EVERY now and again we receive a letter from someone who has decided that breeding fishes is a nice easy way of making a living, or of supplementing his income, but quite obviously is completely ignorant of even the most elementary principles of fish-keeping. We are requested to supply him with the information that will transport him along this easy road to fortune. We do what we can, of course, for this journal exists for the purpose of disseminating knowledge, but we do not hold out too much encouragement and hope to such people. We have seen so many similar cases in the past, and have observed that those coming into fish-keeping from a purely mercenary motive seldom stay long; the hobby gains nothing but is often worse off by their efforts, and the same can be said for them. Disillusioned and disgruntled, they drift away to seek some other El Dorado. On the face of it, of course, it looks easy. All one has to do is to persuade an expert to pass on the cream of the experience he has gained laboriously over many years, set up aquaria at a cost of, say, ten pounds, buy a pair of fishes at about two pounds, breed them, sell two hundred offspring at ten shillings (to undercut the original dealer) and decide what to do with the eighty-eight pounds profit.

In practice, things are very different. Successful breeders are those who begin keeping aquaria because they find them genuinely interesting for their own sake, and acquire knowledge and experience during the pursuit of an enjoyable and instructive hobby. The book which contains all the information necessary to enable a newcomer to become at once a complete aquarist has not been written, and, we think, never will be; it would run to many volumes, and in any case our mercenary friends would be too impatient to read it. There is, in fact, no substitute for personal experience, and that must be obtained the hard way. Without that experience consistent success with fish-keeping is very improbable.

We have to-day a flourishing aquarium trade which is a great asset to the hobby; we cannot do without the dealers on whom we rely for our equipment and accessories and who take the risks accompanying importations. Those who have survived from pre-war days and who are likely to survive in the future have businesses built-on experience and a genuine interest in the hobby they serve. But few of them breed all the fishes they sell; they must rely on what they receive from the surplus of the amateur breeders, and at the moment they are rather short of good stock. They will welcome the production of more good fishes just as much as we will, and they will get them as a result of the organised work now being carried on by real enthusiasts in the various
societies. We should be doing them a disservice to encourage people with no knowledge at all who seek to line their pockets at the expense of both hobby and established dealers. Fortunately, as we have intimated, such people are soon disillusioned.

Down here in the south, when we disagree with the views of a brother aquarist, we don't quarrel over it but indulge in a little leg-pulling which usually serves to settle the matter with less damage to the hobby as a whole. In our March issue we indulged in such a leg-pull, but it misfired somewhat. This was due to the deletion of part of the paragraph owing to lack of space, which necessitated the alteration of "group of aquarium clubs" to "an aquarium club" or "group of aquarists."

In consequence of this the Federation of Northern Aquarium Societies consider that the paragraph may be construed as implying that they have adopted old-fashioned goldfish standards, and we must agree that this impression may have been given. Therefore, we hasten to state that the F.N.A.S. have not so far considered the adoption of standards for goldfish or any other fish, and the paragraph as printed should not be taken as applying to them; we apologise for the careless slip that created this false idea.

Our remarks were based upon the report of a single society which stated quite clearly that the standards in question had been adopted. This report is still on our file. But we mentioned no names originally, and we still refrain from doing so. We framed our comments in a humorous vein, hoping that the shaft would go home without causing ill-feeling, and hope they will be accepted in that spirit.

Another correction to our March issue is in connection with the review of "A Study of Fishes," by Chapman Pincher, B.Sc. The author's name is unknown to ichthyologists, but familiar in journalism, and our reviewer (an ichthyologist) assumed that the book had been written in spare moments between the author's better known activities. Mr. Pincher asks us to state that this was not so, but that he wrote the book before he took up journalism and that it had been in the publishers' hands for a considerable time.

THE AQUARIST

will be sent free for one year to any address for 13/6. Half-yearly 6/9.

All communications for the Editor should be addressed: "The Editor, The Aquarist, The Buckley Press Ltd., The Butts, Half Acre, Brentford, Middx." In every case the name and address of the writer must be given.

The Editor welcomes the opportunity of considering original contributions on all branches of the hobby and its allied interests; authentic breeding records, personal experiences and photographs. Contributions should be typed or clearly written on one side of the paper only. MSS. or prints unaccompanied by a stamped, addressed envelope cannot be returned, and no responsibility is accepted for contributions submitted. Correspondence with intending contributors is welcomed.

The Editor accepts no responsibility for views expressed by contributors.

QUERIES

Postal replies are made to all specialised queries providing a stamped, addressed envelope is enclosed. This privilege is afforded only to registered readers and direct subscribers. Registration and subscription forms can be obtained on application. In all cases letters should be addressed to the Editor.

EDITOR

A. FRASER-BRUNNER, F.Z.S.

ADVISORY BOARD

AQUATIC INSECTS—L. C. Bushby, F.Z.S., F.E.S.; Ray Palmer, F.Z.S., F.E.S.
AQUARIUM PLANTS—Alfred Ashford.
FANCY GOLDFISH—George F. Hervey, F.Z.S.
FISH-HOUSE CONSTRUCTION—J. T. Alcock.
GENETICS—Margery G. Elwin, B.Sc.
MARINE ZOOLOGY—Dr. H. Leen Gauntlett.
POND PLANTS—Frances Perry, F.I.S.
REPTILES AND BATRACHIANS—J. W. Lester, F.Z.S.

Water Examination and Post-Mortem Examination of Fishes:

W. Harold Cotton, 39, Brook Lane, Kings Heath, Birmingham, 14.

Specimens should be sent direct to Mr. Cotton, with full particulars of circumstances, and a fee of 2/6.

It is important that the following method of packing fish be adopted—Wrap fish, very wet, and loosely in greaseproof paper, and then in wet cloth. Re-wrap in greaseproof or wax paper and pack around with cotton wool in tin box. Dispatch as soon as possible after death, with brief history of aquarium or pond conditions.

Water samples should be sent in a large clean medicine bottle, and contain a little bottom sediment, and a stem or two of typical plant growth.
Pyrrhulina rachoviana Myers

By W. BAILEY

In October of last year I purchased four young Pyrrhulina rachoviana, each nearly an inch long, and placed them in my community tank where they soon matured and turned out to be three males and one female.

The male fish, now 1\(\frac{1}{2}\) inches in length, is quite handsome in a subdued way; the general colour is a light brownish grey merging to almost white on the belly; the dorsal fin, set well back, is pale yellow at the base, the remainder of the fin being black except at the edges which are clear. The caudal fin is pale lemon with a bluish tinge at the edges, whilst the anal and pelvic fins, also a pale lemon, are edged with a thin brown line; on the young fish the most outstanding feature is a small glinting turquoise spot on the gill cover just behind the eyes, this spot becomes very subdued as the fish grow older.

A thin pale greenish line runs from just behind the head down the back to the base of the tail and a black line runs through the underlip and across each eye giving the fish a pugnacious look which it does not possess.

On the female fish, slightly smaller than the male, the black mark on the dorsal fin is much subdued and is more centrally situated and the dark line along the anal and pelvic fins is almost, but not quite, absent. Altogether, an accommodating fish, not fussy as regards food, consuming both dried and live food impartially and pursuing a good neighbourly policy in the community aquarium, the male only showing a nuisance at breeding time.

On February 12th last I placed all four fish in a newly set up tank, 24\(\times\)15\(\times\)12\(\frac{1}{2}\) inches, containing three large smooth stones at the rear and two Sagittaria roots; temperature was maintained at 78-80 degrees and mild aeration provided; water slightly hard (pH 6.5) and the tank was lit by two 40 watt lamps. Two days later I noticed unusual activity in the tank, each male had chosen a spot on each side and was busily fanning the position with the anal fins, turning rapidly back and forth and darting at each other and generally behaving very acrobatically.

The female meanwhile, noticeably plumper, appeared to be taking no notice of the rival suitors and snapped up with relish all titbits offered; I therefore removed two of the males whereupon the remaining suitor became even more energetic, darting at the female and nuzzling her over on to her side quite often; however, it was not until the evening that spawning commenced.

The spot chosen by this male was on top of the stone only 2 inches below water level and directly beneath one of the lamps; the female having been raised to the spot appeared a little hesitant, and the male, very agitated, swam rapidly back and forth above the spot and when facing the front of the tank hovered tremblingly, whereupon the female swam rapidly down his left flank very closely, returned up the right flank and stopped so that both fish were level above the spot; the male then slowly fell on to his side at an angle of 45 degrees at the same time moving inwards closely to the female, the egg was deposited and fertilised. The female dashed away and the male swimming about the spot fanning the egg resumed his position facing front and the performance was repeated and continued for two hours, at the conclusion of which I removed the female. During this time I noticed that an irregular dark mark had appeared on the neck of the male just behind each gill cover and the whole colour of the fish had become very intense, and continued so for nearly a week. The eggs, a pale amber colour and about 60 in number, hatched during the night of February 14th-15th and the tiny fry clung to the sides of the tank at the top for three days when they became free-swimming; the male, dashing about looking for potential intruders was not observed to consume the young.

When the fry became free-swimming I removed thirty of them into a small tank containing watercress and a layer of pond sediment and under a glass they could be seen feeding upon the infusoria present; in ten days they readily took newly hatched brine shrimp and were 1 inch in length and at the time of writing they are taking finely chopped and powdered Bemax. Finally, may I note a number of points not mentioned in Exotic Aquarium Fishes, by Innes, regarding Pyrrhulina rachoviana and which caused me to doubt the identity of the fish supplied to me.

Firstly, the brilliant turquoise spot on the gill cover of the young fish, which is so outstanding, is not alluded to in Innes' work.

Secondly, at no time have I ever noticed "the rather clear saw-toothed band of blue-black traversing the entire length of the body," nor the red dots appearing in the V spaces in the upper half of this line. Thirdly, the edging of the anal and pelvic fins is a thin dark line, only on two of my male fish has the orange edging only recently become apparent and the dark line has not entirely disappeared from the edges. Fourthly, when the eggs hatched the fry remained suspended on the glass at the top of the tank and at no time disappeared to the bottom.

May, 1948
WHATEVER the aquatic plants may lack in colourful flowers they more than compensate in their fascinating adaptations and ways of life; but it is a mistake to think that they are all so uninteresting as the average school botany book led us to believe, with its dull catalogues of rushes and sedges written in such un-English botanical snobbery as to give one a pain in the neck! If we group our pond plants for convenience into the flowers—and these are especially the water-plantain group—the rushes, the sedges and the pondweeds, we shall enjoy their fascinating interests without the long faces and long words which took the enjoyment out of school botany.

The water-plantains, the Alismataceae, are so named from their plantain-like leaves, with long parallel veins like all the monocotyledons. In July or late summer the dykes and marshland waterways are resplendent with their beauty. The common water-plantain has its heads of fine delicate silky white flowers fertilised by the useful hoverflies; and the lesser water-plantain, with a single umbel of pale lilac flowers, has a stalk which sometimes bends over to root again at the tip. Arrowhead, with its glossy arrow-like leaves and waxy white whorls of flowers deeply purple in the centre, with purple anthers, is so rarely visited by insects that seeds are almost as seldom found on this plant as on sweet-flag, and it spreads by underground runners or, as on our local canal, by the passage of barges. The best of them is the rose-pink umbel of the so-called flowering rush, growing tall and stately above the sides of the rivers and canals—an English flower I was delighted to find again on the banks of the river Barrada in Syria, above Damascus, and in the upper Jordan Valley in Palestine.

There are other pond and stream flowers to find. Look for the white water-crowfoot's two or three types of leaves, the three flower types on the tall spikes of purple loosestrife with the stigma above, or between or below the two sizes of anthers; and do not forget that this flower is no relation of the yellow loosestrife which is a primula, like the lovely lilac whorls of the so-called water-violet of the marshlands. Notice the stems of white and yellow water-lilies, buoyant like other aquatic plants from their fullness of air spaces, and see how the water-lily lengthens its stem as the water level rises, and kinks it when the level drops, in order to keep at the surface, and how its seeds, floating at first, eventually become waterlogged and finally sink safely distanced from the parent plants. Yellow as phedol is a golden yellow star-shaped marsh lily seeding with a bright red seed stalk—this is another water plant I also found in Palestine—and ragged robin is a pretty pink campanion, a relative of the garden pinks with the characteristic swollen nodes of the stem by which its family (the Caryophyllaceae) is known. Watersoldier, an erect plant with tufts of stalkless, long, narrow, sword-like leaves, edged with fine teeth, creeps along by an underwater rootstock. Its male flower is like a small edition of the white threepetalled frogbit flower, whereas the female flowers are solitary and tubular. A true loosestrife is water-purslane with opposite leaves and small greenish-purple flowers in their axis, a plant that flowers all summer through, and like so many, is often self-
The Water-soldier

The stem is an internode, the stamens bending over. Prettiest of all is the little chickweed called water-blinks, a green plant with tiny half-closed white petals, the only British member of its family. Most fascinating, however, are the duckweeds, floating on the surface of the pond in green flakes which sink for the winter in the dormancy of winter buds. Duckweed rarely grows in this country, except in very hot sunny gardens. The common rush is easily known by tufts of slender cylindrical stems and the brown flowers growing out of one side, a tuft of slender cylindrical stems and the brown flowers growing out of one side, and open in the evening to hang out the female stigma, then a few hours later the stamens shed their golden pollen, and by even more slender, the flower has closed for good. But there are many rushes of great interest like the little toad rush, which open but pollinate themselves. There is the brown heath-rush which forms the character of acres of boggy moorland, and the jointed rush whose stem pith is so spaced as to give a pretty jointed appearance to the dried stem. The woodrushes of the damp fields, have small dry dense brown flowers with a calyx of six teeth and six stamens: they look like little corolla persisting so long. There is a two-flowered form of the three-flowered rush. There are also the club rushes or Cyperus group with their flattened terminal spike of florets, and the cotton grasses whose tufted spikelets have long protruding silky hairs. Reed-maces (Typha) with their drum-stick-like heads of brown female flowers, and above them the slender yellow male flower spike which sheds its pollen and dies away, while the brown female spike ripens, are often miscalled "bulrushes" in confusion. The true bulrush is much rarer and is a Scirpus or club rush, tall, with numerous long hanging bristly spikelets.

The sedges are aquatic perennial grass-like plants usually with solid triangular stems and more greenish-purple flowers in early summer, often hanging gracefully, male and female flowers in separate glumes or spikelets, while the ovary is often in a bottle-shaped sac with its two or three-cleft style protruding. The small tufted flat-sedge with narrow 3 inch or 6 inch leaves is found in early summer on the moist fields; hairy sedge is known by its long flat hairy leaves, prickly sedge by its dense tufted-foot-high stems, narrow leaves, and its flowers crowded into a terminal spike of an inch. Loveliest of all is the great pendulous sedge, three or five feet tall with many slender four inch or five inch drooping brownish spikelets, its long leaves often as long as its spike. The pink-leaved carnation sedge with its creeping runners, short erect flat glabrous leaves and brown glumes is another sedge we pass in the damp meadows on our way to the ponds. The flat leaves of the densely tufted yellow sedge which we find by the sandhill pools have yellow fruiting spikes, and by the moorland pools the green-ribbed sedge has a green midrib to its purple glumes.

Finally, those fascinating pondweeds, the potamogetons, pollinated by the wind when their green flower spikes are held up above their oval floating leaves; the curled pondweed with its wavy-edged leaves and fennel weed with its fine thread-like...
BREEDING THE SCALED FANTAIL

By A. BOARDER

(Continued from March issue)

In my previous article I dealt with the spawning of fish and the treatment of the eggs. I now propose to describe my methods from that stage. About a day after they have been laid the eggs will close. It is easy to determine whether they are fertile or not. The unfertile ones turn white and soon become covered with fungus. At this time the fertile eggs hardly show up at all, and many breeders may think that every egg is useless. Do not, however, be in too much of a hurry to form an opinion as I have often had quite good hatchings from spawnings which appeared to contain nothing but unfertile eggs. After two or three days, according to the temperature of the water, the embryo fish can be seen clearly in the eggs, and about a day before they are due to hatch the young fish in the egg may be seen to move distinctly.

During the period of incubation I think that it is advisable to examine the water to see if it is in good condition. It may be beneficial to carefully change some of the water so that the oxygen content is improved. Aeration may be used although I have had very good hatchings without any form of artificial aeration. Breeders must realise that the eggs must have a supply of oxygen to enable them to develop properly, and I am sure that the lack of it often causes the complete failure of the incubation. It is well to remember that the warmer the water the less is the oxygen content of it. If you wish to prove this, place a few large healthy fish, tench will do, in a small tank and put them in the sun for an hour or two. The fish will soon die, and the larger and longer the fish the sooner will they die. If you do warm the water up to about 80 degrees for your hatching, you must change some of the water fairly frequently otherwise the water will not be sufficient oxygen in the water to keep the embryo fish alive. If you will be advised by me, however, do not warm up the water above 75 degrees as you will get nearly all runts if you do. I emphasised this in my previous article, but it is well worth repeating.

It is impossible to give all the reasons for poor hatchings. Over many years of breeding I find that I get many thousands of eggs but very few fish in relation to the number of eggs. In 1946 I raised twelve hundred fish, but in 1947, from twice the number of eggs, I only raised about seven hundred and fifty. I had increased my tanks and made every provision for a large hatching but this did not materialise. I also had used artificial heaters to warm up the water for hatching, and so it can be clearly seen that the quicker hatching did not give me nearly as many fish as I had the previous year when no artificial heat was used. Last year we had a very hot summer, much better than the year before, and yet wherever I went I heard the same story of bad hatchings. I feel sure that the chief reason of the bad hatches was the fact that the warm weather, by raising the temperature of the water, lessened the oxygen content of the water and so prevented the embryo fish from getting enough oxygen. The heat however was not the only factor which caused failures as I placed some of the eggs in an outside tank in which to hatch and a sudden fall in the temperature to about 50 degrees meant another failure.

These failures were not due to unfertile eggs, as the majority were fertile but seemed to go wrong about a day before they were due to hatch when the young fish could be seen distinctly; well formed in the egg. Some beginners have very good luck with hatchings and then after a while they too experience difficulties. If the eggs are left in the pond where they have been laid, and are allowed to hatch on their own, the temperature of the water may be very much lowered by a change of the weather and failure result. Again when the adult fish are left with the spawn you will find that very many of the eggs are eaten before they get a chance to hatch.

Given the right treatment and a fair amount of luck, the young fish will emerge from the egg and anchor themselves to the sides of the tank, bowl, or to the water weed. At this stage they are very tiny and almost helpless. Do not disturb the container in any way as you can help as the fish have a food sac to keep them going for a day or two, and any unnecessary movement will cause this to be used up too quickly. There is no need to provide any food at first and the nature of the resultant feeding is much a matter of individual taste. Once the fish are hatched I do not see any reason why the temperature of the water should not be stepped up a bit. If you have used a temperature of 70 degrees with which to hatch your fry, there is no reason why it should not be increased to up to 80 degrees once they are out of the egg. In a fact that the warmer the water within reason, the quicker will the fish grow. I noticed last year that the fish in the warmer tanks were swimming about and were much more active than those in cooler water. They then grew more quickly as they were able to digest their food easier and so could take it more often.

I feel sure that the safest food for the first week or two is just green pond water. This contains plenty of algae which is sufficient food for the youngsters.
as this early stage. I have tried infusoria but after experimenting with the different methods from hay, lettuce leaves, banana, etc., I find that I have more infusoria naturally forming in the pond than I can get to form artificially. Also the water in which I raise my cultures smells so foully that I am sure that it cannot be good for the fry. It must also be remembered that the water weed is usually teeming with a tiny population of its own which may be seen with a microscope. Therefore the amount of weed which your tank contains must make a great deal of difference to the amount of food present for the fry. This brings me to the most important difference in raising healthy fry, and that is plenty of room. I cannot stress this point too strongly. It is absolutely impossible to raise a number of fry without giving them plenty of room. I will go so far as to say that if you place a large number of the fry in a small tank and feed them on what you like, I will guarantee to raise a very few fish in a large container without giving them any artificial food at all, and they will beat the fish which you have overcrowded.

I don’t know who first recommended the rule of one gallon of water to every inch of fish, but it is as true to-day as when it was first suggested. Of all the don’ts which I could state the chief one would be overcrowding. When the fry are only about a week old the fantail may be clearly seen. At this early stage it looks just like a small spear, but it is quite distinguishable from the single tail of the ordinary goldfish. Now is the time to start culling your fish, especially if you are limited for room.

You will not be able to raise a large number of healthy fry unless you have plenty of space. This is most important, and as you are concerned more with breeding for quality than for numbers, it is imperative that you do not waste time and labour with the throw outs. You will be very lucky if you do not get a good number of throw-outs and these can soon be seen. Spread the good fish out as an early date so that you can give them the maximum space and attention. I know that it is not much use telling beginners to take away all the dead and single-tailed fish, as I know that they will hate to do so, but it is good policy where you have limited space to concentrate on the good fish only.

When the young fish are about a fortnight old and the water has been warmed enough, you may begin to give artificial food. Of course if you have been able to keep up a good supply of micro worms the fish will have made good progress, but if that has not been the case the rate of growth has been largely determined by the amount of space the fish have had together with the amount of fresh pond water which you have been able to supply. The first artificial food may be finely ground Bemax. This should have been well sifted so that only the powder is used. I strongly recommend scaling this food before using it as the fish will not be able to digest it well otherwise. I have tried dried egg and dried milk but unless these foods are scaled I am afraid that you will not be very successful. If unscaled foods are fed to these small fish I think that there is a strong tendency for fungus to appear on the gills and sometimes tails of the fish. I may be wrong, but I feel sure that many of the dills from which the fish suffer are caused by indigestion. This seems to affect the mucous covering of the fish and lessen its resistance to fungus. The amount of food will depend greatly upon the temperature of the water. The warmer the water the more food the fish will require. It may be given as often as every two hours all day, but only enough food for them to clear up at each meal should be given. From now on the fish will grow fast if they are fed right, and you can see the difference in the fish in a few hours.

May, 1948
ALTHOUGH I have been a keeper of cold-water fish for many years I did not enter into the tropical field until nearly three years ago, and this is how it happened. Owing to increases in my own family, and a subsequent lack of living space, my favourite shubunkins had either to be relegated to the garden pond, or go into the cupboard.

Having installed the 2 ft. x 1 ft. x 1 ft. tank at the top of the cupboard I found that it was maintained at a fairly high temperature, too warm in fact for large shubunkins, so these fish went into other quarters and I bought myself some Guppies and Mosquito fish, which soon multiplied many times.

This encouraged me to bigger things, and my next purchase was two Angel fish. For these I made and installed the lower tank, which is 37" x 12" x 20" deep.

This tank soon became a community one, with

The cupboard aquarium, and a neat wall aquarium. Angel-fish can be seen in the lower tank

The mantelpiece aquarium. The top cover is held by supports on the wall, and when it is removed the lighting hood can be raised up upon the same supports to provide illumination when working. The dark rectangle seen above the tank is a mirror.
A PLASTIC FEEDING-BOX

By D. JOHNSON

In a recent note published in the *Aquarist* it was suggested that plastics may be poisonous to fishes. The term “plastic” covers a very wide variety of substances, and it is possible that some of them may be dissolved out by acid and prove injurious to the inhabitants of the aquarium. On the other hand, appliances made of plastic materials have been used by aquarists for many years without any harmful effects, and one of the most useful, perspex, is being used in America for the manufacture of aquaria themselves.

My own experience with perspex has been wholly satisfactory, and for some time I have been using a feeding-box of my own invention which may interest others.

The point about this is that it prevents the overfeeding of food to all parts of the tank, with subsequent thickening of the sand if feeding is too heavy. Any food that is left over can be removed without difficulty.

As will be seen from the sketch, it is a simple box, the base of which is above water level. One side slopes outward to allow for spreading as the food is dispensed, and in this side is left a large opening through which the fishes swim in order to reach the food. Whatever is left stays on the floor of the box and can be removed either with a dip-tube or by lifting out the whole box. In this model there are four legs fitted to the base by means of screw threads, but these are not really necessary; the box can be made taller and stood on the sand.

Perspex is quite easily cut with an ordinary saw, and joined with a cement sold for the purpose; anyone should be able to make this box. Being transparent, it is not conspicuous when in the aquarium.
The "Balanced" Pond and Aquarium

EXPLAINED FOR BEGINNERS BY

JACK HEMS and GEORGE F. HERVEY

The surface of our country is by no means flat, and one need not travel very far before meeting a natural hollow in the ground. "Mark what happens," T. H. Huxley writes in his Physiography, "when a heavy shower of rain falls upon dry ground. If the ground be formed of hard and solid rock, such as granite, the rain, after wetting the surface, runs off in all directions; some finding its way to the nearest streamlet, whence it flows sooner or later into a river, and some finding lodgement in little hollows of the rock, where it collects in pools, which are slowly dried up by wind and sunshine. But if the ground, instead of being hard like granite, is soft and porous like sand or chalk, the water will then sink into its substance, and may even pass out of sight without so much as wetting the surface of the thirsty soil. Rocks which thus allow water to filter through them are said to be permeable, while those which refuse to allow the water to soak in are described as impermeable: a bed of sand, for example, is permeable; a bed of clay impermeable." If, therefore, the bed of our natural hollow is of a clayey nature, and if there is no outlet for all the water, a pond will form.

At first no life exists in the water, for what vegetation existed in the hollow was terrestrial and has been destroyed by being submerged. But the putrefying vegetation gives rise to bacteria (without which nothing can exist) and the pond receives its first inhabitants. As the bacteria increase in number the water becomes cloudy and exudes an unpleasant smell. The condition persists until all the decaying matter has been converted by the bacteria into nitrogenous (plant-feeding) material. But the conversion of decaying matter into nitrogenous material starves the bacteria of food, and, of course, as the bacteria are starved out the water clears and loses its unwholesome smell.

Meanwhile the spores of algae (minute and elementary forms of vegetable life) have been carried to the pond by the wind from other waters. More advanced aquatic vegetation is brought, in the form of seeds and broken stems, embedded in the mud on the feet and feathers of birds. The eggs of fishes and of water-snails are introduced in the same way. Dragon-flies and may-flies deposit their eggs in the water. Water beetles and water bugs make it their home. Frogs and newts visit the pond, find the surroundings congenial, and make it their breeding ground. Flowers spring up near the water; and, as the years roll on, trees and shrubs make their appearance on the banks.

At last the complete, self-contained, pond; all the inhabitants living in a state of interdependence, preying upon one another, so as to form a self-supporting colony (Fig. I). All the time some creature is being eaten by another so that no species increases beyond its proper proportion. Local temperature, the mineral content of the water, and the nature of the subsoil, play their parts in dictating which plants shall flourish and which shall not. Nothing is wasted: even the dead leaves of the plants and the excrement of the fishes and snails are used up. Nature demands a purpose of everything.

But it is, perhaps, the aquatic plants that play the most wonderful part of all. For the representatives of the vegetable kingdom take in carbon dioxide through their leaves (using the carbon to build up their green tissues and fibres) and liberate oxygen. In fine, the oxygen-breathing animals cannot live without the aquatic plants, the aquatic plants cannot flourish without the oxygen-breathing animals, and neither can live nor flourish without light. The process is known as photo-synthesis; it is of fundamental importance.

If a shoot of Myriophyllum, or of some other oxygenating aquatic plant, is placed in a jar of water and stood in the sunlight, it will not be long before little bubbles will be seen rising from the leaves of the plant to the surface of the water. It is not difficult to capture the bubbles and prove that they consist of oxygen: moreover, by counting the bubbles, and by using glass jars of different colours, it can be shown that the red, orange, and yellow rays are much more important than the blue and violet rays. The absorption of carbon dioxide, fixation of the carbon, and release of free oxygen, is the most characteristic work of green plants. The essence of what takes place is not known, but the conditions for the process known as photo-synthesis are thus

THE AQUARIST
Fig. 1. The food-chain in natural waters—
A. Phytoplankton
B. Zooplankton
C. Weed-dwelling fauna
D. Bottom fauna
Continuous lines show course of inorganic salts, broken lines their course after they have been built into living matter.

aquarium or pond of the aquarist is an unattainable ideal. In a wider sense, however, the "balanced" aquarium or pond is attainable; for by not overcrowding the aquarium or pond with animal life, by stocking the aquarium or pond with sufficient plant life, and by giving the aquarium or pond plenty of light, he can reach a close approximation to a natural stretch of water. But he can never obviate the necessity to feed the fish, and, moreover, he has to assist nature further by removing from time to time any excess of sediment that collects in the aquarium or pond, as well as uneaten particles of food and decaying plants. Apart from the necessity of maintaining the appearance of the aquarium or pond, it is, we repeat, impossible for man to recreate nature, and, at best, he can go only a short way towards imitating it.

But however many plants there may be in an aquarium or pond, they alone will not supply sufficient oxygen to support the animals, and oxygen must be drawn from the atmosphere which comes into contact with the surface of the water. In Freshwater Aquaria, G. C. Bateman records that he kept twenty-six minnows for a week in an ordinary soup plate, a little more than half full of water, and only one of the fish died. Yet one small minnow will soon die if it is placed in a narrow-necked bottle containing many times this amount of water. The reason is not far to seek. In the soup plate the surface of water exposed to the air is so great that the water is constantly being re-oxygenated; but in the bottle the surface of water exposed to the air is so small that the water cannot absorb sufficient oxygen to meet the requirement of the fish, which in consequence dies of suffocation.

From this it follows that the shape of the aquarium and pond in which fish are kept is a matter of very
It is precisely the same with a pond. A pond constructed in the shape of a saucer will hold in comfort many more fish than one constructed in the shape of a cup, even though a pond constructed in the shape of a cup may contain four or five times more water than one constructed in the shape of a saucer. It must be pointed out, however, that fish in a pond are not so dependent on the surface area exposed to the air as are fish in an aquarium; for the water in a pond is kept almost constantly aerated by wind and refreshed by rain. Thus the re-oxygenation of a body of water outdoors is always more complete than of a body of water indoors.

The depth of the aquarium or pond is of no great importance, except that it should never be so shallow nor so deep that the aquatic plants will fail to grow properly. An aquarium may be anything from nine to fifteen inches deep, in proportion to its supercilious. A pond should be about twenty-four inches deep at its deepest part; for it is unsafe to winter fish outdoors in less than eighteen inches of water (so twenty-four inches gives a margin of safety), and though few aquatic plants (except some of the water-lilies) flourish well in such deep water, arrangements can always be made to plant them at a depth to suit their individual requirements. There is little to be gained by constructing a pond deeper than twenty-four inches, at all events in a temperate climate.

**A NOVEL WAY OF DESTROYING PESTS IN A POND**

Dytiscus beetles and water boatmen are not welcome in a garden pond but are often difficult to net. Here is a novel way of destroying them which I find most effective. Obtain a piece of straight ½ in. metal tubing 4 ft. long. File the ends inside and out, and clean if necessary, thus making a blow-pipe. To use, collect a number of hips, seed heads, peas or whatever happens to be in season, insert one of these in the mouthpiece of the blowpipe, place tongue over end of pipe, take aim at foe, build up a pressure and suddenly withdraw the tongue. With a little practice the missile can be sent with sufficient force and accuracy to smash the crustiest old dytiscus and yet become spent within 4 ins. of water.

**OLD SINKS FOR REARING FRY**

Large old-fashioned scullery sinks are unbeatable for raising goldfish fry. They should be mounted on a brick heat box 1 foot high and heated with a lamp if needed. Cover with glass and smear this with white paint if the situation is sunny. A sink 48 x 24 x 4 ins. will hold 24 two-inch fish or 50 one-inch fry. They can also be used for spawning.

A. G. FIELD

THE AQUARIST
"DECONTROLLED"
SPAWNING OF
THE ZEBRA FISH

By H. J. BROOKER

DURING October, 1947, I purchased two pairs of adult Zebra fish, hoping, like the majority of aquarists, when they buy fish, to breed them. On their arrival home I had them put into a tank, 14" x 10" x 8" deep, the bottom of which was layered with stones, the size of marbles, and separated the sexes by means of a glass panel. Their food from then on consisted of Tetrafix, finely chopped earthworms and occasionally Daphnia.

My first attempt at getting them to spawn was in January, as the females were "noticeably swollen with eggs," or so I thought. I removed the partition an hour before dusk one evening and awaited results. Chassing commenced after a few minutes vigorously, and from appearances it looked as if everything was going according to plan. The fish were removed the following day at noon and the temperature raised gradually; from 78 degrees F. to 85 degrees F. and kept constant for eight days. As nothing had happened by that time, I knew my first attempt had ended in failure.

I tried again in March using the same procedure with exactly the same results. During this attempt one of the females died. Its eyes had been picked out. Whether this occurred before or after death is unknown.

On March 6th I had the three Zebras transferred to a small community tank, 18" x 10" x 8", in my bedroom. This tank is planted normally with Cavendishia, Cabomba and Nymphaea nouchali, with Riccia floating at the surface, and situated in a window facing south. The side nearest the window and the two ends are shaded and the top partially so by a light shade which is never switched on during the hours of daylight. The thermostat is set at 70 degrees F. but with the sun on the tank the temperature rises to 80 degrees F. and over. No live food was fed to the fish. They existed on dried food.

The morning of April 22nd was dull and very close. I noticed rather more activity in the tank than usual. The three Zebras were swimming around the top of the tank fairly fast and appeared to be gathering in air. I accredited this to the closeness of the atmosphere as the tank is not overcrowded. A short time after, the female made rushes at each male in turn. These rushes were soon reversed and the two males began chasing the female, forcing her up through the Riccia, and, to my surprise, after my efforts at controlled breeding, now, with no preparation whatever, spawning was taking place. A cascade of eggs, looking like a bursting rocket on Guy Fawkes night, were gently falling to the bottom where the occupants were busy making short work of them. The temperature of the tank was 72 degrees F., rather low I thought, for spawning to take place.

There were six batches of eggs released that I noticed, and the intervals between each irregular. The first occurred at 8.25 a.m., second at 9.20 a.m., third at 9.25 a.m., fourth at 9.59 a.m., fifth at 10.28 a.m., and the last at 11.08 a.m. It will be noted the spawning from start to finish only took 2 hours 43 minutes, and there was as much as 55 minutes between lots one and two and as little as five minutes between two and three. The number of eggs in each batch also varied. The average was probably from fifteen to thirty.

Favoured places in the tank for the release of eggs were:

(a) in a corner, between the thermometer and the male, the female forcing herself over the suction cap holding the thermometer which protruded just above the water.

(b) in the centre where the Riccia was thickest.

Each time the males were nudging the female near the vent as though to lift her out of the water. When the spawning had finished the female retired to a corner breathing heavily, while the two males continued rushing each other at the surface. This may have been caused through jealousy and they were fighting each other because their excitement had not died down.

At one time during the spawning I missed the female and could not see her anywhere in the tank. I thought she was hiding behind one of the rocks until I saw the white-worm basket doing the rhumba. She must have been pushed clear of the water and unluckily fell into the feeder.

Needless to say none of the eggs survived long enough to hatch. I could do nothing about saving them as I am an invalid confined to bed. For all that it was a thrilling morning and for that morning alone I would not have changed my place with any fit man. Illnesses do not seem so long when one's an aquarist. He has more time to study his fishy friends.

Zebra Fish (Brachydanio rerio). Female above

May, 1948

45
BEGINNER’S LUCK

By F. DENTON

THE purpose of this article is not to recount the results of exhaustive experiments by an expert, but merely to place on record the manner in which another family became devotees of that most fascinating hobby, the keeping of tropical fishes. The family consists of myself, my wife, and a lively seven-year-old daughter.

Our interest was aroused over a year ago as a result of seeing a nephew’s tropical tank containing an assortment of brightly coloured “tiddlers.” Very attractive it looked too! We immediately decided that in due course we would set up a tank of our own. Opportunity, in the shape of two rooms, with use of kitchen and all conveniences did eventually arise, and we started operations on January 17th of this year.

Backed by a lot of advice from the nephew, three back numbers of The Aquarist and a small booklet on the subject of aquarium management, I first bought a tank, size 24" × 12" × 15", cost £2. The dealer called it a well seasoned aquarium. My wife described it as a dirty, filthy, second-hand article. However, by the time we had cleaned it, tested it for leaks and found none, and touched up the ironwork with green paint she took more kindly to it.

We decided that the side of the room opposite the fireplace would be the best place for our tank, so it was placed on an old chest, about eighteen inches in height, in a position well shielded from draughts. The room has a southerly aspect and the tank receives direct sunlight for a short period during the mornings only.

For additional light I fixed a wall light with a circular metal shade so that the 60 watt pearl bulb was located centrally over and about 2 inches above the cover glass.

I washed and scalded eight pounds of aquarium gravel, laid it gently by the spoonful in the bottom of the tank, and carefully filled up with tap water to within two inches of the top. I planted six assorted grass-like plants in the back half of the tank. The water looked cloudy, the plants looked “seedy” and numerous tiny bubbles formed on the sides of the tank. For the next fortnight we watched the tank carefully. The water cleared and the bubbles disappeared. The plants did not thrive at all; on the contrary they looked more weary every day. To sustain interest we made regular examinations of water samples under a low power students’ microscope. The first few samples revealed nothing. On the third day my wife observed a kidney shaped object running round in little circles. Excitement ran high at the sight of life in our aquarium! We deduced from the books that we had infusoria in our midst. From then on the samples showed an increasing number of these tiny creatures and by the end of January we could not wait any longer.

On the 31st January we all three went to town. First I bought an assortment of plugs, adaptors and flex, necessary to provide heat and light for the tank. I felt slightly self-conscious as I explained my circumstances and requirements to the expert in charge of our local aquarists’ shop. He was not impressed by my microscopic discoveries, and implied that, without heat or fish, what could I expect but poor plants. Nevertheless he was very helpful indeed. He advised a 75 watt immersion heater and a selection of good plants and fish for beginners. We were enthralled by the array of specimens in his numerous brightly-lit tanks. My wife and daughter were specially thrilled by the tiny brilliant Neon Tetras, but at 70/- each we decided to leave them until another day. That same evening our infant inquired when we were likely

(Continued on page 48)
THE CRAYFISH

By F. W. WOOD

I HAVE been interested in aquarium keeping for a number of years. When I first started I could not afford a proper glass aquarium, so I asked the local builder if he could supply me with an earthenware one. He gave me one 3 ft. × 1 ft. 6 ins. × 5 ins., this I stocked with some fish and two crayfish. When I told my friends I had some crayfish, they asked what they were, and they soon became rather an attraction. Possibly many aquarists do not know of these interesting creatures, so here is a sketch account of them.

The crayfish is found in many parts of the world. Before the war many were exported from Canada in tins as a food. The crayfish is not so common in England as it used to be, but it is still to be found in rivers and canals in chalk and limestone districts. It spends most of the day in holes in the bank, but at night it moves abroad over the river bed looking for food.

The crayfish looks something like a lobster in miniature, the colour varying from a grey-brown to a rich brown. It is about five inches in length when fully grown, and lives about five years if it dies naturally. The continental species grows a little larger and it is slightly different in colour.

It possesses four pairs of walking legs, two pairs of antennae (a pair of ordinary antennae and a pair of antenules) and a pair of formidable pincers.

The crayfish can move in three different ways: walking, swimming and darting. In the first way the four pairs of walking legs are in contact with the river bed, and the pincers are held aloft, the antennae being in constant motion exploring the surroundings. It does not swim very often as the body is a little heavier than water, but it can swim short distances by the action of its legs and other parts of its body. The animal only darts as a means of escape; it does this by flexing the abdomen, with the tail-fan extended, this causes the body to jerk backwards through the water, during this operation the antennae are pointed towards the back of the animal to detect obstacles in the rear.

The animal feeds on practically anything living or dead, preferring worms and beetles, etc. The food is swallowed whole or (if it is too big) torn to pieces with its pincers. The food is then passed towards the mouth with the pincers, but as these cannot bend round to put the food in the mouth, this operation is performed by the front pairs of legs. The food is finely divided at the back of the mouth.

![The Crayfish](image)

(Atopus fluviatilis)

(Phot.: W. S. Price)

May, 1948
As the animal is covered by a hard coat, growth is made by a series of steps. Two or three times a year the outside shell is cast off. When this is about to happen the crayfish retreats to a secluded spot, and agitates its body, as if in an attempt to loosen its old coat. The body is then bent and a crack in the shell occurs, when the anterior part of the shell is withdrawn, the antennae and other parts being withdrawn like a hand from a glove. The abdomen is then released, and with a spring the animal frees itself completely. The old legs and other limbs are freed by a longitudinal split down each limb. The new cover is lighter in colour and is softer than the old one, and it is during the next few days that growth takes place, calcareous deposits are laid down on the new cover causing it to harden.

During this change a leg might be broken off or the animal might lose a limb by an accident. Should this happen a new one will grow, though it is usually smaller than the original limb.

The only sure way of finding out whether a crayfish is male or female is to look at the pairs of appendages under the abdomen. Of the male the last pair are modified to form sex organs.

The mating season is in the late autumn and fertilisation of the eggs is external. The eggs are carried on the appendages under the abdomen of the female until spring when they are hatched. The newly hatched crayfish is a small edition of the parent. The young ones cling to the mother until the first moult.

The depth of water in the crayfish tank should never exceed six inches as they need a plentiful supply of oxygen. Weeds and stones should be provided for cover, but the crayfish will come out of hiding if a worm is put in its sight. Not more than two crayfish should be kept in one tank, but some fish may be kept with them as long as they are not too small.

If the crayfish is caught locally it is best to transport it in a box containing some damp moss. Crayfish can be brought from many pet shops and biological suppliers.

BEGINNER'S LUCK—(Continued from page 46)

to get some wire for Tetras. But we did become the proud owners of one pair of Green Swordtails, one pair of Zebras, one Red Platy and one Blue Platy.

Having installed our fishes in their new home we proceeded astoundingly to overfeed them. Soon the water became cloudy and the sand below the feeding ring turned a dirty grey. The bottom of the tank became covered with a grey woolly-looking substance.

Our expert was very sympathetic when he heard my sorry tale. Acting on his advice we emptied the tank completely. We washed the gravel and replaced it, together with another 4 lb. which enabled us to bank up the gravel towards the back of the tank.

We put the same water back, filtering it through a kitchen sieve lined with cotton-wool. We threw away the first lot of plants and put back only the healthy looking specimens. Since then the tank has looked better every day. We now feed the fishes on the little and often principle. We have added a pair of Rosy Barbs, one Black Molly, and a pair of Red Swordtails to our community, and Mr. Green and Mrs. Red Swordtail have rewarded us by presenting us with a dozen or so babies, four of which were rescued before they were eaten and are now “doing fine” in a large jam jar suspended in the tank.

We are all well pleased with our tank which gives a touch of life and colour to our room which no other hobby could supply. We know all our fishes as individuals, not as specimens. We love the lively playful Zebras, the boisterous hurrying Rosy Barbs, the rakish Swordtails and their harassed females. We have a special liking for the amiable Plats and that most friendly little nosey-parker, the young Black Molly. A tap near the feeding ring brings them hurrying to see “what’s cooking.” We have already made up our minds that when we get a house we will have more tanks, but that will be another story. In the meantime we are proud of our one community tank. We have learned much from experience and from the books we have bought. The tank is an invaluable aid to education for our infant and the pleasure we all get from our pets is ample return for the five pounds odd it cost us to set up the tank.

THE AQUARIST
ALDER-FLIES

By JOHN GRAHAM

The Alder-Flies, of which there are two British species, are quite common insects and during the early summer may be noticed resting on bushes, rushes and fences near water. They have large wings for the size of their body yet, instead of flying freely they seem to be almost too heavy to operate their fine wings and if disturbed may travel away a short distance rather than fly beyond them.

The forewings are rather darker in colour than the hind ones, the nervures are coarse and dark. They are held over the body house-roof fashion, not folded flat like the house-fly. In general appearance these flies are so lacking in elegance that it is difficult to believe that they are related to the dainty May-fly and the gorgeous Dragon-fly.

The female lays her eggs upon any handy surface near the water’s edge and the resultant larvae must find their own way to their future home beneath the surface. As their only guidance appears to be an instinct to go always down hill, a good many take the wrong mud and meet a miserable end on dry land. The fortunate ones hide themselves as quickly as possible in the sheltering mud at the bottom.

They are predacious creatures and will boldly attack creatures quite as big as themselves with their wickedly sharp jaws, which are long and curved. When fully grown the larvae are about an inch in length; they then burrow into the bank above water level and construct an oval cell in which they undergo their metamorphosis. The pupa is quite distinct like that of butterflies and moths, not active and predatory like those of its relations the May-fly and Dragon-fly. The legs and wings, however, are quite free, not merely marked out on the surface like those of the butterfly and moth.

(Continued from page 39)

Two will outgrow the others considerably. As I write I can see a tench which I have in an indoor tank and although it is only nine months old it is already nearly five inches long overall and twice as big as another in the tank the same age. This fish is quite tame and will take a small worm from my fingers with great rapidity. What grand aquarium fish these tench are, no trouble and so handsome.

Having reached the stage when the fish are about a month old I think that it will be a good time to postpone my further comments on the subsequent treatment and culling of the young until a later article.

May, 1948
THE "HARKER" AQUARIUM COVER

An entirely new style of combined Aquarium Cover and Light Shade must now have been seen by many aquarists; quite a number of this noble band have already expressed their praises for its general appearance and pleasing contours. This, of course, is all very gratifying to me, but not many with whom I have conversed appear to be aware of the technical points incorporated. As I am responsible for its design, which to my way of thinking, is an approach to the ideal, no doubt many readers will be interested in the following description.

1. No glass cover is required, thus eliminating a constant bugbear, and by its absence the experienced aquarist will agree, many advantages are gained. 2. The inside of the shade is continued down to a depth of 1 inch inside the tank to form a drip edge so that all condensed water, etc., is returned direct. Thus the top of the tank frame remains dry and free from that rusty appearance with which we are all too familiar when the average tank has been in use for any considerable period. 3. The position of the lamps is so arranged that these are as far forward as possible to accommodate the ordinary bulb type up to 60 watt, and one fixing for approximately every 12 inches of tank length, which produces a strip light effect. By this method the light shines on the fishes and not through them, and the reflector is shaped to throw the light as far as possible to the back of the tank, as possible for the benefit of the plant life. 4. The hole for the lamp fixing allows the lamp socket to extend on the outer side, and the base of the bulb beds down into a soft rubber ring on the inside, and is secured with a stout rubber ring on the outside. Thus, the whole of the lampholder is clear from any possibility of corrosion or electrical short circuits due to condensation. 5. There are no internal ledges on which some of the more enthusiastic occupants of the aquarium can be trapped.

The cover is made of stout gauge sheet metal, and is an easy drop-on fit. It can be readily raised at the front for feeding, and is also adaptable to any size of angle-iron or all glass aquaria, and lends itself suitably for cut-outs to accommodate the usual internal accessories. The outside can, of course, be painted to suit any existing colour scheme, and the writer finds two coats of white flatting under a coat of white marine enamel gives a good twelve months' service on the inside, to which at the end of this time, if necessary, a further coat can easily be applied.

From the foregoing, and the accompanying sketch, the pleasing contours already mentioned can be appreciated, as the apparent outcome of necessity in disguise.

Stanley Harker

AQUATIC PLANT LIFE
(Continued from page 37)

leaves. In many ponds we find hornwort whose whorls of leaves are much forked or branched and which flowers only in shallow waters, and then the pollen is distributed by the surface currents—you can demonstrate this by growing the plants in aquaria. More interesting is to find the very rare male plant of the common Elodea canadensis (known by its whorls of three small leaves), most of whose plants are females. Here the female flower lengthens its calyx tube to reach the water surface, but the male flower detaches itself and floats to the surface, there to burst and its pollen, floating on the surface, is drawn to the female stigma. We often see the oval floating leaves of frogbit in dykes and ditches, followed later by its pretty three-petalled white flowers visited by the bees. Like the hornwort the main plant dies off in winter and the terminal buds, formed in summer, sink to the bottom, rest there for the winter, and rise up and produce the new plant the following year, all of which can be seen by keeping these plants in a few earthenware bowls or aquaria.

50

TIPS ABOUT FEEDING

Feeding fry is often a problem, and some readers may not know that the youngsters can be given raw meat if the following method is used. Do not cut the meat but scrape it, as this gets it into very small pieces; then put the scrapings in a small jar of water and shake it up. Feed this water to the fry with a fountain pen filler or a drip-feed; tiny pieces of meat will be floating in it, and the fry will eat these and thrive on them.

A fountain pen filler is also useful when feeding with Mikro. With the filler, run a little water over the surface of the culture and collect it in a corner of the container. Remove this water, which will now be full of Mikro, and place it in a small jar (such as those in which French mustard is sold). To this more water is added, as this spreads out the worms and the fry will not miss so many. This diluted culture can be given to the fish by means of the fountain pen filler.

F. M. Watson.

THE AQUARIST
FULLY share with Mr. J. W. Southwell of Enfield Aquariumists, one of the most interesting aquariums in the March issue. To me his writing rendered that the Sphene Barbs are a most interesting fish in a Pod," should presume to look on the Live- natural light, and makes me wonder why the devotees of the Sphene Barbs, Perma-Blacks, and Perma-Blacks. The passage edge to the caudal fin of the Sphene Barbs is an interesting refinement, but is not the Perma-Blacks are quite a nice variety. They are born black, but as to say, they also remain small. The Perma-Blacks are certainly a useful thing, for the better male, with his tri-coloured dorsal and caudal fins, was well worth attention.

Mollies are to be had in America, and I believe they are not seen any, but presume, like all that, they are inclined to be weak. Also, of the Sphene Barbs, mention must be made of the Wild Latipoma which now is rarely seen. I am happy to say I have some of them and the beauty of the male is hard to describe. With a slight fading on the front of an aquarium at about 45 degrees its reflection, you will be pleased to see a trace of brown network. This is truly a wonderful fish and one of the few species of fish with a high dorsal which is extended (all too rarely) the most blaze aquarist would be pleased to have. Mollies will thrive under all average conditions, in a large aquarium in a bright position, so that plenty of algae are available at all times. I still adhere to my so-called dirty tanks; it seems to me much more natural for all fishes, and unless the water has become foul no harm is likely to result from mud. Anyone who has seen a tank of Mollies eagerly devouring the algae from the front glass of an aquarium in a sunny period following a dull spell should need no further proof of their liking for these conditions. Though the fishes normally are not always the fare at these times, all can definitely be counted. They seem also to like Tubifex and whiteworms, though these should be given sparingly. Bemix, which is now easily obtainable, is a good food for Mollies, and also any reliable make of dry food. Daphnia is much appreciated, and I like to give plenty to growing females, as I think it helps with the delivery of the young (a very critical period with some female Mollies) since the young are so big at the time of birth. The advice not to move gravid Mollies should be taken to heart. If for any reason such a female must be moved, chase her into a large jar of water, but do not let her lay in a net. I cannot make out why people lose their baby Mollies because of the mother remaining in a tank. I never worry about the young, for if the tank is well planted, including plenty of my favourite floating ferns, and if the female is well fed and not disturbed, there should be no losses. Only this week I had from a dangerously heavy Molly, between thirty and forty young, and besides both parents, there were six adult livebearers in the same two foot tank. The Molly is definitely omnivorous, not of necessity, but by nature, as witness the shape of the mouth for browsing on algae. Those who know of the "innards" of Mollies tell us that the stomach and intestines are unlike those found in the carnivorous species. Any fishes will do for live food, even as small a boy will devour chocolate after a big meal, but even as once a small boy would soon tire of a diet composed entirely of chocolates, so I think would Mollies sicken of an unlimited diet, and the nosey food would not supply all their needs. The ideal way to keep Mollies is to house them in a roomy tank, preferably with no fast swimming fishes, as in my view Mollies like to lead a quiet life—though when a net is produced they have a wonderful turn of speed and can also grow some small plants with care. They are the most well-behaved of livebearers and are content to mind their own business, and as to what they eat, if you would keep Mollies feed them frequently but don’t "muck them about."

**OTHER MOLLIES**

by R. G. MEALAND

**NOTES AND NEWS**

At their meeting on April 6th, members of the Cambridge and London Aquariumists Clubs met at the Cambridge Aquarium, in a display of submerged aquatic plants, comprising a large number of species. The specimens had been donated by Messrs. Perry and Enfield. The aquarium was beautifully arranged in a Kneller jar, and was visited by Mr. B. A. M. Wright, a member of the Society, who was greatly interested, and the Society desires to express public thanks for the generosity of Mr. G. Phillips of the West Middlesex Aquariumists' Society on April 16th, and gave an interesting talk on the breeding of the Leopard Guppy. He traced the history of our knowledge of the species from its discovery by Henslow in 1839 to 1846, when the Rev. R. C. Lamarr gave specimens to the British Museum, and remained in our possession, and it was养护 it in this aquarium fish since 1905. The lecturer stated that the Guppy Breeder Society has been formed and is now a branch of the Cambridge Aquarium Society, with 15 active members. There are more than a dozen varieties named for the Guppy Breeder Society.

He advised his listeners not to breed from species less than six months old, and the possibility of breeding should take place before March, as this leaves the longer days for the fish to feed and exercise, helping their growth and colouring. Artificial lighting will be of great benefit to fish and plants, and the temperature should be about 78 degrees Fahrenheit. As soon as possible the fry should be sexed, and the sexes kept apart except when paired for breeding. Mr. Phillips brought with him six tanks of fish to illustrate his talk, and was afterwards carried on to the London Aquarists' Society, where it was equally appreciated.

The new speciality 'Sphene Barbs', the Study of which is now well established, but no fixed decision has yet been taken as to its title; until this has been agreed it cannot be included in the Directory. The officers of the Society are as follows: President, E. R. President; Vice-President, George Page, E. J. Whitfield; Chairman, J. C. Emsley; Secretary, W. C. Treasure, S. J. C. Fisher; Technical Officer, E. J. Affleck, B.Sc., who at the inaugural meeting gave a brief outline of the research which the Society will carry out in order to improve the golden fish stock of the country towards the B.A.S.

The monthly meetings of the East London Aquarists' and Pond-Keeper's Society continue to maintain a high standard, and in addition a number of study-groups are now functioning, concerned with the special problems of fancy goldfish, live-bearers, larval fishes, and technology, respectively. We have remarked in a previous issue upon the good work being done by the junior section, and it is a clear that this Society is one of the most active in the London area. This year's Banquet and Exhibition is being held on May 21st and 22nd, unfortunately too late to be reviewed in this issue, but we shall include an account of the society shortly.

Other forthcoming shows announced are the Watsford Aquariumists' Society—second annual show on Saturday, August 28th, 1948, at Victoria Schools, Addiscombe Road, Wansford.
THE ANNUAL SHOW AT IPSWICH

This year's show staged by the Suffolk Aquarists' and Pondkeepers' Association was held on May 10-12th, and was notable for a more effective layout than hitherto, and a general improvement in the level of the exhibits.

As is by this time, the show was considered not only as a competition but as an instructive exhibition for the public, with the result that a large and varied assortment of species was included. The coldwater classes, as usual, contained a representative series of species, notably some fine specimens of common goldfish and shubunkins. A handsome pair of Rudd, in fine condition, were considered the best exhibit in this section. On the tropical side a wide variety of species were shown, and special interest attached to the breeders' class, in which all exhibits had been bred by members since last year's show.

Marine aquariums were represented by four interesting tanks shown by Mr. C. Cracknell, and there were the usual classes for amphibia and reptiles which included most of the British species, though the palm went once more to Mr. Beament's lovely Diamond Python; the exhibition of this large and very tame snake this year after year, in perfect condition, is most creditable achievement.

An exhibit of a series of aquarium plants was a good idea, but most of the specimens were rather small, sickly examples; this feature would be well worth improving, and it might help to make it competitive, for plants seem not to be a strong point at Ipswich. Most of the tanks in the furnished aquarium class were too thinly planted, and the plants were of poor quality in comparison with London standards. The best of these tanks was a tropical one in which planting was adequate, though the centre-piece, a Cryptocoryne, was not well selected, many of its leaves appearing upside-down; the choice of fishes was of the "one of each" type, giving a x:ying and picturesque effect. A cold-water tank showed an attempt at originality by presenting the effect of a cave, with stalactites and stalagmites; the conception, however, was scarcely suitable to the occasion, for plants do not grow in caves, where there is no light, and such ordinary fishes as Rudd are not likely to be found there.

This year was a junior year for members of the newly formed Junior Section, and the number of entries, coupled with the number of entrants, shows that the enthusiasm of young aquaticists is increasing. The only criticism, however, was that the Society was justified in taking this step.

Considering that this show was confined to exhibits by members of the Society, its variety and quality were highly creditable. The results were as follows:

COLDWATER

CLASS 1.—COARSE FISH—(1) Mr. F. W. Brinkley, Red Fin; (2) Mr. P. McGill, Golden Orfe; (3) Mr. C. T. Nash, Pike.

CLASSES 2-5.—COMMON GOLDFISH—(1) Mr. F. W. Goldsmith; (2) Mr. W. F. Rowberry; (3) Mr. W. F. Rowberry.

CLASSES 6-8.—FANCY GOLDFISH—(1) Mr. A. Huson, Shubunkin; (2) Mr. A. Huson, Shubunkin; (3) Mr. A. Huson, Shubunkin.

CLASSES 9-10.—LIVEBERARS—(1) Mr. C. T. Nash, Red Swordtails; (2) Mr. P. Cracknell, Red Swordtails; (3) Mr. D. Stiff, Moss Bebe.

CLASSES 11-12.—EGG LAYERS—(1) Mr. A. Mather, Dwarf Gourami; (2) Mr. E. W. Porter, Tiger Bar; (3) Mr. C. W. Porter, Australian Rainbow.

CLASSES 13-14.—ANY VARIETY BREDB BY A MEMBER SINCE DATE OF LAST SHOW—(1) Mr. C. W. Porter, Australian Rainbow; (2) Mr. C. W. Porter, Rainbow Fish; (3) Mr. J. Shuttleworth, Blackline Terras.

Clavering Fish Challenge Cup—Best Tropical Fish—Mr. C. W. Porter, Ploma.

MARINE

CLASS 1.—MARINE—(1) Mr. A. J. Craxton; (2) Mr. A. J. Craxton; (3) Mr. A. J. Craxton.

REPTILES

CLASS 1.—REPTILES—(1) Mr. W. S. Brown, Diamond Python; (2) Mr. W. S. Brown, Greek Terrapin; (3) Mr. E. Nash, European Water Terrapin.

AMPHIBIANS

CLASS 1.—AMPHIBIANS—(1) Mr. E. Nash, Black Axolotl; (2) Mr. E. Nash, Edible Frog; (3) Mr. S. W. Ratcliffe, Great Crested Newt.

Furnished Aquariums

CLASS 1.—Furnished Aquarium—(1) Mr. C. W. Porter, Tropical; (2) Mr. E. Nash, Goldwater; (3) Mr. J. Shuttleworth, Tropical.

JUNIOR SECTION

Furnished Aquariums—Tropical

(1) S. W. Ratcliffe, age 18; (2) L. G. Cox, age 14; (3) D. J. Armitage, age 12.

Furnished Aquariums—Coldwater

(1) H. H. Cocker, age 15; (2) R. Lord, age 12; (3) D. J. Armitage, age 15; (4) V. H. C., Miss Ann Bingham, age 12; (5) H. C., B. A. Barrett, age 11.

P. Clarke Challenge Cup—For Best Furnished Aquarium, Junior Section—S. W. Ratcliffe, age 18, Tropical.

NOTES AND NEWS—(Contd.)

West Surrey Pondkeepers' and Aquarists' Club—first post-war show in conjunction with the Guildford District Anglers and Gardeners Association, on August 2nd, 1948. This will not be an open show.

The Southampton and District Aquatic Society is now in full swing, a recent meeting having elected Mr. R. J. Stringer, M. C., J., P., a well-known and much respected figure in Southwestern aquatics, to the Presidency. The Society wishes to acknowledge and record thanks for the friendly help that has been accorded them by the Hampshire Guild.

That very progressive Club, the Southampton Aquarists, publishes each month an excellent Bulletin to keep members informed with the various developments and fixtures, and to enable the more advanced members to supply information to the newcomer and to the hobby. The Bulletin is well produced by means of a duplicator, and contains illustrations which are colourless and entirely satisfactory, with crayons. The cover, however, is printed and carries local advertisements which presumably cover the cost.

This excellent idea has now been copied by the Southend, Leigh and District Aquarists' Society, from whom we have just received the first copy.

Other Societies might do the same, for it is not possible for us to include in our pages the domestic details of the numerous clubs now existing, nor do we too much of our space for the publication of the valuable information which is ever so often published in the local journals, and we continue to invite observations and news that may interest people outside the club concerned.

Nottingham, incidentally, has recently commenced a Scientific Section, which will be concerned with placing the breeding of fishes upon a more methodical basis, in order to raise the standard of the more common types and increase our knowledge of the rarer kinds. The results obtained by this section will be published in The Aquarist from time to time—commencing next month.

A SOCIETY AT WEMBLEY

An Aquarium Society to serve the interests of devotees living in Wembley and the surrounding district, including Alperton, Kingsbury and Sudbury, was inaugurated on May 11th, at a meeting at Park Lane School, Wembley.

PROPOSED SOCIETY FOR COVENTRY

A society in the Coventry district who would be interested in the formation of a society please get in touch with either Mr. G. Babington, St. John's Road, Chalcotsmore, Coventry, or Mr. O. D. Bradbury, 163, Moreton Avenue, Radford, Coventry.

NATIONAL AQUARIUM AND WATER-GARDEN

As we go to press we have received news of the above exhibition, to be held at the Royal Horticultural Hall, Vincent Square, London, S.W.1, on June 10-12th, 1948. It is being organised by the National Aquarists' Society.

We regret that space does not permit us to give full details, but those can be obtained from the Exhibition Secretary, Mr. L. B. Katterer, 115, Feltham Hill Road, Ashford, Middlesex.
WHERE GOLDFISH THRIVE

Mr. R. H. I. Read, F.Z.S., Secretary of South London Aquarists' Society, sends these photographs of his Goldfish breeding establishment.

The tanks shown are among 12 housed in a wooden shed, 8 ft. x 5 ft., with a sloping glass roof. They are supported, for the most part, on a steel framework made out of an old Morrison shelter.

Heating is obtained by means of some tubular heaters with a total of 420 watts concealed from view underneath the staging. It is not overdone and the temperature in cold weather is never above 45 degs. to avoid coddling the fish. Aeration is obtained by a pump placed in the coolest position and capable of supplying each of the aquaria.

This fish house is only part of a much more extensive outfit which includes a number of ponds and some larger aquaria housed elsewhere.

During the first year, only old stock fish which had been carefully looked after during enforced absence owing to the war, could be used for breeding. Later, however, when it was decided to breed other varieties, some breeding stock of moors and calico veiltails, which were considered good enough for somewhat exacting requirements, were obtained as a result of a prolonged search amongst dealers and friends.

(Photos: G. F. C. Morris)

A corner of the fish-house. Part of the staging is made from an old Morrison shelter.

A pair of Moors in one of the tanks.

In this fine spawning bed of giant Elodea, in a raised outdoor pool, many fish were bred during 1946 and 1947.

May, 1948

53
Directory of Aquarium Societies

Federation of British Aquarium Societies
Secretary: R. O. H. Linn, 31, Coronation Court, 31, Willesden Lane, London, N.W.10

Federation of Northern Aquarium Societies
Secretary: G. T. Isles, F.Z.S., Longsight Lodge, Redgate Lane, Manchester, 12.

Belle Vue (Manchester) Aquarium Society
Secretary: Gerald T. Isles, Longsight Lodge, Redgate Lane, Manchester, 12.
Meetings: Monthly at Belle Vue Zoological Gardens, Manchester, 12.

Benhurst Aquarium Society
Secretary: Mrs. R. Aldred, 50, Benhurst Avenue, Elm Park, Romford, Essex.
Meetings: First and third Tuesday in month, 8 p.m., at Benhurst School, Benhurst Avenue, Elm Park, Romford.

Blackburn and District Aquariums’ Society
Secretary: J. P. Eldred, 47, Preston New Road, Blackburn.
Meetings: First Tuesday in month, 7.30 p.m., at the Reform Club, Victoria Street, Blackburn.

Blair Aquatic Club
Secretary: T. Wyber, 85, Richmond Avenue, London, N.1.
Meetings: Each Thursday evening at 7.30 p.m., at Blundell Street Men’s Institute (entrance Brewery Road), Islington, N.7.

Bournemouth and District Aquariums’ Society
Secretary: Vernon B. Poulton, 84, Shelly Road, Boscombe, Bournemouth.
Meetings: First Monday in month, 7.30 p.m. at Whitehall Hotel, Bournemouth.

Bradford and District Aquariums’ Society
Secretary: R. E. Brigg, 18, Hillcrest Road, off Mowbray, Queensbury, Bradford.
Meetings: First Wednesday of each month.

Bristol Aquariums’ Society
Secretary: H. C. B. Thomas, 46, Wesleyside Road, Bristol, 7.
Meetings: First Monday of each month at Crown and Dove Hotel, Hotwells, Bristol.

Cambridge and District Aquariums’ Society
Secretary: R. I. McKay, 103, Cambridge Road, Great Shelford, Cambridge.

Cardiff and District Aquariums’ Society
Secretary: L. W. Kenyon, 21, Pum-Ewe Road, Birchgrove, Cardiff.
Meetings: Y.M.C.A. Cardift, 7.30 p.m.

Chelmsford District Aquariums’ Society
Secretary: Mrs. C. R. Tappenden, 33, Firefly Drive, Chelmsford, Essex.

Cornish Aquariums’ and Pondkeepers’ Association
Secretary: Mrs. Howard Spring, The White Cottage, Fore Street, Falmouth, Cornwall.
Meetings: First Wednesday in month, 8 p.m., at Millcote Cafe, Market Street, Falmouth.

Croydon Aquariums’ Society
Secretary: G. O. Saunders, 5, Blemish Gardens, Wallington, Surrey.
Meetings: First Thursday in month, 7.15 p.m., at Thornton Hough Public Library, Halsall Road, Thornton Heath.

Dagenham Aquariums’ Society
Secretary: D. F. Eyres, 85, Wren Road, Dagenham, Essex.
Meetings: First and third Monday of month, 7.30 p.m., at Dawson School, Ellerton Road, Becontree.

Derby and District Aquariums’ Society
Secretary: T. S. White, F.Z.S., 25, Biddings Street, Derby.
Meetings: Second Saturday evening in each month, at Prince Charleis Hotel, Derby Museum and Art Gallery, Wardwick, Derby.

East Lancashire Aquarium Society
Secretary: Harry Loder, 59, Standish Street, Burnley, Lancs.
Meetings: Last Wednesday of the month at 7 p.m., Church Institute, Manchester Road, Burnley.

East London Aquariums’ and Pondkeepers’ Association
Secretary: G. T. Isles, F.Z.S., 159, Hackney Road, Plaistow, E.13.
Meetings: First Thursday and third Tuesday in each month, 7.45 p.m., at St. Margaret’s Hall, Ripple Road, Barking.

Enfield and District Aquariums’ Society
Secretary: Mrs. Frances Perry, F.L.S., Bull’s Cross Cottage, Enfield, Middlesex.
Meetings: Third Tuesday in month, 7.30 p.m., at the Methodist Church Hall, Enfield.

Enterprise Aquarium Society
Secretary: H. W. Holland, 96, Ridgeway Road, Whetstone, N.20 (Phone: HILside 7123). Meetings: Third Thursday in month, 7.30 p.m., at Oakleigh Primary School, Oakleigh Road, Whetstone.

Grimsby and District Aquariums’ Society
Secretary: W. J. Vickerman, 99a, Bargate, Grimsby, Lincs.
Meetings: First Monday in month, 7.30 p.m., at Victoria Cafe, Victoria Street, Grimsby.

Guppy Breeders’ Society
Secretary: Capt. B. T. Stacey, 20, Alverton Street, Deptford, S.E.8.
Meetings: Second Thursday in each month at 7.30 p.m., at the Club Room, Crown Hotel, Prince of Wales Road, Chalk Farm Road, N.W.4.

Halifax and District Aquariums’ Society
Secretary: Frank M. Slater, 63, Green Park Road, Skircoat Green, Halifax, Yorks.
Meetings: First Monday in month at the Belle Vue Museum, Halifax.

Harrow Aquariums’ Club
Secretary: S. Sanders, 52, Church Avenue, Pinner, Middx.
Meetings: Second Monday in each month, 7.30 p.m., at Roseth Institute, South Harrow.

Havering Park Aquariums’ and Pondkeepers’ Association
Secretary: A. C. Edmonds, 257, Carter Drive, Romford, Essex.
Meetings: Clockhouse Lane School, Collier Row, alternate Mondays at 7.30 p.m.

Hertfordshire Aquariums’ Society
Secretary: J. H. Glynn, 14, Rooks Hill, Welwyn Garden City.
Meetings: First Monday in each month, 7.30 p.m., at 21, Roundwood Drive, Welwyn.

Hornchurch and District Aquariums’ Society
Secretary: V. F. Sewards, 5, Devonsire Road, Hornchurch, Essex.

Hornsey Aquarium Society
Secretary: P. D. Tiffany, 58, Talbot Road, Tottenham, N.15.
Meetings: First and third Wednesday of each month, 7.30 p.m., at “The Priory,” Hornsey.

Ilford Aquariums’ Society
Secretary: E. H. Coles, 13, Kenwood Gardens, Ilford.
Meetings: First Monday of each month, 8 p.m., at Essex House, High Road, Ilford.

Kingston and District Aquariums’ Society
Secretary: R. W. Alderton, 25, Park Road West, Kingston-upon-Thames.
Meetings: First Thursday in each month, 7.30 p.m., at Alexander Hotel, Park Road, Kingston.

Leeds and District Aquariums’ Society
Secretary: H. Charles, 113, Ring Road, Cross Gates, Leeds.
Meetings: Second Wednesday of each month at the Lecture Room, Belgrave Youth Club, New Bridgiate, Leeds.

Leicester Aquarium Society
Secretary: A. Wilson Smith, 56, Hillborough Road, Blaby, Leics.
Meetings: First Thursday of each month at the Aylestone Road Methodist Church Rooms, Leicester.

Luton and District Pondkeepers’ and Aquariums’ Society
Secretary: Mrs. P. Sutcliffe, 19a, Old Bedford Road, Luton.
Meetings: Third Tuesday in month, 7.30 p.m., at Luton Grammar School.

Merseyside Aquariums’ Society
Secretary: Mrs. L. Plant, 66, Ferguson Road, Liverpool, 11.
Meetings: First and third Thursday in each month, 7.30 p.m., at Great Vale Cafe, 16, Tithebarn Street, Liverpool.

54

THE AQUARIST
SHIRLEY

OUTDOOR

Water Lilies
Marginal Plants
Submerged Plants
Alpines

TROPICAL

Plants Submerged
Plants Floating
Tropical Fish
Cactus

AT YOUR SERVICE

WRITE FOR PARTICULARS of our Trade Support Scheme

NOTE.—Purchase your Lilies now

SHIRLEY AQUATICS LTD.
Monks Path Shirley Nr. Birmingham

THE AQUARIST
PHILIP CASTANG

Special Fish Food Offer
DRIED GROUND SHRIMP
6/6 per lb.

EGG FOOD FOR REARING FRY
2/6 per lb.

OUR SPECIAL TROPICAL FISH
FOOD MIXTURE
6/6 per lb.
Containing cod liver oil, egg, fish, insects, etc.

“BROSIAN” FISH FOOD
1/3 and 2/6 per jar

“BROSIAN” INFUSORIA
1/3 per tube

“MERO” FISH FOOD
1/9 and 2/6 per carton

“BROSIAN” TONIC SALTS
2/6 per jar

“JOHNSON’S” PH TESTING PAPERS
(In book form)
1/6 for two books
Covering a range of 5.3 to 8.3.

CELLULOID CORNER FILTERS
7/6 each

STRIPLIGHT SHADES
18 inch, 12 - each
24 inch, 15 - each
These shades are spray enamelled. They are not supplied without fittings. Special price for quantities.

THE “ANGEL” NEW OUTSIDE FITTING THERMOSTATS
Type O.F.2
37/6 each
Immediate delivery from stock.

THE “ANGEL” A.1 GLASS IMMERSSION HEATERS
16/3 each
Immediate delivery of all wattages.

CELLULOID BREEDING TRAPS WITH GLASS FLOATS
15 - each
Ideal for all livebearers.

CELLULOID WORM FEEDING RINGS
1/6 each
Suitable for white worms or tubifex.

“HYDRAFIN” AQUARIUM CARBON
6/6 per packet
The genuine pre-war “Hydrafin” sold only in sealed packets.

ALL POST FREE

DEALERS PLEASE NOTE—ALL THE ABOVE SUPPLIED AT KEEN TRADE PRICES. SEND FOR TRADE LISTS.

PHILIP CASTANG
91 HAVERSTOCK HILL, HAMPSTEAD, LONDON, N.W.3
Primrose 1842

May, 1948
A NEW THERMOSTAT

for Fitting Outside the Aquarium

Moulded bakelite case, size $4\frac{1}{2}'' \times 2\frac{1}{2}'' \times \frac{3}{4}''$.

Temperature adjustable from 40° F. to 110° F.

Ultra sensitive invar-brass bi-metal.

Differential $±$ or $-2°$ F.

Radio interference prevented by powerful magnet giving snap make and break.

Attached to glass of aquarium by waterproof cement, a tube of which is supplied.

Impossible for thermostat to fall off when fixed in desired position.

Robust contacts with capacity of 2 amps (500 watts) at 240 V. A/C.

1 amp (250 watts) at 240 V. D/C.

Fitted with 6 ft. waterproof P.V.C. flex.

Guaranteed for 12 months.

TYPE

O.F.2

PRICE

37/6

PAT. APPLIED FOR

Owing to priority of exports we regret only limited numbers will be available for home sales

ANGEL ELECTRICAL INDUSTRIES LTD.

CHELMSFORD WORKS, CHELMSFORD ROAD, LONDON, N.14

'Phone: Palmers Green 8921
We aim to introduce, and make available to aquarists, a service second to none in all matters connected with this popular hobby. You are cordially invited to visit our showroom and we will do our utmost to meet your requirements. Inquiries by telephone are welcomed, and a call to GRAngewood 2791 will find us at your service. Present fish stocks include:

- Guppies
- Zebras
- Chequer Barbs
- Angels
- Harlequins
- Platys
- Pearl D's
- Tiger
- Black Widows
- White Clouds
- Swordtails
- Malabars
- Rosy
- Glowlight Tetras
- Beacons
- Mollies
- X Rays
- Half Bred.
- Red Fin
- Feather Fins
- Sailfins
- Flames
- Nigger
- Black Line
- Cherry Barbs
- Perma Blacks
- Serpeas
- Cumming
- Neons
- Fighters
- and others.

It will be appreciated that fish stocks vary, from time to time, according to the availability of supplies but part of our service is to procure, with the least possible delay, any requirements of our clients that we do not have on hand at the time of inquiry. Our business is devoted entirely to the needs of the aquarist, and we do not deal in any form of animal life other than that consisting of, and connected with, tropical fish.

LET US QUOTE YOU FOR YOUR SURPLUS STOCKS

**R. J. SPINKS**

*623, ROMFORD ROAD, MANOR PARK, LONDON, E.12*

Phone: GRA 2791

SPECIALISTS FOR THE TROPICAL HOBBY

TO BE INTRODUCED SHORTLY

AFTER MANY MONTHS OF EXTENSIVE RESEARCH WORK WE HAVE NOW REACHED THE FINAL STAGE IN PERFECTING THE ABSOLUTE BEST FOOD FOR YOUR TROPICAL AND COLDWATER FISH. AVAILABLE SOON, WATCH FOR CURRENT ADVERTISEMENT.

ALSO ANTICIPATE SUPPLYING WHITE WORM (ENCHYTREA) AT COMPETITIVE PRICE. POST FREE.

RETAIL AND TRADE INQUIRIES INVITED.
AN ALL PURPOSE PUMP
Some of its uses:
Fountain, Waterfall, Cesspool, Flooding, Water Supply, Circulating, Filtering, etc.

Foot Valve and Strainer .. 16..± in. 120 gals. Hr. £5 15 0 post. 2..± in. 300 gals. Hr. £7 0 0 post 2..± in. 600 gals. Hr. £8 10 0 post 4..±
Strainer only .. 7 6 post 7
Hose to Union Pipe Fitting .. 2..± in. 1 Pump .. 3..± 2 6 4..± post 4d.
State voltage and current. Illustrated brochure on request.

SHUBUNKINS
Breeding Pairs .. 21/2 .. 35 .. Can and Carriage 4 ..
Shubunkins .. 11/2 .. 2 .. 21/2 .. 34 .. 45 .. 7 .. 12 .. 6 .. 15 .. 20 .. 30 .. Can and Carriage extra.

SHUBUNKINS POOL STOCK OFFER
Multicoloured Shubunkins

FISH FOOD
Grade 1. Highly nutritious.

AQUATIC SNAILS

MUSSELS

PHONE: WATERLOO 499

THE WATERLOO GOLDFISHERY CO.
47, GT. GUILDFORD STREET, BOROUGH, LONDON, S.E.1

Near Evelina Hospital and Fire Station, Southwark Bridge Road

Terms C.W.O. Sufficient postage and carriage must be included. Prices subject to fluctuation. Stamp for inquiry.
AT LAST!
VISUAL CONTROL OF AQUARIA
THE LATEST ADDITION TO OUR FAMOUS "AQUATHERM" PRODUCTS

THE
"GLOLITE"
IMMERSION-TYPE THERMOSTAT
(OUTSIDE CONTROL)
WITH BUILT-IN NEON INDICATOR LAMP

SEE AT A GLANCE WHETHER HEATER IS "ON" OR "OFF"
Suitable for A.C. or D.C. at 200/250 volts at any loading up to 500 watts

33/-
Complete with double leads of Plastic Flex

"AQUATHERM" OIL-FILLED SUBMERSIBLE THERMOSTAT, PRICE 30/-
"AQUATHERM" JUNIOR THERMOSTAT, PRICE 25 6
"NITH" OUTSIDE-FITTING THERMOSTAT, PRICE 35 6

READY SHORTLY
THE SOLWAY AERATOR. Piston type, with silent squirrel cage motor, 200/250 volts, for
operation on A.C. only. This aerator will normally be marketed as a twin cylinder, but is
readily convertible to a four cylinder model, radial type. All parts interchangeable and
spares will be readily available.

Price, twin cylinder model, 66 10/-
Additional cylinder assemblies, 12 6 each.

TYPE R.H. HEATER
23 6 (Including 9/- Pur. Tax)
12 months guarantee.

TYPE H.I. HEATER
16 6 (Including 6/- Pur. Tax)
9 months guarantee.

DISTRIBUTORS:
England & Wales: Robert Jackson, Esq., F.Z.S.,
1 Park Avenue, Timperley, Cheshire.
Scotland: Messrs. Wilson's of Glasgow, SCOT-
LAND'S PREMIER PET STORE, 68-76 Oswald Street,
Glasgow, C.2.
Ireland: Messrs. The Northern Artistic Aquaria,
12 Ethel Street, Belfast.

SCOTTISH AQUATICS LIMITED
Trident Works, Leafield Road, DUMFRIES

May, 1948
Mrs. F. RILEY  F.Z.S.
THE AQUARIUM, KENNARDS ARCADE
NORTH END, CROYDON, SURREY
Hours, 9-5 daily; Wed. 9-12.30  CRO 4455 (Ex. 28)

LARGEST DISPLAY OF TROPICALS AT KEEN PRICES

PLANTS
LIVE FOODS
The "MERMAID" THERMOSTAT
Submersible 3 Yrs. Guar. 25/6 Adjustable Post Free

ACCESSORIES
AIR PUMPS

SPECIALITIES: RUSTPROOF AQUARIA AND SHADES, DOUBLE TIER STANDS,
RILEY AIR PUMPS, INSTALLATIONS AND ADVICE.

BROSIAM TROPICAL FISH
FOOD, 1/4, 2/7, 10- and 17/6
Our Prestige your Guarantee

BIO-VIC, THE BALANCED COLD-WATER FISH FOOD, 1/3 post free

SEE LATEST "MERMAID" RUSTPROOF AQUARIA AT NATIONAL AQUARISTS' SOCIETY SHOW
19th, 21st AND 23rd, JUNE.

CHARLES HARRIS & SON, F.Z.S.
(Maida Vale 3581)
DESIGNERS CONSTRUCTORS AND STOCKERS OF PONDS AND
AQUARIUMS. BREEDERS OF SHUBUNKINS ETC., AND AQUATIC
PLANTS

Shubunkins and Fry
Goldfish
Gombosa
Vallisneria Torta
Vallisneria Spiralis
Ludwigia
Myriophillum
Eleada densa
Water Hyacinths
Water Lilies
Marginal Plants
Red Snails
Sagittaria Natans, Gram and Giant.

Aquariums and all accessories for Pond and Aquaria.
Any quantity of Fancy Fish purchased.

3. Hilltop Road, West Hampstead, N.W.6
S.A.E. for reply.

THE AQUARIST
Is YOUR Name on our Mailing List?

We shall be pleased, on receipt of a card with your name and address, to regularly send you our latest lists as they are issued.

We can offer you the largest selection of tropical fish, plants, etc. in this country at the most reasonable prices consistent with really good quality stock.

KEAN & SONS
15 DALRY ROAD - EDINBURGH
PHONE 62165
ESTAB. 1894

---

ROBERT JACKSON

offers

ALL AQUATHERM PRODUCTS BY
RETURN OF POST, INCLUDING
THE NEW GLO-LITE THERMOSTAT
WITH NEON PILOT LIGHT.

Good stocks of Fish, Plants and Reptiles.

Praying Mantis Egg Cases now in stock.

Wholesale deliveries to Pet Shops in the
North-West by van.

WANTED—British Lizards and Snakes
for export to foreign Herpetologists.

Main Wholesale Agents for
AQUATHERM PRODUCTS

---

GOLDFISH & SHUBUNKINS
Breeding Pairs Guaranteed

Oxygenating Plants, Lilies, Snails and
everything for Ponds.

65 Varieties of Tropical Fish. Heaters,
Thermostats, Aquariums, Plants and all
Equipment.

SOMETHING NEW
ENCLOSED CABINET AQUARIAS
Stove enamelled. Very attractive.

THE PRESTON AQUARIUM

44, Beaconsfield Road
Brighton

Telephone: 9620

---

ROBERT JACKSON, F.Z.S., F.R.H.S.,
3, PARK AVENUE, TIMPERLEY, CHESHIRE.

May, 1948
HANWELL FISHERIES

REVISED AQUARIUM PRICES

Illustrated Model. 24" x 15" x 12" stand and shade, £6 12s. 8d. complete, carriage 7/6 extra.

Standard Aquariums

16" x 9" x 9" ... £1 14 2 18" x 10" x 10" ... £1 17 8
18" x 12" x 12" ... 2 0 0 24" x 12" x 12" ... 2 10 0
24" x 15" x 12" ... 2 17 6 30" x 12" x 12" ... 2 18 8

21 BROADWAY BUILDINGS  BOSTON ROAD  HANWELL
LONDON  W.7  EALing 5028

SOUTH WESTERN AQUARISTS
2, Glenburnie Rd., Trinity Rd., S.W.17
Telephone: BALHAM 7334

PRICE 30-
Plus Carriage

The Illustrated Stand takes two 24" x 12" x 12" aquariums. Made from 1" angle iron. Finished in green cellulose. Other colours are available. We can also supply 3-tiered stand, as above design, £2 5 0, plus carriage.

24" x 12" x 12" Aquariums, £3 0 0, plus carriage.

Any size tank or stand made to your own specification. Ask for prices.

IN STOCK—Good selection of tropical fish

Sold by the Ton

“Aquatight Glazing Compound”

Finest made and goes a long way

2 lb., 2 lb. 3/9, does 24 in. x 12 in., 4 lb.
6 lb., 8 lb. 12 lb., post paid. Neon Tetras £2 6, Flames 5, Feather Fins 5, Albino Swords 5, Black Swords 10,6, Angels 10/6. Nearly Scarlet Swords 3/6, Beavers 14 1/5, Penguins 17 6, Barbas Tetrazona 20 1/5, all each. Bear Cubs £7 5. Various Monkeys, etc.

All Electric goods, present stock at pre-Budget prices. All Accessories.

Compare our list—but see the Quality.

PETS & AQUARIA LTD.
18, GRAND ARCADE, LEEDS, 1
Tel. 23743

THE AQUARIST
JAMES NORTH

FOR

COLD WATER FISHES

SIZES FROM 1' to 8'

A LOVELY AND LARGE SELECTION OF GOLDFISH—GOLDEN ORFE—GOLDEN HIGOI—GOLDEN RUDDO—SHUBUNKINS—SILVER RUDDO—BREEDING PAIRS A
SPECIALITY—WATER LILIES—WATER PLANTS—AND ALL ACCESSORIES

ALSO A VERY LARGE SELECTION OF EXOTIC FISHES, PLANTS
AND ALL ACCESSORIES

Send to-day for my latest 8 page List:
316 LEE HIGH ROAD, LEWISHAM, S.E.13
Tel.: Lee Green 3577
Business Hours: 9 a.m. to 6 p.m. Early Closing Thursday

AN APOLOGY

There is a dearth of variety in our fish stock at the moment. Plenty ofish, but not the many types we have
been able to offer in the past.

Bear with us—the shortage is only temporary. If we haven’t the fish
you require, it will soon be in stock.

Our breeders are busy and will shortly satisfy all needs.

W. T. JEFFERIES
4, THE BROADWAY,
FRIERN BARNET ROAD,
LONDON, N.11

Phone: ENTERprise 2829
Trolleybuses 521 and 621 pass the door

May, 1948
OIL HEATERS
Hot Water Radiator No. 666
(Improved Pattern)
For Greenhouses, Conservatories,
Aquariums, etc.

Made of heavy, solid hard-rolled copper throughout.
Extreme length, 3½ feet; height, 26 ins.; 3 in. pipes;
heavy copper lamp, with
duplex burner and two
1½ in. wicks, or hinged
burner with two 1½ in.
wicks; the complete outfit
with galv. stand, 87½, or
95½ with solid copper stand.
(10½ refunded on return of
crate with packing).

Suitable for houses up to
12 ft. x 8 ft.

Terms: Cash with order, carriage paid, crate returnable

Orders executed in strict rotation

P. J. BRYANT, Forest Road, Fishponds, Bristol.

MORE TROPICALS IN STOCK
Ocellifer, H. and T. Light,
T. L. Gouramis, Danio
Malabar, Red Tail Tetras,
Neons, etc.

SPECIAL.—Four only, Marco Aerator, brand new, all makes Heaters,
Thermostats, Aerators, Pumps, etc.
6 in. Breeding pairs Goldfish, 30½;
Can and carriage, 36 extra.
Send S.A.E. for full list
and
“A Few Facts on Fish-Keeping.”

“AQUARIUM”
(Service Per Return)
66, Cheetham Hill Road,
Manchester, 4
Blackfriars 2163

WE ARE TRADE SUPPLIERS OF
TUBIFEX
WORMS

DELIVERED TO YOUR PREMISES
IN THE LONDON AREA

IF OUTSIDE LONDON WE CAN
DISPATCH BY PASSENGER TRAIN
TO NEAREST MAIN LINE STATION
TO BE CALLED FOR.

QUOTATION GLADLY GIVEN
UPON REQUEST.

EXCELSA AQUARIA CO.,
100 COURTHILL ROAD, LONDON, S.E.13

THE AQUARIST
OIL HEATERS
Hot Water Radiator No. 666
(Improved Pattern)
For Greenhouses, Conservatories, Aquariums, etc.

Made of heavy, solid hard-rolled copper throughout. Extreme length, 3½ feet; height, 26 ins.; 3 in. pipes; heavy copper lamp, with duplex burner and two ½ in. wicks, or hinged burner with two ½ in. wicks; the complete outfit with galv. stand, 87/-, or 95/- with solid copper stand. (10/- refunded on return of crate with packing).

Suitable for houses up to 12 ft. × 8 ft.

Terms: Cash with order, carriage paid, crate returnable

Orders executed in strict rotation

P. J. BRYANT, Forest Road, Fishponds, Bristol.

MORE TROPICALS IN STOCK
Ocellifer, H. and T. Light, T. L. Gouramis, Danio Malabar, Red Tail Tetras, Neons, etc.

SPECIAL.—Four only, Marco Aerators, brand new, all makes Heaters, Thermostats, Aerators, Pumps, etc. 6 in. Breeding pairs Goldfish, 30/-. Can and carriage, 3 6 extra.
Send S.A.E. for full list
and
“A Few Facts on Fish-Keeping.”

“AQUARIUM”
(Service Per Return)
66, Cheetham Hill Road, Manchester, 4
Blackfriars 2163

WE ARE TRADE SUPPLIERS OF
TUBIFEX
WORMS

DELIVERED TO YOUR PREMISES IN THE LONDON AREA

IF OUTSIDE LONDON WE CAN DISPATCH BY PASSENGER TRAIN TO NEAREST MAIN LINE STATION TO BE CALLED FOR.

QUOTATION GLADLY GIVEN UPON REQUEST.

EXCELSIA AQUARIUM CO.,
100 COURTHILL ROAD, LONDON, S.E.13

THE AQUARIST
WATER LILIES
Selected English Roots
Grown in Natural Conditions

Each
Alba—the native white 3/6
Escaraboule—scarlet-crimson 13/6
Gladstoniana—white and gold 13/6
James Brydon—rose-crimson 13/6
Laydeckeri lilacea—pink-purple 13/6
Marliacea albida—all white 4
Marliacea carneum—rose-pink 7/6
Mrs. Richmond—rose-pink 21
Somptuosa—rose-pink 12/6

NATIVE BOG PLANTS
Caltha palustris—Kingcup 1½
Drosera rotundifolia—Sundew 9d.
Narthecium ossifragum—Boy Asphodel, yellow spires 1½
Myrica gale—Bog Myrtle, small spreading shrub with aromatic foliage 1½
Typha latifolia—Giant Reed Mac or Bullrush 1½

Carriage and packing (1-4 plants), 2/- extra, over 4 plants, 3/- extra.

Many other varieties are listed in our Nursery Stock Catalogue, and full cultural instructions and advice given on the selection of suitable varieties for various size pools, together with list of aquatic and bog plants.
Write for our Catalogue.

D. STEWART & SON, LTD.
FERNDOWN NURSERIES • DORSET

On Safari
in
KENYA, TANGANYIKA, UGANDA

Messes. And. Wilson, Mst.J., F.Z.S., and Tom Gwain, F.Z.S. report as follows:
"In spite of the fact that freight, labour, feeding, crates, etc., not here have advanced above the high costs of last year, we have been able to collect the following stock at competitive prices:
Zebra, Wildebeest, Cheetah, Waterbuck, Leopards, Vultures, Hyenas, Jackals, Lynx, Genets, Lion Cubs, Rhinos, African Elephants, Masai Giraffes, Rare Money Baggers, Thomson's Gazelles, Rare Spotted Wild Dogs, Ostriches, Unnamed Foss, Groundhogs, Monkeys, Puff Adders, Hinged Tortoises, Marabou Storks, Small Snakes, Crested Eagles, Albina Ter-
toises, Owls, Harrier, Buzzard, Pythons, 15 varieties Monkeys, Baboons, Toucans, 3 varieties Glossy Starlings, Cranes, Geese, Chimpantzees, Lizards, Chameleons, Ducks. Going up country. Will send list of other stock as we collect it. This is a marvellous collection of stock, and quite the best we have ever seen. Zebras superb, Wildebeest, Waterbuck and Gazelles hand reared, Dogs and Honey Bear expensive but very rare. Ostriches young, but in beautiful feather, Masai Giraffes exceptional. Monitors very large, etc. . . . Quote Ruminants, Rhinos, Honey Bear and Dogs ex Port East Africa if you wish. Expect to be home any day."

Actual prices cannot be fixed until the stock is landed in this country, but if you wish to avoid disappointment ask to be informed of estimated prices now or fixed prices on delivery. Send stamped addressed envelope for lists.

WILSONS OF GLASGOW,
68/76, OSWALD STREET, GLASGOW, C.2.

Angel Fish

R. J. WHITWELL
is the
SPECIALIST BREEDER OF ANGEL FISH

ORDERS TAKEN FOR JUNE DELIVERY

WHOLESALE AND RETAIL PRICES ON APPLICATION

WEST BERGHOLT
nr. COLCHESTER, ESSEX

Telephone: FORDHAM (ESSEX) 223

CHAPMANS of Cardiff

Have the best selection of Tropicaals in Wales and the West, and are the only firm in Wales catering solely for your hobby. We have everything for the aquarist, including Rustproof Aquariums, by the Shot Blasting Process, size 24"×12"×12", £3 10 0. Other sizes in proportion. Perspex Filters, Complete £3 6.

BREEDERS—Send now for your Brine Shrimp eggs and rear that valuable fry. 5/3 tube.

TRADE—Send for Trade Terms of Little Wizard Thermostats, etc. Retail 28/6.
See Cardiff Aquarists' Society Stand at the Bath and West of England Show, held at Cardiff, May 27th to 30th, incl.
All aquarium appliances will be supplied by us by courtesy of Messrs. British Aquarium Products.
Write for List, or better, call and inspect our stock.
We can arrange complete installations to Schools, Clubs, Cinemas and Amusement Parks.

14 MAELOG PLACE • MYNACHDY
CARDIFF

May, 1948
When visiting
SOUTHEND-ON-SEA
You are cordially invited to inspect our new Show Rooms. We have a splendid selection of
TROPICAL FISH
Neons, Gracillis, Glass Fish, Angels, Paradise, Zebras, Barbs, Acras, Gouramis,
Mollies, Golden Guppies, etc., etc.
COLDWATER FISH
and
MARINE AQUARIA
(Sea water despatched by passenger train)
Equipment, Plants, Food, etc.
THAMES AQUATICS LTD.
132a High St., Southend-on-Sea
Opposite Boots Chemists, (Warrior Square entrance), and over the offices of Abbott's, Estate Agents.

---

PUBLISHER'S ANNOUNCEMENT

The first editions of our publications "The Guppy" and "Livebearers" are now out of stock.

We are, however, reprinting these booklets shortly, and copies will be ready in a few weeks.

Copies of "Aquarium Technique for the Beginner," and "A Simple Pond for the Amateur" are still available, both being obtainable from

"THE AQUARIST"
THE BUTTS, HALF ACRE,
BRENTFORD, MIDDLESEX.
Price 1/6 each.

---

PREPAID ADVERTISEMENTS
4d. per word (12 words minimum). Box No. 6d. extra.

AQUARIUMS, Fish, Plants, Heaters, Thermometers, Arrangers, Birds, Pets. Cambridge Aquarists, Cambridge Road, Kingsley (Callers only).

HAVE A GO - Glass your own fish tank frames, 24 x 12 x 12
1 in. 5 lin. angle iron. 21st. c.w.o. Any size made to order. Cunningham, 6, Hall Street, Burnley, Lancs.


PRINTING for your Club. Quick work. Reasonable prices.
Private newspaper for personal use, 100 sheets 4/6d., 200 7/6d., C.W.O. Satisfaction guaranteed. Ashworths, Nuttall & Son, Plume Street, Burnley, Lancs.

FOR SALE-22 copies of Aquarium between January 1939 and March 1941. Offers to 7-2 Weeks, The Barrows, Cheddar.

24 x 12 x 12 Aquariums for sale, and other sizes. Also a few Fish and Plants. "Phone Etham 3972."

FISH and Aquaria, Trade List available. 27, Dearden Avenue, Little Horton, Bolton.

SHUBUNKINS of quality—youthsters shortly—available from selected breeding pairs. 4, Dalmeny Road, Worsley Park, Surrey.

AQUARIUM for sale, 3 ft. 6 in. x 1 ft. 6 in. Plate glass top and aquarium light. Price £7 0 0. Apply evenings, 10, Hayes Road, Bromley, Kent. "Phone Ray 4499."

EXCHANGE—Orandas, Shubunks, for Lionheads, Yellow Paludina Snails. W. H. Macey, "Rhodelia," Radford Park Road, Plymouth, Devon.

WANTED by leading Fish Dealers—All kinds of Tropical Fish. Breeders please quote wholesale prices. All replies answered. Box 2005, The AQUARIST, The Butts, Half Acre, Brentford.

MICRO Worms. Ensure an all the year round supply of this splendid live food by sending 2/6 for culture and full instructions. Joel, "Malvern," Victoria Avenue, Luton, Essex.


AQUARIUMS, all reconditioned, heavy slate beds and angle ironed, two 48 x 24 x 15, one 48 x 15 x 15, one 36 x 15 x 15, also two others, need repair. Woodham Park Nurseries, West Byfleet.

FOR SALE. 36 x 15 x 15, Base Heater and Thermomast. Full size shade and Nedap vibrator. £10. Coloured tail female Guppies. Males same strain, 5/- a pair. Callers, Sundays, or write H. G. Keene, 24, Chimbroke Road, Grove Park, S.E.12

EDUCATED man (30), with good biological training, life interest reptiles and pond life, 12 years of spare time training in same, requires position zoo breeder or dealer in which experience may be made complete. Salary £4 10s. to £5. Anywhere in England. W. G. Raffle, High Hurstwood, Uckfield, Sussex.
