

The AQUARIST AND PONDKEEPER

Founded in 1924 as "The Amateur Aquarist"



THE BUTTS, HALF ACRE, BRENTFORD,
MIDDLESEX

Telephone: EALing 4703

PUBLISHED MONTHLY
SUBSCRIPTION RATES

The *Aquarist* will be sent post free for one year to any address for £1 2s. 0d. Half-yearly 11s. 0d. Canada, U.S.A. \$3.00 yearly; \$1.75 half-yearly.

QUERIES

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

Correspondence with intending contributors is welcomed.

MSS. or prints unaccompanied by a stamped, addressed envelope cannot be returned, and no responsibility is accepted for contributions submitted.

The Editor accepts no responsibility for views expressed by contributors.

Contents

	Page
Editorial	67
Water Pollution Research	68
Low Temperatures give Success with Mountain Minnows	69
Failures in Rearing Fry	70
In the Water Garden in July	72
Book Reviews	72
Aquarist's Notebook	73
Coldwater Fish-keeping Queries	76
Microscopy for the Aquarist—42	79
Lamp-Eyes	80
Tree Frogs	81
Aquarist's Calendar	82
The Mud Skipper	83
Heteranthera zosterifolia	84
When the Toads came to Fiji	84
Our Readers' Write	85
Friends and Foes	86
News from Aquarists' Societies	87

VOL. XXIII No. 4

1958

Editorial

AT the beginning of this year we reported the additional observations that had been made on the phenomenon of "fatherless," virgin or parthenogenetic births in the guppy, the description of which was first publicised in 1953. The further evidence indicated that the eggs of the female guppies concerned in the observations had been fertilised by sperms not from a male fish but from testicular tissue present within the females, so that "self-fertilisation" or hermaphroditism could be held to describe the process involved.

New observations have now been made in Holland by Dr. A. Stolk of the Amsterdam Free University, and reported in the British scientific journal *Nature*, which suggest that these unusual births can arise from yet another cause. Dr. Stolk has recorded births of litters to two female guppies and one female swordtail, all virgins. As in the previous examples reported, all the young were females, an event to be expected from theoretical considerations. However, in these latest instances no tissue capable of producing sperms, to explain the births as being due to self-fertilisation, could be found within the mother fishes. What Dr. Stolk did find in his female fishes was that all had infection of the egg-producing ovaries and surrounding organs with a fungus known as *Ichthyophonus hoferi*. Toxins from this organism, he suggests, might have caused the unfertilised egg cells to act as if they had been fertilised in a normal way and so develop into young within the mothers.

It is well known that under experimental conditions a number of types of abnormal chemical and physical changes in the surroundings of unfertilised eggs of various animals may promote their development. *Ichthyophonus* is not an uncommon parasite within fishes which appear to be in good health, and Dr. Stolk has asked whether previous female guppies apparently giving birth parthenogenetically were also infected with it. Further instances of such births certainly should be examined in the light of Dr. Stolk's findings. A side issue to this main one is that the live-bearing species reported to have shown virgin births now include the swordtail. Breeders of livebearers should be watchful for the happening in their stocks.

Water Pollution Research

*A review of the investigations made during 1957
by the Government's laboratories concerned with
the state of our natural waters*

A NNUAL Reports of the Water Pollution Research Board and of the Director of Research, published in May,* review the work of the Laboratory during 1957. The many subjects dealt with include the further study of the condition of the Thames Estuary, the breakdown of detergents during the treatment of sewage and the experimental treatment of various trade wastes.

The work on trade effluents is of special interest in view of the announcement in the Board's Report of the formation of a joint committee of the Water Pollution Research Board and the Federation of British Industries to advise on problems of pollution in which industry is particularly interested. The Federation is to make a substantial financial contribution to the work of the Laboratory and a considerable expansion in the programme of research on industrial wastes is expected.

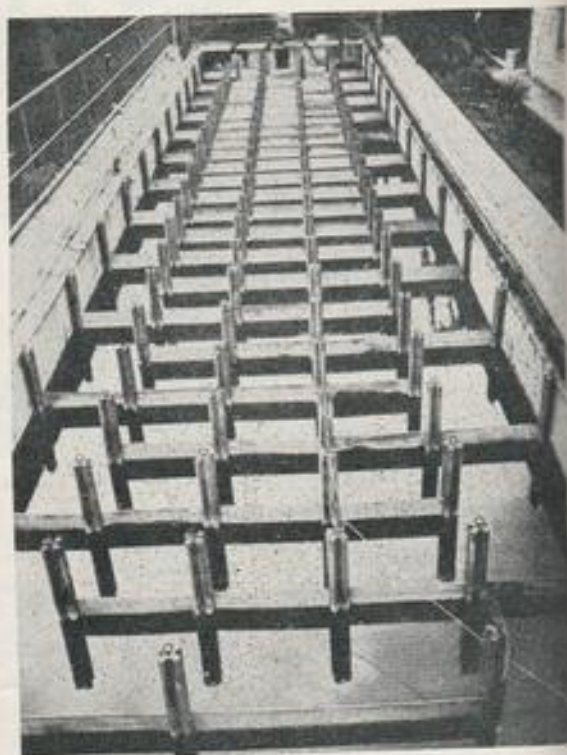
Survey of the Thames Estuary

Since it has been shown that the present sanitary condition of the Thames Estuary can be predicted with reasonable accuracy from a consideration of the present polluting load and other factors, these methods have been used to assess the changes which would occur if certain palliative measures were taken. In some parts of the estuary, particularly in the region of London Bridge, a significant increase in the concentration of dissolved oxygen would occur if the cooling water from the most important electricity generating stations was aerated before discharge. The effect of addition of a given weight of oxygen to the estuary in this way would be approximately the same as that from lowering by a similar amount the weight of ultimate oxygen demand in polluting liquors discharged in about the same position. Heating of the central reaches of the estuary, which occurs by the discharge of cooling water, has been shown to have a relatively small effect on the distribution of dissolved oxygen. Information of this kind has been obtained to provide a basis for calculating the most economic means of improving the condition of the estuary.

It is expected that the large alterations and extensions which the London County Council is making to its two sewage works on the estuary will have been completed by about 1962. Calculations suggest that when these improvements have been completed sulphide will no longer be evolved in the central reaches of the estuary, though the concentration of dissolved oxygen will still be very low in this region, and reduction of nitrate will still occur there. The conditions in which nitrate is reduced are still not known with accuracy; results of laboratory experiments agree generally with observations in the estuary in suggesting that it may be reduced at a significant rate when the concentration of dissolved oxygen is as high as 5 to 10 per cent. of the saturation value. There is some evidence to show that this limiting concentration is higher when the temperature is higher.

Oxygen Balance in Surface Waters

The level of oxygenation in a polluted stream depends to a very large extent on the exchange coefficient for the stream, which is a measure of the rate at which the water will absorb oxygen from the air. The variation of this



An experimental tank used by the Water Pollution Research Laboratory for investigation of the response of fishes to temperature gradients

(Illustration from "Water Pollution Research 1957", H.M.S.O.)

coefficient with temperature has been determined for water flowing through a channel, the value found being considerably less than has previously been reported. Because of the great importance of the exchange coefficient a considerable amount of work has been done on methods by which it can be directly determined for a natural stream. These methods are not at present very satisfactory, but the values obtained by using them are thought to be more reliable than those given by methods hitherto used in which it is necessary to make several dubious assumptions. It is now possible to predict with reasonable accuracy the extent to which water is aerated in passing over a weir, both the height and type of weir and the depth of water below it have to be considered.

Effect of Pollution on Fishes

Metal salts may be discharged to rivers as constituents of industrial effluents, or may be leached from spoil banks, and a programme of work to determine the toxicity of these salts to fishes has started with an investigation of the toxicity of zinc salts. The tests so far made have confirmed that zinc is more toxic in soft than in hard water and the reasons for this are being investigated; it has been found that calcium chloride reduces the toxicity of zinc rather more than does

calcium bicarbonate. Experiments in which radioactive zinc was used as a "tracer" substance suggest that zinc may act as an internal poison and not simply by preventing respiratory exchange at the gill surface.

Work on the toxicity of liquors from gas works and coke ovens, referred to in the last Report (*Water Pollution Research*, 1956) has been continued, special attention being paid to the toxicity of the mixtures of phenols known to occur in these liquors. The effect of biological treatment in reducing the toxicity of gas liquors has been shown to vary with the liquor, being only slight in those which contain a high proportion of ammonia.

Experiments on the effects of synthetic detergents on sewage treatment continue; it appears that the presence of such substances in sewage reduces the rate at which oxygen is absorbed in the activated-sludge process. Under certain conditions this effect could explain the reduction in efficiency which is said to have occurred at some works as a result of the introduction of synthetic detergents for domestic use.

Industrial Waste Waters

The biological destruction of cyanide in percolating filters, which has been proved practicable on a small scale, is now being investigated in a pilot-scale filter containing about 2 cu. yd. of medium. The concentration of hydrogen cyanide has been reduced from 60 to less than 1 p.p.m.

when the rate of treatment was 720 gallons/cu. yd./day.

A pilot-scale plant is also in operation for treating slaughterhouse waste waters by anaerobic digestion. Over a period of 3½ months the average reduction in biochemical oxygen demand (B.O.D.) varied only between 94 and 97 per cent. in spite of considerable variations in load; the lowest period of retention was about 24 hours.

The process of anaerobic digestion, hitherto little used for treating industrial wastes in Great Britain, is also being tried for treating spent wash produced in the manufacture of whisky. Preliminary laboratory experiments have shown that satisfactory digestion can be obtained if the initial loading is small and is increased only gradually. A reduction of 95 per cent. in the B.O.D. has been obtained with a period of retention of 10 days, and work is continuing in an attempt to reduce this retention period.

To study the possibility of recharging an underground water supply with river water, experiments have been made to determine the changes which occur when a polluted water is allowed to percolate through porous sandstone. It has been found that considerable removal of ammonia and reduction in B.O.D. occurs during percolation through 2 ft. of soil, provided that application is intermittent.

**Water Pollution Research 1957* is published by H.M.S.O. for D.S.I.R., price 6s. (6s. 6d. by post). In the United States the Report (1 dollar 8 cents) can be obtained from British Information Services, 45, Rockefeller Plaza, New York 20, N.Y.

Low Temperatures give Success with Mountain Minnows

by WALTER BISSET

THE white-cloud mountain minnow is usually classed as one of the easy-to-breed fishes. Some aquarists, like myself, have found it difficult. I tried four times without success until I tried the coldwater procedure. This I have passed on to others and it has resulted in success.

Pebbles or compost can be used for the bottom of the aquarium, with plants or nylon strands; water is added to a depth of 8 in. The adult pair should be put in with the temperature at 74°F. and left for a day. Then switch off the heater, siphon off a quantity of the water and replace with unheated fresh tap water (when I added the tap water it was 48°F.). Keep siphoning off and replace with cold tap water until the temperature drops to 65°F.; then switch on the heater (the thermostat should cut out at 74° as before). If the breeding pair are in good condition this procedure will not harm them. In 2 or 3 days the fry should be seen clinging to the sides of the glass.

The white-clouds come from the mountains near Canton. The theory is that in the spring the snow melts, runs down to the pools and this urges the fish to spawn, for the warmer weather is on the way.

After a spawning "show," when the fish show off their colourful finnage, I have seen the adults picking the eggs but I have never seen them eat the newly hatched fry as they cling to the glass or when first free-swimming. I never remove the adults, as they keep spawning for months. I leave the young in the breeding tank, removing them as they grow (first removal takes place after 3 or 4 weeks) into a 3 ft. tank.

I remove them by using a fine-mesh net and drawing this just a little out of the surface of the water; with a small spoon, bent L shape, I spoon them from the net to a

2-lb. jar for floating before turning them out in the larger tank.

I use this spoon procedure with all kinds of fry when transferring from a breeding tank to the rearing tank, as this cuts down the incidence of deformed fish to practically nil. With the net only I got quite a few every spawning.

For the first 3 or 4 weeks, while the fry are still with the parents, I feed with Infusoria, micro worms, brine shrimps. After transfer they get chopped white worms, sifted *Daphnia* and fine dried food.

A shoal of shining electric-blue young white-clouds is a wonderful sight. Unfortunately this blue dims as they grow to adults.

Cacti in the Fish House

CACTI of the genus *Epiphyllum* are very suitable for the fish house as these plants grow in a forest where there is plenty of humidity. Most of these types grow as epiphytes on trees and get their sustenance from decaying leaves and bird manure in forks of the branches. Their flowers are very large and handsome and can be obtained in reds, pinks, salmons, creams, whites and purples. Many varieties offered for sale are garden hybrids, the common known one being *Epiphyllum achermannii*. These plants can take some manure in the form of decayed cow manure, but if this is not obtainable some Clay's fertiliser can be added once some flower buds are seen. About a teaspoonful once a month should be enough.

Failures in Rearing Fry

by A. BOARDER

MANY aquarists have told me that they are able to hatch many goldfish fry but that they never rear them, and lose them when they are a few weeks old. I am referring now to the fry of all varieties of the goldfish. This happens to aquarists who have had quite a fair amount of experience with fish-keeping. There are several reasons for this trouble and I shall try to describe various ways in which fry could be lost.

Starting at the very beginning, it is when the fry are first free-swimming that some may die. The condition of the water is generally the cause of this. If hatching tanks have been used and the eggs were laid on water plants, it is possible that there has been a fair amount of decomposition in the water and foul conditions have resulted. If the fish spawned in a tank and were then removed it is probable that many male sperms dying in the water after the actual spawning could foul the water somewhat.

When trout breeders hand-spawn their fish, one of the first things they do after is to wash the eggs to remove the surplus male sperms which would otherwise set up mildews on the eggs. This means that if the fish spawned in the tank, then it is a good plan to change all the water as soon as possible after, seeing that the water is of the same temperature within a degree or two. Do not use fresh tap water for refilling as this can contain enough chlorine to

harm the eggs. Tap water can be used if it has been left in the open air for a couple of days.

The water in the hatching tank could also have become polluted by decaying vegetation. Where some kinds of water plants have been used as a spawning medium they are liable to decay once they are in a tank.

One of the safest things to do once the fry are free-swimming is to catch them up and place them into a fresh clean tank. There are more reasons than one for this change. I have known the spawning medium to have been covered with *Hydra* when in the pond, and these *Hydra* can eat many of the newly hatched fry. By removing the fry from the plants the danger can be avoided. Many fry may disappear in a tank and the aquarist does not suspect *Hydra*, and these are very difficult or almost impossible to kill whilst there are fry in the tank.

Other forms of pests may be present in the tank. Some insects may have laid their eggs on the plants, which can hatch in the tank, and minute young of such pests as water boatmen, water beetles and water lice may be present. Therefore once the fry are free-swimming prepare a fresh tank, which has been thoroughly sterilised, and see that some matured water is placed therein. There is no need for any base compost or water plants as yet. Now with the aid of a small saucepan catch up the fry from the



Photo:

Laurence E. Perkins

Goldfish fry can be caught in an old saucepan and placed in a white basin before transfer to new quarters. Pests can easily be noticed in the basin and eliminated. Old water cisterns with cement linings and a layer of concrete on the base to reduce depth are used by the author for rearing fry

hatching tank. Use a magnifying glass and look over the water to see that no pests are present. Carefully pour off as much surplus water as possible. If this is done gradually very little of the old water need go into the new tank with the fry. If necessary it is possible to count the fry as they enter the tank.

You have now a good chance of seeing that there are no pests present in the fresh tank. This change to a new clean tank can be repeated after a couple of weeks, as it is surprising how soon the water can become fouled. Some aquarists believe in the use of plenty of green (algae-infested) water for the fry. I think that this can be overdone. A little green water added to a fry tank may add some food for the fry but if too much is added the water becomes very thick and soupy, and when this happens it is probable that the fry will not thrive and the water may suddenly become absolutely foul, when the fry would die. When feeding young fry with Infusoria it is imperative to make sure that plenty of organisms are present in the water and that it is not just a nasty smelling liquid containing no food for them.

Use of "Matured" Water

The addition of a little new water to a fry tank is of great help, as it appears to give the fish renewed appetites. It may be that some extra oxygen is introduced into the water, which, of course, is absolutely necessary for the fry to enable them to digest their food properly. It is advisable to have a tank or two of tap water out of doors where it can get plenty of air. Chlorination is performed on tap water to kill low forms of life in the water and make it safer for drinking purposes. The fry are, at an early stage, similar to these low forms of life and so could be killed by the fresh tap water. Old coldwater cisterns which have been floated over with a cement wash and then well washed out can be used for maturing the tap water; this matured water is very useful for topping up and using for a partial change. Some of the water from the fry tank can be taken out with the small saucepan, especially if a large fine-meshed net is held in front of it so that the fry cannot get in.

Even young fish of a couple of months of age can be upset by being placed into water used directly from the tap. An experiment was made and it was found that when a fresh tank was filled with tap water, just drawn, and fishes were placed into it, they went off their food for a couple of days, and it was not until the water had become more mature and clear that the fishes appeared to be back to normal.

When the fry are about a month old they are subject to attacks from flukes, and it is almost certain that many aquarists lose many fish during this period through these pests. The first signs that flukes are present on the fry is when some of the fry remain near the top of the water most of the time. They do not feed round the edge of the tank, as normal fry should, or lower down in the tank. Then the fry go off their food or they just mouth at it without appearing actually to take in any. Next their bodies get thinner and the head appears very large in relation to the rest of the body. The fins fold up and the tail can appear as two tiny points. Later stages will give evidence of blood streaks on the sides of the fish and soon after the fry will die. Trouble with flukes can be cured as long as the cure is not postponed too long. Fortunately the affected fry do not die quickly and so it is possible to take precautions in good time.

There is no doubt that fry can be cleared of the gill flukes, *Gyrodactylus*, by immersion in a solution of Dettol and water. A clean bowl should be used and some matured tap water placed therein. Measure this exactly: a pint bottle will do as a measure. The amount of Dettol to the

water is a matter of individual choice. A teaspoonful to a gallon of water or a quarter of a teaspoonful to the same amount of water can be used. Where the stronger mixture is used the fry must not be left in the solution for more than about 15 seconds, but in the weaker solution they may remain for 15 minutes. It is safer for the amateur to use the weaker solution, but whatever strength is used it is important to watch the fry whilst they are in the solution and remove them to fresh mature water as soon as they turn over. A second immersion may be necessary, but provided that the first was carried out correctly once should be sufficient.

Of course, it is no use treating the fry and then replacing them in the old tank. This may still be infested with the flukes and the fry would soon be as bad as before. It is almost impossible to see the flukes with the naked eye, but an ordinary magnifying glass should enable you to see them on the body of a fish. They appear as thin transparent worm-like maggots, and are able to progress on the body of the fish with looping actions of the body, taking a firm hold with their front portion and then bringing their rear up to it and so on.

Once the fry are cleared of the flukes it is probable that they will soon recover their previous appetites. Some mashed white worms may be given and some *Daphnia* which are small enough to be taken can be given with advantage. Do not give too much fine dried foods during the period when the fry are recovering from the treatment, as anything likely to foul the water will be sure to prevent the fry from feeding well and so making up their strength again.

Another trouble which sometimes occurs with young fry is velvet disease. This appears as a whitish film on the body and appears to distress the fry considerably. It will be found that a little common salt will cure the fish of this. About a teaspoonful to each 2 gallons of water is generally enough to effect a cure but a little more can be added if the first addition is not sufficient. Test the water for smell after a day or two, as the salty water can go rather impure and shows this by the bad smell. If this happens the water should be changed to new mature water to which has been added some salt to bring it to the same strength of solution as before.

Predatory Pests

The only other troubles which may upset the fish from now on are such pests as water lice, larvae of dragon flies, water boatmen and water beetles. These can be netted, especially if the tank is examined at night with the aid of a strong torch. The water louse will usually feed at night and is able to catch unsuspecting fry and eat them up very quickly so that if done at night the aquarist is at a loss to know why the fish are disappearing. If any newt tadpoles were introduced into the fry tank with the water plants they should be removed without delay. They are not very fast moving soon after they are hatched but become quicker in action and dangerous to fry after a few days.

Do not give large *Daphnia* to the fry until all are able to eat them. If you do you will find that some of the fry can take them and grow on much faster than the others in the tank and in time be able to eat their brothers. Be careful always about what kinds of food you use. Liver is a good food but can soon pollute a tank. It is better to boil and then well dry the liver, when it can be grated up fine enough for the fry. Fine biscuit-like foods must be given with caution, and the same applies to dried-egg powder. If these dried foods are given to very small fry they can swell up inside them and cause trouble. It is a safer plan to put some of the dried food into a phial of water and shake it up well before feeding it to the fry.

In the Water Garden in July by ASTILBES

WATCH the water plants with aerial leaves or with flowers above the surface for green or black fly. These can be washed off with a syringe or hose, or even if the stems are tapped many will fall off into the water. The use of any form of insecticide for the purpose of killing blight near a pond must be avoided. Even the slightest amount of D.D.T. will be fatal to fishes, and many present-day insecticides contain this compound. Sometimes the leaves are attacked by caterpillars of certain moths, and these can be picked off and destroyed.

Water snails can also do damage to some kinds of water plants and their inclusion in the pond must be left to the discretion of the pondkeeper. A pond, or tank for that matter, can function quite well without any snails and it is generally accepted that they do more harm than good. It seems to be believed by most beginners that it is impossible to keep a tank or a pond in good condition without having water snails and pond mussels in it. Pond mussels soon die and pollute the water in any newly set-up pond. It is only when a large amount of mulm has formed at the base that the mussels can live and move about.

During this month the water plants will be making a great deal of growth and some pruning may be necessary. Any dead leaves can be removed so that all is kept tidy. Should too much cover (such as duck weed) appear on the pond some should be removed. This can be done by netting it or by flooding the pond, when it will wash away. Where the water in a pond goes very green a good quantity of duck weed on the surface can soon bring an improvement. The green caused by algae will be choked out by the covering of duck weed and most of this could be removed as suggested once the water has become clear.

Where a pond develops a leak it is possible that repairs of a temporary nature could be made with polythene sheeting.



Photo:

Laurence E. Perkins

Water-lily blooms enrich the pond's appearance in July. This variety is the popular James Brydon water lily

This could be placed over the crack and kept in position by some plastic or bitumastic substance so that the edges are secured to prevent water from seeping behind. It is probable that extensive repairs to a cracked pond could be made with this material, and experiments will show whether it is the answer to the leak trouble. There is no doubt it would stop the leak provided that it could be kept safely in position.

A grand plant for the side of a very large pond is *Guznera manicata*, but do not try this unless there is plenty of room. This plant has giant leaves resembling those of rhubarb and if planted at the muddy site of a pond will soon make enough growth to hide any unwanted unsightly spots. Some of the plants known as the day lily or *Heimerocallis* can be planted near the edge of the pond and as they are very hardy they can increase and make a dense mass. The flowers are produced in various shades of yellows and orange and come on a stout spike more like ordinary garden lilies. Although each flower lasts for only a day there are many on each spike and few days will fail to bring forth a few flowers. Once planted near the pond this plant can go for years without any attention except for the removal of dead flower stalks once a year.



BOOK

R E V I E W

The Animal World of the Sea by H. Gwynne Vevers.
Rathbone Books. 25s.

THIS book is essentially a book of photographs, for it contains within its 102 pages (8 in. by 10 in.) some 35 coloured photographs and almost a hundred black-and-white ones. In addition to the detailed notes which accompany each photograph there are 12 pages of reading matter and a final four pages devoted to more detailed explanation of some of the plates. Many of the photographs were specially taken at the Monaco Aquarium. This book, printed in Italy, forms one of the series "Splendour in Nature" and has been translated and adapted from J. Forest's *Beautes du fond des mers* by the curator of the London Zoo Aquarium, Dr. H. Gwynne Vevers.

The cover jacket gives a very adequate summing up of the book: "This book is no text-book, no zoological guide to the creatures of the waters. It is, instead, an essay in excitement: an imaginative document which presents the astonishing variety of the animal life of the sea, and examines its appeal to the lover of beauty, through its form, its texture and its coloration. Under expert guidance the reader is taken from one submarine world to another; from the world of fishes with its harlequin colour, to the world of the invertebrates—the stars and flowers of nature beneath the waves. Some of the most beautiful photographs ever taken of marine life, from coral reefs and sea shells to exotic fishes, embellish a book which is a treasure for the lover of natural beauty, and the scientific student of nature." With this I heartily agree.

R. Y.

THE AQUARIST

AQUARIST'S Notebook



by

RAYMOND YATES

AFTER many years I am once again the proud possessor of a garden pond. Frankly, I had thought that ponds, for me, were a thing of the past, but a recent Editorial (May issue) in *The Aquarist* caught me in the mood and I decided to have a new-style polythene pond right away. Most suburban dwellers yearn for a pond in the garden but fight shy of the work involved, the messing about with cement or concrete and the fact that such a pond generally can't be used for fishes for a month or two. If you have never seen what happens to fishes which are put in a pond which hasn't been sufficiently weathered you can hardly imagine the poisonous effect of a newly cemented pool. At first the fishes seem unaffected but within 12 hours they die, float on the surface and turn a horrible purple colour. Most people feel like making a pond in April or May, but this is the wrong time because it cannot be used as a rule for such a long period. Now all the trouble of making formal ponds is a thing of the past with the introduction of the polythene pond.

I am not one of those people who could be called a "handy man," and I take great pleasure in the informal, the casual and the makeshift. For such as me the polythene pond is a gift from the gods. It so happened I had a suitable spot for the pond which was already half dug out, as the soil had been removed for other purposes. This space had been filled with irises and had become rather unattractive. I pulled up the irises, enlarged the excavation and left the workings for a week, which, being dry, resulted in the earth being baked fairly hard. The bottom was clay and this was puddled. The shape was square, with a semi-circular bay, and the approximate measurements were 7 ft. by 6 ft. I then obtained some thick (500 gauge) polythene sheeting, which costs about 9s. a yard, the width being 144 inches. The colour is the usual silvery sheen. All stones, twigs and roots had been removed from the hole and the sheeting was now placed in position. This sounds easy. It isn't. If there is any wind you have trouble with so large a sheet. My pond being so delightfully informal was quite irregular in shape, the sides often curving inwards or outwards up to 6 inches from true. The bottom end had a wide shelf or step and the floor of the pond was very uneven and sloped from 12 to about 24 inches.

The polythene took all this in its stride and I soon had the sheet in its relatively correct position. The edges were now weighted down with stones and the water was introduced. The sheeting rapidly began to fill in all the irregularities and, by carefully casing the edges, as good a fit as possible was obtained. A side overlap or turn over of several inches was allowed. Having large quantities of suitable stone available (millstone grit, crazy paving and broken paving stone) I was now able to put wooden surrounds on top on the overlap edgings which, in turn, were covered with the old and weathered rockery. The final effect was completed by the addition of a tall bird table at the rear.

The pond was left for several days and it was noticed that the creases in the material changed from day to day as the pool and its surrounds settled. The polythene side nearest to the soil soon appeared to be covered with thousands of tiny globules of condensation, and later on soil adhering to the exterior of the sheeting appeared at first glance as if it were inside the pond. The shiny bottom looked unsightly and would have been useless for fish-keeping as fishes need a dark background for comfort. I spread old aquarium gravel which I had over the bottom and this much improved the effect. Some underwater



Photos:

Raymond Yates

Two views of a pond made from polythene sheet as described on this page

archways in rockery were put in and also several bunches of starwort to provide more natural shade and cover until such time as more suitable plants could be obtained. The rockery edgings were built up high to make things difficult for feline visitors. Natural vegetation was allowed to grow in the crevices so that a most realistic effect was obtained. An old log was pulled into position as a background and behind this two old aluminium baths containing marsh plants were hidden.

Photographs were taken within one week of the pond being started, from which it will be obvious that this method really makes a pond possible almost overnight. Visitors have been duly amazed how quickly and easily a pond can be made, and made to look natural. It took me just two evenings in the garden from start to finish, perhaps 5 hours in all. The fishes at present are three 10 in. goldfish, four shubunkins, some orfe and three diminutive catfish. In due course minnows and rudd will enlarge the

population. I can recommend this new form of pond making to all who want effect with the minimum of trouble and who dislike harsh formality.

Every aquarist at some time or another finds one of his fish has completely disappeared. It is very worrying because in a well-planted tank one cannot always be sure, and it is not a wise policy to poke about among the plants just to see if it is hiding away. If you do you disturb the fishes if it is merely hiding and certainly disturb your set-up. I think it best to do nothing for 3 days. During this period it will surely be seen if it is alive. If dead it will often be found after a day or so floating at the surface or on the gravel. Too many hobbyists fear that a single dead fish will cause immediate trouble in their tank—not on your life. Of course, very large fishes could but then they are hardly likely to be "missing." If after 3 days there is still no sign of the fish it can usually be written off as a loss. All too frequently it has jumped out (and fishes can do this through very small apertures in covers) and a few moments flapping about on a dusty floor makes any fish unrecognisable. Fishes can die in the tank and are soon pulled to pieces by the other tank inmates, and the remnants bear little resemblance to the fishes you once had.

It is, of course, the rarest and choicest specimens which indulge in this disappearing act! Such fishes are often shy and do not take kindly to new surroundings or new bed-fellows. Bullies make shy fishes hide away and deny them reasonable meals. Many fishes are curious and like to explore behind rockery (neons in particular) and may become trapped there and die. A daily check-up on all tank specimens helps—it often reveals an "off-colour" fish which needs attention and might have been lost otherwise. Fishes which seem more prone to vanishing than others include *Copeina*, neons, glowlights, pencils, *Aphyosemion australe*, some anabantids, dwarf cichlids and, in coldwater fishes, bleak and bitterling. If you have snails in your tank they will quickly find a dead fish and make very rapid work of it if you care to leave them to the job.

The superintendent of a large zoo is said to view with disfavour the practice of using a mere three or four foods for aquarium fishes on display and suggests instead a varied diet covering some 30 foods. This seems rather a large number and it is worth considering just how many foods are reasonably available for the average hobbyist to use, counting all dried foods as one item. We have garden worms, *Tubifex*, blood worms, mealworms, micro and grindal worms, *Daphnia*, glass worms, mosquito larvae, flies, garden insects generally, meat, fish, fish roe, shrimp, liver, fish fry, vegetable foods (water plants, duckweed, algae, lettuce, spinach, etc.), Infusoria, egg, crushed snails, tadpoles, maggots, brine shrimps, white worms. This list about covers the stated number and leaves many unmentioned. I think too many of us are quite happy to restrict ourselves to two or three easy-to-obtain foods without thinking that so many others could be offered on occasion with little extra effort.

A handsome fish rarely seen in fanciers' tanks is the Senegal cichlid (*Hemichromis fasciatus*). It is a pity that this fish is rather like the jewel fish in temperament because otherwise it would be in great demand. The red-and-black eye and the red lines which edge the scales, together with the red blotch on the gill cover, give this fish something which catches the eye, and this is enhanced by the row of lateral spots and the edged dorsal. Like so many other really beautiful things, this fish is a trouble-maker and can find no place in a community tank with small and peaceful fishes.

All who have seen the cardinal tetra agree that it out-

shines the neon. This fairly new arrival has the advantage of showing more red and being more sturdily built than the rather frail neon, which is subject to disease and deformity and which tends to be aggressive towards other neons. Cardinals have wonderful dispositions, they are very peaceful and show none of that irritability so common to neons. When they are more plentiful and the price falls to a more reasonable level the neon will be forced to play second fiddle.

I have kept a few tropical varieties in the summer for short periods in very warm weather in garden pools, such as paradise fish and swordtails, but I have not heard of anyone keeping guppies out of doors in the North. However, I have heard yarns to the effect that guppies have been known to do well in some of the warm-water mill lodges of the cotton towns. Golden and ordinary carp have long acclimatised themselves to such lodges, which are warm all the year round, and it seems not beyond the bounds of possibility for the dependable guppy. With so many hobbyists in the cotton-mill areas perhaps some reader has heard of such cases. Big goldfish are wise and very capable of looking after themselves. They would never go near the area where the hot water is run into the lodge but guppies seem too small and too slow to survive.

I am mourning the loss of my one and only chocolate gourami. In our hobby there are some things which money cannot always buy, not easily anyway, and friends often do a swap which makes both happy. I got this fully grown fish on a barter basis for thriving spatterdocks, as good a way as any for obtaining the rarer types. Chocolate gouramis are surely the most sedate fish of all, more so than angels or pompadour fish. They are lordly and they never forget their manners. Surprised at the surface they can make a quick dash for safety but otherwise they never hurry. Unlike most gouramis they pay very infrequent visits to the surface for air and tend to hide behind plants and rarely cruise around the tank in the tiger barb fashion. The body is fuller and of unusual contour; the mouth region reminds me somehow of the archer fish. The scales seem to show up in reticulated fashion. The golden irregular lines on the chocolate background make this fish very hard to spot in a darkened tank when it is still. It is not a hearty eater—what a pity these better-class fishes haven't the appetites of, for example, blue gularis. My chocolate gourami suddenly went "off" in the pompadour fish manner, moped at the surface, refused food and in spite of high temperatures, aeration and tasty tit-bits passed on. Some day someone will find out the trick with these fish, I hope it will be soon.

It is quite possible to keep small terrapins with larger fishes, but I would not care to keep a Matamora turtle with any of my fish. This specimen, sometimes called the leaf-headed turtle, is a killer. The other day I watched one, little larger than a saucer, gulp down seven 2 in. goldfish in 4 minutes. This one was on show and 500 goldfish had been obtained to feed it—at the rate of seven every other day this quantity would last about 5 months! The first two or three never knew what had caught up with them but it was obvious that the remainder well knew their danger as they tried, unavailingly, to find shelter behind rockery.

A gardening correspondent in a national newspaper deploras botanical exactitude and the need to mention three names for the same thing: the one in general use, the "corrected" one and the common or garden one which everybody uses. How true this is getting in the hobby. I have heard people talking about three fishes (by name), only for them to discover they were all discussing the same

fish! In recent years many of our earlier scientific names have been altered and some of the changes which have been made seem pure pedantry. The hobbyist in general goes on calling fishes by their everyday name and the hobby continues to flourish. How I dislike those people who must try to attract attention by using a different nomenclature from everyone else. Years ago I knew a typical suburbanite with a tiny garden who insisted on calling everything by scientific names. I suppose he got a kick out of it. Everybody else got a pain in the neck. Let's keep to barbs, cardinals, glowlights and the like where we know where we are. Some recent films have turned out to be old films under new titles. Don't let this attitude creep into the hobby.

Mealworms are commonly used as a food for many reptiles and birds but are hardly ever mentioned as possible food for fishes. They can be purchased at most pet shops which supply live foods and can be kept indefinitely irrespective of temperature if care is taken to keep them dry. They should be provided with plenty of bran, which they will reduce to a very fine powder, and can also have slices of dry bread, oats and similar foods. This dry feeding will keep them in good condition and there will be no losses to the beetle stage. If, however, anything damp or actually wet is given, particularly greens, the change in the life cycle soon follows. Mealworms are too large for most fishes and are not much attraction when cut up, but they can prove a useful standby to hobbyists who have large pond goldfish or orfe, or the larger tropical cichlids.

When it comes to talking about fishes and how to keep them or breed them it is surprising how quickly a group of aquarists will begin to differ and fail to see eye to eye. When one has pet theories it is really heart-warming to find somebody elsewhere who agrees with you entirely, although it is quite a feat to find anybody who is with you in your views 100 per cent. The other day I was reading a transatlantic paper and came across some comments on red-eyed red swordtails in which the writer shared my views exactly. My heart warmed to this chap, who seemed to have taken as much trouble as myself in getting the "know-how" on this variety. I looked for the author's name but this was not given, just a note to the effect that the article was reprinted from an English club magazine. This started off a train of thought and investigation proved that I had written the article myself about 5 years previously. It was a bitter moment, although afterwards I saw the funny side.

At the pet shop people adopt differing attitudes in ordering fishes. Some are quite prepared to give an order for fishes to be obtained for them with the next consignment. This is buying blind. Anglers always wear rosy spectacles when describing fishes which they have caught or even those which got away. Dealers are no different. Fishes are always larger and better coloured in expectation than they are in realisation. Of course, dealers have to buy blind themselves. Ordering from a list, they hope for the best from brief data but are usually disappointed in the size or other aspects of the fishes when they are received. A dozen fish may prove to be five large and seven midgets, or nine females and three males. One dealer who complained about the large number of females sent in proportion to males was told that "perhaps he had not looked closely"—this to a chap who knows the hobby inside out!

Some purchasers just ask for a fish or fishes and leave it to the assistant to catch any nondescript specimen. The more discerning hobbyists insist on the actual specimens they want, no matter how long it takes to catch them or how full the shop. Most dealers know their clients and are

quite prepared to do all they can to this end. The days of selling fish in pairs is over, although dealers naturally prefer to sell a similar number of males and females with a purchase. However, if you want males only, insist on males only. The customer is always right. It is common practice now to sell some rarer fishes in pairs where breeding is possible and the female would otherwise never be purchased. Alternatively, a higher price is charged for males as, for example, fighters. I have known one dealer who refused point blank to net out particular fish but took the stand that the customer had to have the first fish caught.

Sometimes two prices are shown for the same species, presumably for the large and medium sizes. This has its points. Where a group of fishes contain several first-class specimens and the rest roughly average it might be better to separate the two qualities and charge slightly higher for the better grade. On occasion the prices are not shown and it is necessary to ask. I remember once asking the prices of about 30 varieties in a shop in Yorkshire which showed no price list; a poor policy, in my opinion. Most annoying is where really good fishes are on view at give-away prices, or so it seems, but enquiry proves that "Those are for breeding" or "Sorry, they're sold" or even "They aren't mine, I'm looking after them for a chap on holiday." Fishes that aren't for sale should be clearly marked.

Hobbyists are proverbially easy-going, good-tempered types who are rarely put out, and the longer they are in the hobby the more this is true. They hold in time quite fatalistic views on all aspects of the fancy and usually have a ready cliché to meet whatever comes along. Talking of proverbs, have you noticed how many of them fit hobbyists or the hobby, or the chap who keeps fishes next door, like a glove? Let us have a look at just a few.

"Evil weeds grow apace" (the blue-green algae). "First come, first served," as the dealer says when *Tubifex* is all gone. "Imitation is the sincerest flattery," when the other guy copies your set-up at the show. "It's a long lane which has no turning," after 6 months of white spot. "Leave well alone," such good advice so often ignored. "Listeners hear no good of themselves," as we all know at the club. "More haste, less speed," when setting up or cleaning out. "Don't count your chickens before they hatch," . . . ask any breeder. "Better late than never," . . . the club speaker who arrives an hour late when you got off specially to hear him. "All's well that ends well," when the spawning is reared after many sleepless nights. "A friend in need is a friend indeed," when you simply have to have some gadget or chemical in a hurry when all the shops are shut. "A fool and his money are soon parted," as the know-all beginner realises when he has declined well-intentioned expert advice. "Absence makes the heart grow fonder," as the club member told his wife after a long absence at the club show. "A bad workman blames his tools," the beginner who boiled his fish and blamed his thermostat. "None so deaf as those who will not hear," the chap who says "I told you so" with a leer. "Once bitten, twice shy," the chap who thought it might be a piranha. "One man's meat is another man's poison," the judging at any show. "Pride goeth before a fall," the certain-to-win exhibitor. "The early bird catches the worm," or at least the *Daphnia*.

An unusual fish is *Ambassis buroensis*, the Boeru Island glassfish. In many ways it resembles *Telmatherina ladigei* but is larger and it has that hungry look found in the faces of the barracuda and the whiting. The eye is large and very striking. The colour is silvery and subdued with a fine sheen and a greenish line laterally. The mouths are large and I noticed many slightly damaged, in a dozen specimens. This fish is not transparent as its name might suggest.

COLDWATER FISH-KEEPING QUERIES answered by A. BOARDER

I have a small pond 6 ft. in diameter and 18 in. deep, which is getting full of flannel weed. How can I clean this away, and would emptying the pond help?

It should not be difficult to clear the flannel weed from a pond as small as yours. If you keep pulling it out you will find that it gradually disappears, especially when other water plants get growing more strongly. If the pond is emptied and cleaned out it will give you a chance to take out most of the weed. Many pondkeepers are of the opinion that there is a simple remedy for this trouble and that there is something which could be put into the water to kill off the flannel weed, as if by magic. This is a fallacy, as most chemicals suitable for the purpose would almost surely kill the other water plants as well and be fatal to fishes. Some forms of copper in solution will kill the weed all right but everything else as well. If you have weeds in the vegetable or flower garden you pull them out or hoe them. In the pond the hoeing is no use but you can pull the weeds out and so encourage the wanted plants to thrive.

I have a pond about 30 ft. by 20 ft. and about 4 ft. deep. It is used as a reservoir for spraying fruit trees. I would like to stock the pond with fishes and want to know which kinds would do best. There is one snag: sometimes some of the chemical spray runs back down the suction pipe and into the water. This contains tar oil, lead arsenate, D.D.86 and lime sulphur. Would this be fatal to fishes?

The pond itself sounds a very good place for fishes and the common goldfish should thrive and breed there quite well. However, the risks of the chemicals you use getting into the water in sufficient quantities to kill the fish must not be overlooked. If the D.D.86 is anything like the D.D.T. I am familiar with, then even in very small traces it is fatal to fishes. No doubt great care would be taken to prevent any of the wash from getting into the pond but the possibility is there. I suggest that you get about half-a-dozen of common goldfish and put them in the pond. These should not cost very much and if they die it will not be much loss. On the other hand they may breed and could give you thousands of fish in a year or so. You might try searching along the edges of the pond to see if there is any sign of life already in the water. If the water is pure enough for fishes then it is absolutely certain that you will be able to see something alive, perhaps water snails, water fleas and other small creatures. If the snails live the chances are that goldfish would live.

I have been an active member of an aquarist club for a number of years and have been very successful with my fishes at table shows. I have now gone into the pet-shop business and have been requested by the committee of the club not to enter in competitive club table shows. I contend that I am still an aquarist but it seems that a "gentlemen's agreement" is in force which forbids a dealer to show at table shows. What is your opinion of this please?

I sympathise with both points of view. As far as the committee are concerned I have no doubt that they did not like to have to inform you as they did, but the probability is that someone has complained to them and then they were almost bound to do something about it. I can quite understand that a beginner would feel it rather unfair to have to compete at a club table show against a dealer. As to the "gentlemen's agreement," there is usually a rule in the club's book to say that anyone earning their living breeding or dealing in fishes should not show in club table shows. However, if no such rule exists it is up to the people concerned to do what they think best. I suggest that it would be far better for you if you take along some of your best specimens to each table show but do not enter them in competition. This will show that you are a good sport and it will be a very good advertisement for your fishes. I feel sure that the last thing that the committee

want to see happen is that fewer fishes are on show, but they will surely welcome a non-competitive exhibit from you. You will, of course, be able to show your fishes at any open show which does not have a rule in the schedule barring dealers from entering.

I have in the classroom a tank 18 in. by 12 in. by 12 in. containing Canadian pondweed, two green tench (5 and 3 in. long), a horse leech and a number of pond snails. Recently there has been a high mortality rate among the snails: can you suggest a reason? Also there are a number of creatures in the tank I am unable to recognise. One is from a quarter to half-an-inch long and has a star-shaped head; the other form is thread-like and appears to be anchored in the mud and waves about in the water but disappears in the mud when any movement occurs. What are these?

The snails may have been killed by the horse leech. This should never be kept in the same receptacle as fish and snails. Leeches can suck the juice from snails and so kill them, and if the leech gets a grip on a fish it can also kill that. You can keep the leech quite well in a two-pound jam jar. Green tench eat large quantities of water snails in their native habitat and so may have been the culprits; however, they may not be able to deal with large snails, only the younger ones. The creatures with the star-shaped heads are *Hydra*, which catch their small prey with the aid of small tentacles. They are not likely to harm your fish. The thread-like creatures are *Tubifex* worms which would be eaten by the tench if they had nothing else to feed on. It is probable that these creatures were introduced into your tank with the pond weed.

I have two green tench affected with white-spot disease. I have isolated them and have added a strong solution of quinine sulphate to the water. After 2 weeks the fish seem no better. Why is this?

To cure this trouble you have to understand what is happening. The parasites are under the skin of the fish and whilst there there is little hope of being able to kill them with concentrations of chemicals in the water. What happens is that when the parasites reach maturity they break out and leave the fish. They drop to the bottom of the tank and encyst; that is they have a casing form over them. Then a rapid division takes place inside the cyst and after a time a number of fresh young parasites emerge and seek a fish host. It is when they are free-swimming that they can be attacked and killed with the chemical solution. Even if the water was changed every day for a couple of weeks the pests could be cleared from the fish. There is one main snag, however, especially when treating coldwater fishes. That is, the parasites develop with warmth and so the colder the water the longer will they take to develop, leave the fish and become attackable. The reason why nothing has happened to your fish in the shape of a cure is that the water is so cold that the development of the parasites has been delayed. If you can warm the water up to 65° or 70° F., the parasites will develop more quickly and so a cure can be effected. Aeration may be necessary.

I have a tank 36 in. long by 12 in. wide and 12 in. deep. Would you please tell me how many watts of fluorescent tube I would need to get my water plants to grow well?

Many aquarists have found that water plants do not thrive when fluorescent tubes are used for lighting. You will find that you get better results with ordinary lamps and can use three 60 watt lamps as an experiment. It is hardly possible to say with certainty how the plants will thrive with this amount of light as so much depends on the position of the tank, the amount of natural light which it receives and the length of time you are prepared to keep the lamps

alight each day. Only by experimenting over a few weeks are you likely to find out what suits your position best.

I have a garden pond with fish and plants in but the water is always green; when I see other peoples' ponds clear I wonder how it is done. Can I use copper sulphate?

I do not advise you to use copper sulphate as even in small quantities copper can be fatal to fishes. Once a good growth of other water plants is obtained in your pond you will find that the water gradually clears. Sometimes the adding of too much dried food will cause the water to go green. It is often said that it is of no use emptying and refilling the pond as it will go green again. This may be so but I still think that it is worth doing as whilst the water is fairly clear the water plants in the pond will have a chance to grow stronger and then they can choke out the green algae. Even three times may be necessary for the emptying but in time the water will clear. Sometimes if left alone it will clear by itself. You have to remember that the green is caused by tiny plants called algae and what would kill them is likely also to kill the other occupants of the pond, both animal and vegetable.

I have a pond in the garden with a number of goldfish therein. Two of them have a kind of brown furry patch or two on their backs. What is this and how can it be cured?

The marks on your fish are no doubt caused by fungus. This disease attacks a fish either when it is damaged or when the fish is somewhat out of condition. When this happens the mucous covering of the fish is deranged and the fungus takes a hold. The brown colouring is caused only by the condition of the water. Fungus is white at first but can turn brown or even green when there is a lot of algae in the pond. Place your fish by themselves in clean water then add a heaped tablespoonful of salt to each gallon of water. After about 4 days the fish should be cured, when the strength of salt can be gradually reduced until the fish are once more in fresh water. There is no need to feed the fish whilst they are under treatment, but once the fungus falls away then feeding with small earth worms can be commenced.

During the past 2 weeks I have lost four comet goldfish. They appeared quite healthy up to the time of dying. The water in the tank appears clear and the temperature of the water has been kept at about 60° F. Why have the fish died?

It is not possible to say what caused the death of your fish from the information given. You do not say how large is your tank and how many fish are kept. Their size is also not quoted and so I can only guess at the reason for the death of the comets. In the first place there is no need to keep comets at 60° F. in the winter; they are hardy fish and need no artificial heat. This may have something to do with the death of your fish. When fish die and show no outward signs of ill health I always suspect lack of oxygen in the water. If a fish is ailing it will practically always show some sign such as a lowered dorsal fin, loss of appetite or mouthing at the surface. It is possible that your tank is too small for your fish; you can have only an inch of fish for each 24 square inches of surface area of the water. You may have been over-feeding; uneaten food can pollute the water. Check up on all features and also whether any poisonous substances could have come into contact with the water, and it is probable that you can work out for yourself why the fish died.

I have recently reglazed a tank and now find that the water has a film of oil on the top. Also the putty at the top has formed a skin over it and this has now become wrinkled. Can you please tell me the cause?

The trouble has been caused by use of too much linseed oil in the putty. The surplus oil has formed the skin and you will find that it is possible to peel this off. Putty can

be too soft or over charged with oil, when the state you describe will occur. You can remove the film from the top of the water by drawing a sheet of paper along the surface. Do this each day and a partial change of water will soon put things right.

I am writing a thesis on the common goldfish with special reference to their breeding. I have a pair of fish which show no signs on them of any particular sex and they make no attempts to breed. How can I be sure of their sex and is there anything I can do to encourage them to spawn?

As you no doubt are aware, the male fish often shows small white tubercles on the gill plates during the breeding season but not always so. It is a safer method to examine the fish from above, when the female should show a plumper body than the male. Also the female will usually show a much sharper curve behind the vent up to the caudal peduncle. All pairs of goldfish do not take to each other but if another male is added it is probable that this will encourage spawning to commence. They only spawn as a rule in water which is well charged with oxygen, and a temporary separation will often bring about the desired result.



Photo: Laurence E. Perkins
This female fantail goldfish clearly shows the sharp curve of body outline beneath the beginning of the tail, which is characteristic of the sex

I am making a garden pond from a concrete soft-water tank. I have removed the top and it is now 10 ft. long, 4 ft. wide and 8 ft. deep. Is it too deep; if so, how can I make it more shallow? Can I grow water lilies in it and do they float? I have some solid lumps of concrete. Can I put these in to make resting places and what sort of fish, with their foods, can I have?

The pond may be too deep to become a successful garden pond but you can overcome this by partially filling it up with the concrete blocks. There is no need to have the pond more than 3 ft. deep. As a rule, in a pond such as yours the water at the bottom rarely gets disturbed and so is not oxygenated like the water nearer the top. The capacity of a pond for fish is not reckoned by the amount of water therein but on the size of the water's surface. In other words the more water is in contact with the atmosphere the more fish will it hold. Water lilies do not float, but must have a good root hold either in the bottom of the pond or in containers which can be placed not more than 2½ ft. deep in the water. If the lilies are planted in large pots they can be removed when necessary for cleaning the pond or for division of the root-stock.

You can have common goldfish, shubunkins or fantails

in your pond, and golden orfe would be all right too. There are many forms of goldfish food and it would be better for you if you read *The Aquarist* booklets *Goldwater Fishkeeping* and *Fish Foods and Feeding*, as these give very full details about all you need to know.

I have two tanks each 24 in. by 12 in. by 12 in. with two 3 in. comets in one and two 2 in. golden orfe and a 2 in. comet in the other. I am at a loss to know whether to use aeration or not. I have seen various books, all condemn aeration yet some folk tell me I must have aeration. What am I to do please?

I do not condemn aeration as it has its uses. I do not use it for my ordinary tanks as I contend that once aeration is necessary the tank is overcrowded. I have kept fancy goldfish in tanks without aeration for very many years and never have any trouble. Aeration can be very helpful when breeding to keep the eggs well oxygenated and to assist fry to get enough oxygen when they are small and may be rather crowded in their hatching tank. You do not need aeration for your tanks with the present number and size of fishes. Each tank will hold 12 in. of fish, not counting the tail, before any artificial aeration is needed. A partial change of water once a week at the servicing time will be beneficial; about 3 gallons is a very useful amount to change.

I am quite unable to keep goldfish alive for more than a few weeks. I have a proper tank with sand, shells and water grasses in it. The fish are caught in a net when removing them to change the water; where am I going wrong?

In the first place goldfish should live for many years, but the water does not need frequent changes. If you frequently catch the fish in a net you can remove some of the mucus covering from them. This is their protection and they can become ill if too much is taken away. The water in a correctly run tank should never need changing completely, just a little each week when the surplus mulm is siphoned from the bottom of the tank. You may have been giving the fish too much dried food, which if uneaten can soon upset the balance of the tank. Do not have too many fish in the tank; rather less than an inch of fish for each 24 square inches of surface area will do for a start.

Can I clear my pond with freshwater mussels?

I very much doubt if you could clear the water in your pond with freshwater mussels. In theory they do siphon in water and cleanse it somewhat as they pass it out, but the number of mussels necessary to clear your pond would be enormous. Also the mussels would not live long in a pond which did not have a good layer of mulm or mud at the bottom. These molluscs move about in this mulm and would not be content on a concrete bottom.

Is it true that goldfish should have a very varied diet?

Goldfish thrive on a varied diet but I have known them to live for years on one diet alone, and in fact there are records of goldfish having been kept in tanks for years without having been artificially fed at all. I consider that a diet which includes some form of live food is ideal. A good packet food as a base, with an occasional feed of white worms, garden worms, *Tubifex*, *Daphnia*, etc., will help to keep the fish healthy and happy.

I have a small place in my pond which has developed a leak. I have tried to stop it but without much success. What is the best thing to do?

Try the following. Get some bitumastic substance and paint it over the spot after it is dry. Then get a piece of polythene sheeting large enough to well cover the spot with plenty to spare. Press this on to the bitumastic, so that all the edges of the sheeting are sealed and so that no water can get under the edges. This should make a very good seal.

I am making a number of fairly large aquarium tanks and would be grateful for a formula for making my own aquarium cement.

You would probably find it cheaper to buy a ready-made cement and certainly far less trouble. However, if you prefer to make your own the following has been found very good by many of the old-timers: take 2 parts, by weight, of whiting putty, 1 part of red lead and 1 part of white lead, and mix these with gold size to get the mass to a sticky consistency. Do not get it too soft, and make sure that there are no small hard lumps in it. One such piece could cause a crack in the glass. The compound should be used soon after making up.

I am a beginner with fish-keeping and have only a few common goldfish and shubunkins. I feed them on dried food and live *Daphnia*. I see in advertisements brine-shrimp eggs and *Tubifex* worms under the heading "Live Foods." What are they and how can they be kept?

Brine-shrimp eggs are of no use to you as food. They are used mainly by tropical-fish breeders. The eggs are hatched out in brine at a temperature of about 74° F., and the young shrimps are given to the tiny fry. The shrimps are not easy to keep alive for long. *Tubifex* worms are used for feeding by many aquarists. They are a type of worm which live in mud or mulm at the sides of rivers or ponds. They cannot be kept alive and healthy for very long by beginners and are best used after they have been kept under running water for a few hours. This helps to clear out any impure matter which may be in the worms. You would do better by breeding white worms, as these can be bred quite easily in a box of damp peat, if fed on damp brown bread and kept in a cool dark place.

I am considering building a large tank to stand on a balcony, as I live in a flat. I want to keep some veiltails and am wondering if I can use asbestos sheeting for the back and ends of the tank. Will this be harmful to the fish?

The asbestos sheeting could be harmful to fish if it was fairly new. The usual method of making this material is to use shredded asbestos and bind it together with cement. These are the main ingredients and so the cement could be dangerous because of the free lime which is likely to come from it. Any tank made with such material would have to be treated, as would a cement pond when freshly made. It would have to be filled with water and after a few days scrubbed out well and the process repeated before filling it and planting it up. Before you place any fish in the tank try a few *Daphnia* and a known number of water snails. If they live for a week, then the water should be safe for the fish.

I have a garden pond 4 ft. by 2 ft. by 12 in. deep, with some soil for planting lilies in. Will you please let me know the type and quantity of fishes to put in it?

The pond is very small and may not be a safe place for fishes all the winter. Also it may get too warm in the summer. However, you can try two or three small goldfish and see how they go on. Do not put any more fish in the pond, as it will be only a waste of money. By the time you have a water lily and other plants that you suggest then there is not likely to be much room for fishes!

I recently purchased a breeding pair of Bristol shubunkins, which were in tip-top condition. Over the past few weeks they have become covered in white spots and appear listless. The female was the first affected and the male has only shown the marks during the last few days. The pair are kept in a 36 in. by 15 in. by 12 in. tank which is well filtered and aerated. The water has been changed twice when heavy scum formed on the surface. *Tubifex* worms have been fed to the fish, together with garden worms and dried foods. Can you tell me what is the matter?

The fish are attacked by white-spot disease. They may have been infected when you bought them or they may have

(Please turn to page 80)

Microscopy for the Aquarist—42 by C. E. C. COLE

STARTING this month, we want to examine all the processes which are necessary to make respectable permanent slides of aquatic subjects. In addition we shall consider special solutions of chemicals which will be of particular use to us as aquarists.

Each process has a special name. From start to finish they are killing, fixation, washing, sectioning, staining, counterstaining, differentiation, dehydration, clearing, mounting and covering, and ringing.

Not every subject needs to undergo all the formidable list I have given, and sometimes two or more processes go on at one and the same time. Many small objects can be mounted whole; a great number have no need for counterstaining or indeed of any staining at all. There is no hard-and-fast rule to be rigidly adhered to—rather there are general principles and a set sequence of processes which it is wise to follow to obtain worthwhile results.

Killing is obviously the first requirement. Some aquatic creatures are best treated by dropping in very hot water—death or coma is instantaneous with water beetles, insects, crustaceans and similar organisms, but infusorians need different treatment to keep them expanded and lifelike. These can be given an anaesthetic, added drop by drop until they cease to move. Formalin (formaldehyde solution) is a useful killing and fixing agent in many cases.

What is fixation—what is its object? There are several objects, but the most important is to preserve the contents of the cells of the creature fixed in as lifelike a condition as possible. At the same time fixation prepares the cells so that they may be subjected to further and various treatments. It usually has more effect upon the refractive index of some of the cell contents than upon others, thus introducing contrast and revealing more than would otherwise be seen. Fixatives usually harden the tissues to a certain extent, which is very useful when they need cutting or sectioning. Finally, fixation enables tissue to be more easily stained with various chemicals.

Let us examine the effects of two different fixatives, both of which we probably already have or can obtain for a copper or two at the local chemists. First there is formalin, sold as a solution of formaldehyde (40%). Secondly there is acetic acid (100%). Both liquids can be diluted, by adding distilled water, to any percentage required.

Both have very distinctive smells and should be sniffed cautiously—not because of any ill effect (as far as I know)—but because they are pungent and irritate the nose and, in some, the eyes.

Formalin, although quick to kill, is slow to fix. Whole organisms should be left to soak in the solution for 2 or 3 days, depending upon their size. Acetic acid is comparatively rapid—approximately 50 times the speed of formalin.

Formalin causes little shrinkage of the tissues until acted upon by alcohol at a later stage. Acetic acid swells tissues very much but leaves them soft; it has no hardening effect at all. Not only this but it offers very great resistance to the hardening effect of such solutions as alcohol.

Formalin has a very pronounced hardening effect. Leave aquatic specimens in it for a long time, and then try to straighten them out! Legs and parts of the body break off easily—they just have no "give" in them at all. Take similar specimens kept in acetic acid and they are as pliable as when alive. The moral is obvious—we must consider what we hope to do with the creatures we are preserving before we decide to keep them in formalin or in acetic acid.

If we want to cut them up to show transverse sections through body or legs or head, we pop them into formalin. If we wish to mount them whole and well spread to show as

many different parts *in situ* as possible, then acetic acid is the fixative we require.

A fixative which is a combination of formalin and acetic acid with picric acid is quite useful. It combines most of the virtues of both formalin and acetic acid, and in addition stains certain parts (chitinous) yellow. It cannot usually be obtained from other than a recognised stockist of microscope reagents and chemicals, and is known universally as Bouin's Fluid.

Next month we shall consider washing and staining. Sectioning is worthy of an article on its own, but can be deferred for the time being.

FINNY BUSINESS by LO



"Take no notice—I think he's only a red herring"

Lamp-Eyes

(*Aplobeilichthys macropthalmus*)

ORDER: Cyprinodontes, from Greek *kyprinos*—a kind of carp, and Greek *odontos*—tooth.

FAMILY: Cyprinodontidae.

SPECIES: *Aplobeilichthys*, from Greek *aploos*—single or simple, Greek *cheilos*—lip, and Greek *ichthys*—fish; *macropthalmus*, from Greek *makros*—large, and Greek *ophthalmos*—eye.

ONCE known as *Panchax luxophthalmus* (light-eyed panchax), this Nigerian jewel is now universally called by its popular name of "lamp-eyes."

Seldom has a popular name so aptly described the most attractive and obvious feature of a fish. So bright are they that requests to switch off the room light in order to better appreciate the illumination radiated from the eyes of the fish are by no means uncommon. What a disappointment follows when such a request is complied with, and the result is complete blackness, as though the switch in the room also operated the light within the eyes!

Maximum size is about that of a fully grown male guppy—1½ inches. Streamlined, its length of body is about five times its depth, with dorsal and anal fins approximately equal to the body depth and caudal fin approximately one and a half times the length of its head; its overall hue is very pale green. Along its middle body line is a row of quite bright dots, starting just behind the head and terminating at the root of the caudal peduncle. There are hints of blue in dorsal, anal and caudal fin, and on this latter appear occasional flecks of reddish orange.

These somewhat subdued hues offset its crowning attraction—the eyes, which appear unusually large for such a small fish, and when in light, reflect back an intense greenish blue.

The female fish has slightly more rounded dorsal and anal fins than her mate, and when in spawn is noticeably rounder in body.

Happy within a temperature range from 70° to 85°F., the lamp-eyes like a planted aquarium of moderate size which will give them room to move around freely. They prefer live food to dried food. *Daphnia*, *Cyclops*, gnat larvae, gnat pupae, mayfly larvae, brine shrimps—all are equally relished and eagerly consumed.

From the position of their mouths—always a good indication of feeding habits—it can be seen that they are not likely to be bottom feeders, and this is proved when heavy live foods like bloodworms, or micro worms, are added to the tank. Any which reach the bottom are left unmolested. Similarly with dried food: a little will be picked off the surface of the water, and more when the food is falling, but that which reaches the bottom is left uneaten.

Observers of the spawning act liken it to that of *Oryzias latipes*. The females extrude eggs which remain attached round their vent like miniature bunches of grapes. If floating plants are present, and when it suits the female, the eggs are brushed off on to them and remain attached by short, almost invisible, threads.

The eggs are very transparent and can be observed during the development of the fry with the aid of a hand lens. Thus any out of focus can be gently pushed into position near or against the front of the glass.

Incubation is comparatively long. In a temperature of 80°F. it lasts from 10 to 14 days. The development of the emergent fry is advanced, however, and they are (again according to observers) immediately free-swimming. No



hanging about for them—they are off in search of food. It is now that infusorians from special cultures should be added. The fry will keep to the surface for a day or two.

Parents do not eat eggs, but as the fry are of tit-bit size, they may offer a temptation unable to be resisted. For this reason it is wisest to remove adult fish from their vicinity.

After Infusoria give *Cyclops* nauplii, new-hatched brine shrimps, tiny *Daphnia* and new-hatched gnat larvae (collect the rafts and place these on the surface of the water).

Size of the young fish will by no means be uniform. Remember the habit of the female, and the prolonged "wiping-off" process of egg-laying.

So far, I have mentioned only the female role in producing youngsters. What of the male? Is he unnecessary? He always seems to be paying assiduous attention to his mate, or mates, whether or not they are in spawn.

I can only hazard a guess as to his precise role. It is possible that he emits spermatozoa in the neighbourhood of the female, some of which find the eggs she has extruded. An alternative would be that the sperms enter her cloaca, and that fertilisation takes place inside her body. Experiments that someone interested might like to carry out along these lines are as follows.

Remove the males and leave only females known to have produced eggs previously. Check whether further eggs are produced, and, if so, whether they are fertile. If so, the male sperms must either have lived in the water for some days or be carried by the female. If no eggs are produced until the male is replaced it would indicate that his presence stimulates the production. If eggs are infertile without him, either the sperms (if they were ever present) died before acting or the female did not carry any in her body. And so on and so forth. I shall be interested to hear of any experiments carried out.

Keep your lamp-eyes in an aquarium of their own. They are not ideal community members, being given to sly fin nipping now and again, particularly if they are kept without a minimum of live food.

COLDWATER QUERIES

(continued from page 78)

become infected by some of the *Tubifex* worms. It is no easy task to rid coldwater fishes of white spot. You say that you have no compost or sand at the bottom of your tank. This may be of assistance to you as you can change the water every day if you like. Even this will help to clear the fish if the weather is fairly warm. The parasites are embedded in the skin of the fish and leave only when they become mature. This is hastened by warm water. They drop to the bottom of the tank and encyst. After a couple of days or so they break up and many new free-swimming parasites appear to search for a host. By cleaning out the tank every day you will gradually destroy the pests, but you can add 3 grains of quinine sulphate to each gallon of water.

The fact that scum formed on the top of your tank indicates that you must have been over-feeding. The decaying uneaten food has turned the water foul.

THE AQUARIST

TREE FROGS *by* ROBERT BUSTARD

THESE beautiful little creatures have always been favourites of vivarium-keepers and thousands of the European green tree frog (*Hyla arborea*) are imported into this country each spring to supply the demand.

They are such dainty little creatures, and very attractively coloured—a beautiful leaf-green above, bordered with a black band edged in white which passes from the eye to the end of the body. Below it is white. The colour is variable, and changes with the surroundings. Many shades of green are encountered; some frogs are yellowish and sometimes they are brown. They have adhesive discs on their feet which enable them to cling on to leaves and gain an immediate foothold when jumping from leaf to leaf. So effective are these discs that the frogs can easily climb a vertical sheet of glass (compare many geckos) and in the vivarium tree frogs will often rest attached to the glass front.

Tree frogs do very well in the vivarium provided that feeding is no problem, as they (and this is very true of *Hyla arborea*) feed almost exclusively on flies, bluebottles and other active insects, including butterflies and moths. They are very active at feeding times and will jump great distances, landing safely elsewhere and often catching the food in mid-air.

The vivarium for these creatures should be reasonably roomy and high, as they spend all their time off the ground. It should also be very humid. A vivarium 18 in. by 12 in. by 18 in. high is suitable for at least half a dozen of these frogs. A plant with large leaves should be grown in the vivarium or, alternatively, cut stems of plants such as

rhododendrons and laurel can be set in water in the vivarium. In order to supply the frogs with plenty of food gentles should be purchased, or bred, and small tins of these can be placed in the vivarium so that they can eat the bluebottles when these hatch.

Hyla arborea is also an ideal specimen for the escape-proof greenhouse, and I keep many along with other tree frogs; they live in a small tree and in everlasting sweet-pea plants high above the ground. This is a good species for the beginner, but there are many others available which the enthusiast will want to try. Some of these are very beautiful indeed, as well as being long-lived in simple vivarium conditions as described above.

Tree frogs are particularly abundant in Australasia and the Americas. White's tree frog (*Hyla coerulea*) from Australia is very like *H. arborea* except that it lacks the dark lateral stripes and is about twice the length of its 2 inch European relation. This species has lived for many years in this country and is strongly recommended. Like another large Australian species, known as the golden tree frog (*Hyla aurea*), it should be kept indoors at a temperature of 65 to 70° F. and although these frogs are relatively hardy I do not recommend that they be allowed to hibernate.

North America is the home of a large number of tree frogs, many of which are sold by dealers in the U.S., but of these only a few reach the British market. The species usually available is the variable tree frog (*Hyla versicolor*). As the name suggests, the coloration of this small frog, which is about 2 inches, is very variable. Dorsally it may be brownish or greenish, with darker markings. This is a very



Photo:

Robert Bustard

This South American tree frog is an active species with unusual breeding habits. Tree frogs show great diversity in the ways in which their eggs are hatched



Photo :

Robert Bustard

Arum-lily frogs (*Hyperolius horstoecki*) photographed inside the flower from which their name is derived

hardy species which requires exactly the same attention as *H. arborea*.

Other American species which I have seen offered for sale in recent years include the Pacific tree frog (*Hyla regilla*), which is quite an interesting although sombre species of smaller size than *H. arborea*, and also the tiny spring peeper (*Hyla crucifer*) which is yellowish green and only about an inch long. Both these species do well, and are best kept indoors owing to their small size.

From South Africa come the beautiful arum-lily frogs (*Hyperolius horstoecki*). These small frogs, which are only 1-1½ inches long, are attractively coloured in creamy buff with cream lateral stripes, and the feet are bright orange. They are sometimes available and make unusual vivarium inmates, feeding on insects and requiring similar attention to the other species mentioned. I do not allow mine to hibernate.

Tree frogs are renowned for their diversity in breeding habits—some build little pools at the sides of ponds, others build cradles for the eggs in the trees by sticking large leaves together and yet others behave like marsupials in having a pouch (dorsally situated) into which the eggs are placed. An example of this is *Gastrotheca marsupiatum*, appropriately called the pouched tree frog. I imported this frog into Britain for the first time in 1955, and it has become remarkably popular among vivarium-keepers already. This is possibly because it does so well at about 65° F. and will breed readily in a small indoor vivarium.

The tadpoles hatch from the eggs in the pouch and are liberated by the female entering the water. A depth of 4 inches is necessary for the deposition of the tadpoles, which develop in the usual way. In allied species they remain in the pouch until metamorphosis. In *G. marsupiatum* a brood may comprise 100-150 tadpoles, and it is quite possible to raise at least half of this number to metamorphosis, whereupon they grow very quickly indeed.

Gastrotheca, unlike many other tree frogs, is not essentially arboreal, although in captivity they are often found well above the ground. This frog is brown or green, with longitudinal stripes which are usually brown or sometimes black. All-green specimens, superficially resembling *H. arborea*, also occur.

AQUARIST'S CALENDAR

23rd August: **Romford Aquarists' Society** seventh annual open show.

21st-23rd August: **Rugby and District Aquarists' Society** annual show at Percival Guildhouse, Rugby.

4th-6th September: **Three Counties Show** at the Drill Hall, Penrith Road, Basingstoke.

11th-13th September: **Bath Aquarist Society** annual show.

13th September: **Blackpool and Fylde Aquatic Society** annual open show at the Waterloo Road Methodist Mission, South Shore, Blackpool.

27th-28th September: **Federation of Guppy Breeders' Societies** annual show at Basingstoke.

31st October and 1st November: **Bristol Aquarist Society** annual open show.

12th-15th November: **Scottish Aquarium Society** annual open show at the McLellan Galleries, Glasgow.

The Mud Skipper (*Periophthalmus barbarus*)

by C. WRIGHT

THREE years ago I was fortunate to acquire six mud skippers out of a consignment of 200 freshly arrived from Java. I had heard from a large number of sources that they were very hard, in fact almost impossible, to keep for many weeks. Even the importer warned me against them, having lost large numbers himself at various times and I do know that the dealer who had the majority of the consignment lost 95 per cent. of them within 2 weeks. My own losses, as will be seen later, were very light.

Knowing that there was a possibility of some arriving I had really swotted up all the information I could find concerning these remarkable creatures. On three previous occasions I had tried to keep them but had failed, keeping them just over a week, but these failures taught me a lot and information gained from various articles and books greatly assisted me in preparing what I hoped would be ideal conditions.

As all my tanks were base heated by gas I had no worry about keeping a high temperature with very shallow water. I started with 1/16 in. aquarium gravel and a 24 in. by 15 in. by 12 in. aquarium. The gravel was sloped from one end at 2 1/2 in. to the other end at barely 1/2 in.; water was then added to a depth of 1 1/2 in., and several pieces of flat-topped rock were placed in the shallow end and arranged in steps to reach a flat top which was about 3 in. square and about 5 or 6 in. above water level. Another flat piece of rock, about 6 in. square, was placed in the centre and arranged so that it was covered by about 1/2 in. of water. This was to be the feeding table, because they will not eat food out of water. If food was placed on the tall rock they had no hesitation about coming for it but as soon as it was reached they would take a mouthful and immediately dive back into the water where they would consume it; but more about feeding later on.

To take the drabness out of the tank I planted *Ludwigia nodiflora* and *Mentha aquatica* along the back of the tank, these being bog plants which bear foliage above the water. A tight-fitting cover glass is really a must with these unusual and fascinating creatures, as they can quite easily climb up the sides of a 12 in. deep tank; that was why I chose a 15 in. deep aquarium, for time not spent on the rocks was spent sticking to the glass sides until the body began to dry, then they would drop back into the water, only to be out again in a few minutes. Many times I have lost two or three, only to find them in the front internal angles where they cannot be seen very easily. I had one that found his way into the next tank, and the only loophole for escape was a hole cut out of the glass to take a slim thermostat tube when it was used as a fish-show tank; he did seem to attack the fish but was lying quite peacefully on top of some plants and looked a sitting target for a net—but, believe me, it was only looks, for the speed and power of jumping is really surprising in such an awkward-looking creature. Mud skippers also have the advantage that their eyes are set on top of the head and are so flexible that they can be moved independently and in any direction. At times they can look directly in front and behind them at once, so you can't catch them unawares. Finding this one in a tank of fish tempted me to put some guppies in with them as an experiment. I put in two pairs, the females being very heavy, and I thought that at least the young would be a good feed for the skippers, but 2 days later I was greatly surprised to see a large shoal of fry swimming

contentedly about and almost taking food out of the skippers' mouths. When I finally left them there must have been over a hundred guppies of all sizes with them, but even now I ask myself are they to be trusted in a community aquarium?

The body colour of the skipper is brown. They have two dorsal fins, which are very attractive, being of a steel-blue colour; the first fin, which is very spiny and tall, has a black edge to it with a white band underneath; the second dorsal has a thick black band with a thin white band on either side of it. One reference book states that these are absent in the females; if this is so then I can only say that I must have seen all males. Though the body is covered with white dots the rest of the fins have very dark spots.

I had read that feeding was fairly easy and that they



should be given flies and small insects, earthworms, gentles, tadpoles, white worms and *Gammarus*. It was quite a performance catching flies alive and dropping them into the tank only to see the skippers ignore them, just the same as they ignored gentles, tadpoles and *Gammarus*! After 2 days I began to get alarmed, as they had eaten nothing to my knowledge. In desperation I tried *Tubifex* worms, which I placed on the flat stone just below water level, and within 3 minutes the water was a mass of fighting mud skippers; I put in some more, and that, I think, was my downfall. Within an hour one was dead, choked with a mouthful of worms, and another died the next day; this I think was mainly due to starvation. About 2 months later I found one dead on the floor, having apparently been there all night; how he got out I don't know, unless he got into a position where he could use his pectoral fins like arms. Their strength in these fins is amazing.

The other three I kept going for 3 years, mainly on

Tubifex worms but with an occasional scraping of raw meat, and live *Daphnia*. By this time they had grown from 1½ to 3½ in., and it was a treat to see them chasing live *Daphnia* around the tank. This was a food I had never seen mentioned for them, and was put in to feed the guppies in the first place but the skippers enjoyed it and also got a lot of exercise chasing it. There was always plenty of *Tubifex* in the sand and the fish never tired of searching for it—one eye under the water and the other eye looking at me hoping that I would put some fresh worms on the stone and so save them the trouble of foraging.

Circumstances forced me to put them into another person's care, but in spite of strict instructions as to feeding, etc., the last three were dead within a month.

The reference books have very little to say about mud-skippers but all seem to agree that they have not been bred in captivity; I only quote, I do not know. All that I do know is, that as soon as circumstances permit, I shall have some more and, who knows, I may be the lucky one!

Heteranthera zosterifolia

by JACK HEMS

THIS delightful water plant is native to South America, where it smotheres the muddy banks and shallow waters of sun-drenched lakes and streams with its silky fine, pale-green, grass-like foliage.

As a tropical aquarium plant—and it has been used in this capacity for above three decades—it is both useful and decorative, for its tangled ribbons of foliage provide plenty of hiding places for fishes' eggs and newly hatched fry. And as a spawning plant pure and simple, it ranks, I think, with the best of the so-called spawning plants such as *Cabomba* and *Myriophyllum*.

For decorative purposes it may be planted as single stems set an inch or so apart along the back and sides of the aquarium, or grouped closely together and featured as a centre piece. It is also useful to grow around tall, massed rockwork to soften the edges and add a more natural appearance to the underwater scene.

To grow *Heteranthera* to perfection—nay, to keep it alive—the aquarist must give it plenty of bright light, natural or artificial. Without sufficient light it will soon become stringy and die down. Another thing it likes is a rich compost, for although it will grow well in sand alone, it will grow much more luxuriantly if planted in a small pot filled with rich garden soil, or yellow clay mixed with crushed charcoal and fine grit. If planted in a pot, plenty of grit or small stones should be heaped on top of the growing medium to prevent the fishes from stirring up the soil and so muddying the water.

Grown in a congenial environment, that is in a rich soil, a light position and with warmth, the stems of *H. zosterifolia* will grow so quickly that they will have to be pinched back at frequent intervals. Bits of stem may be used to stock other tanks, or given away to one's aquarist friends, for any piece of stem pinched off parent plants will soon take root and forge ahead if pressed into the compost.

A few stems, however, should always be permitted to grow up from the compost and lie along the surface of the water, for in summer these surface-hugging stems

become studded with pale-blue flowers, tiny flowers resembling those of *Aubrittia*.

H. zosterifolia is a good oxygenator, and its masses of fine roots help to keep the compost in a healthy condition.

About 15 species of *Heteranthera* are known to science, but *H. zosterifolia* and the rather rare *H. graminea* (water star-grass) with bronzy foliage appear to be the only two species available from dealers specialising in the less-common aquarium plants.

When the Toads came to Fiji

by BIDDY WORGER and E. L. KEMP

ABOUT 14 years ago toads were imported by the authorities in Fiji to eat the insect pests which were destroying the sugar cane and other crops. At first only a few pairs were let loose on the island. These were so valuable that large notices were erected warning motorists not to run over and kill them.

At first the Fijian children were scared of the strange new animals that hopped from place to place, splashed and swam in the puddles after heavy rain, stared at them with great round eyes, and stuck out long, pink tongues to catch the great fat beetles as they flew by. Their parents, however, caught the toads when no one was looking and cooked and ate them.

In spite of their popularity as food, in a few years the few precious pairs had increased to thousands. It is true that both dogs and cats chased them but when angry this species of toad sprays out a fluid from two glands at the top of its head in self-defence. This fluid causes such a dreadful irritation in an animal's mouth that they foam in their distress and sometimes fall into a fit and die. Many of the native children who played with the toads when they were first imported got this same fluid on to their hands and developed a skin infection.

By now there must be millions of toads in the Fiji Islands. They have certainly done their work of cleaning up and devouring the pests and insects very well but it seems they have grown a little tired of such a monotonous diet. At feeding time they can often be seen sitting round the family pet's plate of meat. If the cat or dog leaves a little piece on the plate there will be a sudden "plop" and there the biggest toad will be sitting in the middle of the dish, picking up morsels of meat with his funny little "hands" and stuffing them into his wide, gummy mouth. Having no teeth he will seem to be almost bursting as he forces the unchewed lump down his throat, while his eyes nearly pop out of his head with the effort of swallowing. When he has had as much as he can manage he will hop out of the plate and the next toad in the queue will take his place and go through the same performance until there is no meat left.

No dog or cat in Fiji will attempt to drive a toad from his plate of food. They have all learnt to treat them with respect. They know how they will retaliate and remember how the fluid sprayed at them can sting and burn the inside of their mouths. So the toad, after a light meal of beetle, moth and perhaps a mosquito or two, can turn his attention to real solid food—and woe betide the poor household pet who tries to drive him away!

THE AQUARIST

our readers



write

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

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

Painting Ponds

RECENTLY I saw a letter in the February issue of *The Aquarist* this year under the heading "Painting Ponds," and I wrote to the firm mentioned—E. Wood Ltd.

In view of the reply I received from this firm to my enquiry for paint suitable for treating ponds I felt I ought to write lest others might use some of their paint without enquiring about its suitability. Messrs. Wood's Technical Service Dept. intimate that their paint is normally used only for the interior surfaces of swimming pools. The final sentence of their letter reads: "Further, the use of Talbot Cement Seal should not be considered for garden pools as it is harmful to both fish and plant life."

E. C. HAMMOND,
Marlow, Bucks.

IN "Our Readers Write" of the February issue, a reader stated that the firm E. Wood, Ltd., produces a paint for water-proofing ponds, etc. I would like it made known that after extensive personal enquiries at the firm, I am assured that there is no such paint in production, all water-proof paints being dangerous to fishes because of the toxic effects of the chemicals used, apparently even after extended soakings. But, should the firm be proved wrong, both they, and I, would like to know.

B. J. BLACKETT,
London, S.E.18.

P.S.—Thank you, and the staff, for an excellent journal; only wish it was a "Weekly."

Keeping them Cool

OFTEN your articles provide interest by their contrast with our conditions here. I have fish living (some flourishing) some in indoor heated aquaria, whose climate is much the same the world over, some in ponds in a glass house whose temperature ranges from 60° to 85° F and some in outdoor ponds where the temperature can go as low as 35° and last Christmas rose to 95° F for about 5 days. Drastic conditions call for drastic measures, and my goldfish and mountain minnows, which mostly are very happy in the outside pond, liked nothing better than a dish full of ice cubes straight from the domestic refrigerator!

JOHN M. LEE,
South Australia.

This reached us during "flaming June"!—EDITOR.

Documentary Films

ALL your readers probably see documentary films from time to time. Not so many, perhaps, are aware that more than 600 new documentaries covering an encyclo-

paedic range of subjects are made available every year, and that most of them can be borrowed by any responsible organisation without charge—if it knows where to apply.

The "if" has to be emphasised. Although there are now some hundreds of industrial and institutional film libraries, there is not—as yet—a comprehensive directory which those who would be glad to borrow films can consult.

It is our aim to provide such a directory (in the August issue of this journal) and we hope, through your columns, to enlist your readers' help in making it complete. If they belong to organisations or firms with films to lend, will they please get in touch with us—unless they have already received one of our questionnaires? The directory should, incidentally, be helpful to readers interested in using informational films. If they care to apply, quoting this letter, a free copy will gladly be sent.

BRIAN WATKINSON,
Editor, *Film User*, 319, High Holborn,
London, W.C.1.

Cats and Ponds

I READ in your June issue of Mr. Boarder's cat-astrophies—with mixed feelings of some sympathy but more of amusement. I'm afraid my two cats will still retain their position of "Lords of the Household." One of them can from time to time win First Prize at the Cat Show. At the same time, they don't go out at night. Is Mr. Boarder quite sure the culprits are cats? Is he sure they are not seagulls which he has not been up early enough to catch? The early bird gets the early worm, or is it the half-dead worm?

E. R. MACHELL, Glasgow, C.5.

I HAVE read Mr. Boarder's column with interest, and with considerable feeling, since in my opinion he is far more to blame for his sorry tale than the cat in question. Cats are, and always will be, a natural hazard and all the taxing in the world will not alter their instincts.

I have an 800 gallons garden pool with some average good goldfish, one or two nice shubunkins and several fine golden orfe. I also have an 8 in. brick wall surround at pond level so that the fishes are completely beyond the reach of any cat.

In my opinion some form of protection for pond fishes is an obvious necessity, and it seems incredible that an expert judge of Mr. Boarder's standing could have been guilty of such folly in exposing fish which were, on his own admission, both unique and irreplaceable, to any danger from cats.

R. SIMPKINS, Swindon, Wilts.

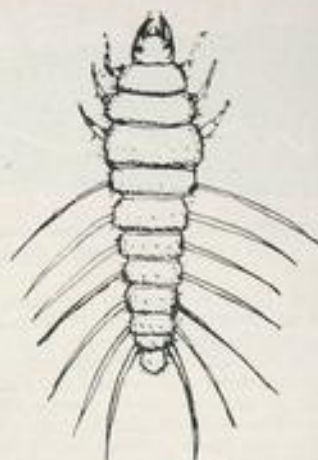
FRIENDS & FOES

No. 68

Water Beetles (continued)



Pupa of water beetle
Philydrus (magnified)



Larva of water beetle *Berosus*
(magnified)

MEMBERS of the genus *Berosus*, which is named after Beroe, a daughter of Oceanus, are somewhat rare, and it is not certain how many members constitute the whole genus. None so far discovered is larger than one-sixth of an inch. All are strong swimmers, the second and third pairs of legs being furnished with numerous swimming hairs. The body is much longer compared with its width than most other beetles in the Hydrophilidae family.

The larvae are particularly interesting, in the possession of very long gill filaments extending either side of each segment of the abdomen except the last one.

Genus *Philydrus*. There are seven known British species within this genus, ranging from a sixth of an inch to a fifth in size. The larvae do not swim but crawl around in submerged vegetation, aided by six pairs of false legs on the abdomen. The pupae emerge from an egg cocoon attached to floating leaves by the female beetle. When ready to pupate the larvae climb clear of the water, shed their larval skins and hang suspended from moss or leaves, head downward, like free-swinging chrysalids of a moth or butterfly.

All the species in the two genera mentioned above are likely to fall victims to marauding fishes.

C. E. C. Cole

Compiled by J. LAUGHLAND

1	2	3	4	5	6	7	8
			9				10
11		12				13	
	14			15			
16	17		18	19			
20			21		22		23
24		25		26	27		
28			29				30
			31				32
33	34	35		36		37	
		38				39	
40				41			

CLUES ACROSS

- Proverbially tight shellfish (5)
- Famous trail to alternative for golden pond fish (4)
- Fruit whose skin is candied (6)
- Les bites the confused guppy (8)
- Regret (3)
- Limited in an American way (3)
- What the most useful aquatic plants do in good light (6)
- What you aim to do at the fish show (3)
- Possesses (4)
- A doey may start trouble (3)
- You and I are nearly wet (2)
- Cycling body (1, 1, 1)
- Head and shoulders of toad, so to speak (2)
- Unusual wind in this country (1, 1)
- Belonging to a female (3)
- These fish are quite shocking (8, 4)
- The rest of the toad; see 24 Across. Our age (1, 1)
- P.T.O. less politely (2)
- Instrument for purifying tank water (6)
- Group of species of fishes or other living things (5)
- Scare about land (5)
- Mother leaves the manor (3)
- Genus of yellow water lilies (6)
- British wild animal subsisting mainly on fishes (5)

CLUES DOWN

- In aquarist's jargon, fancier of coldwater fishes (4, 5, 3)
- Such a fish (or other creature) lacks normal pigmentation (6)
- Lake Superior trout (8)
- The Herring Pond for example (5)
- Workers strike to get these; anglers strike after them (5)
- Short foot (2)
- Roving like a knight (6)
- To show contempt (5)
- Part of the trout is not in (3)
- but this is (2)
- Goldfish variety. Is it worshipped? (4)
- You and I (2)
- Red cent this way is easy of belief (7)
- Fish-keeping could be described as fish this (7)
- Caledonian, that's the spirit (6)
- Concocted (3)
- London postal district (1, 1)
- This kind of fish is less common (5)
- Call for aid (1, 1, 1)
- Come back, friend, and drink (3)
- Age of the genus (3)
- Is not the answer a gift? (3)

PICK YOUR ANSWER

- The sobriquet "Father of Ichthyologists" is sometimes given to: (a) Artedi, (b) Bloch, (c) Linné, (d) Pallas.
- Symphodon albus* (the pompadour fish) was named in: (a) 1820, (b) 1840, (c) 1860, (d) 1880.
- Which is the largest of the following species? (a) *Cichlasoma bicellatum*; (b) *C. casters*; (c) *C. insignis*; (d) *C. severum*.
- The genus *Berosus* is represented in Africa by about: (a) 50 species, (b) 100 species, (c) 150 species, (d) 200 species.
- Synodontis nigricentris* (the upside-down catfish) is native to: (a) Belgian Congo, (b) British Bechuanaland, (c) French Guinea, (d) Portuguese East Africa.
- The flowers of *Cardamine lyrata* are: (a) blue; (b) red; (c) white; (d) yellow.

G. F. H.

(Solutions on page 88)



from AQUARISTS' SOCIETIES

Monthly reports from Secretaries of aquarists' societies for inclusion on this page should reach the Editor by the 12th of the month preceding the month of publication.

THE Open Show of the Bristol Aquarist Society will be held on the 31st October to 1st November. There are 33 classes for cold-water and tropical. Entry forms and schedules are available from Mr. V. Capaldi, 18, Glen Park, St. George, Bristol.

A TALK on breeding cichlids was given by Mr. Leigh of Warrington, to the Widnes and District A.S. at the last meeting. There was also a quiz and table show with their visitors from Southport.

RECENTLY the Merseyside Aquarist Society had a visit from their new President, Mr. Eric Hardy, F.Z.S., the well known naturalist. He gave a most interesting talk about the various waters and ponds around Merseyside, and it was rather disturbing to his listeners to hear about the number of ponds that are being filled and the lack of concern in the matter by the local authorities. Mr. L. Connell gave a show of colour slides depicting the four seasons, which was very well done. At the last meeting the Plant competition resulted in a joint first between Mrs. W. Kelly and Mr. D. Hughes, third being Mr. L. Colvin. The Fish of the Month show for barbs resulted in a win for Mr. M. Connell who also took third place, the second position being filled by Mrs. W. Kelly.

THE Federation of Guppy Breeders' Societies is organising a Guppy Section at the Dagenham Town Show on the 12th and 13th July to be held in Central Park, Dagenham. This will be under F.G.B.S. Rules. The annual show this year is being held at Basingstoke on the 27th and 28th September.

THE forthcoming annual open show of the Blackpool and Fylde Aquatic Society will be held this year on Saturday, the 13th September, at the Waterloo Road Methodist Mission, South Shore, Blackpool. Schedules and entry forms may be obtained from Mr. R. W. Crook, 37, Lunedale Avenue, Blackpool.

AN exhibition of Reptiles was an added attraction at the show of Tropical and Coldwater Fish, organised recently by the Cambridge and District Aquarists' Society. Of the fish—Mrs. Meadows, a qualified London judge, said that they were of an exceptionally high standard, as, indeed, her allocation of points indicated. A tiger barb, owned by Mr. J. Palmer, which was the Best Fish in Show, and won both the Simpson Cup and the Morley Cup, scored a total of 92 points out of a possible 100. This fish would, undoubtedly have secured a top place in most of the larger shows throughout the country. Mr. Palmer was also successful with a double sword guppy, which won both the Guppy Cup and the Tadgell Cup for Livebearers. Mrs. Meadows, in commenting on that entry, said that it was one of the best of its class that she had ever seen.

Among other high class entries was a ticto barb, owned by Mr. C. P. Gibson, which only missed Best in Show by one point. A very colourful red-tailed black shark, entered by Mr. A. Amps. In the competition for the Founder's Trophy on aggregate of points over the year, Mr. Palmer now takes the lead with one point advantage over Mr. Amps.

In the Coldwater class there was a good entry of common goldfish. The Moyce Cup being won by Mr. F. Driver.

Full results were as follows: Moyce Cup, F. J. Driver (common goldfish); Morley Cup, Simpson Cup, J. Palmer (tiger barb); Guppy Cup, Tadgell Cup, Breeders' Cup, J. Palmer (double sword guppy); Fitzroy Cup, C. P. Gibson (C. amara); Pairs Cup, C. Holmes (roy barb). Class 1, Common Goldfish: 1, F. J. Driver; 2, C. Holmes; 3, F. J. Driver. Class 2, A.V. Livebearer: 1, J. Palmer; 2, C. Holmes; 3, J. Palmer. Class 3, Cichlids: 1, F. J. Driver; 2, H. G. Mansfield; 3, N. Radford. Class 4, Catfish or Loach: 1, C. P. Gibson; 2, A. W. Amps; 3, N. Radford. Class 5, Barbs: 1, J. Palmer; 2, C. P. Gibson; 3, R. Human. Class 6, A.O.V. Egg Layer: 1, A. W. Amps; 2, T. W. Isgrove; 3, A. Amps. Class 7, Pairs: 1, C. Holmes; 2, A. W. Amps; 3, R. Human.

THE Sheffield and District Aquarist Society recently held a slide show on Insect and Pond Life, and heard a talk on Reptiles by Mr. Lee. The Table Show for July is for Fancy Goldfish and the Table Show for August will be for Labyrinth Fish. The secretary's new address is: R. P. Middleton, 90, Old Park Road, Sheffield, 8.

THE result of the second competition of the North West London Group of Aquarists' Societies was as follows: Swordtails: 1, A. Farnden (Willesden); 2 and 3, R. Porter (Willesden); 4, T. Tapner (Hendon). Characins: 1, P. Tomkins (Independent); 2, A. Ballock (Hendon); 3, R. Skipper (Hendon); 4, E. R. Landau (Willesden). Labyrinths:

1, E. R. Landau (Willesden); 2, F. Tomkins (Independent); 3, E. R. Landau (Willesden); 4, J. V. Morrice (Hendon). Cichlids: 1, E. R. Landau (Willesden); 2 and 3, R. Fisher (Hendon); 4, H. Walters (Independent). Points gained: Willesden 20, Hendon 12, Independent 8. Total points to date: Hendon 25, Willesden 25, Independent 18, Arnold 8, Harrow 4.

During the judging Mr. B. Calrow (Hendon) gave an interesting talk on breeding egglayers. On Thursday, the 5th June, member clubs were made welcome by Hendon and District Aquatic Society to hear a talk given by Mr. D. B. McInerney, of McLynn's Aquarium, Ewhurst.

THE Burnley Aquarists' Society held their first Open Show and Exhibition for six years recently and there were 14 competing clubs. The winners were as follows: Guppies: 1, S. Taylor (Belle Vue); 2, A. E. Bloom (Salford); 3, H. Crowther (Colne). Plants: 1, Mrs. A. Morgan (Bolton); 2, J. H. Schofield (Colne); 3, Mrs. J. Whigham (Burnley). Mollies: 1, Revell (Salford); 2, J. Ashworth (Oldham); 3, Murphy (Colne). Swords: 1, Lewis (Burnley); 2, Alston (Merseyside); 3, A. E. Bloom (Salford). Large Barbs: 1, Hodgkiss (Burnley); 2, Mallinson (Colne); 3, Penigley (Burnley). Small Barbs: 1, J. H. Schofield (Colne); 2, Murphy (Colne); 3, A. Morgan (Bolton). Large Characins: 1, H. Loder (Burnley); 2, J. Mallinson (Colne); 3, Done (Blackpool). Small Characins: 1, Miss Jones (Burnley); 2, H. Loder (Burnley); 3, Horsman (Skipton). Fighters: 1, Crowther (Colne); 2, C. Whimsey (Blackburn); 3, Mrs. Loder (Burnley). Large Cichlids: 1, Penigley (Burnley); 2, C. Whimsey (Blackburn); 3, Miss Jones (Burnley). Dwarf Cichlids: 1, Done (Blackpool); 2, Mrs. A. R. Bloom (Salford); 3, A. Loder (Stretford). Anabantids: 1, A. Morgan (Bolton); 2, A. E. Bloom (Salford); 3, L. Kelly (Belle Vue). Cyprinodontidae: 1, D. E. Talbot (Bolton); 2, Harper (Belle Vue); 3, Emmott (Colne). Cat Fish: 1, Hodgkiss (Burnley); 2, Stockton (Oldham); 3, A. Morgan (Bolton). Loach: 1, R. Cunningham (Burnley); 2 and 3, Hodgkiss (Burnley). A.O.V.: 1, C. Bennett (Oldham); 2, A. Moss (Accrington); 3, W. Farrer (Blackburn). Cold-water: 1 and 2, H. Loder (Burnley); 3, J. W. Coupe (Belle Vue). Breeders Livebearers: 1, L. Kelly (Belle Vue); 2, S. Taylor (Belle Vue); 3, Connell (Merseyside). Egg Layers: 1, B. Done (Blackpool); 2, A. Moss (Accrington); 3, Connell (Merseyside). Individual furnished: 1, H. Loder (Burnley); 2, Mrs. Loder (Burnley); 3, B. Roe (Merseyside). Best Fish in the Show: H. Loder (Burnley). Phenacogrammus Interruptus. Best Egglayer: H. Loder (Burnley). Phenacogrammus Interruptus. Best Livebearer: Mrs. A. Morgan (Bolton), platy. The Whigham Shield for the Society with most points: Burnley 51, Colne 26, Belle Vue 18, Salford 15.

THE main item at the June meeting of the Bournemouth Aquarists' Club was a talk entitled "My experiences of breeding tropical fish" given by Mrs. W. Meadows—a talk fully enjoyed by everyone.

The annual competition for the Payne Memorial Trophy was held in May. This award of a silver rosebowl is given to the member who in the estimation of the competition judges has the best home furnished aquaria. The winner this year was Mr. E. Hillier with a total of 86½ points out of a possible 100.

AT the June meeting of the Bristol Aquarists' Society the speaker was Mr. P. H. Whiting, of Bristol University, his subject was "The other side of the glass" and he dealt with five senses of fish.

THE Mansfield and District Aquarists' Society has only one meeting in July. On the 14th there is to be a lecture on plants, their uses for decoration and for practical purposes, with specimens for examination.

Activities recently have included an outing to Leicester ("Boots Aquaria"), a cichlid table show, and a lecture on the same subject, and



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.

To obtain your badge send a postal order for 2s. together with the Aquarist's Badge Token cut from page x, to Aquarist's Badge, *The Aquarist*, The Butts, Half Acre, Brentford, Middlesex, and please specify which type of fitting you require.

more recently a "Brains Trust" to answer members' questions. A series of interesting questions prompted considerable discussion.

FEDERATION OF SCOTTISH AQUARIST SOCIETIES

Representatives of the Dundee Aquarium Society, Edinburgh Aquarist Society, Glenrothes and District Aquarist Society, Kirkcaldy and District Aquarist Society, Leven and District Aquarist Society and Perth Aquarist Club met at Perth on 18th May and decided to form the Federation of Scottish Aquarist Societies. Mr. Alexander Cross, 49, Ferry Road, Monifeth, Angus, was unanimously elected honorary secretary of the new Federation. A full report of the meeting has been sent to the secretaries of all known societies in Scotland. Any society secretary who has not yet received the report is requested to contact the Federation secretary. A further meeting and table show is to be held on the 7th September at the Club Rooms of the Edinburgh Aquarist Society, and further details regarding this will be announced later.

DATES for the annual show of the **Rugby and District Aquarists' Society** are 21st, 22nd and 23rd August. The show will be held at Percival Guildhouse, Rugby, and the secretary is Mr. E. F. Bennett, 109, Albert Street, Rugby.

At the recent annual general meeting of the **North of Scotland Aquarist Society** the following were elected to office for the forthcoming year: Mr. G. Robertson, president; Mr. C. Pine, Vice-president; and Mr. H. Wetherby, Int., secretary and treasurer. The address of Mr. H. Wetherby is 17, Aboyne Gardens, Kainhill, Aberdeen.

A TALK on Plant Growing by Mr. Dobbs and a Furnished Aquaria Competition have been among the recent events of the **Grimsby and Cleethorpes Aquarist Society**. Results of the Furnished Competition were as follows: Premier award, Mr. A. H. Marshall; Novice section, Mr. A. E. Parker; Junior trophy, Master P. Grifford.

IN their return match **Independent A.S.** beat **Hornsey A.S.** by 24 pts. to 24 pts., the first prize winners being Mr. E. Smith, Mr. K. Gould, Mrs. Joyce, Mr. F. Tomkins and Mr. L. Dare. **Independent A.S.** meet every Monday at the Islington Men's Evening Institute, Hornsey Road, London, N.8, at 8 p.m., and new members are always welcome.

A SUCCESSFUL club show was held by **Tottenham and District A.S.** at their new headquarters at Northumberland Arms, N.17. The best fish in the show award went to Mr. L. Clements with a magnificent *Barbus schwanofieldi*, and another feature of the show was the setting up of a marine tank by Mr. Clements and Mr. Cook. The hon. secretary is Mr. J. K. Hall, 8, College Road, Tottenham, London, N.17.

AN interesting talk on pondkeeping was given by Mr. O'Neill to the members of the **Kingston and District A.S.** Recently the club had the first leg of an inter-club table show with Streatham and this was won by Kingston. The return will be held on the 19th July.

RECENT activities of the **Bradford and District A.S.** have included a quiz against Leeds Society, a table show for carps and minnows, a trip to Chester, and a visit to Skipton open table show. The last event was judged by Mr. Loder of Burnley.

A VERY interesting and informative evening was spent by **Bath Aquarist Society** for their May meeting at the Bristol Zoological Aquarium. The party was kindly shown around by the curator, Mr. Vic Jones, who explained the set up of the large coldwater aquariums and the layout of the tropical section. A general description was given of each tank as the party

moved around the aquarium. The herpetological section was also visited.

The date for the annual show has been fixed for the 11th, 12th and 13th September, the show secretary being Mr. J. Wheeler, 53, Cameley Green, Twerton, Bath.

THIS year the **Three Counties Show** will be held at the Drill Hall, Penrith Road, Basingstoke, on the 4th, 5th and 6th September. Schedules can be obtained from Mr. R. Forrest-Jones, B.Sc., 5, Park Lane, Old Basing, Basingstoke.

THE classes to be decided at the tropical and coldwater table show of the **Guildford and District Aquarists' Club** are barbs, cunfish, livebearers, breeders' classes (egglayers and livebearers) and shubunkins. The date of the show is the 9th July.

THE last bulletin received from the **Nottingham and District Aquarists' Society** states that the society is now affiliated to the Federation of Northern Aquarium Societies. A new series of articles on plants for pond margins and surrounding areas has been commenced in the bulletin.

THE **Coventry Pool and Aquarium Society** programme has kept the committee rather busy lately. There has been a quiz, ably conducted by question master Mr. W. L. Mandeville, an annual outing to Queensborough Fisheries at Wraybury, a visit to Nuneston for an inter-town table show and quiz and a treasure hunt. The hon. secretary is Mr. F. Prescott, 3, Kings Grove, Coventry.

LAST month's meetings of the **Dunstable and District Aquarists' Society** covered a table show for shubunkins and mollies and also a quiz. There was also a check on the equipment for the annual show.

THE **Erith and District Aquarists' Society** visited McLynn's Aquarium recently. At the June meeting the members were "introduced" to a pH meter and instructed in its use by Mr. D. I. Bothwell, B.Sc.

The Society's membership is rising steadily and new members or visitors will always be welcomed. The hon. secretary is Mr. D. I. Bothwell, 46, Shinglewell Road, Erith, Kent.

THE GOLDFISH SOCIETY OF GREAT BRITAIN

Among those present at the June A.G.M. were Mr. K. A. M. Robertson, who had travelled down from Scotland, and Mr. S. J. Freeman, who had rejoined the Society. The Chairman, Capt. L. C. Betts, M.B.E., in his report, stated that memberships had increased to such an extent during the year that with the advent of the new ASLAS Group, the number would be approaching three figures. The Annual Goldfish Convention has been arranged for Saturday, 11th October, at Streatham Baths and details are to follow. Four technical papers have been distributed to members during the past year and a recording has been made of a talk given recently by the President, Mr. R. J. Affleck, M.Sc., M.R.S.T., on the B.B.C. Network Three Programme.

The President, in his report, said that more members are becoming used to the method of "hand spawning" and that it is expected to have a film available on this subject shortly. Effects of the new varieties of goldfish now being introduced into the country are now being felt within the Society, and some good strains are already being maintained by members. At the table show, Mr. A. T. Tagg won the "Bramblehead Trophy" with a 73 point fish.

"The prevention of disease in fish" was the subject of a talk by Mr. T. Funk. After stressing the need for "cleanliness," such as sterilisation of equipment, etc., and the use of non-furnished aquaria for the better control of fish, Mr. Funk urged members to feed their fish on *Daphnia*

from known cultures only. On reaching adult stage, the fish should receive a cleansing bath, and henceforth, should be fed only with food which had not been in contact with water.

The next general meeting is to take place on Saturday, 13th September, at the Feathers Hotel, Broadway, London, W.1, at 2.45 p.m.

TO aid the breeding programme **Brockley and District Breeders Circle** (Aquaria Society) now holds table shows at which fish are redistributed according to judge's recommendations. After judging the exhibits are paired off—so that an entrant usually takes home fish quite different from those he brought along. They may be better fish, they may be worse—but whatever the individual gains or losses he knows that the stock held by the group is being improved. Progeny are judged at a later date and redistribution can take place if desired.

Two members of the group are also members of the South London Field Studies Society and take advantage of the fact to benefit their aquarist friends. Rocks (some carried down in rockbags from a fairly stiff mountain climb) are being collected and also photographed in their natural state, as are rock pool creatures, aquatic plants, etc.

AFTER experiencing some inactivity, **Lichfield and Tamworth Aquarist Society** are looking forward to a busy year. With a quiz programme and a very successful table show already having been held, a public show is now being organised for September.

New members are welcomed and a new batch of officers have been elected. Chairman, Mr. E. R. Wood; treasurer, Mr. J. Saunders. The secretary is Mr. H. Thomson, 11, Lyn Avenue, Lichfield, Staffs. Telephone: Lichfield 3439.

BGG LAYERS (single fish) varied species, were selected for the third Table Show of the **Guest Keen and Nettelfolds Pond and Aquarium Society**. The entries were very ably judged by Mr. A. Judge, and the principal award winner was Mr. H. Fellows, who won the first, second and third prizes.

SECRETARY CHANGES

CHANGES of secretaries and addresses have been reported from the following societies—**Accrington and District Aquarist Society** (Miss F. Bentham, "Brookside," Hodson Street, Accrington); **Merseyside Aquarist Society** (D. E. Hughes, 11, Deyshbrook Lane, Liverpool, 12); **Scarbridge and District Aquarist Society** (Kenneth R. James, "Sunray," Albert Street, Lye, Worcs.).

Crossword Solution

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

PICK YOUR ANSWER (Solutions)

1 (a). 2 (b). 3 (d). 4 (d). 5 (a). 6 (c)