of floating objects inside. It forms a perfect anchorage for bubble-nest builders—such as the thick-lipped gouramis and dwarf gouramis. It stops the eggs and nest from moving about too much, or being bashed, if an airstone is in use. It prevents that “awful scum”, from fungused eggs, spreading. Male gouramis accept it as a nest site, without any fuss. Mr. Baines asks for readers to send their opinions on “micro eels” as a food for young fish.

(Continued next month)

By Tony Dee

dabbled the area with anti-sting lotion, and the little white pimples in the red area of the “histamine wel” went down like magic. I had forgotten all about it, until a week later I got stung again—doing the same thing exactly! Could be another wasp, but unlikely, I thought. And when I searched for the “body”, there wasn’t one. So-o-o-o... I came to the conclusion, that under certain conditions, certain plants can sting. I have been stung once more... three times altogether. Indian Fern has always been involved, and I think it is the culprit. I may be sensitive to it—I am one of those people who get a rash from certain kinds of geraniums, and other plants, but naturally, I would like to ask other readers the question

“Have YOU, ever been STUNG?”

April, 1971
The European Shore Crab

by Huw Collingbourne

SLOWLY a sea-star creeps over a rock towards its prey, a mussel. Intent upon pulling open the bivalve's shell and devouring the living contents, the sea-star advances in slow motion. Suddenly a claw flashes out and the hungry sea-star is wrenched from the rock on which it crawls. The hunter has itself been hunted and now is torn apart and eaten by an adult Shore Crab.

The Shore Crab, *Carcinus maenas*, is a large and vicious form of marine crustacean, and many crabs of this species tear a little flesh from the probing fingers of inquisitive children every year. Crabs belong to the phylum, *Arthropoda*, and as such are related to lobsters, scorpions and spiders. The Common Shore Crab has eight walking legs and two large pincers of equal size. Its segmented tail is tucked under the body. It has five "teeth" on either side of its head and its eyes are retractable. These crabs frequently live in the nooks and crannies of rocks and when fully submersed in water remain in their own little cave in wait for prey, which may consist of prawns, starfish, sea-urchins and most fleshy animals. The sting of anemones cannot penetrate the horny carapace of crabs but anemones are never eaten by Shore Crabs.

In the aquarium, feeding habits of the crab must be taken into consideration. For instance, although crabs could be kept with anemones it would be foolish to put them with sea-stars, urchins or fan-worms. Once in an aquarium Shore Crabs can be fed on shrimp, minced meat, Earthworms, Sand-hoppers and tinned cat or dog foods. They will also eat flaked fish food, but this does not seem very substantial for such a large animal. When the crab eats an Earthworm it holds the worm in its pincers and pushes it between two movable plates into the mouth. These two plates then move rapidly backwards and forwards and, in effect, slice up the Earthworm into small pieces. Occasionally a fine jet of the humus inside the worm is ejected by the Shore Crab.

The crab’s body colour varies from mottled brown or jet black to dark green. Although the Shore crab is amphibious it is not essential to provide a dry platform for a pet crab to climb out onto. Its hard smooth shell provides an ideal site for barnacles and tube worms to grow on. One unwelcome visitor, though, also uses the Shore Crab as a host. This is a type of parasitic barnacle which lives between the tail and body of *Carcinus maenas*. It appears as a bright orange cluster and is sometimes mistaken for eggs. In fact the true eggs of Shore Crabs look like little berries. The aforementioned parasite restricts growth of the crab and feeds on its host. Healthy Shore Crabs, however, must leave their carapace to grow. The empty shell looks like a dead crab and is often mistaken for one. After the moult the Shore Crab hides away for a few days as its shell will now be soft.

Adult crabs are ten cms. (4 in.) wide and are wider than they are long and for this reason they usually walk sideways.

Small Shore Crabs can be put, without acclimatization, into a tropical marine tank and tiny specimens make excellent scavengers, though they should be removed from tanks of fish etc. when they grow to more than 2-3 cms. (1 in.) in width. At this size they could attack fish or disrupt a coral set-up.
Don't Count your Cichlids
Before they're Hatched

by B. J. Abbott

To lift the old adage to the modern aquarists' sphere and to bring it up to date is something that can be of comfort to the hobbyist who has had frequent failure with breeding Cichlids. These fish are without doubt the most interesting, the most intelligent and also the most frustrating of all to breed.

Most aquarists are aware of Cichlid spawning behaviour, of the cleaning of rocks or other suitable places, the mating dancing and mouth-wrestling, and the subsequent laying of vast quantities of eggs. Up to this point the majority of us seem to have little or no trouble, but it is at this crucial stage that our problems occur.

The first decision to be made is whether to allow the adult fish to raise, or attempt to raise their own progeny or not. This is largely dependent upon one's attitude of mind as to whether the most important aspect of the breeding is the pleasure of seeing the parents guard, fan and lovingly tend their young, or whether a large number of youngsters raised to maturity is the main desire.

Cichlids are extremely unreliable in their parental care and cannot always be trusted not to regard their offspring as delicacies. Nevertheless, if they do raise their youngsters themselves, this is one of the most interesting and beautiful sights of all to the aquarist. As I said, the obtaining of eggs is fairly simple, but to get adult fish from them is not.

When hatching eggs away from their parents various artificial aids are necessary to replace the care which they should receive naturally. The most common method of achieving this is for the eggs to be separated from the adult fish whilst still on the rock or flower pot on which they are laid. The eggs are usually kept in the same water in which they were laid and methylene blue is added to the water until a light blue coloration is reached. An air-stone is then inserted, and a controlled stream of bubbles is allowed to pass before the eggs. If all goes well the eggs will hatch in about three days, and will then drop to the bottom of the tank where they wriggle for a further two to three days before becoming free-swimming. Unfortunately, however, all does not always go well, and by far the most frequent occurrence of failure is that the eggs fungus and gradually disintegrate.

It is quite common, even in nature, for a small percentage of eggs to prove infertile and to fail to hatch, but if the whole batch turn white and die, infertility of either parent is the least likely factor to have caused this. It is the most commonly blamed, however. Very much more likely is that water conditions are unfavourable, and that fertile eggs fail to live. I have found, and I live in the Home Counties, that the traditional method of Cichlid egg hatching is very unreliable. The reasons for this, I feel, are twofold, and these are hard water and bacterial infections.

I have found that the tap water in my locality is extremely hard and I have no doubt whatsoever that this is detrimental to the development of the eggs. The greatest single piece of advice I can offer on this point, and this was offered to me by an extremely experienced dealer and hobbyist, is to ignore the traditional method of hatching the eggs in the water in which they are laid. There is not the slightest doubt, and this is personal experience, that to remove the eggs to extremely soft water as soon as they are laid is to increase the hatch probability by 80 per cent at least.

If normally soft water is difficult to obtain, and I am somewhat doubtful of the efficacy of chemical water-softness for this purpose, then distilled water is ideal. I find that commercial distilled water which can be obtained cheaply (approximately 10-15p per gallon) from garages or car electrical service stations is eminently suitable. One word of warning, however, do make sure that you are not supplied with "topping-up" fluid which contains dilute acids and other chemicals which would be lethal to all aquatic life. When hatching eggs by this method only small quantities of distilled water are necessary, just enough to cover the eggs, and even if it means purchasing it at chemists at about eight times the commercial price, it is still an economic proposition.

To minimise against bacterial infection it is important to ensure that the container in which the eggs are hatched is scrupulously clean. I have found that an all-glass or all-plastic container is ideal as this can be sterilised thoroughly. This is best done by careful washing with a strong detergent; very thorough rinsing afterwards, and soaking with a deep pink solution of permanganate of potash for a couple of days. This
also must be carefully rinsed out afterwards. The distilled water is then added and brought up to the temperature of the breeding tank, either by immersion in the tank, or by the use of a heater in the small hatching container. Methylene blue can also be added as a further protection against fungoid attacks, although this is not usually necessary if all other precautions have been observed.

Finally, aeration is necessary, and the normal airstone can be used for this. However, a more effective method I have found, is by the use of an external filter to aerate the eggs. This is achieved by arranging the return flow of the filter to be directed into the hatching container immediately in front of the eggs. It will be perceived that this has a reverse action to the normal method, and it has two advantages over the usual system. The first of these is that freshly filtered water is directed over the eggs at all times and this reduces the risk of infection. Secondly, the force of the flow can be carefully regulated and controlled, so that any eggs which do fungus will be dislodged from the sound eggs and washed into the filter. Fungus is very commonly contagious and it is obviously a great advantage to eliminate this possible source of trouble.

I hope that this article will give some food for thought to aquarists who have had failures with breeding Cichlids previously and will give them fresh encouragement to attempt to raise these most exciting of fishes.

THE NAMES OF FISHES

By Henry Tegner

A number of sea fishes have descriptive English names, flying fish, globe fish, swordfish, whitebait and lump-sucker are examples. Amongst the freshwater species there are the goldfish and the pike. The pike is so-named because of its spear-like appearance. In Sweden this fish is called the goddel which means a pricked instrument.

Apart from the various species which have obvious descriptive titles there are a number of others like dace, bleak, rudd and char whose names are less obvious. The name “dace” is derived from the old French word “dars” meaning a dart. The little dace is certainly a quick moving fish and its title is well deserved. The bleak gets its name from the Anglo-Saxon Bluo meaning pale, shining or white and this tiny species is so named because of its brilliant, lustrous appearance. Few people realise that, before the advent of the present day artificial pearl, the bleak was an important factor in the jewellery trade. Millions of these freshwater species were caught and scaled. The scales were then salted to preserve them and eventually dried. The finely ground scales were known by the romantic name of Essense d’Orient. Hollow glass beads, like tiny electric torch globes, were then filled with this preparation and the resultant “pearl” was said to be indistinguishable from the real thing. One can even now occasionally come across some of these old imitation pearls in antique shops.

The rudd’s name is also of Anglo-Saxon derivation being the modern English translation of ruddu meaning ruddy. The rudd has a distinctly reddish tint. The char often described as a species of landlocked trout gets its title from the Celtic word cear meaning blood. During the breeding season char assume a quite distinct blood-like hue.

One of the commonest of British freshwater fishes is the roach. The roach is so-called from the Anglo-Saxon word rechhe which is cognate to the Danish rokke and the Dutch rog, all meaning a ray or beam of light. Chub has a rather controversial derivation. Some maintain that it comes from the Danish kobbe, meaning a seal. Others say its origin is the Swedish word kubb, a block or log. Tate Regan, the renowned ichthyologist, has suggested that the link is more likely to be from the same root as the word chubby or with fat cheeks, this being a characteristic of the chub. Whichever derivation is correct, all the suggested origins contain some reference to the shape of the head.

The French name this fish chevin or chevonden from chef, a head.

Quite a number of our native freshwater fishes are named from their original Latin, or Roman descriptions. The tench comes from tinca, the carp from carpa, the gudgeon is derived from the accusative of gobio, gobiomen a gudgeon. The name bream comes from the low Latin breamia. All these Latin names in themselves are the labels used originally to describe the individual species.

The name barbel also has a Latin source and here the link is surely with the word barbellus a diminutive of barba, a beard. The barbel having four distinct barbels or fleshy filaments which droop from the nose and the jaws.

A very common little fish, with one of the nicer name derivations, is the minnow and Tate Regan says that the word minnow comes from the French menu which, believe it or not, can be translated as meaning small or tiny! I will admit that I have also been under the impression that this nigh universal word indicated a descriptive list of good things to eat.
**Blanus cinereus**

A vessel of water, also shallow, stands in the vivarium. So far, in spite of fairly close observation, I have not seen the worm lizards drink but since they may well do so at night, keep water continually available.

According to the records, these reptiles are long lived in captivity and make good vivarium inmates. They are certainly easy to maintain, make few demands on one’s time and are completely non-aggressive towards other lizards. They do tend to spend the major part of the daylight hours hidden and out of sight but they do appear from time to time and are sufficiently unusual to be of considerable interest to herpetologists. They are unenthusiastic about being picked up and coil themselves with surprising strength around the fingers, making tremendous efforts to bury their heads in the darkest region of the partially closed hands. It does not seem to occur to them to institute reprisals and none of mine have ever made the slightest attempt to bite. They do however constantly extrude their pink tongues, making up for their lack of vision by a continual testing of the atmosphere.

Normally they move by extending their bodies like earthworms but if placed on a smooth surface they lash themselves into coils in a frantic effort to escape to more congenial surroundings. When returned to the vivarium they immediately set about burying themselves in the familiar soil.

Very little seems to be known about the breeding habits of worm-lizards. Carr states he discovered two eggs of the Florida worm-lizard on one occasion when digging in his garden. Other reports suggest that some species appear to be viviparous. Their way of life does not make observation of their habits, under natural conditions, easy and it is hoped that mine will prove cooperative and at least yield some information about their reproduction.

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**The Pygmy Angelfish**

My Centropyge fisheri was 1 in. in length when I bought him, and he has since grown slowly to just over 2 ins. The blue rings around the eyes give one the impression that he is either wearing glasses or else is suffering from a succession of sleepless nights. He leads a very active life: he is never still, but is continuously fitting in and out of the coral in a not dissimilar manner to the Demoiselle fishes. He settled in quickly and took over a beautiful piece of Lettuce coral that is in one corner of the aquarium. This he regards as home: during the day he keeps himself strictly to himself, but when he has decided to retire for the night, the other inhabitants are chased away if they approach too close; even the Thalassoma lunar which is over twice his length.

After the first few days feeding has never been a problem. All the usual flake foods, such as Tetramin, are eaten, together with freeze-dried brine shrimp, roe and tubific. Little pieces of shredded fish, shrimp, prawn and sea-urchin are greedily accepted. No, greedily is not the right word, because C. fisheri is a careful one, might almost say fastidious, feeder who clearly likes to savour each morsel, unlike the gluttonous T. lunar who treats each meal as though it were likely to be his last. In between meals C. fisheri browses quietly on the algae covered coral, which is surprising since basically the Angelfish as a group are carnivorous. The prominent lips are, however, ideally suited for this purpose.

My C. fisheri has proved to be very hardy. About six months ago, for no apparent reason, I had an outbreak of the dreaded Oodinium in the tank. I was able to cure the fishes with no loss of life, but the Centropyge remained unaffected throughout.

My C. botia is a comparative newcomer to my collection, and is housed in a separate aquarium. I do not feel qualified to make any detailed comments on this species as yet, but nothing in his behaviour to date contradicts my observations on my C. fisheri.

I have grown very fond of my Pygmy Angelfish, and would say in conclusion, that, based on my experience, these are fish which I can wholeheartedly recommend, even to a beginner, in this fascinating and rapidly expanding branch of the aquarium hobby.

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**Correction**

The author of “De-Ionised water in the Aquarium” (March issue) has drawn our attention to the following.

In the article it was stated that a cartridge gave approximately 15 gals of pure water in the London area and 60 gals in the Liverpool area. This should have read 7½ gals and 30 gals respectively.

April, 1971
OUR EXPERTS’ ANSWERS
TO YOUR QUERIES

READERS’ SERVICE
All queries MUST be accompanied by a stamped addressed envelope.

GOLDWATER QUERIES

I have kept fancy goldfish for many years but have now come up against a mystery. Many of my fishes in an aquarium have wart-like growths with spines coming from them on their bodies. What is the cause please?

From your description of the trouble I suspect that the fish are attacked by Anchor worms (Lernaea). These must have been introduced into your tank either with live foods from the wild or water plants. However, if any fresh fish have been purchased during the previous weeks it is possible that these were infested when procured. Several records on hand are of fishes being attacked by Anchor worm in garden ponds but there is little evidence available of the parasite being found in tanks. This pest is not a worm at all but a crustacean and the species is probably Lernaea cyprinacea. The adult female carries the eggs in a sac and so if these are killed it is possible to prevent the pests from spreading. The “worms” may be pulled from the fish with tweezers and if they are touched with T.C.P. or Dettol beforehand they will come away more easily. A salt bath will help to cure the wounds after treatment.

In August last year I saw some Bristol shubunkins which had been bred the same year and was surprised at their size. How do people get fish so big and when do they start to breed them?

Some breeders, especially those with a fish house, could commence their breeding operations in March. Even fish bred in April or even May can be grown on to a good size providing the correct conditions are provided. You also ask if fancy goldfish can breed at eighteen months old. I have bred from fantails which were only eight months old. The secret is to provide plenty of space for the youngsters. To get the maximum growth the water needs to be about 70°F, from hatching, and plenty of the right kinds of food must be given. Some aeration is necessary unless there are plenty of water plants in the tank and the fish are not over-crowded. To sum it up one must use

Bristol Shubunkin

by Arthur Boarder
warmth, food, oxygen and space for the best and quickest results. If any one of these conditions is lacking, then the fish will not grow as fast as one would like. If young goldfish are crowded in their tanks, and even if the other conditions are supplied, although the fish can remain healthy, their growth will be stunted and if this happens it is difficult to get them growing again as they normally should do.

I set up a tank 18 x 10 x 10 in., with gravel and some Vallisneria. After the water had settled I put in two tench and two comets. The water soon became cloudy and the fish off colour. Woolly fungus collects on the gravel although I change the water every week. Where have I gone wrong?

In the first place you have not stated the sizes of the fish, your tank should only hold seven and a half inches of fish. If you have more then you will soon be in trouble. Secondly, your choice of fishes was not a good one. Tench soon grow if properly fed, and are better in a garden pond or a much larger tank than yours. The goldfish are also types which are better in a pond as comets are fast-swimming fish and need plenty of space. Your next trouble with the cloudy water resulted in that you have been giving too much food, especially dried types. The fuzzy growth at the bottom is caused by decaying uneaten food. You should not have to change the water completely, ever. A slight change with the weekly servicing should be sufficient and a tank can go for years with this treatment. It is possible to keep a coldwater tank with crystal clear water for years as long as there are the right conditions with growing water plants, no too many fish and not too much food. This can be done quite easily without using either filter or aerator.

I remember that you used to breed a coldwater type of Paradise fish (Macrocarpia opercularis), many years ago and that I think you stopped keeping them in 1952. Do you know where I can get any like that nowadays, as I would like to breed some?

It is true that I had a splendid strain of Paradise fish which used to breed in an unheated tank with fantails. These could stand quite a low temperature and were very handsome, especially the male when displaying. When I had plenty I could not get rid of them. Once I parted with the stock I was asked for them repeatedly. I will enclose an address of a dealer who might be able to help you. With regards to the young ones you have in a tropical tank, it is possible to gradually reduce the temperature of their water to an ordinary room one, but I suggest that you do this when the weather gets a little warmer.

After transferring three goldfish to a larger tank and adding a few more fish, one of the original ones started swimming violently around knocking himself against rocks and gravel in the tank. It injured itself so badly that it had to be destroyed. Could you explain this please?

As the fish was the only one affected it is not likely that the water conditions were at fault. It is probable that the fish must have been injured slightly when it was caught. The gills could have been caught in the netting and were so damaged that the fish could not breathe properly. Another possible reason is that the fish swallowed a stone from the gravel which stuck in its throat. If the new water conditions had been at fault one would expect more of the fish to have been distressed.

I have a tank, 30 x 15 x 15 in., in which I have two fantails, one moor, one comet, one golden carp and one tench. Could I add two veiltails without over-crowding?

I take it that your fish are small ones, but you did not state their sizes. The tank will hold comfortably about 18 in. of fish, not counting the tail. Providing you keep within the limits you could add two veiltails. If your fishes are no more than 1½ in. body length you should be safe with two extra fish.

Can you tell me if Lionheads and Pearlscales can be bought in this country. I have seen them at shows but not at any dealers?

Some dealers can supply these fish and I enclose the address of one who could probably help you.

I have, in a community tank, fantails, comets and goldfish and a veiltail which for days on end will sink to the bottom like a stone and remain motionless for hours. It does feed occasionally and has the dorsal fin erect. After feeding it returns to the bottom again. What can be the reason?

I suspect that the fish started to act in the manner described when the water in the tank became colder. It is a form of swim bladder trouble which is so often found in the short bodied veiltails. The fish can be otherwise quite healthy but has difficulty in keeping an even balance and position in the water. It may remain in the same state all the winter and once the water warms up in the spring it may become normal. If you can do so, remove it to a tank with warmer water, say 65-70°F, and see that the water is so shallow that it only reaches an inch or so above the extended dorsal fin. Cut out all food except an occasional broken garden worm.

I wish to breed from a pair of Bristol blue shubunkins but do not know which sex they are. How can I tell?

Most male fish of this variety show raised white tubercles on the gill covers and sometimes on the front of the pectoral fins. These usually show up in the breeding season if the fish is in a healthy condition. If no such signs are evident then examine the fish from above. The female fish should be much fatter in the body than the male if she is carrying eggs.
How can I cure my rocks, corals, shells and sea-fans before adding them to my newly-established sea aquarium?

Rocks: These vitally important decor items are only a problem with regard to curing when they contain dangerous metals or metallic compounds in an “unlocked” readily soluble form. The metals to be especially careful of are copper, zinc, aluminium, lead, silver and tin. To illustrate to you the importance of steering clear of metal-bearing substances, may I recount the following story. My Company had been asked to instal a proprietary brand of fibre-glass marine aquarium which has, as one of its patented features, a reaction-chamber at the rear which is used for heat-exchange purposes, safe ozonisation and ultra-violet sterilisation. Owing to the design of this unit’s filtration system, all the water passes through this reaction chamber every six minutes or so. For a variety of reasons, I decided to handle the installation of this unit in the home of the customer (who is a very successful retail jeweller), personally. Eventually, the installation was completed, the synthetic sea-water in the unit was gin-clear, and after several tests of pH, S.G., nitrite level and temperature, I decided that all systems were at “go”, and stocked the tank with a beginner’s selection of Damselfishes as normal. The customer then brought in to us the usual once-weekly sample of water for nitrite-testing, so that we could ascertain when the bacteriological maturation of the filtration system was complete, as indicated by the falling off of free nitrites to zero. No damsels were lost during this period, but when I took the customer’s selection of beginners’ butterflies, surgeons, angels and other hardy show fishes, I noted that the original damsels supplied appeared very listless and in poor colour. However, there was no trace of disease whatsoever, as one would expect since the customer had been wise enough to carry out the simple course of prophylactic treatment which we had recommended. I dismissed the damsels’ condition as being due to fighting or the recently sky-high nitrite level in the tank or fear of the customer’s highly active young children. The tank was situated only some 6 in.-8 in. above ground level. The following morning I received a telephone call from a most worried customer saying that every one of the showfishes which we had supplied, plus one of the damsels, was dead. I wasn’t able to get to see the customer that day owing to pressure of work and an earlier appointment, but rushed round as early as possible that evening, sick about the unnecessary deaths of several lovely fishes, bitterly disappointed about the loss of prestige for my Company and grievously worried about the loss of a considerable sum of money in dead fishes whose deaths I was completely unable to account for. A thorough check-out of the whole system threw no light on the problem whatsoever, until I noticed a prettily-striped piece of rock which I didn’t recognise and certainly had not used in my original dressing of the tank. The customer informed me that it had come from an ornamental rockery in his garden. Suspecting that the striations may have been due to metallic ores, I removed the rock, supplied another batch of synthetic salt free of charge and similarly replaced all the dead fishes free. Two days later all these fishes were dead also. By now, as you might imagine, I was beside myself with worry. At no cost to the customer, yet again, we completely removed all the old water, replaced it with matured water from our own tanks this time and again stocked the tank with a free selection of expensive beginners’ show fishes. The following morning a now frantic jeweller told me that his fishes were dead again. Unable to stand the stress and strain both financial (we had by now poured over a £100 in materials and fishes alone into this tank), and psychological, I decided that discretion is the better part of valour. We cut our losses and offered to refund the customer’s money in full. This he gratefully accepted since his wife was a woman of high sensitivity who was finding this morning massacre too much. Accordingly, two evenings later I went to their home fully-equipped to remove the unit. Now to appreciate the point of this story to date the reader must imagine the innumerable inquests, theories, and solutions which had all been held or considered over the period of these weeks, all I might add in the customer’s home under the unpleasant tensions of a vastly deteriorating sales situation. I believed that I had considered all the possible reasons for this dismal failure. Secretly, I began to nurture the theory that Mr. X’s children were both ichthyocidal psychopaths, who were daily pouring some potent death mixture into the tank without Daddy noticing!

The solution to the mystery? Whilst stripping the tank I found that a massive piece of near-pure silver, weighing some ½ lb. to 1½ lbs. had been used to weight down the ozonising wooden diffuser inside the reaction-chamber where I had previously been unable to see it. You see, Reader, this is yet another instance of a little knowledge being dangerous when coupled with the frightening coincidence of a marine aquarist who had access to cheap sources of what are known as the noble metals. But I ask you seriously, without the wisdom which comes after the event, how many of you
would have thought to ask this man, “Oh, by the way, I don’t suppose you’re using £50’s worth of scrap silver to weight your diffuser down are you, old man?” Mr. X had remembered from his college days that the lecturer had told them that the noble metals—platinum, gold and silver were not prone to corrosion. What should have been said, of course, was that the noble metals are comparatively less prone to corrosion than are the base metals. Anyone who has ever had to clean his grandparent’s silver ware will know only too well that silver will form compounds with several chemicals. To come back to our jeweller’s tank, his troubles were obvious when we realise that less than 0.25 of one part per million of silver was needed to go into solution to kill everything in the tank. I think it is a telling testimony to the hardness of corallfishes that the Demoiselle fishes survived as long as they did.

I stripped down the tank yet again, washed everything, supplied yet more fishes and salt free of charge. The tank still contains its last complement of fishes and looks beautiful some six months after the holocaust.

The moral of the above story is two-fold . . . Firstly, don’t become a professional aquarist unless you have the proverbial steel nerves (nerves of any other metal would be a severe hazard in this profession); secondly, be prepared for someone, sometime, somewhere making a mess of your product no matter how carefully you word the instructions (like the recent customer of ours who carefully installed her vibratior air pump inside the tank and underwater); thirdly, avoid all natural rockwork which isn’t some form of sandstone or gritstone (e.g. York or Sussex stone, Millstone grit, etc.), Limestone, or Westmorland Stone. The latter is beautifully grained and easily obtainable. These comments, of course, do not apply if you are a geologist with specialised knowledge or if you have some stone which you know full well, from personal experience in saltwater is perfectly safe.

The only curing needed for rockwork is to hold it under a running tap and with an old-fashioned scrubbing brush, scrub it until absolutely clean. It can then, after a final rinse, go straight into the tank.

Curing Corals. Depending on the initial state of cleanliness of the corals when bought or collected, you should soak the corals for at least five days in the following solution.

For Clean Corals. Place the corals in a plastic bucket. Add one cupful of Brobat, or some other deterrent-free bleach, and fill the bucket with tapwater. Set aside for five days.

Medium-clean Corals. Exactly as above but use two cupfuls of bleach.

Filthy Corals. As above but use three cupfuls of bleach and prolong period of cure.

After any bleaching the now-cured objects should be placed in a clean bucket and left under a fiercely running tap for a couple of hours or so. The final test is the “nose test”. If there is none of the characteristically pungent-smelling chlorine gas clinging to the corals and no musty smell lingering to betray the presence of some residual organic matter still within the coral, then it is ready for your tank.

Curing Sea Shells. This is not nearly such a simple task, and will be considered in two parts, as follows:

Bivalve Molluscs. These are the easiest mollusc shells to prepare for the marine aquarium, since it is easy to see inside the two halves and physically remove any dead molluscan flesh still clinging to the shell by scraping with a knife. All that remains to be done then is to give the shell a very “light” bleeding for a few days just to digest out any organic matter which may still be inside—worm cases, barnacle shells, etc.—clinging to the outside of the shell.

Examples of bivalve mollusc shells most often used in tank decor are the scallop and clam (Tridacna) species.

Univalve Molluscs. This group contains the vast majority of shells used in tank dressing. It includes the Turban Shells, various types of Conch, Murex, Cowrie, Scorpion, Bat and Spider shells etc. Owing to the convoluted growth pattern of the animal’s shell, it is quite impossible to see inside the shell without permanently damaging it, e.g. sawing it in half.

The natives who collect these shells in one area which I know, have a most interesting means of cleaning univalve mollusc shells. When they find an interesting shell in which the molluscan tenant is still alive, they remove it from the water and place it near one of the several exist and entrances of the many termite hills in the area. The occupant of the shell is then left to the tender mercies of a few hundred thousand termites for the next week or so. At the end of this period, all the shells around all the termite hills are rounded up, boxed and despatched to dealers in America and Europe. It does not require much imagination to realise that with perhaps 20 to 40 termitaria being used by a village “collective” of some 20 divers, when packing time comes around, some of the shells will be “eaten out,” some only “half eaten out” whilst yet others will have the highly unfragrant flesh of the late-departed occupant almost intact. Having witnessed this procedure, I always regard all new shells with great suspicion, and I would advise everyone else to do the same. Begin with all univalve mollusc shells on the premise that the dying curse of the unfortunate snail on all collectors of sea shells is still potently vested in its hidden, rotting corpse tucked neatly, just out of sight round the corner of the first bend. When planning a mode of attack on this store of potentially lethal organic matter, one must realise that after three to six weeks’ sea travel, most of which time being spent in the tropics, the mollusc corpse will have totally dehydrated. The dry flesh will therefore have little or no odour attached to it.

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Begin the cleaning procedure in the bleach solution prepared as for filthy coral above. Do not forget that owing to the spiral shape of the shell, if you just simply drop it into a bucket of bleach, it quite often happens that some or all of the snail corpse is safely out of the bleach in an airlock within the shell. To prevent this from happening you must force the shell to the bottom of the bucket and rotate it in all possible planes until air bubbles cease to issue from the mouth of the shell. Then you can be certain that the shell is as full as possible of bleach solution. As the available free chlorine and nascent oxygen, both potent oxidising agents, are released from the solution inside the shell they will attack and begin to "digest" the snail-flesh inside until it is loosened and with a little vigorous shaking under the bleach solution most of it will come away. In any case, I always empty and refill each shell every morning in the manner described above. This ensures that the bleach stagnant inside the shell doesn't lose its chemical activity through stagnation. When pouring out the old stagnant and de-activated bleach from inside each shell each morning, observe carefully what comes out with the bleach. If you detect bits of slimy organic matter, in addition to the inevitable insects, then you have been unlucky enough to buy one of the "half-eaten out" or totally untouched shells as described above. In this case the shell should be left in strong bleach for a full fortnight with a complete change of bleach solution after seven days. At the end of this time the shell should be fiercely boiled in tap-water for a couple of hours.

By now it would seem reasonable to assume that the shell is cured and safe, but such is my fear of the sea-snail's curse, that I always take any newly-added shell out of the aquarium three times for "nose-testing". These fall at roughly 12 hour, 24 hour and 36 hour intervals. If you are new to the fantastic hobby of sea-aquarium keeping you must take my word that the unique stench arising from a shell which was placed not fully cured into a heated marine tank is an unforgetable experience and a quite unmistakable aroma. Fortunately the smell develops quite early, well before the water has fouled, and so provides a useful early-warning system.

Sea-Fans. These skeletal marine animal remains are so fiendishly difficult to fully cure, even for the well-experienced marine aquarist, that my advice to a beginner is to let them remain on the dealer's shelf. If, you are a compulsive sea-fan buyer, wonders can be worked by simply gluing the fan to the outside rear panel of the aquarium.

I do not include Sea Whips (Gorgonia) in the Sea-Fan category since if treated as Filthy Coral, they seldom give trouble.

Finally, may I remind you that all gravels, and particularly white gravels must be bleached as Clean Coral and finally washed before addition to the sea aquarium.

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SHOW SCHEDULES

are now available and are being distributed by the Show Committee. If your Society has not received schedules or you, as a keen aquarist, are interested in entering the competitive classes, complete and send the coupon below to: The Show Organiser, The Aquarist & Pondkeeper, The Butts, Brentford, Middlesex; or the Show Secretary, G. Greenhalf, 39 Garth Close, Morden, Surrey.

Please indicate in the space provided, the approximate number of schedules required

Competitive classes for the Exhibition will comprise of single fish, pairs of fish, furnished aquaria, plants and a class for juniors.

All lighting, heating and tanks will be provided by the organisers.

Handsome trophies will be awarded together with souvenir miniatures and award cards for first, second and third place winners. Fourth place winners will also receive award cards.

Please send me........ schedules for the Aquarist & Pondkeeper
Fishkeeping Exhibition.

Name
Address

(Please print your name and address)

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THE AQUARIST
Show Jars Wanted

I have lately started keeping tropical fish and have joined Ashton Aquarist Club. I have been to several shows but have been unable to enter any fish because I find I cannot get show jars. The members of the club tell me that Bubble Gum jars are used but I find them impossible to obtain.

What I cannot understand is, why the firms that sell fish and equipment do not supply these small jars, as there must be a good market for them.

Could any of your readers inform me as to where, if possible, I might purchase some small jars? I can get plenty of large sweet jars but the weight of the jar plus the water makes them impractical to use unless one has a car or a good friend who will take one to the show. Hoping you can help me.

M. HARRIS,
38 Knowle Avenue,
Ashton-U-Lyne,
Lancs.

Satisfied Customer

I wish to show my appreciation to Messrs. J. E. Marshall, 97 Dagets Road, Walderslade, Chatham, Kent, for his trust and generosity in replacing my ampularia snails which died in the post. This was done without delay or extra cost for which I am very grateful.

W. A. LYLE,
Durrington, Salisbury,
Wilts.

Copper Spawning Ground

I have a tropical community tank and in it a true pair of angels. Having kept and bred angels for many years, I am, I suppose, familiar with their needs, methods, etc. Well, recently the syphon tube to my outside filter broke while cleaning so I thought I would replace it by a piece of half-inch copper tubing. The tubing was not cleaned or shone up as I thought anything I might use would be detrimental to the fish. I merely scrubbed and cleaned with a rag under very hot water. To my astonishment, 10 minutes after placing the tubing in the tank, the angels spawned on it. I did not have the facilities for saving the eggs, so lost them all within 24 hours, but a great many were obviously fertile. I do have Vallimania and broader leaved plants in the tank but this pair had made no attempt at chasing or spawning up to this time. I have removed the tubing now because the angels were forever guarding it and too much chasing was going on. However, I occasionally put the tube in to show other people, because the angels always show great interest and excitement when I do, even following it when I move it around the tank. I am just wondering if angels in general might prefer to use say, a flat strip of copper, unpolished or tube like myself. As soon as I have made arrangements, I intend to experiment anyhow; you never know, I may have struck an ideal medium. A tank with just a strip of copper holding eggs aerated from beneath and no plants, could easily be kept sterile, and your unlike Methlene Blue used with best results.

J. J. DIXON,
Sutton Courtney,
Berks.

Siamese Tiger Fish

Some of our members have recently acquired some young Siamese Tiger Fish.

There seems to be conflicting advice given as to the correct treatment of these fish and I wonder if I could appeal, on behalf of our club members, for any information/advice that any aquarist can give us on these fish.

We would particularly appreciate knowledge obtained from personal experience in keeping these fish, which despite their particular beauty are far from common.

K. WYKES,
P.R.O., Brighton &
Southern Aquarists
Society, 39 Stanmer
Villas, Brighton, Sussex,
BN1 7HQ.

'Ware Daphnia

In the article “In Support of Daphnia” in the January issue of The Aquarist, Mr. L. Vanderplank makes criticism of my article of November when I stated that Daphnia and Tubifex from natural ponds could introduce pests to tank or pond. Whilst I am always glad to receive criticisms if they are constructive I find no joy when they are unfair. I definitely stated in my article that these live foods would cause no trouble if one could be certain that they contained no harmful pests. Of course if Mr. Vanderplank breeds his own, under cover, there is no risk but even without a microscope anyone could see some of the pests I have in mind, and a magnifying glass would disclose more. His surmise that daphnia ponds would not have any fish in them is very doubtful. He also states that the only danger from open ponds would be from the larvae of Dragon flies and Damselflies.

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This is not so as such ponds could contain the larvae of any of the four water beetles; water boatmen; water scorpions; Asellus (which can attack small fishes); eggs or small larvae of many insects, some of which can eat fish eggs; leeches or their eggs, etc. Even where no fish are present there may be water snails which can harbour certain pests and diseases.

A. Boarder,

*Daphnia* and Infection

To comment upon the article by Lionel Vanderplank, on *Daphnia*, I have all the equipment he refers to, but I would like to draw his attention to the book by C. van Duijn page 216 “Water flea carriers of *ichthyophonus* ... Elaborate experiments have been performed by J. Lewer to find out whether *ichthyophonus* could be introduced with live food. The parasite could be cultured on blood serum and used for infection experiments. Tubifex remained completely unaffected and did not transmit the parasite, but *Daphnia* soon showed traces of it and all became infected. When these infected water fleas were fed to fishes all of them showed *ichthyophonus* within five to 12 weeks. Some of the specimens were used for histological sectioning and were found to contain typical cysts in the brain and liver. These experiments seem to prove that water fleas can transmit *ichthyophonus* parasites.” Lewer, J., Die Aquarien—u Terrarientechnik (Oct. 1952).

For years I used a small pond near my home, indeed a very small pond about 10 yards by 10 yards, and took *daphnia* from it at will. After many years’ use, one day I was surprised to see small perch swimming near the edge. These ponds also are inhabited by frogs, newts and toads. It remains to be known if these inhabitants can also pass infections.

The majority of fish-keepers are not so much concerned with establishing rapid growth, but more concerned with keeping their tanks infection-free, and I suggest that it would be over-complacent to judge *daphnia* from the wild to be entirely infection-free.

D. H. Ainsley,
Woodlands Park,
Newcastle upon Tyne 3.

Priority of the Hobby

It is with great pleasure that we read the article “Guppies, Where Do We Get Stock,” by Don Philimore and George Goodall. It is indeed pleasant to see that, despite the unfortunate and unnecessary bickering between certain Sections of the PGBS and FGA, it is still possible for some of the more intelligent and liberal hobbyists to acknowledge the existence and usefulness of the so-called “enemy camp.” Both organizations are specialists in the field of Guppy Breeding and showing to organized standards, and although rivalry is the spice of competition there should be no necessity for petty jealousies.

Well done, Don and George—keep up the good work of making the hobby more important than local affiliations.

L. Myers,
Secretary,
Federation of Guppy Breeders’ Societies.

European Catfish in British Waters

If Mr. Boarder had read my letter carefully he would have seen that I was aware the *Silurus glanis* had been released in this country on several occasions, and I see no reason to doubt that the occasional specimen turns up, but as such a capture attracts a press photograph these fish cannot be commonly caught, though William Yarrell in 1860 wrongly believed it to be a British fish.

My argument with Mr. Boarder is as follows. Both in the October and November issues of the *Aquarist*, in answers to queries, Mr. Boarder has suggested to readers that the common catfish found in commerce is *Silurus glanis*. He does not mention its commoner American cousin.

In my first letter I stated that I had never seen *Silurus* offered for sale in a dealers, or an English journal. Can Mr. Boarder tell us whether he has seen them for sale in this country?

Since Mr. Boarder stated in November that these fish are often sold as scavengers, he presumably knows a source of supply. Will he please share it with your interested readers? Or will he admit to what is only a small error?

John S. Vinden,
Brecon, Wales.

Mr. Boarder replies:

I do not know where European catfish can be purchased as I do not visit dealers’ shops. I have only been in one during the past twenty years. I have assumed that they have been sold in this country as I have had so many letters from readers who have described the size and shapes of the fish so clearly that I have no doubt that they are the European ones, and their behaviour related by the correspondents has verified my suspicions.

As I have admitted this assumption can Mr. Vinden state categorically that no European catfish have ever been sold in this country? Anyway, it is still a fact that the warnings I have given in the past about introducing any coldwater catfish with small fishes still stands, whether they are the American or European types, as the former will attack and eat any fish smaller than itself as I have had definite proof of this,
from AQUARISTS' SOCIETIES

Monthly reports from Secretaries of aquarists' societies for inclusion on this page should reach the Editor by the 5th of the month preceding the month of publication.

AQUARISTS CALENDAR 1971

3rd April: Thurrock Open Show at Thameside School, Arthur Street, Grays, Essex. Schedules available from Show Secretary, T. D. M. Durrant, 22 Kingmans Road, Stanford-le-Hope.


4th April: Nelson A.S. Open Show, Civic Centre, Stanley Street, Nelson.

11th April: Newton Aycliffe A.S. Second Annual Show. Further details later.

11-12th April: Newton Aycliffe A.S., Beverley Hall, Sunnanside, Newton Aycliffe, County Durham. Booking 12-2-15 p.m.

11th and 12th April: Tottenham and District A.S. Open Show at the Harlingen Sports Council, Drill Hall, High Road, Tottenham, N.17 (opposite the Spurs Ground). Schedules from show secretary, B. Thornton, 7 Reynoldsons Court, High Road, Tottenham, N.17.


17th April: Beth A.S. Annual Open Show will be held at St. Peter's Church Hall, Lowes, Brent Road, Beth. Schedules now available. P. Allenby, 33 Brookfield Park, Beth, BA1 4FG.

18th April: Sheffield and District A.S. Open Show, Technical College Gymnasium, corner Leopold Street and West Street, Sheffield. Schedules available from show secretary, St. John School, Orchard Street, Chatham, Kent.


Official changes in the administration of North Kent A.S. are as follows: Chairman, M. J. Godfrey; Vice Chairman, M. E. Slade; Secretary, P. Willa; Treasurer, D. H. Robinson. Officers of the Woking and District A.S. are as follows: Chairman: Mr. Lane; Secretary: Mr. Reid; Treasurer: Mr. Baker; Show Secretary: Mr. Stacey; other committee members: Mr. Honeysett, Mr. Ege, Mr. Roden, Mr. Forbeh.

SECRETARY CHANGE

Halifax and District A.S.: M. Fletcher, 5 Towngate, South Ockham, Halifax, Yorks.

THE 1970/71 season at Ixiling and District A.S. ended with the Presentation Dance on the 13th February. The trophies, won by members during 1970, were presented by Harry Towell (P.B.A.S.) and the winners were: Akin Shield (Total Table Show points): J. Butts, Berrett Trophy (4 - 4 Showers): R. Mills, Butts Trophy (Highest scored by Fish): J. Hesley, Burghhead Trophy (Furnished Aquarium at Closed Show): J. Butts, Church Trophy (Cyprinids): J. Butts, Cruckshank Trophy (Dwarf Cichlids): R. Sellers, Evans Trophy (Nominated fish shown four times a year): J. Hesley, Mills Trophy (Plants): R. Mills, Rainford Trophy (Highest Pointed breeding at Closed Show): D. Green, Savage Trophy (Home Furnished Aquarium): May Burghhead, Sellers Trophy (Kinnowaday Cup): J. Akin (Tug Trophy for Novices): J. Butts, Woodward Trophy (Highest pointed Junior's fish at Closed Show): J. Akin.

A full programme of table shows has been arranged for this year and speakers so far have been C. A. T. Brown (P.B.A.S.) on Judging Fish; Terry Cruckshank (Baking) on Livebearers and a Slide A.S. "Everything an Expert" hired from Hendon A.S. Ty. N. Carrington of InterPet will address the Society on 20th April, when the Society has a home match against Bracknell A.S.

The Torbay A.S. won the Interclub Challenge Shield for 1970, the results being as follows: Torbay A.S. 104 pts.; Plymouth A.S. 55 pts.; Totnes A.S. 41 pts.; Exeter Marine 24 pts.

Other events included: The President's Trophy: Mr. Poole, for the highest number of points in the year; the Thompson Trophy: Mrs. Doubleday, for the consistent high work behind the scenes; and the Lance Trophy: Mr. Lay, for Most Improved Home Furnished Aquarium. Any aquarists planning to enter the Interclub Trophy, the Challenge Shield or the Lance Trophy are cordially invited to join Torbay A.S. on their next meeting. The Secretary, Mrs. Lay, at 7 Newake Rise, Northampton.


1st May: Trowbridge and District A.S. and P.S. Sixth Annual Show at Nelson Hadon Club's School, Trowbridge.


2nd May: Scunthorpe Museum Society Aquarist Group First Open Show. Details from Mrs. P. Knights, 56 Scunthorpe, Lincs.


9th May: Derby Regent A.S. Open Show. Shrewsbury Foresters Recreation Centre (Nevanom Barracks), Osmaston Park Road, Derby. (Follow R.A.C. signs). From E. T. Bull, 46 Queen Drive, Littleover, Derby.

9th May: Worksaop A. and Z.S. Open Show at the North Notts College of Further Education, Carlton Road, Wirksworth, Notts., the same venue as last year. Schedules available shortly on application to Show Secretary, C. G. Gibson, 17 Clifton Street, Worksworth, Notts.

9th May: Ovam A.S. Open Table Show in the Recreation Hall, Refuge Street, Show, Oldham, Lancs. Details and schedules from J. E. Shore, general secretary, 13 Refuge Street, Oldham, Lancs.

11th May: Urmston A.S. Open Show, Meadow School, Royal Lane, Hillington, Urmston. Details from J. H. Hindley, 22 Balderston Road, Ealing, W.5. 4SU.

12th May: Alderside A.S. Open Show.

22nd May: Yeovil A.S. Open Show at Grass Field, Yeovil. Details and schedules from show secretary, R. D. Fairclough, 38 Saltwell Road, Ealing, W.5.

22nd May: Corby and District A.S. Open Show. Scheduled details and schedules from show secretary, K. D. Bond, 316 Victoria Road, Corby, Northants.

22nd May: Exeter A.S. First Open Show, Exeter College, Exeter. Details and schedules from show secretary, Mrs. D. Thorne, 28 Whiterose Avenue, Exeter.

22nd May: Southend, Leigh and District A.S. Open Show will be held at the Liberal Hall, 9a, High Street, Leigh-on-Sea, Essex.

22nd May: Corby and District A.S. Open Show. Scheduled details and schedules from show secretary, D. D. Bond, 316 Victoria Road, Corby, Northants.

22nd May: Exeter A.S. First Open Show, Exeter College, Exeter. Details and schedules from show secretary, Mrs. D. Thorne, 28 Whiterose Avenue, Exeter.

22nd May: Northwich and District A.S. Open Show at the Welsh Church Hall, Cuddington, nr. Northwich. Booking 12 noon to 2 p.m. on each day. Details and schedules from show secretary, Mrs. D. Thorne, 28 Whiterose Avenue, Exeter.


1st June: Bishops Cleeve A.S. Second Open Show at the Tythe Barn, Bishops Cleeve on the Cheltenham Road. Details and schedules from show secretary, Mrs. C. F. Scriven, 77 Hill Road, Cheltenham, Glos.

6th June: Bournemouth Aquarists Society. Annual Open Show at the Park Hotel, Park Road, Bournemouth. Details and schedules from show secretary, Jack V. Jeffery, 20 Braemar

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6th June: Lincoln and District Open Show, Drill Hall, Ford Street, Lincoln.
12th June: Llanrwst Major A.S. Open Show at the Town Hall, Llanrwst Major. Show secretary, A. Biberston, 84 St. Marys Ave, Barry, Glamorgan.
13th June: Loughborough and District A.S. Open Show, The Sports Centre, Granby Street, Loughborough.
20th June: W.K.P.B.A.S. (Colnhill) Inter-society Open Show, Town Hall, Colnhill. Schedules and information from Show Secretary, R. T. Trenson, 27 Mayfield Road, Birming-
ham, B4.
20th June: Swillington A.S. Open Show.
20th June: Glossop A.S. Open Show, Venus Glossop Centre, Talbot Street, Glossop, Derbyshire. Schedules from Secretary, Miss M. D. Smith, 3 Chapel Lane, Hadfield, via Hyde, Cheshire. This is an A.M.D.A.S. Show.
24th/25th/26th June: Bristol Tropical Fish Club Open Show, Congregational Church Hall, Newent Street (off Stapleton Road), Bristol. Schedules and information from E. Nesman (Show Secretary), 71 Somerdale Avenue, Knowle, Bristol 4.
26th June: Chingford and District A.S. Open Show, Methodist Church Hill, New Road, Chingford, Show Secretary, A. Panseil, 9 Pembur Ave, Wallhampton, London, E.17.
27th June: Wednesbury and District A.S. First Open Show at Belfry High School, St. Paul's Road, Wednesbury. Schedules from T. Shapcon, 9 Gloucester Road, Wednesbury.
4th July: Lymington A.S. Open Show at the Lower Gardens Pavilion, Lymington. Show Secretary, R. Thompson, 83 Alexandra Road, St. Anne's, Lancs.
10th July: Port Talbot and District A.S. First Open Show. Full details to be given later.
11th July: Grantham and District A.S. second Open Show at the Guildhall, St. Peter's Hill, Grantham. Schedules available mid-March from Show Secretary, M. Partleton, 6 Witham Terrace, Earl Street, Grantham.
11th July: Tadcaster A.S. Annual Open Show. Details to follow.
17th July: Basingstoke and District A.S. thirteenth Annual Open Show at Carnival Hall. Part of the activities of the Basingstoke Carnival. Show schedules from M. Strange, 10 Loddon Court, Neville Close, Basingstoke.
1st August: Blackpool and Fylde A.S. Details of venue later.
15th August: North Staffs. A.S. Stokes-on-Trent third Open Show.
21st August: Weymouth and District A.S. (proposed date).
4th September: Yate and District A.S. Annual Open Show. Details to be announced.
5th September: Huddersfield Tropical Fish Society, Open Show at the Town Hall, Huddersfield.
11th September: North Kent Open Show, Sweyne School, Swancombe, Kent. Details from A. Cox, 35 Bridge Road, Slade Green.
18th September: Havant and District A.S. First Open Show at the Deverill Hall, London Road, Putney, London.
28th September: Stockton-on-Tees A.S. Open Show, Wellington Community Centre, Stockton-on-Tees. Schedules available from Mr. Jones, 62 Fenn Family Place, Ascent, Berks. Tel. Winklefield Road 3480.
28th September: Hounslow and District A.S. Open Show at Youth Centre, Cecil Road, Hounslow (awaiting confirmation).
28th September: Selly Oak A.S. and District A.S. first open show, at The Museum Hall, Park Street, Selly Oak. Further information may be obtained from Show Secretary, W. A. Bunnage, 22 Heath Croft, Solihull, York.
5th October: North Kent A.S. Inter-Club Show at the Sweyne School, Swancombe, Kent. Details from A. Cox, 35 Bridge Road, Slade Green.
5th-10th October: British Aquariums' Festival, Zoological Gardens, Belle Vue, Manchester.
17th October: Sherwood A.S. Second Open Show, Show Secretary, D. Bracknell, 173 Peter Smith Drive, New Uffington, Notts.
7th November: Middlesbrough Tropical Fish Society Open Show will be held at the Middlesbrough Community Centre, Clough Lane, Middlesbrough, Halifax. All enquiries to S. Leeds, 74 Clough Lane, Middlesbrough, Yorks.

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The firms listed are wholesalers or retailers or both in fishes, tanks, plants, appliances and accessories, reptiles and amphibias. Abbreviations: W.—Wholesale only; R.—Retail only; WR.—Wholesale and Retail. C.—Coldwater. T.—Tropical. M.—Marines. P.—Plants. AA.—Appliances and accessories. R. & A.—Reptiles and Amphibias. E.C.D.—Early closing day.

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12, Springbridge Road, Ealing, W.5  
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E.C.D. Wednesday.  R.  C.T.P.A.A.  

Chiswick Aquaria  
136, Chiswick High Road, London, W.4  
Telephone: 01-994 6549  

Queensborough Fisheries  
111, Goldhawk Road, Shepherds Bush, W.12  
Telephone: 01-743 2730  
Closed all day Thursday.  R.  C.T.M.P.A.A.  

THE AQUARIST
NORFOLK
Sovereign Supply
The Street, Newton-Flotman, Norwich
Telephone: Swainsthorpe 383. WR. T.P.AA. R.&A.

NORTHAMPTONSHIRE
The Pet Shop
120/122, Kettering Road, Northampton
Telephone: Northampton 38841
E.C.D. Thursday (all day). R. C.T.P.AA.

NORTHUMBERLAND
Grotto Aquarium
202, Chillingham Road, Heaton,
Newcastle upon Tyne. R. T.M.A.A.C.P. R.&A.

Pet-Fare
46, Nile Street, North Shields
Telephone: North Shields 72312
E.C.D. Wednesday. R. T.A.A.C.P.

The Aquarium
91, Pilgrim Street, Newcastle upon Tyne, NE1 6QF
Telephone: 28839
WR. C.T.M.P.AA.

The New Pet Shop
58, Shields Road, Newcastle upon Tyne
Telephone: 653462
E.C.D. Wednesday. W.R. C.T.P.AA.

OXFORDSHIRE
The Goldfish Bowl
188, Cowley Road (Retail)
9, East Avenue (Wholesale)
Oxford Telephone: Oxford 40411
E.C.D. Thursday.

STAFFORDSHIRE
The Aquarium & Aviary Co.
19, Bore St., Lichfield
Telephone: Lichfield 2405
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SUFFOLK
Mickfield Fish Centre
Mickfield, near Debenham, Suffolk
Telephone: Stonham 336
E.C.D.: Closed all day Tuesday and Thursday. R. T.C.M.P.AA.

SURREY
Aquapets
1, Grand Parade, Tolworth
Telephone: 01-399 0678
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Carlton Pets
7, Windsor Street, Chertsey
Telephone: Chertsey 5007
E.C.D. Wednesday. R. C.T.P.AA. R.&A.

The Ark Pet Centre
High Street, Bramley, Guildford, Surrey.
Telephone: Bramley 2770
E.C.D. Wednesday. R. C.T.M.P.AA. R.&A.

The Pet Shop
12-14, Braysey House, New Zealand Avenue,
Walton-on-Thames Telephone: Walton 24076
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SUSSEX
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Hailsham Pet Shop
18, Garfield Road, Hailsham, Sussex
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Old Town Pet Shop (Prop. G. H. White)
53, High Street, Hastings
Telephone: Hastings 4418
E.C.D. Wednesday. R. T.A.A.C.P. R.&A.

Pets and Supplies
5, Crescent Road, Worthing
Telephone: 200444
E.C.D. Wednesday. R. C.T.M.P.AA.

Pleasure's
39b, Vicarage Field, Hailsham
Telephone: Hailsham 4099
E.C.D. Thursday. R. C.T.P.AA.

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

Regency Pets Aquarium (Prop. R. A. Bassett)
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Brighton
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YORKSHIRE
The Corner Shop (Prop. J. Wilde)
526, Abbeydale Road, Sheffield, 7
Telephone: Sheffield 94172

Joseph Dennis Fletcher
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Telephone: Aston Common 2209
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Kynoch's of Falkirk
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XXXIX
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<table>
<thead>
<tr>
<th>Heaters</th>
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<tr>
<td>ES-ES Standard 25W to 100W</td>
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<tr>
<td>ES-ES Superb 25W to 150W</td>
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<tr>
<td>Uno Regal 25W to 200W</td>
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<tr>
<td>Rena 35W to 200W</td>
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<tr>
<td>Inter-Pet Hi-duty 50W to 150W</td>
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<td>Inter-Pet Mini Heater 5W to 75W</td>
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<td>Inter-Pet Minimatic</td>
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<td>Rena Auto Stat</td>
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<tr>
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<tr>
<td>Uno Pop/Neon 70p</td>
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<tr>
<td>ES-ES Minor 69p</td>
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<td>ES-ES Minor/Neon</td>
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<tr>
<td>Rena Top Control/Neon</td>
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<tr>
<td>Springfield</td>
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<tr>
<td>Silk-Stat</td>
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<td>Constat J-L</td>
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<tr>
<td>Hygro Spirit</td>
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<tr>
<td>Floating Spirit</td>
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<td>Uno Blue Line</td>
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<td>Windmill Outside Square</td>
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<td>Windmill Outside Round</td>
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<tr>
<td>Amazon Sword</td>
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<td>Corkscrew Vallys</td>
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<td>Banana Plant</td>
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<td>Apononeon</td>
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<tr>
<td>Spatterlock</td>
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<td>Cryptocoryne Affinis</td>
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<td>Foxtail</td>
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<td>Ambulia</td>
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<td>Oxalis</td>
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<td>Proops</td>
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<td>Super Summit</td>
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<td>Rena 100</td>
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<td>Esha 200</td>
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<td>Windmill Connector</td>
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<tr>
<td>Round Diffuser</td>
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<tr>
<td>Fine Flow</td>
<td>8p</td>
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<tr>
<td>Long Stone 15cm</td>
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<tr>
<td>Hobby &quot;Long Long&quot;</td>
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<tr>
<td>P.V.C. Air Tubing</td>
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<tr>
<td>Per yard</td>
<td>4p</td>
</tr>
<tr>
<td>P.V.C. 60 ft. coil</td>
<td>41p</td>
</tr>
</tbody>
</table>
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  - White Terylene
    - 3 x 2 13p 5 x 6 20p
    - 3 x 4 15p 7 x 9 31p
    - 4 x 5 18p
  - Daphnia
    - 3 x 3 9p 4 x 5 14p
    - 3 x 4 13p 5 x 6 15p
    - 4 x 5 18p 7 x 9 31p
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