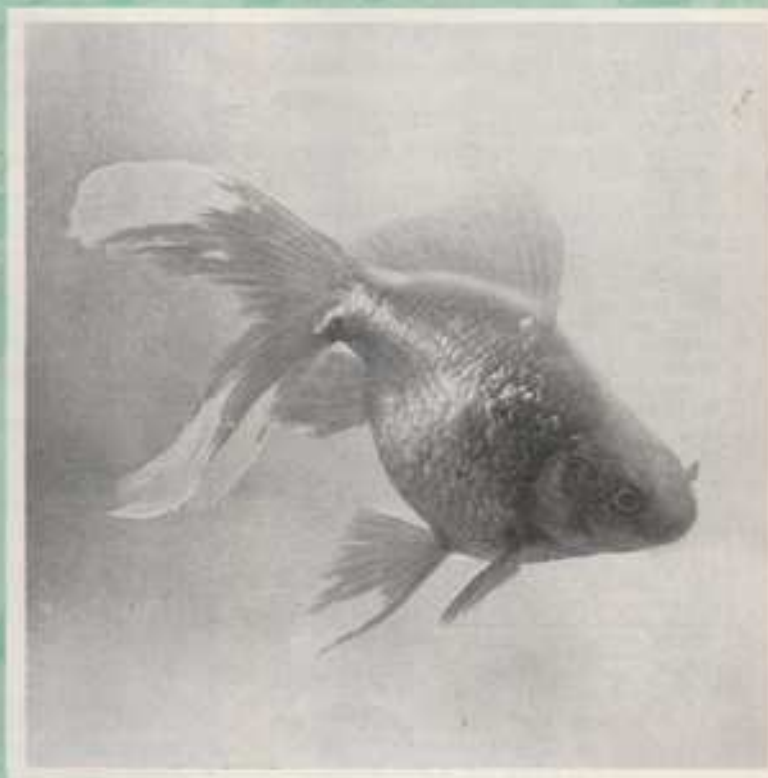


# The Aquarist

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AUGUST, 1960



MONTHLY  
Vol. XXV No. 5

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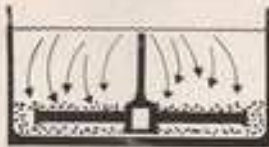
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VOL. XXV No. 5

1960

## Editorial

NOW that scientists have demonstrated with sensitive recording apparatus that the silent deep is not so silent after all, we should, perhaps, give a little more thought to the matter of sound and fishes. Fishes produce sounds under water, enough to embarrass the naval users of listening devices at sea, and it is known that they can hear sounds in their watery world although their ability to locate the source of a sound is poor. What interests us is the possibility that fishes are capable of being affected by sounds in the way that other animals are known to be.

An article we were reading recently suggested that birds in an aviary showed signs of appreciation of the broadcast musical programmes relayed from a loudspeaker, installed in the first place for the entertainment of the aviary keeper when working with his stock. It was even suggested that some unusual breeding successes with the birds were the result of the musical environment. Reports in the past have described how the effects of music on egg production by hens kept in batteries and on milk yield by cows have been studied, and all of this leads us to ask if readers who enjoy radio programmes when slopping water about in their fish houses have noticed whether Victor Sylvester or the Proms. cause any obvious cavoring among the characins or signs of drive in the love-shy species.

It may be that music, albeit the food of love, does not provide the right kind of sound to create the necessary sense of well-being in aquarium fishes. There is scope for experiment here. Perhaps some societies could start off by observing the effects of playing back the tape-recordings it is their deplorable habit to make at their meetings (these usually provide a fair sample of noises—from the speaker's whistled sibilants to the throat-clearing, coughing and chair-scraping of the audience). Our own forecast of the effect of this procedure on the fishes is, however, best conveyed by the advice given by the man with the new cure for white spot—do not try it first on those fishes that you prize!

## Contents

	Page
Editorial .. .. .	95
The Garden Pond in August .. .. .	96
A Furnished Aquarium for Fancy Goldfish .. .. .	97
Nature Moisture-Loving Ferns .. .. .	98
Aquarist's Notebook .. .. .	99
Chameleons .. .. .	101
The Guppy—King of Tropical Fishes .. .. .	103
Colour in Goldfish .. .. .	104
Planted Surround for the Garden Pond .. .. .	106
The Filter .. .. .	108
Aquarium Scavengers .. .. .	109
Butterfly Fish from the Niger Delta .. .. .	110
Hand-stripping the Spotted Danio .. .. .	111
Readers' Queries Answered .. .. .	111
Our Readers Write .. .. .	113
News from Aquarists' Societies .. .. .	115

## The Garden Pond in August—by ASTILBES

**W**ATER in the pond should have become quite clear and sweet at this time of the year. If it is not so then there is something not quite right with the conditions. If the water is very green this signifies that too much strong light is reaching it or the under-water plants are not vigorous or numerous enough to do their job. Foul conditions can also affect the clarity of the water; for instance, the presence of a quantity of uneaten food can upset the balance and the fouled water always seems to encourage the formation of green algae. Some pondkeepers just cannot refrain from over-feeding their fishes despite the fact that at this time of the year there is usually plenty of food available in the pond so that artificial feeding is almost unnecessary. A lot will depend on the size of the pond and the number and size of the fishes therein. It may have been necessary to feed artificially in the earlier part of the year but once the water warms up a little and many insect larvae are present in the pond there should be a gradual easing off of feeding with dried foods.

Although the under-water plants can make a great deal of difference to the clarity of the water considerable help can be given by the water lilies. When growing well their leaves can spread out over a fair surface of the pond and so shade out excess of sunshine. A pond well covered with water-lily leaves is not nearly so likely to be clouded by green algae as one with no cover at all. It can be seen then that the ideal pond is one where there are sufficient plants to keep down the growth of algae but yet not be so densely crowded with surface leaves as to hide most of the surface of the water. I consider that the ideal coverage for a garden pond is about a third of the surface to be covered with leaves and the rest open. Provided that there are also enough under-water plants such a pond should remain clear and healthy.

It must not be thought that a pond with green water is necessarily an unhealthy one as far as the fishes are concerned, as green algae are plants and under light will give off plenty of oxygen. However, it is unightly and the fishes cannot be seen, and if the algae becomes too thick it seems to kill itself and dead algae can pollute the water very quickly. Once a pond becomes so thick with algae that one cannot see into it to a depth of a few inches then it is safer to empty as much of the water away as possible and refill. It is, of course, probable that the algae will form again but meanwhile the water plants will have a chance of growing stronger and so will be able to choke out much of it. It is sometimes said that a few freshwater mussels in a pond will siphon out all the algae and foul matter from the water, but unless there were a great number I cannot see them clearing up a badly affected pond and in any case mussels could live only where there was plenty of mud at the bottom in which they could move about.

There have been several fibre-glass ponds advertised lately and many people may be experimenting with them. It must be emphasised that if these are very small it will not be easy to manage them successfully. The very small pond is always a bit of a problem, especially when the owner tries to grow a few plants of differing species and to keep too many fishes in as well. These miniature ponds may look fairly well when first established but, after a



Photo: J. Howe

Garden pond with dry walling surround and natural stone paving

short space of time, the plants will grow too rampant and the water can well be hidden. What will happen to these ponds in a severe winter remains to be seen. The pressure which can be exerted by the formation of ice is great and once the water freezes to any considerable thickness it is doubtful if the artificial ponds will be able to stand up to the strain. With polythene covered ponds it is likely that there will be a certain amount of stretch to the polythene when the water freezes and it is possible that there will not be so much likelihood of this breaking in consequence.

A point to watch when siting a small pond is that it need not be where it will receive too much sun, or it will warm up very quickly in the summer and this can be dangerous for the fishes. Remember to stick to small fishes in a small pond, as once there is a lack of oxygen it is the larger fishes which are in trouble first every time. Some fresh tap water run into the pond during hot or thundery weather can help a lot to keep the fishes safe.

As the water-lily flowers die it is a good plan to remove them. They may be cut off with a sharp knife tied to a long stick and then netted out. Any dead leaves should also be removed as these all tend to pollute the water. Do not neglect your nightly visits to the pond with a good torch and a ready net. It is surprising how many pests can be caught quite easily at night time. Water beetles often come up near the surface then, when they can be netted out, and water boatmen are much more easily caught than during the day. You may even see leeches as these move about at night time, and many other larvae of insects such as those of the dragonflies can be caught with the aid of your torch and net. If any fishes are required to be taken from the pond the night time is the best for this. They are usually quieter and less disturbed by your actions than they would have been in the day.

Most fishes in the pond should be in good health at this time of the year but if any fresh specimens are introduced to the pond make sure that they are not carriers of any disease or pests. It is safer to keep them in an aquarium apart from the pond fishes for a few days to make sure that they are quite clean. It is easy to upset the whole pond of fishes by the introduction of one doubtful character, and once pests or disease are introduced it is not easy to get the pond back to normal again.



# A FURNISHED AQUARIUM FOR FANCY GOLDFISH

by Dr. R. J. AFFLECK

**T**HERE are many aquarists who began by keeping goldfish but found this job too difficult and so went over to tropicals! This is a remark often made by goldfish fanciers. Although there may be some truth in the statement let me hasten to add that I believe the main cause of failure with goldfish is lack of definite information on how to keep them. Few books on goldfish are written by experienced fanciers and most do not give adequate or accurate information on the requirements of the fish. Tropical fanciers have a much better selection of books.

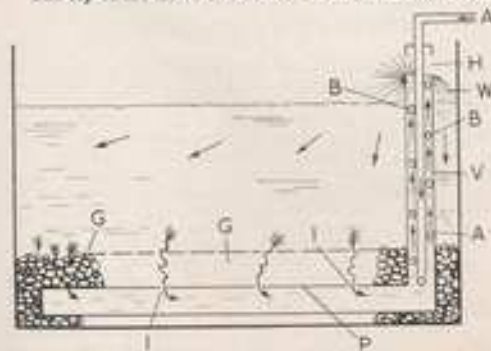
Goldfish are mighty tough. Every year we hear of the death of a fish which has existed from 10 to 20 years in a glass bowl, with a daily swim round the sink, on a diet almost exclusively of "anus" eggs. Human beings have been known to exist for long periods in cramped quarters and with very little food but if we keep pets we should give them conditions where they will thrive rather than just exist.

## Aquaria for Goldfish

Goldfish may grow into relatively large animals if conditions are favourable but, in common with most fishes, the size is related to external conditions. In some rivers fish grow fast and become large, whereas in others, individuals of the same species grow much more slowly and rarely reach the size of their relatives in the other habitat. Goldfish have been domesticated for hundreds of years but they are, fundamentally, fish which inhabit slow-flowing rivers. Although young goldfish may eventually accommodate themselves to conditions in the tank, it should be a large one (36 in. by 15 in. by 15 in.) is a convenient size for most people but do not hesitate to install a larger one if you are able to do so; 24 in. by 12 in. by 12 in. is the absolute minimum size.

Most people buy their tanks ready glazed but if you are a handy person you can save a little money and get enjoyment by purchasing an angle-iron frame and then painting and glazing it yourself.

The top of the tank should have a shade which will hold



Sectional view of an aquarium with a "built-in" sewage works. The letters are identified in the text.

two electric bulbs. This is one essential which is often omitted. Regular hours of light are essential for planted aquaria containing goldfish but in Britain the natural commodity is often unobtainable for days on end. As successful fish-keeping cannot be allowed to depend on the weather, two 60-watt electric bulbs will ensure that one possible source of failure has been eliminated.

The position of the tank in the room is not very important so long as it is not liable to be overheated by a fire or radiator. If you do not have electricity, however, then the tank must be situated in a window where it will receive the maximum top light.

## Sewage Disposal

When the tank is set up with plants and fish it will be almost an enclosed unit. Gases, including water vapour, will escape at the surface while other gases will enter the tank. The only other material that will enter the tank is food for the fish.

If a few people are living in a relatively unpopulated region the problem of sewage disposal is not a difficult one to solve. The wastes may be emptied below the settlement into a nearby river where the dilution effect will be such that the micro-organisms can convert the sewage into simpler compounds without the production of noxious gases. In an aquarium the amount of dilution is small and in order to ensure success it is desirable to install a "sewage works."

In a sewerage works the solid material is allowed to settle and the fluid is treated by micro-organisms which "feed" on the material and use it either as a source of energy, or as raw materials for building up new organisms. If the treatment is efficient the fluid leaving the sewerage works may be pure enough to drink!

There are two main ways of treating the liquid. The more modern one is referred to as the "activated-sludge" method. Briefly, this consists of blowing air into the liquid in order to supply the micro-organisms with oxygen. Each tank therefore consists of a whirling mass of millions of micro-organisms and sewage. This is a most efficient system as long as the "culture" of organisms remains "healthy." However, if the concentration of sewage becomes too great and there is not enough oxygen, or if poisons kill off the organisms, then the whole system breaks down. The activated-sludge system can be seen at work in many aquaria (cloudy water being whirled around by violent aeration!), where the waste materials will eventually be rendered innocuous unless the system becomes overloaded or unless the aerator fails. I am sure everybody will agree that a small sewerage works is not an ideal decoration for the sitting-room. A sewerage works is certainly not a desirable residence for a pet goldfish.

The second method of dealing with the liquid is to pass it through a "percolating filter." Here the fluid is sprinkled over a bed of clinker. The micro-organisms in the interstices of the clinker use the materials in the liquid. As the clinker is exposed to the air this system is not so likely to break down through lack of oxygen.

## Under-Gravel Filtration

After this ramble round sewerage works let us return to

our aquarium. The most efficient type of sewerage plant for an aquarium is a modification of the percolating filter with the gravel (1-2 in.) on the bottom of the tank taking the place of the clinker.

The diagram shows the general arrangement of the system. Under the gravel (G) are one or more pipes (P) which connect to a vertical pipe (V) standing out of the water. Near the top of this pipe are two holes (H). A small pipe (A) passes inside the larger vertical pipe (V) as shown in the diagram.

Air is blown down pipe A by means of a small aerator and the bubbles which escape from the end of the pipe rise up inside pipe (V) and eventually burst at the surface of the water. In passing up the pipe the bubbles push water before them and this water (W) spills out of the holes (H) into the general bulk of water in the tank. As water is lifted out of the pipes, it is replaced by more water which passes through the gravel and into the base pipes (P) through the holes (I). In this way a circulation of water is set up and all sewerage is moved down into the gravel, where it is dealt with by the micro-organisms.

This type of sewerage system will deal most effectively with much more waste than is normally produced in an aquarium and the water will not turn green but remain crystal clear. However, if you keep too many fish in the tank and shovel in so much food that much remains uneaten, then even this efficient system will be unable to cope with the load. It will be appreciated that this is not a mechanical filter merely sieving the suspended matter out of the water.

Solids will eventually block the spaces in the gravel and the holes in the base pipes but this will not normally occur for at least 8 months. To ensure efficient running the tank should be cleaned out and set up again every 6 months.

#### Water Plants

There is a popular belief that fish cannot live in an aquarium without plants. This is definitely not true and some fanciers keep their fish in bare tanks with running tap water. What is more important to remember is that plants are often the indirect cause of the death of all fish in a tank or pond.

Oxygen is used by fish and the higher plants as well as by algae and bacteria. If the daily amount of light is insufficient the plants begin to die and the number of bacteria increases enormously. In a flourishing tank there are millions of bacteria but the numbers become astronomical when decomposing vegetation is present. Under these conditions, when oxygen is being used up rapidly by bacteria, the amount available for the fish may become so reduced as to be below the safety level for fish. Even in a tank or pond with few fish which looks healthy, the water near the surface may be less than 40 per cent. saturated with oxygen and near the bottom there may be no dissolved oxygen.

In a clear tank most of the oxygen enters the water at the surface. Our circulating system is thus ideal for distributing the dissolved oxygen from the surface to all parts of the tank and bringing water to the surface for oxygenation. Two 60 watt bulbs switched on for 8 hours a day will ensure that the plants receive enough light and do not die.

The choice of plants and rocks is a personal matter but even with these features there are a few essential points to consider. The more plants, sands and rocks you use the less space will be left for the fish. The coldwater furnished-aquaria class at fish shows should be an inspiration to the beginner. Unfortunately in most cases the tanks exhibited, although looking attractive for the day of the show, would not remain in the condition for long. The typical tank is too cluttered up with plants and rocks and the fish might exist for a while but they certainly would not thrive. Mr.

N. E. Perkins's tanks, illustrated in *The Aquarist* (March 1960), show restraint in planting which leaves large swimming spaces for the fish.

I believe that *Lagarosiphon major* (*Elodea crispata*) is one of the best plants for tanks and ponds containing goldfish as it is able to stand up to the rough treatment it will receive from the fish. Rocks are best avoided. Some dissolve slowly in the water while all take up valuable room and will restrict the working of the base filter.

The main idea behind this article is to point out to beginners that goldfish need more than a tank full of water. If fish are kept as pets they are dependent upon us and we should give them the best possible conditions.

## NATIVE

### MOISTURE-LOVING FERNS

A FEW species of the large native genus of ferns, *Dryopteris*, are admirably suited to life in the water garden. All are deciduous, though the rapidity with which they lose their fronds depends on the abundance of moisture in the autumn atmosphere. The sturdy, mid-green fronds arising in the form of a shuttlecock from the stout crowns of *Dryopteris filix-mas*, the male fern, are a familiar sight in suburban gardens. This robust, common species will grow in almost any soil, but produces luxuriant foliage if its roots are in the moist, peaty soil of a bog garden. The more root moisture and shade available to *Dryopteris dilatata*, the broad buckler fern, the longer it will keep its dark-green fronds. A species frequently occurring in moist woods, this fern is easy to grow and its



*Dryopteris dilatata* growing in a bog garden

spreading, triangular, much-divided fronds are useful for masking awkward corners and dark nooks in the water garden. A third species easily adapted to life at the edge of the garden pool is *Dryopteris thelypteris*, the marsh buckler fern, a local plant of fens and marshes particularly in western counties. Its slender, black, underground rhizome will creep in and out of the water, producing at intervals erect, almost scaleless fronds of a conspicuous yet pale green. The outline of the frond is lanceolate but the lowest pinnae are quite long and immediately distinguishable from the small, deltoid, basal pinnae of the otherwise very similar species *Thelypteris caespitosa*. The young fronds of *T. caespitosa* are clothed in shaggy, silver scales and they make a striking sight by the garden pool, though this species is unable to endure the stagnation which does not worry *D. thelypteris*, and must therefore be planted in equally moist, but better drained, loamy soil higher above the pool level.

C. D. SCULTHORPE

THE AQUARIST



# AQUARIST'S Notebook

by

RAYMOND YATES



A RECENT film that will be seen by the majority of the film-going public appears to have more than the usual quota of violent scenes. In one of these a tank of tropical fishes is wrecked and the audience is offered the spectacle of gasping fishes vainly struggling on the floor and tiny terrapins being crushed under foot. This new low in horrific entertainment will hardly appeal to hobbyists, who will consider it a shocking example of rank bad taste. In these days when property is "broken into" with such sickening regularity it would seem that wrecking, and not theft, is often the reason where juveniles are concerned. Fishkeepers have no illusions that burglars in general would leave their tanks alone. Cases have been reported of smashed tanks and of the addition to the tank water of all sorts of toxic materials, from vinegar to detergents. This must be great fun to the warped minds of the perpetrators. There is very little the hobbyist can do except take the usual precautions against breaking and entry. When the house is empty I never leave tank lights on or even pumps working. One wonders what sort of a public outcry would have followed if, instead of fishes and terrapins, a litter of puppies had been trodden to death in the scene in the film. Altogether a very poor show.

Beginners are always quietly pleased when they hear that some "expert" has had losses in spite of his experience. Every fishkeeper, of course, has losses from time to time which just can't be helped. Life is like that and it is probably a good thing that it is. Some time ago I happened to glance at my dining-room tank and I realized instantly that something was very wrong. Somehow the fishes did not seem to be their normal selves although temperature and cleanliness seemed satisfactory. Close observation revealed that a large leeri gourami was heavily coated with a white film and two large red-eyed red swordtails were in similar trouble. However, the other fishes were unaffected, these including a fighter, tigers, barbs, angels and cardinals. Knowing full well that trouble of this sort just does not come without good reason I began to look around for the cause. It was then I noticed that a third large swordtail was missing. There was no sign of it anywhere in the heavily planted 4-foot tank. As it was impossible for it to have jumped out the only possible explanation was that it must be behind the rockery. Investigation proved this to be true; the fish was long dead and in the last stages of decomposition.

How can an experienced aquarist be so careless as to leave a large dead fish in his tanks for a week or two? Small fish can be overlooked but large ones shouldn't. I dosed the tank with achromycin with more hope than expectation. Nothing happened, the fishes did not improve. After 3 days I decided to medicate the tank with phenoxetol. Within 24 hours the affected fishes were completely cured and as lively as ever. A day later, however, I ceased to congratulate myself when I found the leeri gourami and one of the swordtails dead, apparently in perfect condition. None of the other fishes was affected and the other swordtail completely recovered. Events like this make us realize that we just don't know the answers and I have no idea why these fishes were cured, only to die the following day, and why none of the other fishes in the tank was bothered in any way. If you are a beginner, don't worry; we all are!

When I dismantled my pond I had to give away most of the pond fishes. However, I retained some shubunkins and three orfe which I have had several years. I keep them in an old shed and find no difficulty in maintaining a happy

family of perch, dogfish, rudd, goldfish, orfe and catfish. We even had an eel. Hobbyists often say it is impossible to keep perch in aquaria. This is nonsense. Mine have survived without ever having any natural food for the simple reason that the orfe always get there first. However, meaty table scraps like fish, crab, ham, meat, tongue and chicken suffice.

The main point with perch and orfe is temperature. Once the temperature rises to the mid-sixties they are in trouble and often before that temperature range. All you have to do is change the water. I am a dahlia fan, and as dahlias are great drinkers I kill two birds with one stone by siphoning the water from the coldwater fishes for the dahlias and refilling the tank from the hose with colder water from the mains. Orfe can be kept at high temperatures, even as high as 77°F, provided that they have vast swimming space and surface. They tend to lose balance and appear drunk but are quite tough and will survive if you aerate the water. Perch cannot stand high temperature at all; it is no use trying. Coldwater fishes such as tench, rudd, carp etc., are very easy to keep but loach really need shallow water; gudgeon prefer cool water and roach are best left alone. Rudd are similar in needs to perch and offer no difficulties. The stickleback is hard to feed; he needs regular supplies of meaty food, which makes him something of a nuisance as his small size means that food offered must also be small. Sticklebacks just cannot be left without food as most other fishes can.

Dr. Maurice Burton, writing in *The Daily Telegraph*, has given some interesting facts on secrets of deep-sea life. He mentions that the descent of the bathyscaphe Trieste to nearly 38,000 feet is twice as deep as the deepest dredging and more than half as deep again as the lowest limit from which fish have been caught. The increase in pressure of 15 lb./sq. in. for every 32 feet of depth has always suggested that a terrestrial creature sinking into the deep sea would be flattened, and that, conversely, any deep-sea creature brought to the surface would burst. This theory seems to be incorrect from what we now know. Dr. Burton explains that the real danger from pressure to man is due to too sudden release, and the consequent formation of nitrogen bubbles in the blood, with pains known as "the bends." Deep-sea creatures face the danger of exposure to light and increased temperatures. Death soon follows unless such creatures are quickly transferred to sea-water in a refrigerator in total darkness. These creatures are used to living a daylight-free existence and constant low temperatures round about freezing point. Lower temperatures do not kill. What is lethal is the formation of ice crystals in the blood. The higher the pressure the lower the freezing point so there is no risk of freezing well below zero Centigrade.

The sea appears to have boundaries in depth. For example, at 350 feet down all plant life becomes rare. Between 270 and 400 fathoms (i.e., approaching 3,400 feet) is the limit of penetration of light. Just above this boundary is a layer something like our night and day. Some concentration of animals here might be due to their taking refuge on the fringes of outer darkness but this may be false. Experiments in the Mediterranean suggested that at



great depths the rate of flow of the water was either nil (stagnant) or not more than 2 inches in 5 seconds.

Mr. Arthur Saxon, of Nottingham, a very keen and well-known Midland aquarist, told me how one day he was in an aquarium shop when he noticed a typical country woman excitedly viewing the stock. When it came her turn to be served she asked for "Another of those lovely mussels." When she had been served with the shellfish (in cardboard box) she was asked where it was to go. "Oh, into my goldfish bowl with the other one" came the reply. With her youthful companion she peered into various tanks and was heard to exclaim: "Look, little fishes without any tails": investigation proved these "fishes" to be *Daphnia*. Finally: "So they eat corn, do they?" pointing to a goldfish tank with well-washed gravel.

In Lancaster I was surprised to notice a massive turtle shell hanging outside a pet shop. Written on the shell in white paint was the price of tortoises. This certainly was an eye-catcher. I also saw the peculiar fish stone (a door lintel), erected in 1610, over the doorway of a local fishmonger.

Mr. August M. Roth, who publishes *Aquatic Life* in Baltimore, U.S.A., tells of a certain society who asked their members to give fish jars for their auction. Jars were duly forthcoming but, although the auction was successful, many pairs of fish were killed in the small, unclean pickle and mayonnaise jars.

The world's largest aquarist store in New York was badly damaged by fire recently, much of the stock on three floors being destroyed. The fire began in the shipping department and caused a loss of approximately £66,000. Some of the departments were quickly in operation again.

A rather costly aquarium repair was that in Toronto, where a leaky propane gas tank set off an explosion which tore out a wall and put two brothers in hospital. The brothers were using the gas to solder an aquarium in the basement.

Mr. Roth also gives details of an instance where a youth of 16 who had got into bad company came before a judge. He told the judge that he found it hard to pass the time in his mother would not let him have even a small corner of the cellar to keep toy fishes in and a few frogs, lizards and a couple of harmless snakes. The judge asked him what types of fishes he had in mind for keeping. The youth replied that he had had several livebearers but wanted to try his hand at breeding egg-layers. He thought he would like to try breeding neons, which he had heard were hard to breed. Without hesitation the judge told the youth that he was glad to hear he liked breeding fishes, and that he also had fishes, three tanks in fact, and had so far had no luck in breeding neons. The youth was discharged and the judge suggested to the parents that they allow the boy to keep fishes as a hobby. He also suggested they might allow the boy to phone him to arrange for a visit to see the judge's fishes.

*A cartoon in a German paper shows the shape of things to come. A fishing trawler is loaded with fish, fish everywhere, and the crew in frogman outfits are forced to swim back alongside the ship.*

Although I prefer pastures new I mostly get around much the same old places. New or old, I always endeavour, if time allows, to visit the local museum, for one never knows just what might be on view. I find fishy aspects most conspicuous by their absence, although one is sometimes fortunate to find fishes on view, as at Derby, Leeds, Bolton, and before the war, Liverpool. Sometimes there

are interesting models of fishes and perhaps fossils. The trouble is one just does not know in advance if anything of interest is on view. I have often thought that aquarists would appreciate a list of towns where public and similar aquaria (however small or poor) are on view, and also those places where interesting outdoor pools, ornamental gardens with fishes and even fish hatcheries can be seen. If any readers care to send me details of anything fishy in their vicinity I shall be only too pleased to pass on the information to other readers of these notes, so please give full details.

Recently I was in Lytham and was quite delighted there to be taken to see a lily pool in the public gardens containing hundreds of grand flower heads and many large fishes, mainly carp, goldfish and rudd. As this park is not fenced off with railings I wondered how the fish survive the attentions of teddy boys or angling-mad small boys. What a treat to find such an attractive pool, contrasting with the empty (of fish) concrete excavations which pass as ornamental ponds in so many of our seaside resorts. In Holywell I found a novel garden pool set out in the window of a pet shop. The pond contained real pond plants and rushes and also polythene flowering stems and water lilies plus fishes. The result was attractive and made one look

I am not one of those hobbyists who give much thought to the electrical aspects of the hobby, and probably most aquarists will share this fault with me. We potter about in our haphazard way and just hope for the best. We hope against hope that a heater or a thermostat will not give out on us at an inconvenient time and usually they don't. I don't know how other hobbyists are, but I seem to be lucky insofar as most breakdowns seem to occur at weekends. Of course, modern equipment rarely gives trouble, especially if of a reliable make, and heaters and thermostats go on, year after year, doing their job most efficiently, although this happy state is dependent upon their not being moved. Personally, I never move or change a heater or thermostat unless it has failed to function. Even when a tank is cleaned the electrical equipment is untouched. Moving heaters which have been in use is a bad policy, although I know aquarists who change their heaters and thermostats about weekly.

Wiring is taken very much for granted and I often shudder to see some of the rough and ready jobs in the backrooms of the fishkeeping fraternity. People who live in glass houses . . .! The other day I was renewing lamp sockets that had become ruined by the damp of hood condensation when I suddenly noticed the 6-foot lead to the switchboard. It looked decidedly old and closer inspection revealed that it was absolutely rotten. As I picked up the plug the cable came away in my hand. What a let off! This particular plug and cable had probably been undisturbed for years. Spring cleaning is an excellent system but in the aquarium world regular check-ups are advisable.

It is now quite the vogue to have indoor plants of tropical origin. These are rather expensive and when one sheds a leaf (particularly if a large leafed type) the owner feels a keen sense of loss. Actually many of these leaves will live for months if kept in water and make delightful decoration to some of the darker corners of a house. A plant which grows well both indoor and outdoor is the so-called castor-oil plant. The giant leaves when removed look charming in a sturdy vase and gradually bend over in a very palm-like manner. *Monstera* is another plant which will adapt itself this way.

*An evening paper gave a picture of a goldfish bowl with two fish. Says one, "Looks as if that guy Columbus was right."*



Adult male Kenya dwarf chameleon (*Chamaeleo bitaeniata elleti*)

## CHAMELEONS (2)—by ROBERT BUSTARD

(Photographs by the author)

**I**N last month's article I mentioned that the best chameleons to keep were undoubtedly the dwarf species.

While it is true that some of these are very hardy and are accustomed to cold nights, this was not the sole consideration. Small chameleons need less food, and since chameleons feed only on live winged insects, feeding, particularly during the winter months, can be quite a problem.

Nowadays most collectors regularly purchase small quantities of gentles for their pets and many keep mealworms on hand. They can therefore readily supply bluebottles at all times of the year. While large specimens (e.g., a 10-inch common chameleon) will accept bluebottles, these in themselves will not provide sufficient nourishment unless consumed in such quantities that the lizard would soon tire of them. Should one decide to keep large species one must have several good sources of food available. Items such as cockroaches, large grasshoppers and large moths (Saturniidae), and a large common chameleon, when it would not accept bluebottles, would at once catch and eat large-bodied silk moths with a wingspan of 5 to 6 inches. The whole moth, including the wings, was eaten.

These feeding problems do not arise with the dwarf chameleons, which will subsist throughout the year on flies and bluebottles. My specimens are fed largely on the latter and do not appear to show any ill effects despite this somewhat monotonous diet.

The South African dwarf chameleon (*Micronotus pusilla*), although not always obtainable, has long been a favourite in Britain. This chameleon is accustomed to cold nights, coming from the Cape Province. It is, also, most attractively coloured and as it is of small size (5 to 6 inches) a

couple can be kept in a fairly small vivarium (20 in. by 20 in. by 30 in. high).

Another species is the Kenya dwarf chameleon (*Chamaeleo bitaeniata elleti*) which, although found on the Equator, occurs at elevations of about 6,000 ft. so that it, too, is comparatively hardy. In fact, I kept specimens out of doors in my chameleon house, which is not heated, during the early spring when the temperature reading was under 40°F at 8 a.m. Despite the fact that there were over 50 specimens present I sustained no losses. Such temperatures cannot be recommended and the beginner is advised not to subject even these hardy specimens to temperatures below 50°F. This extreme tolerance is, however, mentioned so that it will be realized that there is scope for careful experimentation, and the temperatures recommended are only those which the author has found suitable. For species like *Chamaeleo chamaeleon* I recommend a day temperature of 70 to 80°F. The dwarf species I keep at 65 to 75°F.

### Outdoor Enclosures

I keep all my chameleons out of doors for as much of the year as possible—1st April until early October. I keep them in a completely enclosed reptillary so that I can put in tins of gentles, and these will change into bluebottles which cannot escape, and which are therefore eaten by the inmates. My chameleon house is built against a wall; the front incorporates sliding glass doors and the roof too is of glass. The sides are brick half height and then wire gauze.

In this enclosure, which is sprayed with water three times per week in sunny weather, is an old everlasting sweet pea plant, which grows up over branches to a height of 5 or 6 feet and also a small purple osier. The chameleons are



Helmeted chameleon (*Chamaeleo helmi*). Characteristic features of this species are the large casque and upturned snout. It comes from elevations of over 7,500 ft. in Kenya.

perfectly at home among these natural surroundings and do very well. In fact I have many babies born in the collection—births of baby chameleons often exceed 500 per season.

#### Breeding Chameleons

Some chameleons, such as the common species, lay eggs (i.e., they are oviparous); others—in fact all the others mentioned in this article—are viviparous (produce living young). In *Chamaeleo bitaeniata ellisi* the largest brood I have recorded was 25. Average broods are about 15. The young chameleons are best housed away from the adults, who might eat them, and should be well supplied with

fruit flies (*Drosophila*). They have large appetites, which must always be satisfied if they are to be reared successfully.

Other species of chameleons which are sometimes seen in this country are the helmeted chameleon (*Chamaeleo helmi*), which comes from Kenya and is very hardy and the three-horned chameleon (*Chamaeleo jacksoni*). This latter species is also from East Africa. The three-horned chameleon is quite an impressive creature, as the photograph shows. Adults measure about 8 to 9 inches. In my experience this species cannot be recommended, as it seldom does well. The helmeted chameleon on the other hand is also attractively coloured, possesses an impressive casque and beard (see photograph) and does well in cap-

Three-horned chameleon (*Chamaeleo jacksoni*). The horns are better developed in the male of this species, which grows to 10 inches in length and uses the horns for fighting.





tivity. One specimen in my chameleon house produced seven youngsters.

#### Chameleon Characteristics

Chameleons are fascinating lizards. They possess great ability to change colour, as do certain other lizards (notably the anoles of the Iguanidae), although many members of both the Iguanidae and the Agamidae are capable of considerable colour change.

Their shape—they are flattened laterally—makes them leaflike and their thin limbs could easily be mistaken for twigs. The prehensile tail is frequently coiled round the branch and the lizard will rest motionless for hours on end; motionless that is, except for the queer protruding eyes, which are constantly on the alert for enemies or food. The eyes of chameleons are large and are covered with skin except for a small aperture over the pupil. They are constantly moving in different directions and the two eyes work independently, one looking forward while the other looks backwards, then one up while the other looks down. Chameleons are therefore able to look in two different directions at the same time. The only time that the two eyes look in the same direction is to judge distance before the tongue is projected to catch a live insect on which they feed. Binocular vision is, of course, essential to judge distance accurately. The tongue of the chameleon is worked by an antagonistic muscular system and can be shot out at great speed to catch a fly or other insect. The

tip is sticky and to this the prey adheres, when it is at once brought back to the mouth by the elasticity of the tongue, where, still stunned, it is chewed up by sharp teeth.

Sooner or later most reptile collectors turn to chameleons and it is unfortunate that most chameleons do not appear to live long, since they are not well understood. It is true that they do need individual attention. Some reptiles (like the larger skinks such as *Tiliqua scincoides*, the blue-tongued skink from Australia) will feed in a warm box. Chameleons are more particular, they are firstly arboreal and must be provided with branches and foliage in which to climb and hide. Water must also be sprinkled on the foliage for them to drink. This should be done on alternate days when they are kept indoors. Suitable food should be offered frequently but excess should not be left in the vivarium. I have seen vivaria with chameleons containing dozens of flies which would suffice for a month. I have also seen chameleons kept in boxes which were so low that they could not climb and indeed where no foliage or branches were provided for them. Under such conditions they must not be expected to survive. If, however, they are pampered, many species will live for some considerable time, although they are probably short-lived even in a state of nature. Their life span is possibly only several years—which is short by reptile standards.

For those who understand these "bags of tricks" they are a constant source of interest and enjoyment and there are over 70 species, some of which possess horns, casques etc., which the collector can try to acquire.

## The Guppy—King of Tropical Fishes—by PETER DENDY

**I**N the first two articles I dealt with selecting the breeding pair, water and maintenance and I am now going to discuss breeding. The guppy is, of course, a livebearer and produces broods of from a dozen to 50 fry approximately once a month. One fertilisation lasts on the average for five broods. Females should not be bred from until they are nearing maturity, say at an age of 6 months; this means that until this age they must be kept virgin, which is easier said than done.

In a strong healthy female of a good strain after one fertilisation the brood number should increase for three or four broods and will then drop away again until the fish runs out of stored male sperm. If the second brood is not larger than the first, then there is a strong indication of an incipient weakness in the strain.

In the act of fertilisation the male swings his gonopodium from a backward-pointing direction until it is aiming forward, and at the same time brings his pelvic fins into line with the gonopodium so that the grouped fins form a kind of guide down which the balls of sperm may be fired at a female, rather like a machine gun. This combination of fins may be directed to right or left as a target is presented.

Authorities argue about whether the male actually makes physical contact with the female during mating, but that is an academic point and it is sufficient for us that a delivery of sperm takes place and the female is no longer virgin. The female is equipped with special tissue which absorbs the male sperm and keeps them alive until they are used to fertilise the next batch of eggs, and so on until the store of sperm is exhausted. This storage device is provided by nature to ensure a continuation of the species under adverse conditions. The female being dull in coloration is less likely to become the prey of a predator than the highly colored and much more obvious male. It must be tough being a pretty boy in the wild!

As a general rule, at a subsequent mating the fresher

sperm will take precedence over the older sperm for the fertilisation of the next batch of eggs, but this is not always so and can by no means be relied on. So that if your female has been contaminated by a stray male, to be safe you must either scrap her, or wait until she "runs out" before using her to continue the strain.

There is normally no difficulty in getting the female to become gravid, but if trouble is experienced then the male should be placed in a tank on his own and given plenty of time to settle down and feel at home. Later the female can be introduced and the male should show an immediate reaction, by displaying and addressing his attentions to the lady and making passes at her with his gonopodium. Failure to show any interest is a bad sign and an attempt should be made with another male.

All being well the female will show signs of becoming gravid within 2 to 3 weeks and the first brood should appear between 24 and 35 days, the number varying between one and two dozen, depending on the age and condition of the female. Guppies do not normally eat their newborn fry if kept well fed, but it can happen, so it is wise to take precautions either by heavy planting in the brood tank or by the use of a breeding trap.

I dislike breeding traps myself as they often upset the female and I rely on providing cover for the fry by using one or two teased-out green nylon pot-scoopers. These have the advantage of being easily sterilised by boiling. The water depth should not be more than about 8 inches to allow the fry to reach the surface without too much effort. All my broods are raised in small brood tanks 12 in. by 8 in., into which the gravid female is placed about a week before the happy event. When the brood has been dropped the female may be netted out and the fry left in peace. This type of small tank has advantages for the initial feeding of the fry and for keeping an eye on them, as I also remove the teased-out nylon, leaving them well exposed to view in a bare tank.

# COLOUR IN GOLDFISH

by R. E. ISON, B.Sc.

**L**IGHT travels in wave motion, the distance from crest to crest of adjacent waves being known as the wavelength of the light. These wavelengths are very small and are usually given in angstrom units (an angstrom unit is one ten-millionth of a millimetre). The colour (hue) of light depends on its wavelength. If white light passes through a prism it is split into a band of colours known as the visible spectrum. These colours are the constituent parts of white light but our eyes are unable to see the individual colours.

A mixture of the rainbow colours appears white to our eyes. There is no distinct dividing line between the colours of the spectrum as they merge, one into the next, but we can recognise red, orange, yellow, green, blue and violet. It is convenient, however, to regard the spectrum as being made up of three main colour regions—red, green and blue—which are called the primary colours of light. When light rays of these three primary colours are mixed in the correct proportion we see white.

Light rays may be reflected or absorbed. An object which appears white does so because it reflects all the colours of the spectrum in their original proportions. A black object appears black because it absorbs all the colours and does not reflect any of them. A red object appears red because it absorbs all rays except the red ones, which it reflects. An object which is capable of reflecting red light cannot do so if no red light falls on it.

From the above it can be seen that colour is not a matter of opinion, but of wavelength, a property which can be measured and is precisely defined.

## Colours seen in Goldfish

When white light shines on a goldfish the following colours may be seen: orange, yellow, black, smoke, blue, silver and pink, occurring singly or in combinations. These colours are due to combinations of reflecting tissue and



Photo: Harry V. Lacey  
Imported Japanese fantail goldfish

pigments which are found at various depths below the epidermis (skin).

Reflecting tissue (Affleck, 1952; Chen, 1928) consists of crystals of guanine, which may be present in two definite layers as shown in diagram 1.

## Reflecting Tissue

**Layer 1:** Here the guanine is found lining the lower side of the posterior (back) part of the scales and is thus an interrupted layer. The scales themselves are transparent like glass and the guanine acts in a similar way to the silvering on the back of a mirror. When guanine is present in this layer it obscures any pigments and guanine which may lie below it, and it gives a metallic shine to any pigments found above it. In metallic fish the head does not appear to be as shiny as the rest of the body because there are no scales on the head and the reflecting tissue lies under the bones of the skull. These bones are much thicker than scales, consequently the head has a mother-of-pearl appearance.

**Layer 2:** This layer of guanine is situated below the dermis. Reflecting tissue is always present in this layer, although it varies in amount. Where reflecting tissue is absent in the first layer but present in the second the pigments above the second layer have a mother-of-pearl appearance.

Reflecting tissue in layer 1, with no pigments above it gives the fish a metallic silver appearance. Reflecting tissue in layer 2, with no pigments or guanine above it, gives the fish a dull silver (nacreous) appearance. If reflecting



Photo: Harry V. Lacey  
Young veiltail goldfish (10 months)



tissue is absent from both layers the fish will have a dull (matt) appearance.

#### Pigments

The pigments which can be extracted from the body of a goldfish are: orange, yellow and black, plus haemoglobin from the blood. Just recently a fifth pigment called carassius purple (Yamao, 1956) has been extracted from the body of goldfish. The pigments are carried in cells known as chromatophores, and may be concentrated into a small volume at the centre of the cell or dispersed throughout the cell, giving either a light or intense colour effect. The chromatophores are found in four regions as shown in diagram 2.

Orange and yellow pigments occur only in the first two regions. Black may occur in all four. In region 1 the black pigment appears black and may be so dense as to obscure reflecting tissue below it. In layer 2 the black pigment appears a smoky-blue (smoke), and in regions 3 and 4 it appears blue.

#### Colours produced by Combination

A brown colour may be produced by black pigment overlying orange pigment. Brown can also be produced by orange and black pigments in the same layer; the eye is really "tricked" into seeing brown by the close proximity of the tiny spots of the two pigments.

A lilac or violet colour is produced by black pigment deep down but very sparse so that the blood of the fish shows through. Black pigment in the third or fourth layer appears blue; this blue together with yellow pigment will give a pale green. Pale colours are undesirable in fancy goldfish for they indicate a lack of the necessary pigments for producing those intense colours so much admired by goldfish fanciers.

For other colours which can be produced by combinations of pigments see Table 1. It should be noted that there is no red pigment in a goldfish except that in the blood (Chen, 1934). The intensity of the colours depends on the abundance of chromatophores and also on the concentration of the pigments within them. Besides the colours mentioned in the Table, it is possible for others to occur, produced by combinations of those listed.

Table 1. FACTORS RESPONSIBLE FOR COLOURS IN THE GOLDFISH

	Black regions			Orange regions		Yellow regions		Reflecting tissue layers		Blood
	1	2	3	1	2	1	2	1	2	
Metallic black	+									
Metallic orange				+						
Metallic yellow					+					
Metallic silver										+
Pearl black	+									+
Pearl smoke	+									+
Pearl blue										+
		+	+							+
		+	+							+
Pearl orange										+
Pearl yellow										+
Pearl silver										+
Matt black	+									+
Matt smoke	+									+
Matt blue										+
		+	+							+
		+	+							+
Matt orange										+
Matt yellow										+
Matt pink										+

#### Loss of Colour in Young and Old Fish

When a goldfish is small (about an inch long) it is very transparent, so that black-pigment cells which lie in the region of the spinal cord are readily seen and give a black appearance. As the fish grows, however, these pigment cells come to lie deeper in the body and give first of all a

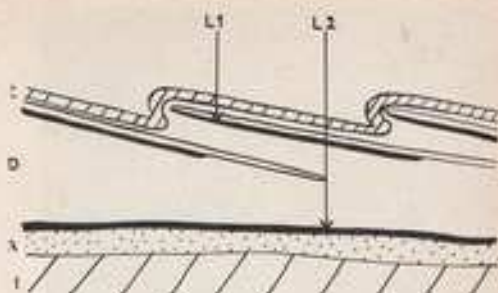


Diagram 1. Horizontal section through scales and surrounding tissue, showing distribution of reflecting tissue. E, epidermis; D, dermis; A, adipose (fat) tissue; M, muscle; L1, first layer of reflecting tissue underlying the posterior portion of the scales; L2, second layer of reflecting tissue.

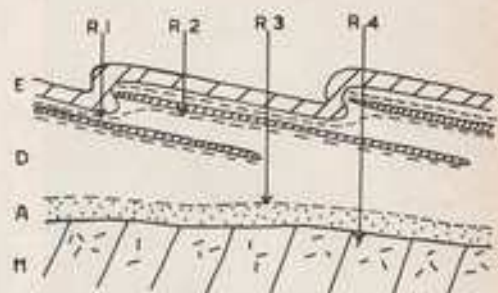


Diagram 2. Horizontal section through scales and surrounding tissue, showing distribution of chromatophores (pigment cells). E, epidermis; D, dermis; A, adipose (fat) tissue; M, muscle; R1, first region of chromatophores lying above scales; R2, second region of chromatophores; R3, third region of chromatophores; R4, fourth region of chromatophores.

smoky-blue and then a deep-blue coloration. The colour then slowly disappears because overlying tissue becomes increasingly thick until it is too opaque for the pigment to be seen. When a goldfish, in this country reaches the age of about 7 years the colour begins to fade. This is due to the fact that the chromatophores are slowly destroyed and not replaced.

It seems obvious from what has been said above that only fish with intense pigmentation should be selected and used for breeding. The ideal colouring for the nacreous and matt fish would appear to be half blue, a quarter orange and a quarter black in an overall mottled pattern.

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## PLANTED SURROUND FOR THE GARDEN

*A well-planted rockery surround to the garden gives additional interest to pond-keeping. The pond surround is very great, and the following plants provide examples photographically.*

1. *Anemone nemorosa* var. *Allenii*
2. *Tulipa stellata*
3. *Fritillaria meleagris*



## SURROUND GARDEN POND

The garden pond provides a natural setting  
for many plants. The number of plants available for use  
is great, and the other pictures on these pages  
are photographed at the pond-side.

4. *Armeria maritima* ("Vindictive")
5. *Saxifraga primulaeoides* ("Elliott's")
6. *Caltha palustris*
7. *Iberis saxatilis*





# THE FILTER

## Various Types and Their Functions

by A. BOARDER

**T**O filter or not to filter is the subject of many an argument at aquarists' clubs and it is certain that few aquarists would agree on the need for filtration and on the various types available. Let us first consider what a filter is supposed to do. The main function is to keep the water clear. It is not to aerate the water, although by the action of a filter moving the water around this object is also achieved to a certain extent. The desired water in a set-up tank is bright and clear but many tanks are anything but bright or clear. The water is usually quite clear when added to the tank and so it will be useful to consider what causes the water to become cloudy.

There are only a few main causes why the water gets cloudy. The most common is when green algae forms in the water and all turns green. This is usually encouraged by too much sunlight or too little growing water-plant life in the tank. Another cause of cloudiness is the presence of Infusoria. This can be encouraged by over-feeding, when some of the uneaten food starts to decay and the Infusoria forms among it. This is often only a temporary phase and the condition can right itself if dried food is withheld for a few days. Another cause of cloudy water is that the fishes disturb the muck at the bottom of the tank and the fine substances float about in the water.

This last-named trouble is often the fault of the aquarist when setting up the tank. It is not often realized that the type of compost to be used in a tank can be decided upon only after it has been settled what types and sizes of fishes are to be housed in the tank. This is most important. If fairly large goldfish are to inhabit the tank then it is essential to see that only fairly coarse compost is used. These fish are able to suck up all food particles which might fall between the coarse gravel. If, on the other hand, it is intended to have very small fishes in the tank then much finer compost must be used. Small fishes are unable to suck up anything in the form of food which might have sunk among the stones, but if fine sand covers the bottom of the tank they are able to take any food on its surface. The small fishes are not likely to disturb the fine sand as the larger fishes would surely do. Disintegrated droppings of the fishes may also be dispersed from the bottom when fishes root about there.

Some types of cloudiness in water can disappear if the tank is left alone, but others will not do so without the help of the aquarist. This is when the use of a filter becomes necessary. It can be seen then that with the correct compost for the size of the fishes, care with feeding and regulation of the light it should be quite possible to run a tank for years without ever having to resort to the use of a filter. Water plants play a very important part in the clearing of the water as they use up much of the droppings from the fishes. Any tank with insufficient plants is more likely to need a filter than a well-planted tank.

There are several types of filter to be had and often it must be left to the individual taste of the aquarist as to



Photo: W. J. Hesse  
Well-planted coldwater aquarium. It is more difficult to keep a coldwater tank in a clean and sparkling state than a tropical tank.

which one is used. Where a tank has been in use for some time it is perhaps only possible to use one of the filters which fits either outside the tank or just inside the top of the tank. Where a tank is being set up for the first time and a filter is needed it is possible to obtain one which lies at the bottom of the tank. This type is connected to an aerator which draws the water up through the base part of the filter. This type needs a fairly open kind of compost, as the action of the filter is to create a circulation of water through the compost and in doing so to clear many of the floating particles from the water. It is said that in this way the floating matter is brought to the roots of the plants to their benefit. Against this must be placed the possibility of the moving water not being to the good of the plants, as it cannot be natural for the plants to have water continually running among their roots. The drawing of the detritus under the compost will certainly bring the waste matter to the roots of the plants, but after a time this matter must clog to a certain degree, when the effect of the filter will be lessened.

The type of filter which operates from an air lift allows the water to filter through a cleansing medium. This medium can be sand, small stones, glass wool, cotton wool or carbon. Whatever material is used it must be realized that the better the cleansing of the water then the more detritus will be left behind in the cleansing medium. Therefore it will be seen that in time the efficiency of the filter will be impaired. This can be remedied by either changing the medium completely or by washing it well before returning it. If carbon is used it will absorb some of the soluble organic matter, some of which may be necessary for the healthy growth of water plants, but it soon becomes saturated with the matter so that it cannot function for long without renewal or thorough washing.

It must be realized that even the best of filters will not remove all the fine particles or bacteria from the water, nor will filtration remove any accumulation of dissolved mineral salts. Therefore it is a good plan to change some of the water occasionally, say, to remove and discard about 4 gallons from a 12-gallon tank and to replace it with fresh water. If this replacement is carried out once a week when the weekly servicing is done there may be no need to use a filter. It is certain that a tank can be run successfully without the use of a filter, but this can only happen when the aquarist is well experienced in the art of fish-keeping.

## AQUARIUM SCAVENGERS by JOHN S. VINDEN

**M**ANY aquarists, especially those who are newcomers to the hobby, labour under a misapprehension about the so-called aquarium scavengers. This attitude has been fostered in the past by many of the earlier writers on the subject, who made extravagant claims for various snails and other creatures, and also by unscrupulous or ignorant traders who would exaggerate the scavenging capacities of certain animals in order to sell them. In the past, street traders in the common tortoise would assure potential customers that these animals would soon clear a kitchen of black beetles and cockroaches!

The problem of scavenging resolves itself into two parts and cannot, in the small home aquarium, be left entirely to nature. The home aquarium must present a clean and tidy appearance for the benefit of the spectator, and it must also be in a healthy condition for the benefit of its inhabitants. Often it is difficult to achieve both objects at once, for what sometimes appears to be a dirty tank is a healthy one, and some tanks of pictorial beauty make poor homes for fishes.

From the point of view of general tidiness there is little doubt that the best scavenger is the aquarist himself. Regular attention with a dip tube and a razor blade will ensure that the bottom of the tank is reasonably clear of detritus, and that the front of the aquarium is transparent enough to enable one to see the fishes.

When these simple matters are attended to, the question arises whether the addition of natural scavengers is necessary or not. There is little doubt, however, that scavenging fishes and other creatures will earn their keep in the aquarium provided that their limitations are understood and their wants provided.

As soon as a tank is established myriads of natural scavengers appear in the form of beneficial bacteria and, although unseen and disregarded, these contribute enormously to the well-being of the aquarium. An aquarium without bacteria (if such could be set up) would present a very sorry picture from the point of view of the aquarist. There would be no muck, no broken-down plant tissue and animal excreta and therefore no plant food. The fishes would be unable to digest their food and life of any sort could not continue for long under such un-natural conditions.

In addition to bacteria, other disregarded scavengers are the so-called infusorians such as *Parameciums*, which also appear spontaneously in established aquaria. It is the presence of bacteria and single-celled animals that produce that desirable fluid, "old water," which appears to be so necessary for the well-being of so many fishes; these microscopic creatures, though never seen, are amongst the more important natural scavengers of the established tank.

The higher creatures with scavenging propensities can be divided into three sorts: molluscs, crustaceans and fishes. All of these can be of use to the aquarist provided that he recognises their limitations. It must be remembered that none of these higher scavengers can live on dirt. They consume only food that has been overlooked by other creatures and no scavenging fish or crustacean can live on muck or fish droppings, so the aquarist who feeds his fish with care must ensure that his scavenging fishes receive a ration of food themselves, otherwise they will cease to thrive and may come to an untimely end!

Snails usually appear in the aquarium whether desired or not, since their eggs or young are frequently introduced on plants. Provided that they are not allowed to multiply unduly and are excluded from breeding tanks, they do some good and little harm, although some species such as

*Limnaea stagnalis*, the freshwater whelk, are plant eaters and have no place in the decorative aquarium. The droppings of large snails do not contribute to the tidiness of the tank, and few species are decorative in themselves.

If it is wished to introduce snails, then the more attractive species should be chosen. The red ramshorn snail is suitable for both tropical and coldwater tanks, and the small *Limnaea*-like Australian red snail, *Indora* species, though not often available, is a pretty and tidy snail for the tropical tank. A useful snail, also, is the well-known Malayan mud snail, which does scavenge for food fragments among the compost. It is an unobtrusive creature, for it spends most of the daylight hours buried out of sight. The coldwater aquarist can use any of our native snails, with the exception of *L. stagnalis*, but the members of the genus *Planorbis*, the ramshorn snails, are, with the uncommon freshwater winkle, *Paludina vivipara*, more attractive than most of the other species. Bivalves, such as the freshwater mussel, soon starve to death in an ordinary aquarium, have no place there and should be studiously avoided.

Crustaceans are of little use to the tropical aquarist, although in the U.S.A. the aquarist has available delightful transparent freshwater prawns that may be kept as scavengers. In coldwater tanks shrimps and *Aesop* will often appear with plants and, if overlooked by hungry fishes, do a certain amount of scavenging.

When it comes to fishes we find numerous species that are used as scavengers. There is, however, no magic about the word scavenger, for in practice it signifies a fish that normally lives and feeds on the bottom of the tank as opposed to those that feed on the surface or in midwater. Fishes such as hatchets feed exclusively on the surface and are unable to gather up food from the bottom. Consequently any food they miss falls to the bottom and decays unless eaten by other fishes or removed by the aquarist. Although many of the barbs will feed from the bottom they are not bottom-livers and may scarcely be included with the scavengers.

The most popular and useful scavengers are the pretty armoured catfishes of the genus *Corydoras*. With the exception of the dwarf *Corydoras hastatus*, there is little to choose between the species from the point of view of utility, though in looks some are certainly more attractive than others. Which species to choose is a matter of personal taste and pocket, but all community tanks should have their complement of *Corydoras* at the approximate rate of one per linear foot of tank. The eel-like kuhli loach, with its relations of the genus *Betta*, are also good scavengers though most of the larger loaches are so attractive that they warrant somewhat better treatment.

The sucker catfishes *Plecostomus* and *Otocinclus* and the Siamese sucker fish *Gyrinocheilus aymonieri*, although scarcely scavengers, do perform a useful duty as window cleaners, for they spend much of their time feeding on the soft algal growth which, so frequently, covers the leaves of plants and the sides of the aquarium.

The scavenging fishes of the coldwater aquarium do, in reality, not exist. In the old days the "doctor fish" or green tetra, and the common North American catfish, were recommended by dealers as scavengers, but as the practising coldwater aquarist knows only too well the only way to keep his tanks clean is to adhere to the laws of aquarium hygiene and then "keep one's fingers crossed."

By the careful selection of scavenging creatures and the use of common sense, the aquarist should be able to avoid such hazards as "black sand," milky water and other manifestations caused by the decay of surplus foodstuffs.



# BUTTERFLY FISH FROM THE NIGER DELTA

**E**ARLIER this year fish importer Mr. E. R. Smykala of Smykala (London) Ltd., decided to locate the precise region from which butterfly fish (*Pantodon buchholzi*) could be obtained in West Africa.

He took a plane from London Airport to Lagos and arrived one Saturday morning laden with every sort of equipment except oxygen and nets. He engaged a Nigerian assistant and set to work at once to explore the waters around the island. Although he was able to send back large numbers of useful specimens of other tropical fishes to London, Mr. Smykala's bag of butterfly fish after a fortnight's hard work in steamy heat was no more than three—caught near the Lagos Waterworks. And nobody knew where there were any more.

At this point Mr. Smykala's African assistant became convinced that they could be found in the Niger Delta 400 miles away. Later it transpired that the African had a daughter in the Delta who was just about to present him with his first grandchild. But nobody else could offer even a hint of the whereabouts of the butterfly fish. So Mr. Smykala took the African's advice and set off with him in a Morris Minor for a 400-mile journey along roads of very variable quality. They reached the place the African had pointed out; there were no butterfly fish. (The grandson had arrived in good order.) It was not the season, they said, for butterfly fish.

Mr. Smykala went on deeper and deeper into the bush, leaving the tarred roads behind him and suffering more and more primitive conditions. At last he met with success—butterfly fish in reasonable quantities but, alas in a river held sacred by the local tribesmen! Mr. Smykala sought out the tribal chief and asked for permission to fish in the sacred river. The fact that he had arrived in the middle of a 2-weeks' ritual fast was an added complication.

However, the chief called a meeting to consider the application and after 2 hours' deliberating granted permission. Not only permission but active help as well—six of the chief's sons accompanied Mr. Smykala down to the river, an hour's hard walking from the village. Another hour and a half later, Mr. Smykala had 42 butterfly fish in the bag.

He engaged a new African assistant and ventured on over another 90 miles of grueling roads still further into the bush. His car broke down and he improvised a repair. However, the village in which he found himself contained a friendly Roman Catholic Mission and the villagers promised large numbers of butterfly fish if he would wait for 3 days.

At the end of 3 days news of the strange adventurer had



Mr. E. R. Smykala boarding his plane at London Airport on one of his fish-collecting expeditions

got around, and hundreds of Africans turned up to inspect him. Among them were 31 carrying round bowls of butterfly fish. The number of fish in the bowls varied from three to 200! It was overwhelming. Mr. Smykala had enough oxygen to pack four of the 24 boxes the car would carry, but because he had promised the Africans money for their fish he had to buy the lot. Packed in the boxes without oxygen they would be dead in no time at all; they would be better still in the Africans' bowls. By three o'clock the bowls had been acquired and 1,200 butterfly fish stored in them, covered with palm leaves. Another 300 fish had been paid for. And Mr. Smykala was left wondering how he could get oxygen (the nearest re-fuelling station was 500 miles away) to keep the fish alive.

After battling with primitive communications he located a source of oxygen 41 miles away by bush track or 128 by mud road. He chose the bush track and after making three detours to get round giant trees, which had fallen across the track, and twice digging his Morris out of the bog, he succeeded in getting the oxygen. By then it was dark. Mr. Smykala gave up the jungle for the mud road and got back to the butterfly fish close on midnight.

Packing started straight away and at 3 a.m. all was ready. And the race against time began again. The flight from Benin City Airport, 120 miles away, left at 9 a.m. Mr. Smykala set off and made it with an hour to spare.

After a month's search and a final 28 hours' non-stop work without sleep and without even a change of clothing in a temperature which fluctuated upwards from 88° F he had got away 1,500 fish for the benefit of British zoos and aquarists. He had established a plentiful source of these butterfly fish; and he had made plans for a return visit in the autumn this year, when it would be possible to make arrangements for steady supplies.

## Hand-Stripping the Spotted Danio—by R. E. MACDONALD

**T**HERE are times when the spotted danio (*Brachydanio nigrofasciatus*) will offer excellent opportunities for the aquarist to practise a method of artificial spawning by hand-stripping the female fish of her eggs and the male of his sperm.

This procedure is possible only because the female of this particular species of the Cyprinidae family frequently becomes egg-bound. By saying that a fish has become egg-bound, we mean that the eggs which are produced by the female accumulate in exceptional quantities in the ovary before being discharged from the body by natural spawning in relationship with the male. This over-abundance of eggs occurs only occasionally during the breeding life of each individual fish and not during each productive cycle. It is only when a female has become egg-bound that this method of artificial spawning should be practised.

A female that is overlaid with eggs will appear to be in danger of exploding because of her heavy load, and will be easy to recognise when in this condition by comparison with other females of the same age, size and species.

When a very heavy female has been selected, she should be picked up in a net that has holes of a wide gauge. The eggs can then be gently massaged from her by a very slight pressure on the abdomen with the thumb and forefinger, whilst rubbing the body (in the direction of the anus) from just behind the gills to the anal opening. It is important to note that the pressure exerted should only be very slight, as too much pressure can cause serious internal injury to the fish. The eggs which are released will pass through the large holes of the net and can be caught in an object such as a small plastic dish or spoon.

As soon as the eggs have been stripped from the female, the male should be treated in a similar manner and his sperm allowed to fall on the eggs in the receptacle. Finally, water is added to assist complete fertilisation and the eggs are removed from the container and placed in a breeding tank, where they will hatch in 24 hours with a water temperature of 78° F. It does no harm to add 2 drops of



Spotted danio (*Brachydanio nigrofasciatus*)

a 5 per cent. solution of methylene blue in the breeding-tank water to help prevent infection with fungus.

Great care must also be taken when massaging the fish not to damage the mucous covering on the fish's body, as a breakdown of this protective coat will leave the fish wide open to bacterial and parasitic infections.

This method of artificial spawning can also be used on heavy females when for some reason it is found impossible to erect a breeding trap in the tank, as the spotted danio during natural spawning will lay eggs in a similar manner to that of the zebra fish (*Brachydanio rerio*). The eggs of the spotted danio are non-adhesive and have a specific gravity a little greater than that of water, therefore they will fall to the bottom of the tank and be eaten by the parents. During natural spawning, they should be treated in the same manner as that adopted for the zebra fish by keeping the depth of the water to about 3 inches and providing a breeding trap of some kind.

Preference and encouragement should always be given to natural spawning and artificial spawning used only where conditions make it absolutely necessary.

## OUR EXPERTS' ANSWERS TO TROPICAL AQUARIUM QUERIES

The sand along the front of my aquarium has turned black, and the *Vallisneria* grouped at each end have rotted away at their bases. What has caused this condition, and the trouble with the plants?

Black sand is a sign of pollution, and can be caused by plants such as *Vallisneria* being planted too deeply, so that they rot away. The crowns of the plants should always be just above the level of the sand. But uneaten food left to decay on the bottom will also render the sand unwholesome and stain it black. To remedy this condition before it spreads all over the floor of the aquarium and kills all the rooted plants (besides making the fishes come to the surface to gasp for air), scoop up the black sand with a bent spoon tied to a piece of stick, and wash it well under running water. Then spread it over a sheet of newspaper placed outdoors for the sun and air to restore the colour and render it fit to use again.

One of my fish has got gill flukes. Please tell me a way to treat this disease.

The following treatment, which is often successful, does not necessitate removing the fish from the aquarium. Add drops of a 5 per cent. solution of medicinal methylene blue to the water until it turns deep blue, and make breathing easier for the fish by supplying artificial aeration. A more drastic

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

treatment is to add a teaspoonful of Dettol to a quart of the aquarium water placed in a jar or bowl. Immerse the diseased fish in a net in this solution for 15 seconds—no longer—and then transfer it to clean water at the same temperature. In 5 minutes or so, return the fish to the aquarium. Treatment may have to be repeated in a day or two.

I have a 18 in. by 9 in. by 9 in. aquarium, planted with *Vallisneria*, in which I used to keep a goldfish. What would I need to convert this tank into a tropical aquarium, and how many fishes could I keep in it?

You will need a heater of about 60 watts controlled by a thermostat to save you the trouble of switching the current off every time the temperature rises into the eighties during mild or warm weather. A thermometer is necessary to ascertain the temperature of the water, which should be



maintained at about 72-75°F. Your tank is too small to house more than ten fishes of neon tetra size.

I am thinking of heating a tropical aquarium by gas. Do I need anything special in the way of equipment to make it a success?

The tank should be supported on a strongly constructed wood plinth faced with sheet metal to guard against scorching of the surround. A screen or baffle of thin zinc or tin must also be fitted about an inch below the aquarium, so that the flame does not play directly on the bottom. Depending on the size of the tank, the pipe to carry the supply of gas should be tapped every 9 inches or so to receive small bat s-wing type burners.

I am on the point of setting up a tank measuring 36 in. by 18 in. by 12 in. How many heaters will I require to maintain a temperature of 75°F? And how many fishes will this tank support without artificial aeration?

In a normally heated living room, one heater of 150 watts should keep the temperature of the water at about 75°F. But two heaters of 60 or 75 watts each placed in a horizontal position close to the bottom of the water will ensure better distribution of heat. Your tank will support about 30 mixed small and medium-sized fishes.

My dwarf gouramies spawned and the eggs hatched out, but before a month had passed every one of the fry died. Please can you give me a reason for this?

Perhaps the food you gave the fry was unsuitable. Dwarf gouramies have very small mouths, and freshly cultured

Infusoria is necessary. Then again, rapid changes of temperature will soon have disastrous results. Another thing to bear in mind is to protect the surface of the water from scum and cold air.

Please give me some hints on keeping the dwarf pike (*Belontiella belontiella*).

This 6 in. livebearer from southern Mexico and Guatemala is extremely savage and must be kept by itself. Sometimes it will eat pieces of meat, small earthworms and garden insects such as woodlice, but if it doesn't take to this sort of food it must be provided with guppies and the like. A temperature of about 72-75°F suits it very well.

I should like to know the names of some plants that will prosper in a rather poorly lighted aquarium.

*Anubias lanceolata* will give satisfaction in a poorly lighted aquarium, and so will the majority of *Cryptocoryne*. If the light is not too poor, *Nitella*, *Najas* and *Laanophila* will stay alive but not make very much new growth.

I want to set up a really decorative aquarium stocked with small fishes that will not mutilate the plants or quarrel with one another. Kindly suggest a few species.

We think you cannot do better than make a selection from the following: *Nannostomus anomalus*, neon or cardinal tetras, zebra fish, spotted rasbora (*Rasbora maculata*), harlequin fish, dwarf gouramies, White Cloud Mountain minnows, guppies and the tiny mosquito fish (*Gambusia affinis*).

## COLDWATER FISH-KEEPING QUERIES answered by A. BOARDER

If goldfish rub themselves on the gravel at the tank bottom is it a sign that they have flukes or other parasites?

It is not always a sign that parasites are present. I have known goldfish rub along the bottom when they have not had parasites on them at all; it appears to be just a habit. If fishes are infested by flukes there are usually some other signs to be noted. The fish will soon appear out of sorts by the lowering of the dorsal fin. They will go off their food and mouth at the top of the water for most of the time. Later they become thin and look really bad and one of the later signs is the appearance of blood streaks on the body. A bath in diluted Detrol usually kills the pests.

I have a few goldfish in my garden pond. Are they likely to breed or shall I have to buy a breeding pair?

Your goldfish can breed as long as both sexes are present in the pond. As long as there is one female and one male fish there is a good chance of them breeding. If you have several fish it would be very unlikely that both sexes are not among them. When the fish are in good condition and the water conditions just right the males will chase the females and nudge them to encourage them to lay their eggs. The males then fertilise them with their milt. You will have no doubt about whether they are breeding once chasing starts as the fish become very excited and splash about considerably, especially in the weeds in shallow water.

In my outside pond I have a parasite which appears to live on fish eggs and small fish. The nearest I can describe it is that it is like a small shrimp with a pronged tail and six legs with an eye like a fly. What is it and how can I combat it?

The creature is the larva of a damselfly. It is rather a weak insect and I do not think that it will do much damage in the pond. The larger goldfish would eat it if they found it. You can catch them only with a net and the best time is in the dark when they can be seen near the surface with the aid of a torch.

My pond water is still very green although the pond has been made over 2 years. There are plenty of water plants but the fish are difficult to see. What can I do?

Green water is usually encouraged by excessive sunlight. The green algae just cannot live in the dark and so you can well understand that when a lot of light gets to the water the green algae thrives. It can be discouraged by having more water plants which throw their leaves on the surface of the water like the water lilies. Duck weed is also useful as this helps to shade the water. At the same time it must not be forgotten that certain conditions of water help the algae to grow. Overfeeding is one almost sure way to assist the growth of these tiny plants. Although if you change the water it is probable that it will become green again there is no doubt that when the water is first cleared the water plants will grow more strongly and have a chance of choking out the algae.

I lost several goldfish through fungus disease. Is there anything I can do to prevent this from spreading to the other fish?

It is usually in the spring when the fish are attacked by fungus. The trouble is that during the winter months the fishes may have become rather listless and they are then unlikely to be able to throw off an attack of the disease. When a fish is healthy its body is covered with mucus or slime. This is the protective covering and as long as this is in a sound state and the general health of the fish is all right there is little chance of the fish getting trouble from fungus. During the winter months the water often becomes impure through the decaying of water-plant leaves and leaves which may have entered the water in the autumn. If too much of this fouling takes place the water will smell and often take on a milky hue. This is a danger signal and the water should be changed at once. The trouble is accentuated if the water freezes over in the winter and the foul goes are trapped underneath. Look after the general condition of the pond next autumn and the water should keep sweeter.

## our readers

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



## write

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

### Scientific Criticism

MR. R. AFFLECK (*The Aquarist*, June) makes great play of my supposed misuse of technical terms invented by the Goldfish Society of Great Britain. However, as the Editor indicated, I was not guilty upon this occasion, though I would be the last to suggest that it couldn't happen, for we are all guilty at times of errors of this kind, even Dr. Affleck. I have before me an account by Dr. Affleck entitled "Facts and figures from the Goldfish Society" published in 1952, where he refers to some 900 non-scaled ventrals reared by a Mr. Soell. Now we are all aware that there is no such creature as a non-scaled goldfish, and accept this remark for what is implied. I must add that this expression was not in inverted commas, nor afterwards modified in any way.

As to the reference regarding the results of breeding sacrocaecous fish with little or much reflecting tissue, perhaps he would care to explain Miss Morris's pseudo-matts and mock-metallics, which he has stated were mutations discovered by this lady, though they have an unfortunate likeness to the type of condition which I have frequently affirmed has long existed.

With regard to the possible functional change in the kidneys of sacrocaecous and matt fish, I claim no special knowledge or facts, but merely the ability to make reasonable deductions from established knowledge.

Finally, I am glad that Dr. Affleck enjoys Mr. C. D. Sculthorpe's letters, but surely it would be more to the point if he lent the weight of his scientific knowledge to the question which many new converts to the hobby probably now feel must be answered, i.e. the value of plants as oxygenators and their possible cause of suffering if over-crowded.

Whilst looking through the article in question I came across a further letter from Mr. C. D. Sculthorpe (*The Aquarist*, April) in which he makes the following rather surprising remark: "The flow of gas bubbles from these plants must come . . . from the sites of injury. The wounds need not have been inflicted by pruning, etc., though this is an obvious additional cause; they may be self-inflicted by the building-up of a very high gas pressure within the plant as a result of a high rate of photosynthesis, though I have no evidence to support this idea."

Now, really you know, this is just not good enough! What are these bubbles of gas to which he now refers? Let us consider his first letter (*The Aquarist*, April 1959), with its amusing references to glassy-eyed ignorance, etc. He states—"The main fallacy in this argument, and it is a common one, is that gases produced within the plant are

passed out into the water; this is most definitely not so for those plants studied . . ."

Well, there we are. First of all we are treated to an impudent letter denying the possibility of gases leaving a plant under the influence of photosynthesis, and, when this is adequately countered, possible reasons for the escape of the gases are sought, so that Mr. Sculthorpe concludes by offering an opinion for which he admits he possesses no evidence. I think I can safely leave this issue to the readers of this journal.

N. E. PERRINS,  
Beckenham, Kent.

### Goldfish in Ponds

I WAS interested in the article in your May issue by "Aardvark." I have seen tadpoles eating goldfish but never goldfish eating tadpoles. This year my pond proved a great attraction to several frogs and the tadpole population is very high at the moment. When the fish are fed they sometimes inadvertently get tadpoles in their mouths, but on every occasion this has happened they quickly spit them out again. The tadpoles, on the other hand, seem to enjoy nibbling at the backs of the goldfish whenever they get an opportunity.

I have seen it stated that all goldfish are born a bronze colour. From my own observation I do not think this is so. Last year I bred some fish which I am sure were born either coloured or bronze and did not change. Twenty-five of these young fish, approximately half of which were coloured and half not, were placed in the pond in the garden of "The Wakes," Selborne, the home of the eighteenth-century naturalist, the Rev. Gilbert White, and it might be of interest to any of your readers who visit Selborne, to see whether the proportion of coloured to plain is the same as it was, when they were put in the pond.

F. JOHN BENNETT,  
Kingsdown, Box, Wilts.

### Fish Losses

I MUST thank R. Dobbing of Thornton Heath for his sympathy with my fishkeeping troubles. I see that he has lost 15 in 2 years; I have been much more unlucky and lost 35 in 1 year! Several more I had had about 9 months died recently; I have five more coming up to that time so daily expect to find more dead. I decided a while back that I would not buy any more tropicals, but when the numbers dropped I would transfer the remainder to a smaller tank and give my large coldwater fish the benefit of the large tank. They have now decided to live it seems!



I have never been able to agree with the people who say tropicals are easier to keep than coldwater fish. I still adhere to my first love and shall return to them entirely when my tropicals have lived their lives, though I may still keep a few angels—my favourites.

I have always wondered why fishkeeping is mostly done by men. I cannot interest any of my female friends in the hobby—they just say "very pretty" and change the subject. I have never been able to find anybody (except perhaps my father) who really shared my avid interest in all living things from caterpillars and tadpoles to horses. I have just been considered slightly "barmy"!

I had a rather exciting time a month ago. I procured a small oranda which the dealer assured me would be best in the tropical tank. I put it in and the rest of the inmates set upon it en masse, nibbling its tail and sides; scales fell in all directions. Hastily I fished it out, cooled it down slowly and put it in with the coldwater fish, where it has recovered from its nasty experience and is doing well. A warning to anyone else who may be told that they are tropical fish!

(Mrs.) D. A. HANNING,  
Plymouth, Devon.

#### Golden Orfe

REGARDING Mr. A. Boarder's interesting article on golden orfe, in the June issue, I would like to add a further item of interest for the many admirers of this handsome fish.

At the Brussels World Exhibition of 1958 the American Pavilion was constructed in the form of a large circle. Inside there was a large circular pool of about 100 ft. diameter, containing several large goldfish, and about a dozen large golden orfe of 12-14 in., and one pair of 18 in. in length. The pool was about 18 in. in depth and was planted with water lilies. No doubt many readers visited this Pavilion and admired the fishes.

During the 6-months' duration of the Exhibition several orfe, including the largest pair, bred on quite a prolific scale in the pool. The staff at the Pavilion fed them on porridge and bread, and they appeared to be in good condition on this unusual diet.

At the ending of the Exhibition in October the large pool was drained and the large orfe and goldfish were transferred to a smaller pool of about 30 ft. diameter. The swarms of small orfe which had hatched in the large pool perished, and their numbers may be judged from the fact that the pool quickly smelled so unpleasantly from their decomposing bodies that it was necessary to flush it out again with a lime solution.

I attempted to bring the largest pair of orfe to this country, but they died en route, and I now have them set up in a glass case. They are nearly 6 in. in depth and their weights were 4 lb. and 4½ lb. I never heard what happened to the other large orfe and goldfish.

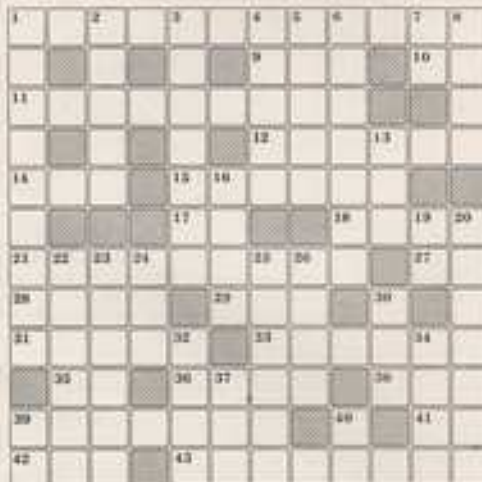
R. SIMPKINS,  
Swindon, Wilts.

#### Albino Lung Fish

A RECENT acquisition of the Southend Aquarium is an albino lung fish, about 30 in. in length and 3 in. in diameter. Mr. H. W. Bowler, Curator of the Aquarium, describes the fish as having well-developed limbs that it moves in a walking action and reports that the British Museum of Natural History experts have only a mid-nineteenth century record of such a fish—a description by Indians found on an expedition. Cost of the fish was £120, excluding freight charges and duties. Other rare species from Brazil are expected to be arriving at Southend Aquarium this summer.

## The AQUARIST Crossword

Compiled by J. LAUGHLAND



#### CLUES ACROSS

- Great order of fishes (12)
- Spawn (3)
- In shape (1, 1)
- Live food for small fry (9)
- Burial confined to rest (6)
- Scandal wren, but not a sea-lark (3)
- Succulent bristle, to coin a phrase (6)
- Gustavus head 3 Down (1, 1)
- Tall woody marsh-grass (4)
- Laying eggs instead of fully formed young (9)
- And Sappers head 18 Across (1, 1)
- Mixed race in the Helixidae (4)
- Ducks from recurring pool (3)
- Trail (5)
- Pertaining to liver in state after leaving egg (5)
- Electroplated (1, 1)
- This is—response is—English river (4)
- He sounds a slippery customer (3)
- Amphibian swapped at floating island? (7)
- An answer at first glance (2)
- Money (1, 1, 1)
- Space gin for way of taking salt (5)

#### CLUES DOWN

- Various P.O. for 21 Across (9)
- Champs (5)
- Harlequin (2)
- Ers much used in perthamery (5)
- Nothing in pipe for sticky end; bonus nickerback? (3)
- Necessities in tropical tank (7)
- Yes, Sense (2)
- Bycross (4)
- Before a great number taken down the stairs (3)
- Back the vehicle into the yard (a gift) (4)
- Hestias here to begin (2)
- Trading may be a deal in line overlapping (7)
- Big shot among the snakes (6)
- A meal for instance (8)
- Do this for the next page (1, 1, 1)
- Limerick composed of grains like 9 Across (2)
- Polynomial name of snail (4)
- She gave Adam the pig in a way (3)
- and he gave her one of these (1)
- Celtic Christian name (4)
- Take usual drink (3)
- Two shilling piece (2)
- Alternately (2)

(Solution on page 116)



## from AQUARISTS' SOCIETIES

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

**RESULTS** of the annual table show of the **Yeovil and District A.S.** were as follows: Goldfish—1, M. Bennett; 2, W. Reeves; 3, N. Staines. Bristol Shubunkins—1 and 2, S. Langston; 3, N. Staines. London Shubunkins—1, E. J. Stokes; 2, W. Reeves. Fancy Goldfish: 1 and 2, V. Collins; 3, A. Downer. Pond or River: 1 and 2, G. Aron; 3, N. Staines. Breeder: 1, S. Langston; 2, V. Collins. Labyrinth: 1, T. Perry; 2, H. Dodds; 3, L. Pilkington. Hibernian: 1, Miss Walford; 2, H. Cox; 3, E. J. Stokes. Barbs: 1, N. Staines; 2, Miss Walford; 3, H. Dodds. Characins: 1, N. Staines; 2, M. Eastman; 3, J. Cyril. Cichlids: 1, N. Staines; 2, L. Pilkington; 3, E. J. Stokes. A.D.V. Egglayers: 1 and 2, N. Staines; 3, G. Aron. Catfish: 1, M. Bennett; 2, E. J. Stokes; 3, G. Aron. Molluscs: 1 and 2, N. Staines; 3, H. Dodds. Guppies (male): 1, J. Pyles; 2 and 3, D. Pyles. Guppies (female): 1, Mr. Higgins. Swords and Plants: 1, H. Dodds; 2, G. Aron; 3, M. Eastman. Breeder—Egglayer: 1, T. Perry; 2, Mr. Mitchell. Breeder—Larvae: 1, T. Perry; 2, N. Staines; 3, G. Aron. The shield for the Best Tropical Fish of the Show was won by N. Staines with a scarlet tailed and the cup for most plants was also won by N. Staines. The Best Goldfisher Fish was won by Mr. V. Collins with a tangerine tango.

At the **Canford A.S.** open show the inter-club competition was won again by Canford. The winner of the Pencil trophy was also a Canford member, Mr. W. Ryan. The Kingfisher Cup was won by Mr. D. W. Ellis of Kingston A.S. The full results were as follows: Furnished Aquaria: 1, Walsingham; 2, Independent; 3, L. T. B. A. V. Singletail: 1, R. D. Owen (Canford); 2, T. Shrewsbury; 3, G. Jenkins (Canford). A.V. Veinstail: 1, W. B. Lee (Canford); 2 and 3, F. T. Barry (B. Green). A.O.V. Goldfisher: 1, G. Jenkins (Canford); 2 and 3, P. Evans (Canford). Breeder (Egglayer)—10-14 yrs.: 1 and 3, R. W. Hall (Mithras); 2, G. Jenkins (Canford). Breeder (Egglayer)—15-20 yrs.: 1, J. Wills (Southsea); 2, F. Holloway (Regent, Derby); 3, S. N. Cornock (Canford). Breeder (Larvae): 1, J. Northam; 2, R. Yealey (L.T.E.); 3, W. A. Ryan (Canford). A.V. Characin: 1, K. Reynolds; 2, E. W. Bartlett (Chapelton); 3, F. Holloway (Regent, Derby). A.V. Egg-layer (Danish Carp): 1, J. G. Rowe (Riverside); 2, D. Biggs (Riverside); 3, I. H. Matham (Riverside). A.V. Male Guppy: 1, G. Baker (Drith); 2, D. E. Bushnell (Drith); 3, K. D. Owen (Canford).

A.V. Female Guppy: 1, M. Challenger (L.T.E.); 2, K. Reynolds; 3, K. D. Owen (Canford). A.V. Fry: 1, M. Challenger (L.T.E.); 2, J. E. Cobden (Canford); 3, R. G. Biggs (Riverside). A.V. Veinstail: 1, J. Northam; 2, R. Yealey (L.T.E.); 3, V. Stevens (Kingston). A.V. Molly: 1, E. Agnew (Canford); 2, D. W. Ellis (Kingston); 3, J. Stewart (L.T.E.). A.V. Barb: 1, W. A. Ryan (Canford); 2, T. Sumner (Chapelton); 3, J. Northam. A.V. Danis: 1, W. A. Ryan (Canford); 2, R. Yealey (L.T.E.); 3, H. Barlow (Canford). A.V. Barbetta: 1, H. Baker (Canford); 2 and 3, W. A. Ryan (Canford). A.V. Characin: 1, A. G. E. Jansz (Drith); 2, P. G. Evans (Canford); 3, R. Langmuir (B. Green). A.V. Labyrinth: 1, A. Hall (Mithras); 2, W. A. Ryan (Canford); 3, J. E. Cobden (Canford). A.V. Cichlid: 1 and 3, J. A. Horne (Frisland); 2, P. Brown (Frisland).

A.O.V. Tropical Fish: 1, R. Langmuir (B. Green); 2, S. N. Cornock (Canford); 3, W. A. Ryan (Canford).

At the annual meeting of the **Edinburgh A.S.** the following officer list were elected: Hon. president, Mr. I. Walker; hon. vice-president, Mr. G. Gurney; hon. secretary, Mr. H. J. Downie; hon. treasurer, Mrs. M. Fagan; I. Wilkie Place, Leith, Edinburgh.

The officers elected at the annual general meeting of the **Association of Yorkshire A.S.** were as follows: Mr. C. Duckett, of Skipton, chairman; Mr. A. Knigton, of York, vice-chairman; Mr. R. Winterburn of Bradford remained as secretary and Mr. D. Dunford of Dewsbury remained as treasurer. All the meetings for the year will be held in Leeds. The Association now has its own Diploma and at the Bradford and District show the Diploma was won by Mr. C. B. Wilson of Bradford for the Best Exhibitor in the Show. A further Diploma was won by Mr. R. Winterburn, also of Bradford, at the Skipton and District show for the Best Exhibitor in that Show.

There was a slight increase in the entries at the **Slough Aquarium Society's** annual show. The prize for Best Fish in the Show went to Mr. S. Bullen with a scum. Mr. H. Moore won the first prize in the Best Breeder section. Results: Winners were—First prizes: E. C. B. Knight, S. Bullen, H. S. Pratt, E. J. Dapson (two each); R. Keppel, L. Povey, F. Holloway, H. Moore and W. A. Ryan. Second prizes: B. Keppel, V. P. Verray, R. Meakled (two each); S. Bullen, H. Moore, E. G. Kitching, C. Connor, H. G. Rundle, E. C. B. Knight, J. C. Hunter. Third prizes: S. Bullen (three); V. P. Verray, W. A. Ryan (two each); L. Povey, C. Connor, D. Anderson, R. Laif, R. Forest-Jones, E. C. B. Knight.

At the monthly meeting of the **Physmouth A.S.** it was decided that arrangements could be made for the installation of a tank of tropical fish at The Cante House, Tansartin Fyloe, because donations from club members and friends were readily forthcoming. Members learned with regret that Mr. Albert Lane, who has serviced the tanks at Freedom Fields Hospital for seven years, could no longer do so. Mr. and Mrs. J. Southwood willingly took over.

Mr. Tom Easterbrook gave a talk on the fish of the month, the paradise fish, and brought a specimen to show. Mr. and Mrs. W. Randle arranged a 20-question quiz (winner, Mr. J. Southwood).

Further plans for an aquarist show as part of the **Keighley Agricultural Show** in September were made at a meeting of the **Keighley and District A.S.** There will be an inter-society furnished aquaria contest, as well as many tanks displaying a large variety of fish.

There were over 200 entries for the sixth Three Counties open show organized by the **Reading and District A.S.** in conjunction with aquarist societies of Basingstoke, High Wycombe, Oxford and Slough. Prizes for the best fish at the show went to

Mr. H. S. Pratt, of Hasworth, Middlesbrough, with a kissing gourami. The class for barbets was won by Mr. F. Holloway, who came from Derby. The presentations were made by Mr. Arthur H. Gray, president of the Reading Society. Prize-winners were: Goldfish, E. Partridge; Shubunkin, R. Forest-Jones; A.O.V. cichlids, I. G. Plummer; swordtail, E. J. Dapson; plant, F. Holloway; molluscs, A. C. Masters; guppy, male, R. Forest-Jones; (female), R. Forest-Jones; A.O.V. Dytiscidae, S. Harman; Siamese fighting, R. Laif; Labyrinth, H. S. Pratt; rainbow, K. Morgan; barbs, F. Holloway.

Cats and loaches, E. Pitt; characins, R. G. Hugg; cichlids, A. C. Masters; A.O.V. tropicals, A. Webb.

Club tropical aquarium: 1, Oxford; 2, Reading. Club cichlidry aquarium: 1, Oxford; 2, Reading. Individual tropical aquarium: R. Laif. Individual saltwater aquarium: R. J. Smit.

Breeder (freshwater), A. Weller; breeder (egg-layer), V. P. Verray. Plants, K. J. Potts. Mammalian tank set-up, R. Forest-Jones.

At the July meeting of the **Regent A.S.** Mr. John Barrell, of 216, Harrington Street, Pear Tree, Derby, was elected secretary, in place of Mr. B. Gascoyne, who resigned owing to pressure of work.

Recently, Mr. R. Forest-Jones visited the **Oxford A.S.** and gave a very interesting and informative talk on judging, mentioning all the points the would-be exhibitor should look for in his fish before bringing them. In June the society visited the Bristol Zoo and Aquarium, and also heard a talk by Mr. M. Gibbs on Equipment for the Aquarist, which proved very interesting and also showed how much money one should spend on the hobby if everything was done correctly.

The society also entered the **Three Counties show** at Reading, and came away with quite a few honours, gaining a first in the Club furnished aquaria Goldfisher and Tropical, a first in the Individual furnished aquaria Goldfisher, first in the Home Furnished Aquaria competition, third in the Shubunkin class, and highly commended in the cats and loaches class. The show was a great success and the Reading A.S. are to be congratulated on the organization and staging of the show. Meetings have now been discontinued for the summer months and will re-open on Thursday, 19th September, when Mr. Mason Smith of Cambridge will pay a return visit to give another of his excellent film shows.

The annual general meeting of the **Ilford and District Aquarists' and Pondkeepers' Society** was held recently and the following officers were elected: President, Mr. L. Jarvis; vice-presidents, Messrs. Atkins, Charter and Nott; chairman, Mr. A. Saltham; vice-chairman, Mr. L. Smith; secretary, Mr. V. Price; treasurer, Mr. D. Fosterthwaite; show secretary, Mr. Parsons; press and social secretary, Mr. L. Smith; librarian, Mr. Ellis; committee members: Messrs. Hartley and Hunt; auditors: Messrs. Gillsby and Moore. At the last meeting a talk was given by Mr. Arnold, a well-known local authority on tropical fishes, and the table show was for water plants, indigenous and tropical.

The result of the Society's annual pond competition was as follows: 1, Mr. Berger; 2, Mr. Atkins; 3, Mr. Nott and Mr. Jarvis (tie). Awards will be presented at a subsequent meeting. Further information regarding the Society may be obtained from the secretary, Mr. V. Price, 1a, Horse Road, Barkingside, Ilford, Essex.

A **LIVELY** meeting was held recently when **Workop** visited the **Sheffield and District A.S.** for a game of "Pinby Dotted." The visitors won—three games to two. The results of the inter-club table show for any variety of tropical fish were: 1, E. Parnborough (Sheffield); 2, V. P. Galatyl (Workop); 3, J. Beaumont (Sheffield).

Mr. B. Chapman (F.N.A.S.), the resident judge, offered a small prize at a meeting for the



most correct results in judging seven guppies. This raised a great amount of interest and comment, and was finally won by Mrs. E. Grove. This meeting was also attended by members from the **Doncaster Society**. The inter-club table show for cichlids and gouramis held between the two societies resulted as follows: 1, J. Pomroy (Sheffield); 2, J. Beaumont (Sheffield); 3, A. Sanders (Doncaster). The results of the Sheffield table show for the same fish were: 1, J. Pomroy; 2, J. Beaumont; 3, G. Lloyd.

DR. F. N. GHADJALLY was the speaker at the **Blackpool and Fylde A.S.** meeting in June. His lecture on "Genetics" was exceptionally well received, particularly by those members interested in breeding. It came somewhat as a surprise to most of those present to learn that it was virtually impossible to breed true to strain from blue Klansse fighters.

New members are always made welcome by the Society at the **Veveyer Arms Hotel, Cookson Street, Blackpool**. Contact can be made through the secretary, Mr. E. Crowther, 15, St. Heliers Road, South Shore, Blackpool.

"TOPICAL, if not tropical" was the subject of the talk given by Mr. E. W. Haller at the June meeting of the **Eltham and District A.S.**

Stating that June was an ideal month for the construction of outdoor pools, Mr. Haller gave valuable hints on the site to be chosen, whether for formal or informal pools or for incorporation in a garden, the methods of rendering them both watertight and frost proof, also the choice of plants and fish.

At the beginning of June, the club gave a display of tropical, coldwater, and marine aquaria at the Arts and Crafts Exhibition at the **Central Town Hall** and were given an "Award of Merit" for their stand.

THE **Brighton Amateur A.S.** recently entertained a party from the **Croyley A.S.** It was the first get-together of its kind in recent years, and proved to be a most successful evening.

Meetings are held in the **Central Schools, Church Street, Brighton**, on alternate Wednesdays at 8 p.m. and the June secretary, Miss B. Stephenson, 14, Lincoln Street, Brighton, 7, would be pleased to supply further details to anyone interested.

THE first heat of the four-heat Inter-Club table show competition was held at the June meeting of the **Weston Tropical Fish Club**, the first tables being cichlids, characins, plecos and long-tailed guppies. One hundred and seventeen entries were received. The remaining heats will be held in **Keynsham** in September and **Bath** in October. At the July meeting the speaker was Mr. H. C. B. Thomas, **Bristol A.S.**, who gave a very comprehensive talk on "Balanced Aquaria."

AT the June meeting of the **Bristol A.S.** the subject was "Tropical and Coldwater Plants." There were two speakers on the subject and also a table show.

The first speaker was Mr. S. J. Davis, himself a **B.A.S.** member. He spoke about using the plant life in aquaria which can be obtained from ponds and streams. He said it was best to take them from still pools because they were more easily acclimated to aquarium life, and gave details of places around **Bristol** where plants could be obtained.

The second speaker was Mr. E. Challenger of **Bath**. Mr. Challenger brought many plants with him to illustrate his interesting talk. Both Mr. Davis and Mr. Challenger gave their plants free to members at the close of the meeting. There was a good number of entries in the table show which was a great success.

THE **North Midland Section** staged the first of a series of contacts between the three **Midland Sections of the Federation of Guppy Breeder's Societies**. There were 50 members present and 221 exhibits were touched. A licence was also delivered by Mr. Eric Harrison,

**F.Z.S.**, who then led the discussion that followed.

The exhibits were judged by Messrs. H. Forrest-Jones, B. Aldry, and B. Adams, and the winners of the contest, the **West Midland Section**, were presented with the **Mark Welch Koshovoi** by Mr. H. Lysons, president of the **Nottingham Aquarist Society**. Mr. H. Lysons also presented Dr. D. Porter with the **West Midlands Trophy** for his **Gold Female**, which was judged to be the best fish in the show.

THE **Bristol A.S.** is holding the annual open show at the **Babington Parish Hall** on 8th and 9th November. There are 33 classes, cold-water and tropical, and 31 trophies are up for competition. Schedules are obtainable from the show secretary, Mr. V. Capaldi, 18, Glen Park, St. George, Bristol.

AMONG the recent meetings of the **Merseyside A.S.** there was a talk on plants, given by Mr. D. Jones, who covered a variety of aspects including the latest names of some of the cryptocorynes. Another meeting that was well attended was a talk on **framed aquaria** by Mr. D. R. Hughes.

AT the July meeting of **Bradford and District A.S.** the speaker was Mr. George Cooke. His subject was "Judging Methods and Standards." Mr. Cooke is a well-known **F.N.A.S.** stalwart. At the June open table show there were about 300 entries and **Bradford** had six darts, several seconds and thirds and also the **Best Fish** in the show which was shown by Mr. C. R. Wilson. Mr. Peggilly was the speaker at the June meeting, and he gave a talk on **punches, hobs and chandeliers**.

AN interesting talk was given by Mr. A. Lindley, **F.A.S.S.** to the **Nottingham and District A.S.** in connection with a table show. Winners of the table were Mr. C. Baxter, who won the double swordfish, and Mr. H. P. Lysons who was first in the **A.O.V.** The August meeting will be held on the 30th when the subject will be "Ponds." The speakers will be Mr. H. P. Lysons and M. A. Adcock.

#### NEW SOCIETIES

A NEW Aquarist Society has been formed recently in **Swindon**. It is called **The Otter Aquarist and Pondkeepers' Society**, and meets every fourth Thursday at **Queen's Drive Methodist Church, Swindon**. The secretary is Mr. J. Williams, 57, Argyle Street, **George Hill, Swindon**. At present there are 12 members.

THE inaugural meeting of the **Wallasey A.S.** was held on Wednesday, 6th July with a founder membership of eight. A further 12 members were kept at home owing to the extreme bad weather.

Meetings will be held every other Wednesday evening at the **Wallasey Central Conservative Club** rooms, **Manser Road, Wallasey**, commencing at 7.45 p.m., on and from 25th July, and membership is open to both sexes of all ages. Visitors are welcome.

Committee members elected were: Chairman, Mr. Frank Hilliard; secretary, Mr. Gordon Bally, 83, Manser Road, **Wallasey**, and treasurer, Mr. Dave Hall.

MR. D. M. CHESWRIGHT is trying to form a Society in the **Wickford and Billerica** area of Essex. He would be pleased if any interested readers could contact him at 9, **Igare Road, Wickford, Essex**.

#### AQUARIST'S CALENDAR

**24th-27th August:** The **Midland** open show, **Ringley Hall, Birmingham**. Schedules available from Mr. J. Edwards, 4, **Avon Terrace, Oley Street, Birmingham, 18**. Entries close 9th August.

**8th September:** **Yorvil and District Aquarist Society** Exhibition at **Yorvil Agricultural Show**.

**9th-10th September:** **East London Aquarists' and Pondkeepers' Association** annual open show at the **Central Hall, Barking Road, East Ham, London, E.6**. Details can be obtained from the secretary, Mr. E. Saunders, 32, **Claremont Road, Forest Gate, London, E.7**.

**10th-11th September:** **Willesden and District Aquarist Club** Annual open show entry forms and details from Mr. Wooster, 249, **Kilburn Lane, Kilburn, London, N.W.10**.

**20th-24th September:** **Leeds and District Annual Open Show** at **Trently Hall, Rose Lane, Leeds**. Entry forms from Mr. L. Greenham, 28 **Darwith Road, York Road, Leeds, 9**.

**23rd-24th September:** **Macclesfield Aquarist Society** annual show.

**24th September:** **Kingston** open show. Details and Schedules from Mr. C. Henry, 129 **Canadock Avenue, Ashford, Surrey**.

**22nd October:** **Hendon and District A.S.** annual convention, 6-9 p.m. at **Whitfield Secondary Modern School, Greenway Road, Hendon, London, N.W.2**. Applications for tickets should be made out to the secretary, Mrs. H. Robertsshaw, **Black Cottage, 45, Buck Lane, London, N.W.9**.

**22nd-23rd October:** **British Aquarist's Festival**, **Bebe Yuc Zoological Gardens, Manchester**. Schedules from Mr. Geo. W. Cooke, **Spring Grove, Fieldhill, Bally, Yorks**.

**4th-6th November:** **Bristol Aquarist's Society** annual open show at **Bishopscott Parish Hall, Bristol**.

## The Aquarist's Badge

PRODUCED in response to numerous requests from readers, this attractive silver, red and blue substantial metal emblem for the aquarist can now be obtained at cost price by all readers of *The Aquarist*. The design is pictured here (actual size). Two forms of the badge, one fitting the lapel button-hole and the other having a brooch-type fastening, are available.

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## Crossword Solution

O	S	T	A	R	I	O	P	H	Y	S	I
V	U	A	R	O	E	I	C				
I	N	F	A	R	O	R	I	A	E		
P	T	B	I	N	T	E	R	S			
A	S	S	O	Y	S	T	E	R			
R	A	R	A	R	E	E	D				
O	V	I	P	A	R	O	U	S			
U	I	S	T	D	O	P	E	E	A		
S	P	O	R	L	A	R	V	A	L		
E	P	I	S	I	S	E	L	I			
F	R	O	G	B	I	T	O	A	N		
L	S	D	S	P	E	A	R	I	N		

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### THERMOMETERS

Dummy Compass	4 4
Comet Plastic Back (Mercury)	4 4
Russell (Mercury)	2 4
Perplex Aqua	3 4
Stark on Special	5 0

### PUBLICATIONS

Handbook of Tropical Fishes	105 0
The Encyclopedia of Tropical Fish	40 0
Tropical Fish	39 0
Exotic Aquarium Fishes	84 0
All about Tropical Fish (McNab)	75 0

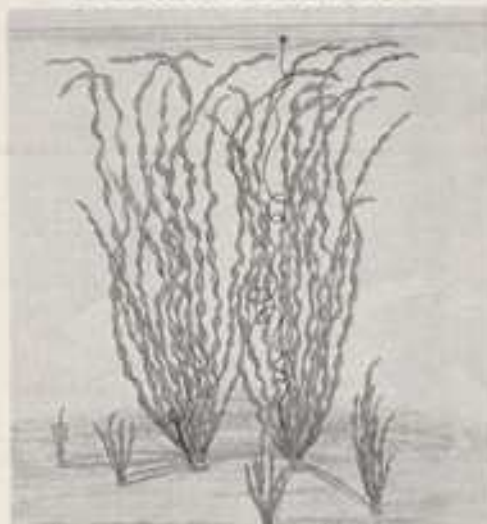


# Shirley Aquatics Ltd.

WATER PLANT NURSERIES AND FISH HATCHERIES—Phone: SHIRLEY 134

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## THE NEW SENSATION



*Vallisneria spiralis* Linné cult "Contortionist"

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**HOURS OF BUSINESS**—Weekdays 10 a.m.—6 p.m. Sundays 10 a.m.—12 noon. May—July Sunday afternoon also.  
**TERMS OF BUSINESS**—Cash with order please. Fish sent by rail. Tropical minimum order £3, insulated container and carriage 10/-. Cold-water minimum order £2 plus 10/- tax and carriage. Plants by post (minimum order 10/-) please add 1/6 post and packing.