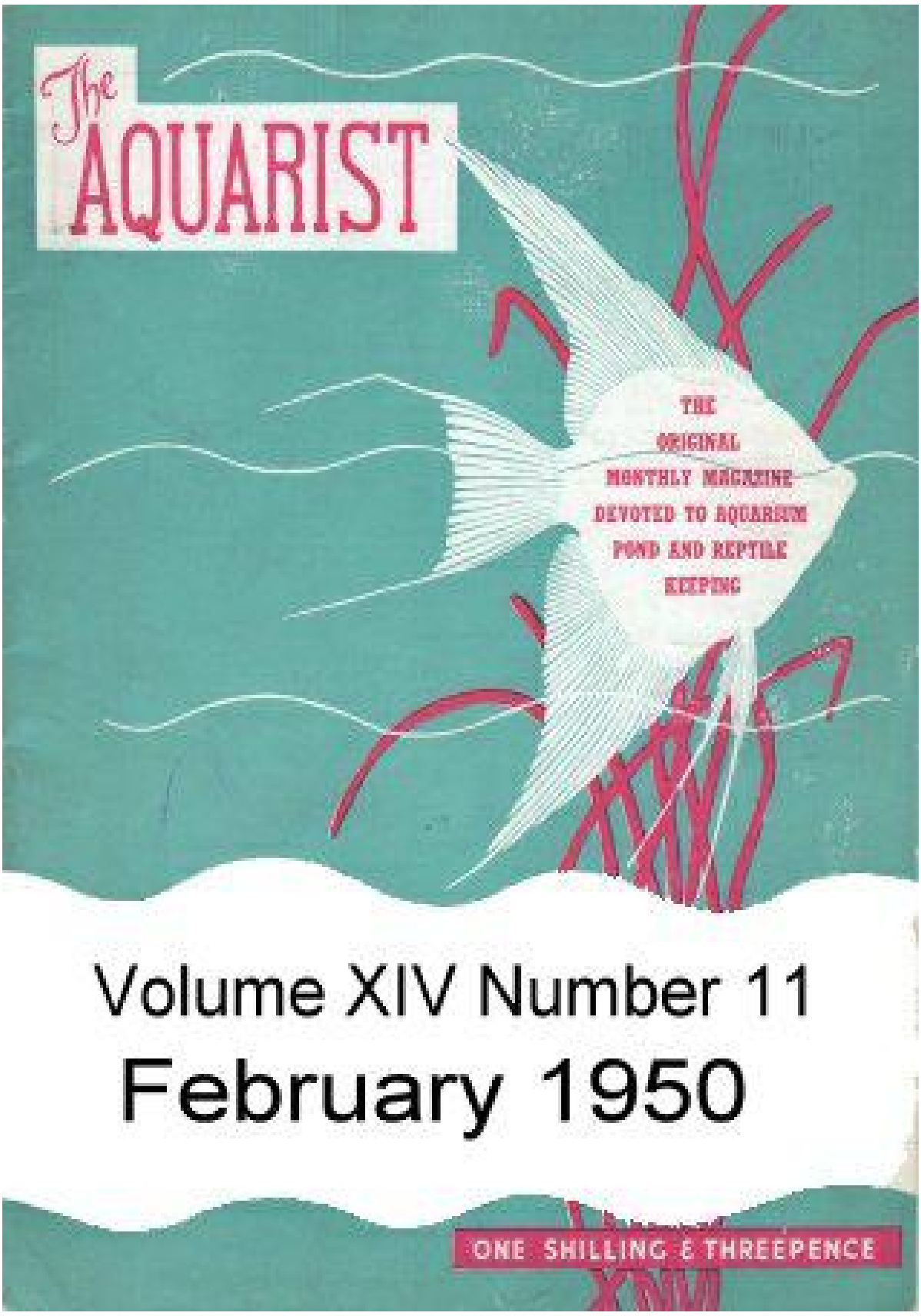

Volume XIV Number 11

February 1950

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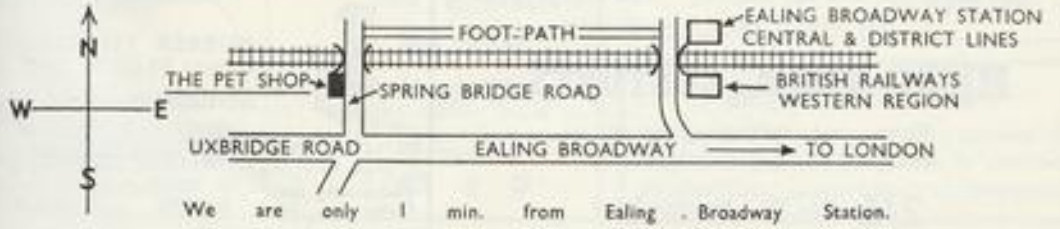

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The AQUARIST
AND PONDKEEPER

Founded in 1924 as "The Amateur Aquarist"

PUBLISHED MONTHLY | VOL. XIV No. 11 | FEBRUARY 1950

All communications to :
The Editor, *The Aquarist*,
The Butts, Half Acre,
Brentford, Middlesex.

In every case the name and address of the writer must be given.

Photo: Andrey Andersson

A shubunkin having only one eye (sightless side towards the camera). Problems of the one-eyed fish are discussed on page 262

Editorial

HISTORY has been made. February 1950 must go down in the annals of aquarium-keeping as a month in which claims for recognition by the humblest and all too often the most despised of our aquarium inhabitants, have been given full consideration. If the guppies in your aquarium appear to be wearing rather self-satisfied looks of late then you may be sure that they are aware of February's momentous event.

It is always a pleasure to record a triumph for the under-dog, if this term may be applied to the guppy, and for that reason in particular we wish to enlarge on the cause of guppy complacency. This month, for the first time ever, the guppy was the subject of a leading article in a national daily paper—the *News Chronicle*. Not that the beauty and variety of his shape and colours, or his great procreative ability, or yet the strangeness of his name (though this did receive mention) earned the guppy this high place in editorial regard. It was his activities —more potential than realisable, we fear—as a dollar-earner for Britain that elevated *Lebistes* to leader column attention.

Inquiries have been received from the United States —some of them at this office, about the possibility of purchasing some of our British-bred guppies. Before readers begin parcelling up their surplus stocks we must add that only the best guppies qualify, those reaching high standards in coloration and finnage. But where are these to be found ?—the British aquarist may well ask. For it is due only to the activities of a mere handful of specialists in guppy breeding that our best guppies have attracted the attention of American aquarists at all.

One New York importer is reported to have offered eighteen shillings a pair for British guppies. If there were more enthusiastic specialists doubtless this country could supply all that he could take, but as things are it would cost him at least double the price named to buy the few pairs that are available. The reason for our inability to supply high standard guppies in numbers is the same one that explains American aquarists' failure

to provide similar fishes from within their own ranks: there are too few experienced aquarists in both countries who concentrate on the breeding and rearing of good strains of single aquarium species.

It is a regrettable fact that many aquarists are tending more and more to try and buy first-class fishes ready made, rather than getting down to the job of breeding them for themselves. We think that leading specialist breeders in this country will fully endorse this statement. All too often they are approached by other aquarists who expect to be supplied with the best of their stocks at prices little greater than those asked for common shop specimens. We know at least one breeder whose well-advised if curt reply is " Breed 'em yourself !"

And that is the recommendation which this saga of the unobtrusive dollar-earning guppy prompts us to make to serious aquarists. No matter the species to which you are attracted—specialise in breeding those fishes and let us all build up stocks, independently of imports, that the world will want to buy.

* * *

The " scientific feeding " method for fishes, on which we gave some words of warning a few months back, is being given support in quarters from which one has the right to expect a less credulous approach. The whole business is far worse than we had feared. Articles have appeared which for all their confusing mumbo jumbo cannot hope to conceal the lack of scientific support for the cause that is being championed.

Enzyme preparations as well as hormones have entered the field. Now, there is nothing mystical about either of these biological materials. As we stated in a previous Editorial the effects of sex hormones, in particular, on animals have been and still are the subjects of considerable research. Enzymes have attracted scientific workers since the first positive identification of one of their legion in 1835, and their actions have been seen by man unknowingly in cheese making and alcoholic fermentation processes since early times.

But we would like to know a lot more about the evidence for some of the claims that are now being made. Where is the scientific evidence for the efficacy of enzymes given to a fish by mouth as treatment for indigestion and, even more strangely, for egg-binding? What experiments have been done? Which scientific journal has published results of such work? How has the activity of these most fickle compounds been preserved, in forms suitable for administration in fish food?—biochemists will want to know.

And to what avail is all this? We are in favour of the experimental approach to fish-keeping by aquarists. We give full support to any work that has the aim of advancing our knowledge of aquarium life. We are acutely aware of the need of greater knowledge of the nutrition of our aquarium fishes, particularly with regard to possible vitamin requirements. But the preparations now being placed on the market are not sold to further knowledge or for experimental work; they are offered with vague claims to work wonders.

We suspect that someone thinks the British aquarium hobby a likely source of revenue, and that British aquarists are particularly gullible over scientific matters. Nothing could be further from the truth. *The Aquarist* will continue to expose any attempts to make our interests a profitable market for useless or dangerous patent products.

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QUERIES

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

CONTRIBUTIONS

The Editor welcomes the opportunity of considering original contributions on all branches of the hobby and its allied interests, authentic breeding records, personal experiences, and photographs.

Articles: Should be clearly written or typed on one side of the paper only.

Illustrations: Should be on plain white paper or card and finished in Indian ink.

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

Correspondence with intending contributors is welcomed.

Post-Mortem Examination of Fishes :

W. Harold Cotton, F.Z.S., 39, Brook Lane, King's Heath, Birmingham, 14.

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

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

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

BREEDING THE RIVULUS

by ——— P. A. SHARK

I HAVE not heard of many aquarists keeping this marvellous little fish. This is really a pity, because it is worth a place in any exotic fish collection. It is easily fed, requires no special attention (except that its tank should always be kept covered—it is a great jumper), and it breeds rather easily; last but not least, it is very pretty, particularly the male fish.

I think I will omit a description of the colours since this can be read in any book on the subject, and in any case a written description can hardly do it justice.

Rivulus cylindraceus prefers a well planted tank in a not too sunny situation, with shallow water (up to ten inches depth). For breeding, best results are obtained by placing two females with one male; this set-up constitutes a breeding "battery" for one season.

I have always bred them in a ten-gallon community tank in which I also have *Panchax lineatus*, *Epiplatys chaperi* and *Barbus barbi*. I place a mass of floating plants (*Riccia* and *Wolffia*) in the darkest corner of the tank. The temperature is kept at 77°F, and the tank, situated in an aquarium cupboard, receives light from a 15-watt bulb as well as daylight penetrating the front side.

Females First

The females are placed in the tank a couple of days before the male, and breeding display occurs soon after his introduction. The females are coy at first, but the male soon drives them into the mass of *Riccia*, where with the fish in a side by side position, the single eggs are dropped and fertilized.

The morning after the first spawning of my fish I inspected the *Riccia* and found twelve eggs of rather large size. These I put into a jam jar of water and placed this in my aquarium cupboard in the dark, at a constant temperature of 80°F. For a period of six days I inspected the *Riccia* every morning and the total number of eggs transferred to the jam jar amounted to about 60 on the sixth day.

L. C. Mandeville

Epiplatys chaperi (upper fish is a male)

Rivulus cylindraceus

The egg membrane in this species is rather tough, and although every egg passed through my fingers on transfer to the jar, not a single one became white (a sign of the death of an egg).

For the next fortnight I had pleasure in watching the development of the fry; for the first five days nothing could be seen with the naked eye, but the microscope showed the formation of cells and the flow of life in them. The following days showed a steady progress and on the twelfth day the young fish were visible through the membrane, occasionally moving. On the morning of the fifteenth day the first little *Rivulus* made its entrance into the world; the others followed during the next eight days. Naturally these did not all fit into the jam jar, although it was a fairly big one. They were transferred to a small tank of 2½ gallons capacity; water level was about five inches and mild aeration was supplied.

Growth on brine shrimps as food was rapid, and the length of eight millimetres at birth was soon doubled. With increasing size of the fish I transferred them to a bigger tank, in which they grew to the size of their parents and were soon themselves breeding. Since the time that I first bred the *Rivulus*, a further 500 have followed, and at the present time about 60 eggs are in the jar again, and I expect the first hatching to happen within the next two days.

The water used in the breeding tank was drawn direct from the tap of the water supply for our town, and the pH reading was 7.1. The parent fish were fed on live foods only (*Daphnia*, white worms, mosquito larvae), for which they show a good appetite.

Other Hatchings

I have hatched *Panchax lineatus*, as well as *Epiplatys chaperi*, in the same way, although the results were not so good as with *Rivulus*. If it is required to breed these *Panchax* varieties in larger quantities they should be placed in a tank with a bundle of *Riccia* and left there for about a week. They should then be transferred to a second similar tank for the same period and so on until it is obvious that the stock of eggs of the female is exhausted.

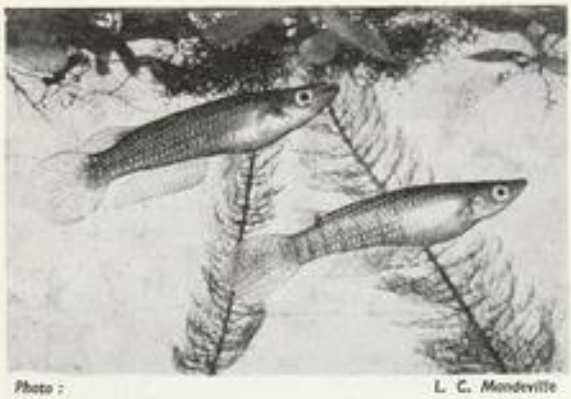


Photo : L. C. Mondeville

Panchax lineatus (upper fish is a male)

The tanks containing the eggs should be covered with paper, since strong light, and artificial light, does harm to the eggs. It takes 10-12 days for the fry to hatch, when they can immediately be fed with brine shrimps or other live food of equivalent size.

It is advisable to sort the fry according to their size now and again, because the dwarfs, or the fish hatched from later laid eggs are naturally smaller than those from earlier eggs. If this is not done you can be sure that the big ones will soon dispose of the small ones, for the question interesting the *Panchax* is one, according to a version of the well-known Shakespearian phrase—to swallow or not to swallow !

The author has kindly offered to answer any queries from readers on these topics. Letters should be addressed c/o the Editor.

Useful Glass Cover

A glass cover on an aquarium provides several advantages besides the more obvious ones of preventing the fishes leaping to their deaths on the floor, or acting as a buffer against little Bertie's bouncing ball.

In the winter-time, a glass cover helps to conserve the heat. This, as the aquarist will realise, helps to guard against a rapid fluctuation of temperature if the aquarium is one of those not possessed of thermostatic control.

Moreover, this conservation of heat saves the aquarist some money. For we all know that heating even one tank can prove quite an expensive luxury these days.

A cover also collects drops of moisture on its underside ; every now and again these drops of moisture fall back into the aquarium. In doing this they perform two very useful services. One is that their fall breaks the surface film and helps to improve the circulation of the water around the tank. The other is that they convey small amounts of atmospheric air into the water. Both actions assist in the aeration of the water.

Floating plants are also rather particular about the amount of moisture that their foliage is in contact with when the top light is warm and bright. If the atmosphere is not sufficiently humid the plants' leaves soon turn brown and curl up. But a glass cover creates just the sort of steamy heat to stimulate the top plants into their most luxuriant growth.

J. H.

Concerning the Water-Garde

by——H. A. DAY

VERY few gardens possess a bed of lily-of-the-valle that gives its full quota of blooms, and the flowe available are usually very few compared with th number of plants. So often, too, one sees lily beds that a mostly leaves with a flower here and there, as though the presence is accidental !

This state of affairs need not occur ; you can have a be covered with flowers of good size upon long stems, and th can be achieved in the average water garden, or in fact, i any damp or shady garden. The lily-of-the-valley (*Con valleria*) is a native of damp woods, and it often grows i very shady conditions. This plant grows wild in Englis woods, although the wildling is smaller than the cultivate plant ; but the fact that it grows in moist woods shows tha its garden home should be a more or less damp spot—i fact, the water garden ! But this lovely flower will no thrive in wet, muddy soil, and so only the damp parts of th water garden should be selected for its home. A littl colony should be founded at a place that is both shady an moist, and where the earth is somewhat bare. If plantec around a shrub or small tree, the ground must be made rich by manuring and kept in a state that allows quick wate drainage from the surface foot of soil. Many a vacant spo could be brightened up by planting lilies-of-the-valley.

When you plant *Convalleria*, see that they are plantec deeply enough for the soil to come up to the top of th crowns ; that is, the point from which the leaves spring If the ground is dry, a good watering through a rosed ca will settle the soil round the roots. Later on, when th foliage begins to die away, a light mulch of decayed manur spread between the rows will protect the crowns through th winter, and this will also help to strengthen them. A bec of lily-of-the-valley treated in this way will stand for severa years before it again gets overcrowded, and even next sprin you will have better results, which will keep on improvin year after year, especially if you give the bed an annua dressing of good soil—loam, leaf mould or peat and a littl sand is good.

* * * *

There may be some misgivings on the part of the posses sor of a water garden about the action of frost upon plant growing in the moist ground, seeing that such ground i more liable to become frost-bound than a site which is dry While it is true that most water plants will stand a consider able amount of frost without being killed outright, it is jus as well to take certain precautions to protect one's plant from the attentions of Jack Frost where possible. On general action could be the temporary withdrawal of wate supplies from the soil of the garden, either by drainage o the stoppage of any flow of water into the garden from pon or stream.

However, a good way of preventing frost-bite in the cas of a treasured plant is to place over it a small cloche, or t tilt a couple of pieces of glass over to form a tent. Neve attempt to thaw a frozen plant with warm water, and alway protect a frozen plant from the sun's rays.

COLDWATER FISH-KEEPING

by A. BOARDER

What to keep, coldwater or tropical aquaria? —that is an old controversy. Beginners deciding to start fishkeeping with the coldwater species or tropical enthusiasts who are extending their interests will find this article of great help. Now is the time to set up the new coldwater tank, says the author.

TOWARDS the end of February is undoubtedly the best time to set up the coldwater tank. For several reasons you will stand a greater chance of success now than if you wait until later on in the year. One of the chief reasons is that the sun has not yet gained too much power and so there is less tendency for the water to become green and unsightly. The main cause for the greening up of the tank is exposure of the water to too much sunlight, which encourages the growth of the tiny plants known as algae. These will not form or grow unless there is plenty of light and so, to prevent growth, one has only to exclude much of the bright light and the tank will keep quite clear.

I will describe what I consider to be the best method of setting up a coldwater tank. First of all, see that the tank is thoroughly cleaned and washed out with a strong solution of permanganate of potash. Then obtain some coarse sand, and I mean *coarse*; silver sand is no good for this job. Place the sand fairly thickly at the back of the tank and run it down to half an inch deep at the front, so that only the surface of the sand is visible from the front glass. It is a good plan to sterilise the sand by soaking it, after washing, in the solution recommended for washing the tank. For beginners, I do not think that any garden soil need be used. Now get some well weathered rock from a nurseryman and scrub this well. See that there are no sharp points or edges on the rocks and do not have too many. Remember that the more rock you use the less room is there for the fishes to swim in. Try to arrange the rocks as artistically as possible and, for goodness sake, don't place one large rock exactly in the centre of the tank; it will look awful if you do.

Setting-up Technique

You should bear in mind that you are trying to set up the tank to look like a section of a pool and the more natural you can make it look the more pleasing will the ultimate effect be. See that the bottoms of the rocks are buried in the sand so that no uneaten food can find its way underneath and so cause trouble. If your tank is about twenty-four inches long, you will be able to use three rocks of decreasing sizes, so that if you place the largest piece on one side you can arrange the smaller piece next and then the smallest piece a little farther away. This will make the arrangment look more natural. Take plenty of time to arrange the rocks in the best way, as they may remain in this same position for years. It is now advisable to run in a little water. This can be tap water and, if you have a hot water system, you will find that it is an advantage to run the water from the hot tap—you can let it cool before using. This will ensure that much of the lime and chlorine has been removed. Place a thin piece of board or a sheet of paper over the sand when you pour the water in so that the sand is not disturbed. Run about four inches of water in the tank and then start to plant the water plants.

If you can obtain any plants which have roots use these in preference to unrooted cuttings. If some mulm adheres to the roots this will be an added advantage, so don't wash it off. Push the roots into the sand, or you can cover small roots with a stone. The rooted plants will be better able to cope with the waste products from the fish than would unrooted ones. Many freshly set up tanks do not succeed because the plants used have no roots and start to decay before they can get going. Arrange the plants so that the larger ones are at the back of the tank and try to cover the two back corners. Place the smaller plants towards the middle of the tank and almost cover the ends. Do not plant large water weeds in front of the rocks or they won't be seen and might as well have been left out. From my own experience, the best water plant for the cold water tank is *Vallisneria spiralis* var. *torta*. I have had this plant growing in my tanks since they were set up and I am very well satisfied with it. It is still healthy, growing, and has had hardly any attention at all. For the back corners you may use one or two *Sagittarias*.

Egeria densa is another plant which will be quite useful as it is a good oxygenator. It is inclined to run up spindly to the surface and then wind about round the top but an occasional trimming will keep it well within bounds. Small bunches of *Ceratophyllum* (hornwort) may be attached to a piece of lead and sunk in position. This weed does not make any roots but obtains its nourishment from the leaves and stems. Hair grass does very well in the cold tank; it is not a quick grower but, once it gets established, it will send out runners which look very attractive. My pieces of hair grass are growing very well and never seem to want any attention. *Ludwigia* will also do fairly well in the tank but place it where it will get the maximum amount of light, otherwise it will get too spindly. *Elodea crispa* is also a very good plant, but this too requires occasional pruning, as it has a tendency to run "leggy." One of the best small plants is the *Fontinalis* or willow moss. If you can get a piece of this attached to a stone (this is how it usually grows) you will find that the stone with the plant can be removed from the tank at intervals for washing. This plant appears to attract a great deal of the mulm and impurities in the tank to its leaves and if placed under the tap now and again it will keep nice and green.

Aquarium Maintenance

When you have arranged the plants to your satisfaction you may add some more water. Use the board or paper as before so that as little as possible is disturbed. Once there is more water in the tank you can get a better picture of the whole set up and if anything requires moving do it now before you put any fish in. The introduction of the fish will depend on the water plants; if they had good roots then there is nothing to prevent you from putting in the fishes. On the other hand, if the plants were unrooted cuttings it will be better to wait about a fortnight before stocking with fishes. The type of fishes must be left to each one's own individual taste but if you want to succeed do not over-stock.

Recommended for the coldwater aquarium is Fontinalis, the willow moss. On the left is F. antipyretica, and right, F. gracilis

It is much easier to keep three or four small fishes in a twenty-four inch tank than to try to have eight or more in such a crowded condition that failure is certain before very long. I can assure you that you will never keep too many fishes healthy in any tank, so don't be greedy. An over-crowded tank never looks well and is sure to go wrong before long. For a tank 24 ins. by 12 ins. by 15 ins., I consider that six fishes which are no more than two inches in length over all are sufficient. For a beginner, I would advise only four such fishes for a start.

If you are able to do so, choose a position for the tank so that one end only is close to a window. I know that the plants will grow better with plenty of light but so will the algae, and the water will soon become green. Any lack of natural light can be made up with artificial lighting. My own tanks have two 25-watt lamps over each and these are used occasionally on dark or short days. In the winter the glass at the window end can be kept clear by scraping with a razor blade but in the summer it is as well to leave it to green up so that some of the sunlight is then kept out. Never clean the back or other end of the tank. The front will require scraping about once a week, and not so often in the winter.

Providing that there is not too much direct sunlight on the tank you will find that the water will keep fairly clear as long as you do not over-feed the fishes. You can rest assured that ninety per cent of the troubles which may arise are caused by over-feeding. There are no " ifs " or "buts" about this. As long as you do not give the fishes any dried foods the water will remain fresh, but start giving that tiny bit too much food and the whole tank will cloud up and smell in no time. It is practically impossible to say how much food should be given, as so much depends on the type and size of the fishes. The fish will browse on the water plants and get some sustenance from them and from the water, and you will be surprised how long you can keep the fishes healthy without adding any food at all to the tank. Anyone can keep their tank clear as long as it does not get too much sunlight and as long as the fishes are not over-fed. When you do feed with any dried food see that you only give the tiniest bit at a time so that it is all cleared up straight away. Most types of fishes can only dispose of a little food at a time and if you give too much it is not long before the extra food turns foul and the water becomes polluted.

Feeding is an Art

If you can learn the art of knowing when to feed and when not to feed, you have mastered much of the art of fish keeping. Half the ills that may attack the fishes can be avoided by keeping the tanks and so the fishes healthy. Prevention is so much better than cure and I can assure you that a healthy tank is practically no trouble at all to maintain.

After the original setting up all that is required is a weekly servicing of the tank. First of all, scrape the front glass with a razor blade on a stick or similiar object. Then siphon along the front bottom of the tank so that the mulm is picked up. Do not worry about the mulm that washes away behind the rocks, this will be utilised by the water plants, and so should not be removed. You will find that to pick up most of the mulm from the front of the tank the siphon will take away a gallon or two of water. This should be replaced by fresh tap water until the top of the water is just above the lower edge of the angle iron of the tank. If any leaves are dead they should be removed, and if any plant needs replanting do this at once. You will find that about half an hour a week is all that is required to keep the tank in good order. In very hot or thundery weather I advise the changing of a couple of gallons of water from the tank, as the warmer the water the less oxygen will it hold.

I have left the question of water snails for your own answer; personally I would not think of doing without them. I am not referring to a breeding tank where the snails would possibly eat the eggs, but to the ornamental tank in the house. I recommend about half a dozen *Planorbis* snails—the red ones are most attractive. These snails will not eat the healthy water plants but exist entirely on decaying vegetable matter and the surplus fish food that you put in the tank. Do not use *Limnæa stagnalis* snails as these will eat your plants, decaying or not.

Selecting the Fishes

If you can get one or two small green tench for the tank you will be very fortunate, as they are hardy and are very good scavengers. Any of the goldfish types are suitable for the indoor tank but if you are new at the hobby, get your hand in with some common fish instead of being too ambitious and starting with moors or veiltails. Common goldfishes, shubunkins or fantails are the best for a start and then when you can keep these healthy you may try the other types. Small bleak do very well indeed as long as you keep the top of the tank covered. Bleak are fine jumpers and will soon be out of the tank if you are not careful. Small rudd, golden or silver, are suitable but it is as well if the novice leaves the golden orfe alone unless they are very small; as a matter of fact, you are not likely to succeed with any type of fishes if they are too large. I like to use young sters of the first year and then put them outside in the pond in May. Then fresh youngsters are put in the tank so that I have only young fishes in the tank at any time.

There are many little tips that you can pick up as you continue with the hobby, but rest assured that it is the feeding problem which is the most important, and for goodness sake don't think that your fish will die overnight if they are not fed every day. You could leave them unfed in their tank for six months and they would still be alive and healthy.

IAN HARMAN *describes*

THE DELIGHTFUL DANIOS

(with photographs by L. C. MANDEVILLE)

THE danios are among the most popular of tropicals, and have a special appeal to the beginner, being easy to manage and breed, and excellent community fishes. They are sociable by nature, and in their general habits resemble the familiar minnow of our streams, being just as ready to form a " school " in the aquarium. A small shoal of danios makes a most attractive sight, but one rarely sees such a display, other than in the larger dealer's tanks.

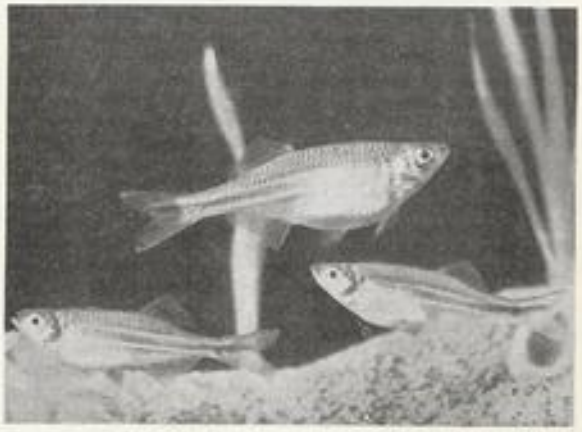
The danios are members of the great carp family (Cyprinidae), and are extremely common in suitable waters in India and Burma, from whence they were first brought over as aquarium specimens some thirty or forty years ago. Since that time there have been many fashions and favourites in fish from many lands, but the modest little danios have never fallen from the high position they still retain. They have the great advantage of being hardy in constitution, not at all prone to disease, and inexpensive to buy, even at to-day's prices, ranging from half-a-crown to about seven-and-six.

The Pearl Danio

Perhaps the favourite of the danios is the pearl danio, formerly known as the opalescent fish, which is quite descriptive of its appearance. *Brachydanio albolineatus*, as it is scientifically termed, is a small fish, rarely exceeding two inches when full grown, and though it has no clearly defined markings, is a most attractively-hued species. Its movements are as important as its colours, for it is seen at its best as it darts hither and thither about the tank ; at such times the mother-of-pearl-coloured body fairly flashes and scintillates with every twist and turn. Its shape is also very attractive, being long and slim in the body, yet nicely rounded and proportioned.

The colours are delicate pastel shades of pink, purple, blue, and light green, with the pink predominating as a kind of flush. There is a light red stripe from the fork of the tail to about half the length of the body along the sides. On the lower lips are small barbels, characteristic of the carp family. The pearl danio is quite easy to sex since the body of the female is distinctively shaped, being longer and deeper.

A pair of spotted danios, about natural size. The male is the lower fish



The largest of the danios is Danio malabaricus. A female (above) and two males are shown in this photograph

The Giant Danio

The giant danio (*D. malabaricus*) is the largest of the group, and mature specimens may reach four inches in length. The main pattern is two blue horizontal bars preceded by a few short vertical lines behind the gills. The fins are slightly tinged with red, especially in fish in breeding condition. Except that the male is somewhat more slender and perhaps a little redder about the fins, there is not much difference between the sexes. The giant danio is not generally easy to breed, and needs considerably more space than the others of the group. Unlike the rest of the danios, the giant species lays slightly adhesive eggs, so that plenty of plants are needed for successful spawning to take place. The number of eggs laid is between 100-300, and they hatch in 40-60 hours, according to the temperature of the water. For spawning, the water temperature should be not less than 75° F.

The Spotted Danio

The spotted danio (*D. nigrofasciatus*) is a very pretty little fish of small size, rarely exceeding one and a quarter inches, but it does not seem to be at all common nowadays. In colour it is olive above, paler below, with a pink band, bordered below and above with prussian blue, and extending from behind the gill covers to the tail. Below this there are a number of dark spots. The ventral region is yellowish. It is said that during spawning the female lays her eggs while balanced in a vertical position among the plants, the male being similarly positioned. The eggs are

dropped during a partial embrace. The spotted danio is less hardy than its relatives, and the water temperature should not normally be less than 70° F., and about 80° F. for spawning.

Breeding the Danios

To breed danios one has to protect the eggs and fry from the cannibalistic tendencies of the parents. Since, with the exception of the giant danio, these fish lay loose, non-adhesive eggs, this is not particularly difficult.

A tank which is longer than it is wide or high is the best type to use. Cover the bottom with round pebbles about three deep, so as to make numerous crannies down which the eggs can drop out of sight. Put in some strands of *Cabomba*, *Myriophyllum*, or other aquatics which will grow without roots, and stand the tank in a sunny spot. Select a good pair of fish and put them in the tank, divided with a glass partition, for three days. If preferred, two males can be run with one female. When the glass is raised the males should soon begin to butt the female in the sides with their heads, causing her to drop eggs, a few at a time. The males drop their fertilising milt over these while careering about in a wild manner. After a few hours, the fish should all be removed, otherwise they will start searching for and eating the eggs. Remove or shade the tank from the sun now, otherwise fungus will spoil the eggs. At 80° F. the eggs should hatch in three days, and twenty-four hours later Infusoria should be added, and then dust-fine dry foods.

The normal foods of adult danios should be prepared fish foods of medium grade, and live foods.

Furnished Aquaria

by G. F. HERVEY

THE method of judging furnished aquaria is fundamentally wrong, and the present judges are not the right people for the job. Having made that sweeping statement I must attempt to justify it. To do this, let me record an incident that occurred many years ago. A world-famous artist painted a landscape with some cows in the foreground. When it was exhibited it was unanimously acclaimed by the critics as " The Picture of the Year "; one day a man entered the gallery where it was being shown, took one look at it, and burst into laughter. By chance, the artist was standing nearby.

" You seem to think there is something amusing about my picture," he said coldly. " Let me tell you that this picture has been praised by the greatest critics of the day. What do *you* know about art ? "

" Nothing " the man replied. " But I'm a farmer, and I've yet to see cows get up fore-legs first."

Frank Buckland, in his *Natural History of British Fishes* (1830), reveals much the same sort of Philistinism towards art. He writes : " I was highly amused, not very long ago, to observe that an artist had painted a scene supposed to have taken place at Pompeii, in which goldfish were represented as swimming about in a glass globe. How could the inhabitants of Pompeii, in the year A.D. 79, have possibly known anything about China ? " They could, but let that pass. The point is that technical errors of this nature do not detract from a work of art. Walter Scott is not to be ridiculed because in *Kenilworth* he quotes from the *Mid summer Night's Dream*, in a scene dated several years befor the writing of that play. Dante's *Inferno* is none the wors because the poet introduces pagan mythology into th Christian hell. Shakespeare is no less the world's greate dramatist because there is a reference to striking clocks i *Julius Caesar*, and many other anachronisms in his play All art is full of technical errors and anachronisms, but the are of no great importance, and do not detract from th artistic merit of the whole.

The man who sets out to paint a picture should n attempt to hold the mirror up to nature. If his aim is t record a scene exactly as he sees it, then he would do bett to carry a camera than a paint-box. The true arti selects. If a telegraph-pole or modern council cotta spoils what is otherwise a good landscape, he is justified i omitting it from his canvas. If he can improve his compo sition by introducing a tree where no tree grows, he justified in painting one in.

Now, I submit that precisely the same is true of th furnished aquarium. The notion that an aquarium shoul mirror a natural stretch of water is a fallacy. For on thing, man cannot re-create nature. For another thing, th beds of most ponds and streams are pretty filthy. Thus, carry the idea of a natural stretch of water to its logic conclusion, the aquarium should contain a layer of mud o the bottom, some old boots, bottles, and tin cans distribute here and there, and perhaps a few frogs, newts, and insec mixed up with the fish. The plain fact is that an aquariur by its very nature, is something artificial, and no one ca argue that fact away. It follows, therefore, that th furnished aquarium should not be judged by aquarists the same way as they judge individual fish and plants, b as the work of art that it is, or should be. From this poi of view, aquarists are not qualified to judge. Let the stick to their lasts and judge individual fish and plants bare aquaria. The furnished aquarium should be judge by an artist. That he might know nothing about fish an plants is of no importance whatsoever, because his ta would be to judge the aquarium as a living picture ar nothing else.

To put it another way. The furnished aquarium shou be regarded and judged as a work of art, rather than as attempt to reproduce in miniature a section of a natur stretch of water. If that is accepted, a technical error (su as burying the crowns of *Vallisneria*) should no more allowed to detract from the artistic result of the whole, th painting the Disciples in the costume of fourteenth-centu peasants detracts from the religious paintings of the Midd Ages. The idea of an artist, rather than an aquaris judging furnished aquaria may be revolutionary, but believe that something like it should be done, at all events progress is to be made. Certainly, at the present mome very few furnished aquaria on the show benches are worth second look, and most are not worth even one. This is fault of the exhibitors, whose aim, of necessity, is to cat the eye of the judges. It is the fault of the judges, or rath of the system that refuses to tolerate any aquarium that do not aim at representing a natural stretch of water.

The result is inevitable. Individuality and originali are strangled at birth. Colour in the aquarium is virtual non-existent. There is, in fact, a certain uniformity, sameness, about every furnished aquarium that is seen the show benches. We know, even before we visit th show, precisely what to expect of them. This way stagn tion lies.

Ulster Aquarium Society in June last year had the furnished aquaria entries for the Warnock Cup judged by well-known Irish artist, Mr. F. McKelvey, and it would interesting to know of that society's experience of Mr. Hervey suggestions put into practice.—EDITOR.

The Characin Family:

Pristella riddlei

by

W. J. van der KOLK

Photo: B. & F.

THIS lively exotic fish was first imported into Europe in 1924, and since then it has held its own among our most treasured aquarium species. Coming from the quickly flowing, clear streams of South America, Venezuela, Guiana and the lower part of the Amazon, *Pristella riddlei* is reckoned among the most beautiful of characins.

Its body shape is high, attenuated towards the tail, which is forked and shows a pretty pink to faint red colour when the fish feels at its best. The male reaches a length of about one and a half inches and the fully grown female may grow up to one and three-quarter inches.

Ground colour is silvery grey, and the body is transparent, with a soft light brown to yellow sheen. *P. riddlei* has very distinct markings : one dark spot just behind the gill-covers, one brown to deep black spot in the dorsal fin and similar ones in the anal and ventral fins. At their bases the anal and dorsal fins are lemon yellow, and they end in white points ; the adipose fin is colourless.

Some aquarists have difficulty in distinguishing the sexes and use only the body shape for guidance—taking the one with the slender belly for the male and the rounder fish for the female ; these differences can only be seen in fully grown fishes and are of no use when buying youngsters. However, there are easier ways to distinguish the sexes—the dark area to be seen in the transparent belly of the male is rather pointed, while that of the female has a more rounded shape ; young *Pristella* in good health show colour differences, the red in the caudal fin of the male being more distinct than that of the female, and the male has a white band or border to his anal fin.

Colours of this pretty fish are so distinctive and attractive that the European breeders often call it the goldfinch. I have always compared its dorsal fin with the feathery headgear of a Red Indian. When kept in proper surroundings, in a healthy, clean, well planted and heated tank that receives plenty of sunshine, a small shoal of at least four or six of these fishes is one of the liveliest sights I know. Given the right sort of food—bloodworms, mosquito larvae and large Daphnia, *Pristella* thrives well and shows its antics to the full, males " dancing and strutting " in front and around their chosen female partners. In fact they are so lively that their activity seems to be contagious—other fishes in the tank also becoming more lively. A temperature of 76° to 80°F. is the range at which their colours are brightest and their appetites greatest.

To breed *Pristella* the first essential is to have a well-matched and fully grown pair. If there is disparity in size, attempts at breeding are often failures. A fairly large tank with plenty of plants such as *Myriophyllum*, *Nitella* and *Ambulia* growing in fresh water, is required. Place the tank so that the rays of the early morning sun can reach it.

When the fishes are well matured, keep them separate for a time, and then, if they are properly fed beforehand, after placing them together spawning takes place in the early hours. They press closely together and swim in corkscrew fashion to the surface of the water, just above the plants, on to which the eggs are dropped. In from two to four hours several hundred eggs are scattered ; they are clear, white, and hatch in one and a half to two days, depending on the temperature. Optimum temperature is 80°F.

After spawning take the parent fishes out immediately as they love to eat their own eggs. Soon after hatching, the plants, sides and bottom of the tank are covered with tiny " glass-splinters "; only good eyesight can discern them, for they are very small and hide in the plants and any out-of-the-way places they can find. Often it is thought that the fry have disappeared, but it does not do to give up too soon. Apart from having a good pair of fishes and suitable plants and environment for them, the breeder must have plenty of patience, and this applies to all fish-breeding.

For eight to ten days the *Pristella* fry have a camouflaging grey colour, and this is a difficult time for the aquarist. If he is unable to get the tiniest of pond Infusoria for them the youngsters decrease in numbers rapidly, and all will be doomed to die. This is because they have very small mouths and are unable to swallow the large Infusoria which we try to grow in home cultures. If, however, they have plenty of Infusoria of the right sort, they thrive, and after about ten days they can take micro-worms and sifted *Daphnia*.

Growth will then be obvious from day to day. Care should be taken to remove the most rapidly growing young *Pristella* to another tank, to give the weaker, late hatchings a chance of survival. All going well you will have 100 to 300 youngsters swimming in a great shoal—a really grand sight. They attain the adult coloration when about one quarter of an inch in length.

The breeding and rearing of this species is not easy. I tried several times before I was successful ; it depends greatly on having a good pair and the right food for the earliest stages of the youngsters' lives. Yet I would advise any advanced breeder to give *Pristella* a trial, as it is worth while to study their breeding habits.

The INDIAN WATER-FERN

by

JACK HEMS

Photo: Lionel E. Day

THERE are few plants which are so lasting, so ornamental, so useful, and so easy to grow in the tropical aquarium as *Ceratopteris thalictroides*, an aquatic fern native to the shallow fresh waters and swamps of many tropical and sub-tropical regions of the world. From all accounts, the species is particularly abundant in the East Indies and the Malay Archipelago, where according to some reliable writers, the natives gather the fronds and cook them for a table green.

The general appearance of *C. thalictroides* is unmistakably fern-like. The submerged fronds, pale green and fragile, are borne on narrow, rather brittle stalks or stems, which unfold from a woody crown. In deep water, these stems may reach a length of several feet. In shallow water, the stems either lie prostrate just beneath the surface, or rise right out of their natural element and bear a profusion of medium green, smooth-surfaced, rather coarse-cut foliage.

In the wild state, the production of aerial foliage is a normal occurence during the dry season, when the waters gradually recede and the marges of the rivers and lakes dry up and leave the fern uncovered on the mud. At such times, the fern continues to flourish as a bog or terrestrial plant ; that is, until the return of the rainy season, when the stems and foliage once more become submerged beneath the rising waters and quickly revert to an entirely sub-aquatic existence. Mature aerial fronds develop spores which ripen early in the year and soon germinate on constantly wet, warm mud. But propagation is not limited to the development of spores alone. Baby plants are produced in abundance on the edges of the large fronds. They start their existence as mere rugosities on the foliage, but soon become recognisable as perfect miniatures of the parent plant.

As a rule, a young fern does not become detached from the parent plant until the frond that gave it birth has turned brown with decay and withered away. As soon as this phase in the young fern's existence has been reached, it floats at the surface as a free-swimming plant until the feathery roots somehow or other find anchorage in the mud or sand. Anchored ferns grow apace, but ferns allowed to float in deep water seldom thrive, though they will take a long time dying. Coming as it does from the warm parts of the world, *C. thalictroides* flourishes best in a temperature above 70° F. It will turn brown and die if kept for more than a week in a temperature below about 60° F.

The fern appears to grow equally well in full sunlight or partial shade. It can be grown to perfection under electric light alone. A number of young ferns pushed into the sanded floor of the aquarium, and encouraged by the right amount of heat and light to form a mass of greenery, make an ideal spawning mat for barbs and the like. On the other hand, a large fern with a dozen or so stems laden with surface-caressing foliage offers one of the best protections imaginable for livebearer fry.

Among the many popular names which *C. thalictroides* has had given to it since its introduction to the tropical aquarium hobby in the middle 1930's, the most widely used are Indian fern and Sumatra fern. American aquarists usually refer to it as water sprite. Now and again it is found listed under its older name of water thalictrum.

AQUARIST'S Notebook

Seasonal notes on pond and aquarium interests

AT the time of writing it rather looks as if the pond-keeper's tasks will be started earlier than usual this year. The next few weeks will, if no freak weather occurs, be well spent in cleaning out any ponds that require it. Those that became choked with blanket weed last year should certainly be cleaned now, for the threads will soon grow again, before the plants can make progress, and so hinder their development.

Pond cleaning is no job for half measures. Everything must come out, and the concrete sides should be well scrubbed—with a wire brush if you have one. If the pond has no outlet, emptying it will be troublesome. The water can be siphoned out with a hose however, if the pool is on raised ground, or if there is a nearby drain or hole into which the hose can be pushed so that its waste end is lower than that in the pond.

Throw away any dead plants and leaves, and pick off algal threads from the others. Handle the fishes gently after netting them, for any damage to their scales at this time of year in particular may result in fungus developing very quickly. They will have to be kept in tanks or butts containing some of the pond water during the clean-up ; plants should be given plenty of space during the temporary storage—piling them one on another in a small container is asking for trouble.

If the compost on the bottom is black or foul-smelling discard the lot, but you may find that only the top layer needs changing. Compost in planting pots or troughs should also be changed, as it will probably have been depleted of manuring materials. Well-rotted garden waste (and it must have been well and truly changed to humus before using it in the pond) may be employed in such special planting sites, under a two-inch layer of coarse sand.

When setting the pool up again space out the plants in regions that are not too deep ; two to three feet is about the maximum for many varieties. Tap water can be used for re-filling, and the fishes are returned the following day. It will take several weeks for the pond to become quite clear so do not be worried about cloudy water. The fishes should be eating well during the coming weeks, and earth worms, chopped if large ones, can be given to help prepare them for breeding during the early summer.

JOHN GUNN

Trout Rearing

described by A. SHARP

TROUT are now bred artificially with much success, and there is a regular demand for these fish for stocking and restocking waters. There is little difficulty in the process of obtaining eggs or ova. All that is necessary is to strip the ripe females—which are kept for that purpose by the fish farmer, in ponds—of their eggs, and fertilise them by milt extruded from the males.

The fertilised eggs are then placed in suitable receptacles, in the hatching house, and a constant flow of pure water passes over them. During about six weeks of incubation the ova are periodically examined and any unfertile eggs removed. The period of hatching lasts longer in some cases, varying according to the atmospheric temperature. This part of the business is comparatively easy ; the trouble begins with the wee alevins, as the newly-hatched trout are called. At first, they require little attention, and until the yolk sac on the underside of the body has been absorbed, they need no feeding by the fish culturist ; their mouths do not function till this yolk sac has disappeared.

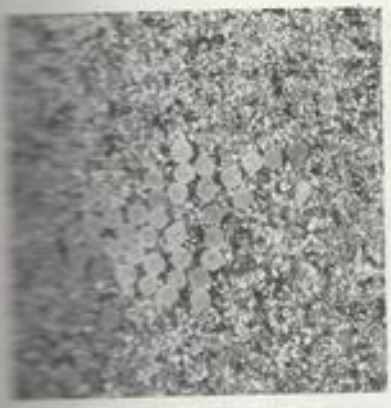
Once this natural development has taken place, in due course the quaint little creatures—mere atoms of life—take on a definite fish form and have to be fed on a suitable food of an almost microscopic character. Under natural conditions this food is provided by the minute forms of water life in the river, the various kinds of plankton or "water-dust," as it is occasionally called. Under artificial conditions on the fish farm, where at this stage of development the tiny "fry" are transferred from the hatching trough to some well-guarded runnel of pure spring water, they have to be fed on substitutes in the form of finely powdered cooked animal's liver or a meal made from finely ground dried fish, or a mixture of the two.

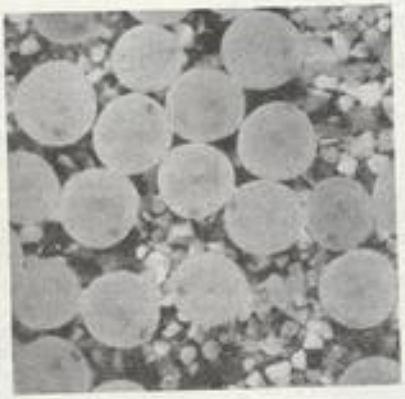
This is the time for the real work to begin, as the fish have to be fed frequently through the day, and this has to be done very patiently, for the tiny things are shy and at first only seem to want to hide. During the initial period of feeding the fry, the water in the hatching troughs must be kept perfectly clean, all uneaten food being siphoned away. But soon the fish will have gained sufficient strength to keep their own quarters clean, fanning away with their tails all impurities before such can settle. In the later stages of life, from the fry to the yearling ages, and from that of yearlings to the final adult stage of from two to three years, the fish are fed on similar food as when in the alevin stage, but the particles are not, of course, in microscopic form. By the month of May the young fish have attained a definite trout form, and are most beautiful little creatures. Now they begin to rise to flies and to hunt water shrimps, and thus require less artificial feeding stuffs.

There is, probably, less wastage when trout are artificially reared than under natural conditions. Many eggs are lost and alevins destroyed where trout visit the shallow tributaries to spawn. Heavy floods at this time do much harm to the eggs, either washing them away completely or silting up the redds. Spawning trout generally select a gravelly run which has a steady flow of water, and as long as the conditions are normal in winter, all goes well ; even so, the fry suffer much from their many natural enemies—kingfishers, herons, ducks, and other water birds, as well as from predatory fish. In the early stage of artificial rearing much of this is avoided. Herons occasionally manage to drop in by the ponds on the fish farm unnoticed, and take toll of the trout ; other enemies are few.

The products of the trout farm are disposed of in various stages of growth. Owners of waters needing restocking can buy "eyed ova" to put down where suitable redds exist or can be made. Fry—fish a month or two old—are well adapted for introduction into rivers having numerous feeders and tributary runnels. With these small fish, a certain amount of wastage is to be expected. Yearlings are satisfactory for stocking waters free from pike and eels. Two-year-olds are better able to look after themselves and are the best for stocking barren waters or replenishing streams that are over-fished by anglers. Amongst the several varieties of trout the common brown trout is the most popular for river stocking purposes ; the Loch Leven variety is good for lakes and ponds. The rainbow trout is easily reared, but it is a doubtful proposition for restocking streams, having a disposition for wandering and for finally disappearing altogether. Only a few of our British rivers seem really suited to its habits.

Fish culture has made it possible for anyone having a pond of any size in his grounds or garden to keep a few trout. Proper cultivation of the water is necessary if good results are to be enjoyed. Plants suitable for the pond should be planted in it, and natural food introduced.





Trout "eyed ova": the right picture shows the eggs enlarged

Photos; W. S. Pitt

A newly-hatched alevin

Home-Made AIR PUMP

WHEN I started to keep an aquarium I thought that it would be a good thing if I could aerate the water. Not being able to afford the cost of a pump, I set out to make one of my own with the materials at my disposal. These were :—a 6-volt electric motor and a transformer for it (bell circuit type); a piece of ⅜″ diameter brass tube, 1″ in length; a piece of ¼″ brass, 1″ by $\frac{7}{16}$″ wide; a piece of ⅛″ brass, 2½″ by 1″; a brass angle plate, and a copper tube. Also, in steel, a piece $\frac{5}{16}$″ diameter, 1½″ in length, for the piston; a piece ½″ diameter, 1½″ long, for the pump shaft; a wheel; a coupling, and a stud with nuts, washer and spring.

Construction

If you are fortunate, you may have the main part of the pump (cylinder, piston and pump-shaft) in an old model steam engine of the moving cylinder kind. These toy steam engines can be readily adapted for air pump construction. Not being lucky enough to have an engine, I had to make these parts.

For the cylinder, the ⅜″ diameter brass tube (Fig. 3A) was used with a piece of brass that had been slightly grooved to take it (Fig. 3B). Before soldering them together, the position of the holding stud (dead centre) was marked; this stud screws tightly into the back of the grooved plate (Fig. 1A). It is $\frac{5}{16}$″ diameter Whitworth thread, screwed at both ends, leaving a plain part near one end to act as a bearing (Fig. 3C). The length of the threading depends on the free length of the spring that slips over it, for this has to be free when the nut is at the extreme end of the stud.

The piston (Fig. 1B) I made from the $\frac{5}{16}$″ diameter steel bar. It was turned to fit the inside of the brass tube and then all but ⅜″ at one end turned (or filed) to $\frac{7}{32}$″ diameter. The crank pin hole drilled at the end of it is $\frac{3}{32}$″ diameter. The crank or pump shaft (Fig. 1C) was made from the ½″ diameter steel turned down to $\frac{5}{16}$″ diameter for a distance of 1$\frac{5}{16}$″; this gives a $\frac{5}{16}$″ end piece in which the crank pin is

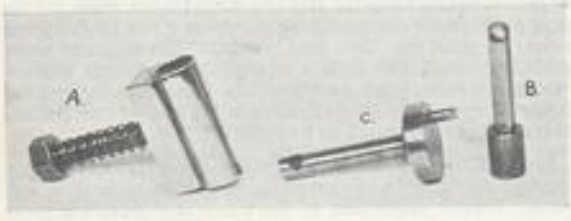


Fig. 1

placed. The pin is $\frac{5}{16}$″ from the centre of the end piece, giving a ¾″ stroke of the piston.

Any wheel of the heavy type can be used for the flywheel (Fig. 2B) or one can be turned, 1½″ diameter, ½″ thick, with a boss having a $\frac{5}{16}$″ hole in it. The wheel has two ⅛″ diameter holes drilled in it—these can be slotted together if necessary; a screw fastens the wheel to the shaft. A coupling (Fig. 2C) connected to the electric motor drives the flywheel and piston. This coupling is ⅜″ diameter and ½″ long, with a hole drilled half-way through its length to take the pump shaft. The other half is drilled to take the motor shaft and screws are needed in each half to secure the coupling to both shafts.

The bearing plate (Fig. 2A) is the mounting for the pump and measures 2½″ by 1″ by ⅛″ thick; it may be brass or steel, whichever is available. In this plate are drilled two $\frac{5}{16}$″ diameter holes, one for the shaft and the upper one for the cylinder stud. The first is $\frac{11}{16}$″ from the bottom, and 1″ is allowed between the centres of the holes. The brass angle shown in Figure 2A at the lower end of the plate is soldered in position to suit the height of the motor.

Assembly

The piston is placed in the cylinder and these parts are attached to the bearing plate. Then the crank shaft is added and the crank pin put through the piston rod end; by turning the shaft the piston should go up and down in the cylinder, moving the cylinder backwards and forwards as it goes round.

Now, when the cylinder is as far as it is possible for it to go to the right, the bearing plate should be marked with a needle at this point. The process is repeated for the other, left, side; the centre of each marked position is found and two holes $\frac{1}{32}$″ down from the top of the plate are made at these points (Fig. 4). Both holes are drilled $\frac{7}{32}$″ diameter. Great care should be taken to get them correctly positioned. Assemble the parts again and when the cylinder is right over, mark the cylinder back with a needle through the hole; check this mark by moving the cylinder over to the other side and watch that the mark is also in the centre of the other hole. Then drill a $\frac{5}{16}$″ diameter hole through to the cylinder.

The pump described in this article may be made from parts taken from a model steam engine of the moving cylinder type. Details for making it from other readily obtainable materials are also given for aquarists with metal-working facilities.

Construction described by REG. MORTON

Photographs by J. A. SHAW

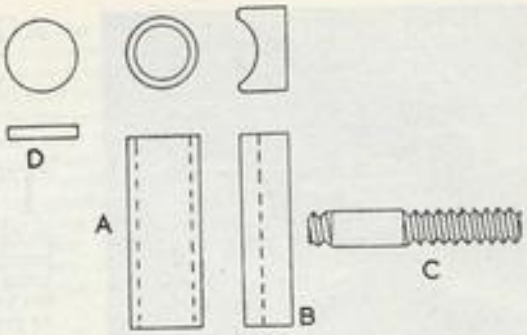


Fig. 3


Fig. 4


Fig. 5

The cylinder cap (Fig. 3D) is soldered on; a copper pipe is soldered to the hole in the bearing plate that receives the air from the cylinder when the piston rises. All the parts may then be assembled into position on the hard wooden base—4" by 3½" by ½" thick. The motor is packed up so that when it is fastened to the board it runs easily.

Operation and Cost

The pump has a good output and its speed may be increased or decreased by altering the tension on the spring. Slow running occurs if the brushes of the motor are dirty. Figure 5 shows a brass bracket fixed at the back of the motor to reduce the friction on the distance piece inside.

My main cash outlay was for the transformer (8s. 6d.). I had been given the motor, in not too good a condition but crankable; suitable electric motors are sold by model-makers' suppliers. If you can get the pump parts from an old model engine then the cost of the whole assembly is not as high as that of other mechanical types of pump that are sold. If you make a pump yourself, any part that wears can be replaced; thus for the small initial cost of the parts you have a pump that is economical to run for many years.

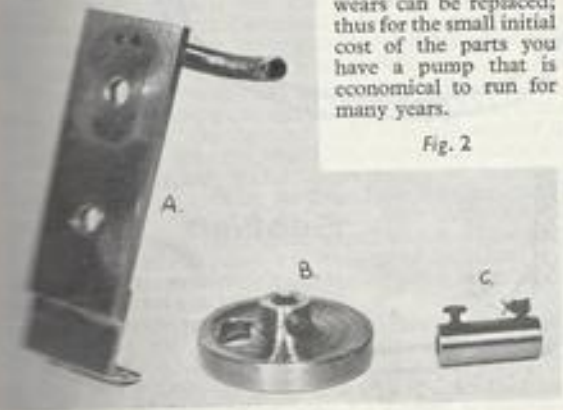


Fig. 2

AQUARISTS At Home: No. 9

Pools in a Pre-Fab's Garden

View of Mr. Thompson's pools showing the water-course and falls connecting the higher pool with the lower one

Above is seen the low-level pool in which gold-fishes breed; below, the upper pool is shown

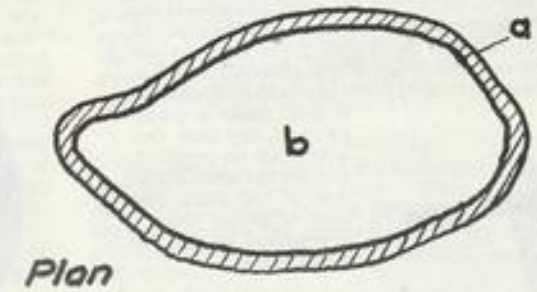
THE decorative effects that may be obtained within quite a small are by careful planning and siting of garden pools are demonstrated b the photographs on this page. The pools illustrated are in garden attached to a pre-fab house at Maghull in Lancashire, and thei proud owner is Mr. A. R. Thompson. The two pools are at differen levels and are connected by a waterfall; since these pictures were take last year, Mr. Thompson has made another pool between the two shown At present, the waterfalls operate during wet weather by the overflow o rain water, but plans are made to install a low horse-power pump t achieve circulation in the pools.

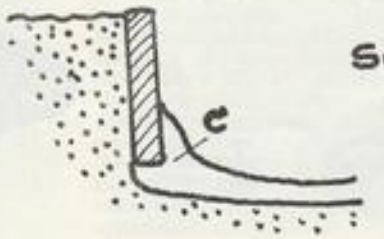
They do not serve only as charming additions to the garden, however From one pair of goldfish Mr. Thompson reared over 200 fry in the pool last season, simply by leaving the fishes " to look after themselves " Varying in depth, each pool has a particular function: the deepest is use for wintering fishes, and in this one the goldfishes breed; the shallowes is used for breeding shubunkins; the third, of medium depth, is used as hatching pond for spawn that is recovered from the others.

Mr. Thompson uses his own method for pond construction. He say that it is simple and economical—and he knows that it is satisfactory, fo one pond that he built in 1933 is still in service. He has described hi procedure for the benefit of *Aquarist* readers:

" To commence with, I make a rough design to my own liking. When ready to commence building—if it is to be a week-end task I start o Friday evening—I mark out the outline of the pool site and then dig out trench having a slight inward slope on the side following the markings all round. I use a special small spade for this (any engineering firm wil make one at small cost); it is four inches wide and about six inches lon with an eighteen-inch handle to it.

" I next fill the trench with ordinary concrete mixture. Then abou a foot away from its inner edge, I commence excavating the soil within the surrounding trench to form the centre of the pool. After about day the soil may be removed right up to the inner face of the concret wall that the trench has formed. The bottom of the pool is shaped an covered with concrete and pockets for plants are made, thus completin the job. Where the concrete bottom meets the wall, a thicker layer o concrete is placed to make a reinforced joint as shown in the sectiona view diagram ".





Construction details: (a) th shaded area is the concrete-fille trench surrounding the earth (b in which the pool centre excavated. (c) shows the r inforced concrete joint where th bottom meets the wall

News and Reviews

NEW ZEALAND

NOVEL and useful is an idea for covering the top of the tropical aquarium described in the September 1949 issue of *The Dominion Aquarist and Pondkeeper*. Sheets of glass lying flat on the top frame of the aquarium often cause trouble, since the condensed water collects under the edges and rusts the iron, and may also run down the tank's exterior. By using the glass cover designed by Mr. J. C. Boyd, a member of the Dominion Aquarist and Pond Society, all the water runs back into the tank without contacting the metal.

This cover is made by first cutting a piece of glass to the dimensions of the top outside edge of the aquarium frame. Then, at each end of the sheet, oblong pieces of glass the width of the angle iron and half the width of the sheet in length are cut out. This gives a cover with two points that may be used as pivots for it when on top of the tank. The longer of the two long sides rests against the angle iron and the shorter rests below the opposite angle iron, so that this edge acts as a return for condensed water.

HOLLAND

FIRST attention to the January issue of the Dutch Association "Aqua-Terra" journal (*Het Aquarium*) is drawn by a beautiful colour plate showing among other fishes *Barbus tetrazona*, flame fishes, and *Epiplatys* (formerly *Haplocheilus*) *chaperi*. Dr. J. M. Lodewijks, chairman of the Association, has written an article "Everyone should have an aquarium"—this might make more people interested in nature, so often overlooked in these days of tension, he says. Six pages are devoted to photographs of beautiful tanks and fishes; also included is a photograph of that well-known American ichthyologist, Mr. W. T. Innes. Mr. Hoedeman writes an informative article on *Cynolebias bellottii*, one of the killifish group. Following an article on *Hemigrammus caudovittatus* is "A bubble nest builder," dealing with the less well-known croaking gourami, *Ctenops vittatus*, recently imported into Holland again. It derives its name from the noise it makes—something like the croaking of a frog.

Increasing popularity of aquarium keeping in Holland is shown by two photographs of decorative aquaria, one built over a sideboard and the other set in an alcove, in a well furnished living room; both are really very artistic. Dutch aquarists are trying to revive interest in the *Panchax* species, and an article with that aim deals with *Panchax lineatus*. A five-page illustrated article on angel fishes, their care and breeding, gives details of the difficulties to be overcome when breeding this popular fish.

The big dyke through the former Zuider Zee has been the cause of interesting changes in the flora and fauna of that area of Holland. On the north side it is still washed by salt-water waves from the North Sea, but on the south side the water is brackish owing to the inflow of freshwater streams and rivers forming the Yssel Lake, causing changes in the animal inhabitants and plant life. Although this area looks rather forlorn to the casual visitor, who tries to cross it as quickly as possible in high-speed cars, there is an interesting field of inquiry there for the biologist, to whom I recommend a visit.

Badis badis, although not so frequently kept now, provides interesting details of parental love and care for young fry, especially on the part of the male, and an article on this species recommends us to try breeding it. Another less-known exotic fish, *Chriopeops goodei*, a killifish, is illustrated in a colour plate accompanying an article about it. A footnote gives a tip for those using *Tubifex* worms—put them in a small basin of water under a dripping tap; they will keep much longer by this means.

In the section "Biologia Mariforma" the marine aquarium and its population—anemones, sea-horses, brine shrimps and the arrow-tailed lobster *Xiphosura polyphemus* and its brother *X. moluccanus* (not true lobsters but classified with spiders and scorpions)—are described for aquarists who enjoy keeping marine tanks. From the Association's news part of the journal, it is learned that another six aquarium clubs have been formed in Holland, bringing the total number affiliated to "Aqua-Terra" up to 125.

W. J. VAN DER KOLK

(News and Reviews continued on next page)

WELL-DESIGNED FOUNTAIN

The Stokes Fountain: manufactured by Stokes Appliances Ltd., 16, Dingwall Road, Croydon, Surrey.

THE Stokes Fountain has an attractively finished metal body measuring three inches in diameter and four inches in height, weighing approximately four pounds. The vertical nozzle has six jets some six inches from the base of the fountain. Immediately under the nozzle there is a milled head for controlling the height of the spray. On the base of the model there is provision for the attachment of three feet; these are available in various sizes. The fountain works off the A.C. mains, connection being made with the nine feet length of light grey waterproof cable. The whole appearance of the Stokes Fountain is pleasing and efficient.

For the past three months the fountain has been under test and throughout this period it has given satisfactory service. With the model tested it was possible to vary the height of the spray from two inches to seven feet. In an aquarium, of course, the height of the spray must be limited so that water falls only within the tank. Working at maximum output the quantity of water pumped per minute is one and a half pints.

The direction of the spray may be varied up to ten degrees from the fountain's vertical axis; however, it has been found that the entire instrument may be tilted without impairing its efficiency to any obvious extent. Thus it is possible to conceal the fountain behind a rock and have the spray playing upon another part of the pond or tank.

Current consumption is negligible and according to the makers it can be run for less than a penny a week. In operation the fountain makes a noticeable humming noise common to all vibrator type pumps, but in this model it is reduced by using the rubber-footed legs supplied.

F. E. CHILDS

CANADA

HINTS on culturing *Daphnia* are given in the December 1949 issue of *L.Aquiculteur Canadien*, official organ of the Canadian Aquarium Club. A shallow wooden tub is a suitable vessel, and it should be provided with a layer of sand in which pond plants are rooted. A small bag with a stone in it, to stop it floating, is filled with dried cow manure and suspended on string over the side of the tub; *Daphnia* may then be introduced. Collect the water fleas from a pond in early morning or at dusk, when they are to be found at the surface, says the article, by netting them in a fine sweep net. Examine the catch in a glass jar to eliminate any pests such as dragonfly larvae, before adding them to the tub to start the culture going.

BELGIUM

INCLUDED in the contents of *Aquariumwereld* for this month is an aquarist's account of a warmed and shock-proof carrying container for tropicals. The carrier consists of two boxes, one inside the other, the space between being filled with glass wool as insulating material. The inside box has three springs secured to its bottom, and set side by side. On the middle spring is placed a metal tube filled with hot water, and on either side of it on the other two springs are placed jars (similar to the fruit-preserving type) in which the fishes are carried. A double lid, when placed on top of the boxes and secured by butterfly nuts, forces down the springs below the jars so that they are held rigidly and yet may be carried by means of the handle secured to the outside of the box without shocks being transmitted to them or the fishes. The central heating provided by the metal container keeps the interior of the box at the right temperature, and owing to the double structure little of this heat escapes. The device should be useful to aquarists transporting fishes over long distances, when vacuum flasks of the wide-mouthed type are not available.

U.S.A.

EXAMINING black widow fishes (*Gymnocorymbus ternetzi*) against a strong light source so that the shadows of their internal organs may be clearly seen is one method of sexing this species mentioned in an article in last December's *The Aquarium*. Females show a semi-transparent half moon-shaped area behind the more solid part of the body whereas in the males this solid part descends in a straight line. These differences were observed when the top light from the aquarium was placed behind the tank so that the fishes swam in front of it and were thus "X-rayed."

If you want to get rid of snails from your tanks, then keep *Cichlasoma severum* in them, suggests another article in this ssue, which gives this cichlid as a champion snail killer.

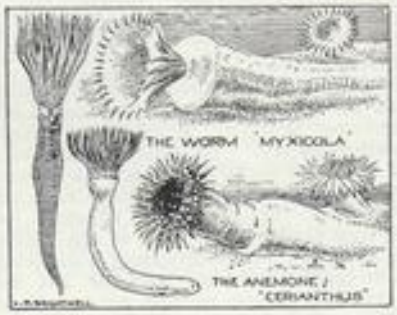
THE danio species will interbreed freely says a note in *The Aquarium Journal* for January, but results from experiments made to try and breed from the hybrids produced seem to indicate that these are sterile. Crosses between the spotted danio and the pearl danio, between the zebra fish and the pearl danio, and between the zebra and the giant danio are described.

In an article on live food culture the addition of marble-sized lumps of baker's yeast as well as a cup of aged sheep or cow manure is recommended for the culture of *Daphnia* in twelve-gallon shallow containers. Shallow water is an essential, and the presence of snails such as *Ampullaria* is a help. Occasional doses of milk (one tablespoonful), dried lettuce leaves, fish food and dried egg serve to supply additional nourishment for the *Daphnia*, which can be produced in quantities sufficient for the average fish keeper by this method.

London Zoo Aquarium Not

by L. R. BRIGHTWELL

TO THE growing band of marine aquarists, th endless fascination in the often extraordinary arity of design in quite unrelated animals, happen to share a similar habitat and way of life. small tanks, lining the west wall of the Zoo's sea-wat is now displayed a fine collection of anemones, the ten crowns of which are mimicked by an adjacent collec sea worms. But whereas the anemones' blooms spel to other animals, those of the worms are merely ass with respiration. In one instance, the mimicry even to the body. The jelly-tube worm, *Myxicola*, sandy-cloak anemone, *Cerianthus*, both found on our have long tubular bodies which secrete a clear slimy c sometimes half an inch thick, that soon gathers to camouflage layer of sand or mud. If taken from thei both species form new envelopes within twelve hour That of the anemone may measure fully eighteen inch several short off-shoots. On alarm the polyp slide wards to safety down its burrow. The worm lives minutest organisms, the anemone upon considerably game. Most visitors confuse the two, so close is the ficial resemblance.



The adequate identification of such similar ani the uninitiated rouses the difficult question of label black-out type of aquarium hall. The Zoo has o this partly by neon signs, a combination of illu transparencies and mirrors. The provision of labels by similar means was devised by the writ years ago, and is I believe, to be adopted by the architectural staff at some future date.

Both Plymouth and Cullercoats aquariums have sweeping alterations and improvements. These aq enjoy a not too subdued normal lighting of th corridors which in no way detracts from the tanks the inestimable advantage of making it possible for work in comfort; this, of course, is impossible in painted corridor of the London or Edinburgh type

It must be a matter of regret to all sea water en that there is no biological station or even coastal worthy of the name within a more reasonable dist some two hundred miles of London. If only institution could be set up at Brighton, say, or even one is confident that hundreds of amateur and pr research workers would soon more than justify th and ensure its upkeep and efficient maintainance round.

L. R. Bright

My Favourite

NEWT

by A. LEUTSCHER, B.Sc.

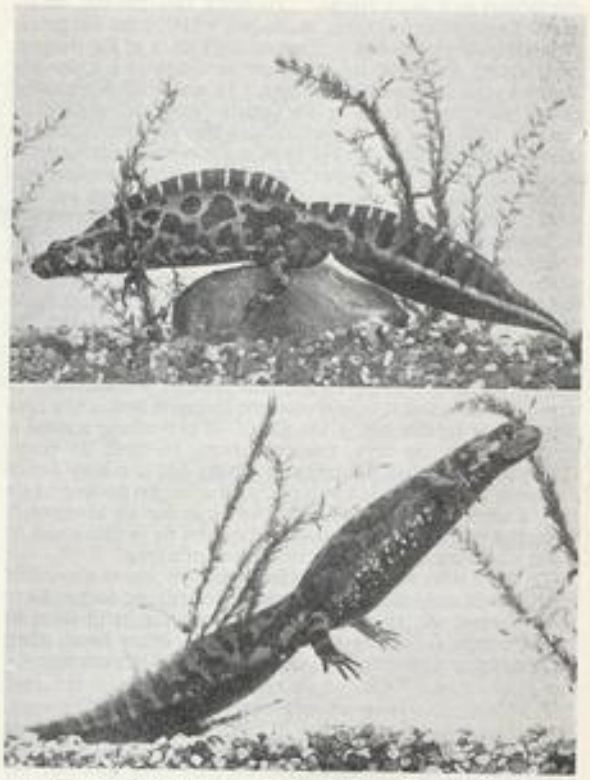
THE three native species of newts all come within the genus *Triturus*, which is widespread throughout the northern hemisphere. Living in the ditches and ponds of France and Spain is a handsome cousin, called the marbled newt (*T. marmoratus*), which is undoubtedly the aristocrat of its family. It rivals in size our crested newt, and can grow to a length of nearly seven inches.

My aquarist friends, I find, give pride of place to the same sorts in their collections of tropical fish, because of its beauty. If this counts for anything with the hobby, then I feel sure that the marbled newt will score full points with any newt lover. Above, it is a brilliant emerald, which may be tinged with olive or yellow, and is marked with dark spots, giving it a marbled appearance after which it is named. These spots sometime merge to form continuous, wavy lines along the flanks. The dorsal crest of the male and the tail crests of both sexes are barred vertically with green, which alternates with black and white. The female's dorsal groove is orange. As in the crested newt there is a silvery band along the sides of the tail in the male. In the female the edges are tinged with orange. The limbs and digits are green, banded with black. The undersides in both sexes are brown, grey or rose, spotted with white, and sometimes black marked with white. Some specimens are very dark and others almost entirely green. As in the case of the male crested newt the dorsal crest dips sharply at the tail, but is not so serrated. The skin is rough on top and smooth underneath. The head is flattish and rounded, with overhanging lips, and the eyes are rather small. The body is rounded and swells out towards the hinder end.

A roomy tank, planted with vegetation such as *Elodea*, starwort or willow-moss, is the usual home for newts, and economises space. The landing platform is in the tank. For lightness I prefer an inverted flower-pot, on which is balanced a flat stone just clear of the water. I sometimes use the ventilation type of house brick, which is not too heavy and in which the newts can hide. A clump of moss might be placed on top, with one edge immersed so that water which soaks up will keep it fresh. The green moss and aquatic plants make a pleasing background for the marbled newt.

A young marbled newt tadpole: notice the large external gills and transparent tail

Photos: Lionel E. Day



Triturus marmoratus, the marbled newt; the crested male is shown in the upper picture

Triturus marmoratus certainly deserves a tank to itself. I would advise this in any case because I have known it to savage other species and even swallow the smaller kinds. Especially at mealtime it becomes excited and will snap at anything which moves, even its companions. As a result, toes and portions of the tail are sometimes bitten off. To avoid domestic strife the newt tank should be covered.

The marbled newt appears from hibernation as early as February, in the warmer parts of its range, and commences to breed in March. The male courts his mate and displays his crest and curved tail in the usual fashion of newts in the genus. I once observed a peculiar dance by one of my males in which he arched his back and bounced lightly up and down on the tips of his toes in ballet style. The female lays her greenish eggs here and there among the water-plants, into which she climbs, cupping the leaves with her feet. These eggs should be removed, together with a portion of the plant, in order to avoid cannibalism. When wishing to rear the young, I prepare a shallow dish of water beforehand—about two inches of well-matured water containing tiny aquatic life. The baby tadpoles will thrive on Infusoria, and later on *Daphnia*, *Tubifex* and Enchytrae worms. At metamorphosis, in about six to eight weeks, the young measure some two and a half inches.

Newts leave the water after breeding, usually by mid-summer. They lose their attraction, become dull and dry-skinned and reduced in size. The crest of the male

diminishes to a mere fringe. To delay this natural emergence I adopt the following measures, which work for newts generally—keep the water down to six inches at the deepest part, stand the tank in cool surroundings and keep the inmates on a semi-starvation diet. In water adult marbled newts may be fed on small aquatic animals, worms of suitable size, bits of raw meat and fly-maggots. Should they leave the water, and if kept indoors this may happen at any time, they will hide themselves in moss, coming out at dusk to feed. When on land they may be given normal food or bits of raw meat, which they may even take from the fingers or from a pair of forceps.

My wife has spent hours during evenings one winter, when we kept some newts in a vivarium, enticing them from hiding places behind stones and plants by waving her little finger at them. When sufficiently tamed, newts can be attracted by any movement in their vicinity, even a passing figure, and will emerge to " see what's doing." We often played the finger-game to see which newt would reach it first. The " meal " would often be snapped at and the tiny teeth could be felt biting the skin. When taking a meal a newt will use its tiny, recurved teeth to hold its prey. Consequently it has difficulty in letting go, and may easily suffocate if the food is too large. The finger-game reveals that a newt's eyes are often " too large for its stomach." Sometimes the tiny tongue may be seen as it flicks out to assist a capture, much after the fashion of a frog.

To those who wish to breed from the specimens a word of caution will save disappointment. Newts that do not have their normal winter sleep may not show any inclination to breed in the following spring. On the other hand, they do not appear to suffer in health from lack of hibernation.

AQUARIUM SCIENCE:

One-eyed Learning

ANIMALS can form many habits resulting from impressions made on one or more of their natural senses. The sound of a clanking bucket handle, for example, sends Zoo animals, associating the noise with feeding time, running to their feeding place, and similarly the sight of the cover of an aquarium being moved brings about the habitual congregation of fishes at the feeding corner. Interesting information about the visual learning of habits by fishes has recently been given by R. W. Sperry and Eugenie Clark, two Chicago, U.S.A., scientists who have studied the small marine gobies (*Bathygobius soporator*) in laboratory aquaria.

What interested these scientists was the mechanism by which fishes learn to make a set response to a definite visual signal. They wished to find out whether the brains of fishes are sufficiently advanced for the animals to learn with either eye, or whether each eye must learn separately. A man who learns with one eye covered to perform some complicated action when he sees a red light flash, still acts the same if the signal is given to the other eye alone, without any extra training for that eye. Fishes, or the gobies at least, cannot achieve this transfer from eye to eye anywhere near so perfectly, as the experimental results show.

The habit the fishes developed was always to swim to the higher of two baits offered in the tank from the surface. This habit was formed in gobies, each with one eye covered with a light foil cap, in the following way. When the two baits were offered it was arranged that the upper one was a piece of food—fish or crab meat, whereas the one abo inch lower was always something inedible, such as wool or rubber. Repeated trials, always presentin baits in the same way, caused the fishes after about a (some took only three days to learn) to swim at once higher of two objects placed in their aquarium. A further period of intensive training to make sure th fishes had fully developed the habit, came the real tes

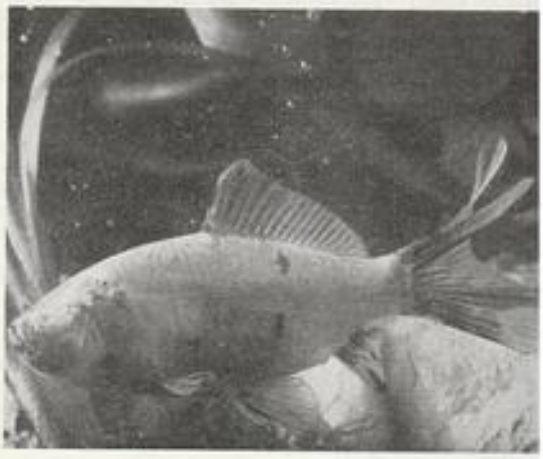
The little eye shields were transferred on each fish the covered eye to the one that had been used durin learning period, and the baits again placed in the ta exactly the same way. Only five out of sixteen g remembered the old habit of swimming to the uppe bait to be sure of getting food, now that they saw th through a different eye !

Other animals such as rats and chickens, with ey each side of their heads, and man with his binocular viss not make such mistakes, so it may be concluded thi brains of fishes are not sufficiently organised to allo pressions from one eye to affect automatically the system. It seems that behaviour patterns made by eye are stored separately, but the differences that this n in the fishes' actions are not noticed of course until, the experiments, one eye is covered up.

ANTHONY EVAN

This shubunkin has grown up with only one eye. Perfectly normal in all other respects it is blind to the surroundings on its left side

Photos: Andrey Andersson



OUR READERS

Write—

Readers are invited to express their views and opinions on subjects of interest to aquarists. A selection from queries received will also be answered here. The Editor reserves the right to shorten letters when considered necessary and is not responsible for the opinions expressed by correspondents.

Address letters:

The Editor, *The Aquarist*,
The Butts, Half Acre,
Brentford, Middlesex.

Blindness in Tropicals

[illegible] experience of Mr. A. T. Whelpton (January *Aquarist*) has been almost duplicated in my aquarium; again, angels were the sufferers. I had two—about 3-4 months old, which after a mixed diet of live and dried food, displayed an immoderate appetite for *Daphnia*. They gorged on it, and thereafter became apparently almost blind.

The symptoms of bumping into obstacles and inability to locate food continued for a week. I then consulted without avail all tropical fish literature in the Birmingham Reference Library. As a good old remedy I tried the salt bath, and after about fourteen days of this at a stepped-up temperature (90°F.) there seemed little or no improvement. The fishes were then transferred to a small tank on their own—in old water at 75°-80°F.—and *hand-fed*.

I gave them dried food and in addition I tried dangling white worms, held in a pair of tweezers, in front of their noses. One fish became very tame, fed better each day and is now completely recovered; he still expects his dinner at the sight of tweezers! The other, not so tame, continued to fade and eventually died.

D. J. VARNOM,
Harborne, Birmingham 17.

I HAVE had trouble with the complaint of blindness in my angels and gouramies, and all fishes affected in this way have died.

I used to change my aquarium water every two weeks and I came to the conclusion that it was the lime which made a film over the fishes' eyes. I now use a filter in the aquarium and siphon sediment from the bottom every month. With the removed sediment I siphon out only one-third of the water from the aquarium and now I never completely change the water.

Since doing this I have not had any other fishes becoming blind, and also, I now get less lime forming on the heater in the tank.

J. H. MEDHURST,
London, E.2.

Hospital Aquarium

We have a very fine aquarium of exotic fish which has been presented to us by Mr. B. Nicholls, of 17, Gerard Street in Brighton, and having read an account of such a presentation to another hospital in the January number of *The Aquarist*, I thought you might be interested to know of this and perhaps record it in your journal.

EVELYN CAWTHORNE, Matron,
Royal Alexandra Hospital
for Sick Children, Brighton.

"The Aquarist" is very pleased to give publicity to these well-disposed donations; we have seen the delight that an aquarium can give to the sick child.

Imported Fishes

I READ with great surprise Mr. C. Wright's letter concerning imported fishes. He says that it did his eyes good to see some really good coloured fishes—" fishes that put the British bred fish in the shade." The opposite has been my feelings when from time to time I have come across these misshapen flat-bellied objects wobbling around the tanks; with the exception of colour they have no resemblance to what a goldfish should be like, and seventy-five per cent. are obviously due for an early death. No British breeder with any self- respect would dream of rearing this type of fish, let alone selling them. I notice that Mr. Wright does admit that they do not conform to F.B.A.S. standards. I myself would call the majority runts.

KENNAIRD W. THOMSON,
Ramsgate, Kent.

Crustacean Infestation

TWO of my tanks are infested with *Cypris*. At first their presence was a novelty but now they have become a nuisance. Can any of your readers tell me of a way to get rid of them without completely cleaning out the tank? I know that the acaras will eat them but I do not wish to keep this species since they tear up the plants as they dash around the tank.

S. J. GRETTON,
Westbourne Park, W.11

Aquarium Lighting

ENLARGING on the approximate information given in Aquarist's Notebook for January concerning the wattage required for different sized tanks, I recall "Sweet's Formula" $W = \frac{L \times 32}{H}$ where W is the total wattage, L is the length of the tank in inches, and H is the number of hours during which light is required.

Applying this formula to the 24 inch and 36 inch tanks the wattage varies from 48 to 64 watts in the first case and from 72 to 96 watts in the second. In each case H is either 16 or 12 hours, assuming no daylight. Generally speaking, fewer watts over long periods is more satisfactory than the reverse, but the ideal is found when the light is on for anything from 12 to 16 hours daily.

R. A. FIRTH,
Southwick, Sussex.

Early Fish Artists

(From L'Anthropologie, Vol. xxii)

ON reading R. A. S. Macalister's *Textbook of European Archaeology* I came across the enclosed picture which I think might interest your readers. It represents a male and female reindeer, the spaces left free being filled in with fishes, and was found carved on a bit of reindeer horn ; the specimen was found in the cave of Lorthet (Dept. Haute Pyrenees, France). It was made by palaeolithic man, about 20,000 years B.C., and this must be one of the earliest representations of fishes known to us.

Archaeologists are not sure of the meaning of the two rhomboid figures in the top right corner. They think these may represent traps used to catch smaller animals.

Dr. E. ELKAN, Pinner, Middlesex.

Wooden Veteran

CONCERNING wooden aquariums, this school has in use a wooden aquarium with the rough internal measurements of six feet by one and three-quarter feet by one foot. It is now well over fifteen years old and during the war it spent two years full of foul sea-water. (Apart from this it dropped off the lorry when the school returned from its evacuation.)

However, as far as my knowledge goes there has been no serious leakage during its career. It has been used for both marine and fresh water work but never tropical, so I am unable to say what its performance would be at anything above the normal range of room temperature.

M. PUGH THOMAS,
Rydal School, Colwyn Bay, W. Wales.

White Worm Culture

AFTER reading your article on white worm culture in the October 1948 issue of *The Aquarist* I decided to start a culture, and I have met with a decided success. I have tried to interest other aquarist friends in starting a box but they do not seem to have succeeded so well and have marvelled at my supply whenever they have seen it.

I have put my success down to two things which seem to have made the difference :

1. When the cover glass is replaced on the culture box after feeding it is firmly pressed down instead of allowing it only to rest on the food ; this removes the air gap formed between the medium and the glass.
2. A two-inch depth of medium is used ; the article suggested three to four inches.

These factors combined give me a large quantity of worms at the surface whenever they are required and do not necessitate taking a spoonful of the medium and separating the worms from it. The worms have been fed solely on bread and milk and are kept in the living room ; other details of the culture are as in your article.

C. J. GRANT, Cheylesmore, Coventry.

READER'S RECORD :

Good-bye to Trouble

BEING a beginner in this interesting hobby, I was qui alarmed to notice white spots on three of my fishe I had bought a pair of bloodfins, a pair of flame fish and a female fighting fish and had introduced them to t community tank without first quarantining them. It w two days later that I saw the white spots on the fishes.

The next day white spots also appeared on two fema swordtails and a male green swordtail, and I then con menced the following treatment of the disease. A solutic of three grains of quinine hydrochloride in a gallon of wat was prepared, using hot water to ensure that the chemic was completely dissolved. I drained my aquarium, leavir a little water for the fishes and the plants in it, and when t quinine solution had cooled to about 76°F. I added it to t tank. Next morning the white spots had disappeared fro the infected fishes.

However, two days later the same fishes again showe white spots. A fresh solution of quinine was added, an after about nine hours these spots too disappeared; to mak sure of the cure, I repeated my treatment after an interv of three days, and I have had no recurrence of the troub since. Cost of quinine hydrochloride is one penny a grai

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This specifies quinine sulphate (½ grain per gallon) quinine hydrochloride (3½ grains per gallon). No quinine sulphate contains, if my calculations are correc 83 per cent. of quinine base, and the hydrochloride 82 p cent. Why, therefore, the large difference in concentra tion ? The recognised dose of either is 2 to 3 grains p gallon, and I have found 2 grains in most cases to be a ver effective cure, killing the free swimming parasites in abo 45 minutes, and probably rendering them incapable attack in less than that time. It would be, howeve interesting to know if such a low concentration as ½ grai per gallon has been used with success, because if so, th puts quinine as number one killer of white spot more tha ever. We must, of course, bear in mind that one or tw instances can hardly be taken as a sure sign of comple success, but with all the white spot around us at the momen perhaps collective evidence will result in reducing treatme costs of this devilish parasite to one-sixth of the pric

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Incidentally, for those who prefer to use quinine bisulphate, if again my calculations are correct, this contains

a quinine base of 77 per cent. Here again it will be seen this does not warrant a change from the usual 2 to 3 grains per gallon of water. While on the subject, I can never quite understand why so many other treatments are entertained, incorporating anything from ginger-beer to catching the fish in one jar and the spots in another, when a straight treatment of quinine to the aquarium itself clears up everything without ill effects to the fish or healthy plants.

STANLEY HARKER,
London, S.E.10.

The article summarised treatments that may be found in the literature, the ½ grain per gallon quinine sulphate treatment has been reported, although like Mr. Harker, we have always advocated using 2 to 3½ grains to the gallon, and prefer to use the hydrochloride because of its greater ease of solubility.

Double Dorsal

I HAVE noticed that one of a brood of zebras grown up recently has its dorsal fin paired in a similar manner to the pelvic fins. Each fin of the pair is similar to a normal dorsal, and each is attached to the body on either side of the mid-dorsal line about three-sixteenths of an inch apart. They flap in a butterfly-like manner when the fish swims.

I would be interested to know whether this is a common variation experienced by your readers.

C. D. BINGHAM,
Berkhamstead, Herts.

How certainly uncommon to be seen in a grown fish. Double appear in many large broods of fry but most of them die at a very early age.

Aerator Query

I WONDER if any of my fellow readers of *The Aquarist* could tell me if it is possible to work any type of aerator from an accumulator or 120 volt battery? I have a 24 in. by 12 in. by 12 in. tank which I would like to aerate but unfortunately our house is not equipped with electricity, so I must look for an alternative source of power.

I have tried a cycle inner tube as a source of air but it doesn't last very long, and as my tank is for show I do not want anything that would spoil the appearance. If anyone can suggest anything I will be very grateful.

G. KIRLEY,
Leeds, 11

Sexing Goldfish

RECENTLY I have bought some goldfishes and I wish to breed from them this season. How can I sex my specimens?—they are the common type of goldfish.

J. PILKINGTON,
Manchester.

Spring is the time when sexing is most easily done. Females may be seen to be deeper than males when viewed from above, and the males develop small tubercles like pearly pimples, on the gill covers and pectoral fins. The accompanying photograph shows these on the gill cover of a goldfish, and they may be felt by running the little finger gently over this area on a fish held in a net. Watching the behaviour of the fishes—chasing by the males—is a good indication of sex.

Photo: L. E. Perkins

Livebearer Deaths

IT is the experience of many aquarists that the young of several livebearers develop quite well until they are about half grown. At this stage they begin to die off until the whole family is extinguished. Any explanation of this would be extremely interesting.

A. BEANEY,
Hastings, Sussex.

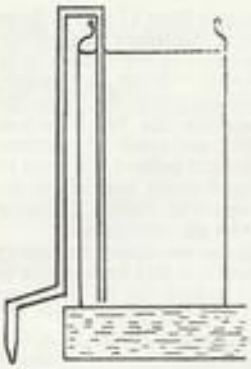
This is an interesting observation. It is well known that an aquarium of given size will only support a certain population of fishes (see Vol. XIII "The Aquarist," page 373) and a possible explanation of what is here observed is that as the fishes grow this population limit is exceeded. The fishes then commence to die, perhaps from the accumulation of some secreted substance in the water; little is known about this aspect of aquarium keeping.

JUNIOR'S LETTER

Our medal-winner this month comes from Leicester. He is fifteen-year-old Geoffrey Burwell, and he wins his prize for this letter and diagram:

HAVING read Mr. T. Frankland's experiences of spawning the mountain minnow in last October's issue of *The Aquarist*, I thought that my own would be of interest. This is the first egg-layer I have bred, by the way, but I have met with success in breeding livebearers, especially platys.

I prepared a 24 in. by 12 in. by 12 in. aquarium for my mountain minnows and put in plenty of bladderwort. This received the eggs quite successfully but the bladders may easily be mistaken for fishes' eggs; the reason that I used it is that bladderwort was the only suitable plant I had at that time. On 1st September last year, I counted fifteen young fishes stuck on the aquarium glass, but I must admit that I never actually saw the eggs dropped; I did notice the extended fins and trembling to which Mr. Frankland referred.



When the young were free-swimming but appeared as if their swim-bladders had not formed, I started to feed Infusoria. A few days later the fishes could be seen swimming on the surface in small groups. From Infusoria I went to micro-worms and then to fine dried food and chopped white worms. I now have thirty-four one-inch fishes, closely resembling neon tetras with their bright electric stripes.

My Infusoria feeder may be of interest to readers, so I will describe how I made it. First I procured about eighteen inches of one-eighth inch bore glass tubing. This I bent to the shape of the side of a jam jar, with one end reaching the bottom inside and the other hanging about four inches below it on the outside. This end is bent away from the jar, almost but not quite at right angles to the length of tube coming from the top of the jar. This piece is bent again so that it hangs straight down about one and a half inches in length. Next I heated the middle of this length and pulled off the end piece with a pair of pliers.

This left a thin filament at the end which I broke off to leave a very small hole. The tube was filled by shaking it vigorously under water and then used as a siphon from the jar of Infusoria. A small jet is produced which also aerates the water considerably, more so than the usual drip feed.

Cambridge Show

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SOCIETY ORGANISATION—2

by J. LAUGHLAND

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(Continued next month)

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

Notes and News of AQUARISTS' SOCIETIES

★ Monthly reports from the secretaries of aquarists' societies for publication on this page should reach the Editor by the 5th day of the month. Only items of general interest to all readers, e.g., reports of shows, lectures, outings and announcements of coming events, should be sent.

ANGEL fish breeding was the subject of an extremely interesting talk given by Mr. A. Evans of the **Merseyside Aquarists' Society** when he visited the Belle Vue (Manchester) Aquarium Society last month; a keen discussion followed, in which the speaker ably answered many questions.

FIVE frogs as big as sandwich plates were present at a recent meeting of the **Blair Aquatic Society.** This was when Mr. Lester, curator of the London Zoo reptile house, gave a lecture to members on these amphibians and told of the fascination of this branch of the hobby; the tameness of his specimens was demonstrated. This society has recently donated a set-up aquarium to the Santa Claus Home for children at Highgate, and members are to give guidance on the maintenance of the aquarium.

MR. MANSON gave an interesting talk on pond life, and illustrated his subject with a projector, at the January meeting of the **Bradford and District Aquarists' Society.**

ANNUAL General Meeting of the **Bridlington and District Aquarist Society** was held last month. The treasurer's report was favourable and showed a good balance in hand; at the end of the meeting a general discussion on the subject matter of the current issue of *The Aquarist* was held, and copies were distributed to new members. A lecture on the history of aquariums is to be given by F. C. Ward this month.

PRESENT total membership of the fifteen-months-old **Bromley Aquarist Association** is over thirty-five. At the last meeting the chairman expressed the hope that more members, not necessarily with experience but with enthusiasm, would soon be swelling the ranks of yet another West Kent Aquarist Association. Plans for the coming include a visit to the London Zoo aquarium and a local show of fish and aquaria.

EIGHTY new members were gained by the **East London Aquarists' and Pondkeepers' Association** during 1948, making the total membership well over 200. Mr. W. P. Bradley, vice-president and former president, was awarded life membership of the Association at the January meeting; in his speech Mr. Bradley said that he considered the aquarist's hobby by far the best one for the ordinary chap, and that the success of the Association as being due to the fact that it stood without reproach externally and was internally a happy band. The secretary's report included a mention of the pleasure that tanks donated by members to St. Mary's Hospital and to Plaistow's Invalid and Crippled Children's Hospital were giving to the patients. The chairman urged members to specialise more and to collate all information for future use. Livebearers were the subjects of the lecture given by Mr. Mealand at the second meeting last month. Specimens of swordtails, platys, mollies and guppies were shown together with hybrid swordtails and platys, and the lecturer described the genesis of his "London swordtail". At the debate "Livebearers v. Egglayers" this month the egglayers had the majority; their champion had played up the beauty and interest of the courtship of egg-laying species.

DELEGATES from the affiliated societies attended a council meeting of the **Federation of Northern Aquarium Societies** in Manchester last month. It was decided to hold a sixth (spring) assembly of the Federation this April, and the possibility of holding an inter-society competitive show this year was further pursued.

TALKS given to the **Orpington and District Aquarist Society** last month included one by Mr. A. J. Wilcox on glazing aquaria, with a practical demonstration, and one on filters, their construction and use, by Mr. L. W. Webber. Second number of the Society's bulletin includes summaries of recent lectures and a communication on the treatment of white spot disease.

REGULAR bi-monthly meetings are now being held by the recently formed **Eastbourne Aquarists' Society** on the first and third Thursdays of each month at the Foresters' Hall in Eastbourne. Secretary is Mr. D. L. Cann, 44, Westham Drive, Pevensey Bay, Sussex.

THE **Coventry Pool and Aquarium Society,** which has now moved to new headquarters at the Priory High (Wheatley Street) School, were given a demonstration of aquarium glazing and a talk on fishkeeping experiences by two members at last month's meeting.

MEMBERSHIP of the **Gloucester and Cheltenham Aquarists' Society** now stands at 65, and at the society's first Annual General Meeting every satisfaction was expressed with the results of the first season's activities.

SECRETARY of the **Luton and District Aquarists' and Pondkeepers' Society** at the recent Annual General Meeting reported a year of steady progress and continued interest. At this month's meeting the possibility of holding a club show this year is to be discussed.

TALK with an unusual title was that given by Mr. W. H. Brooks to members of the **Midland Aquarium and Pool Society** at their January meeting; the lecturer called his talk the "Chessboard of Fishkeeping", but apart from saying that it was illustrated by a large chart drawn by the lecturer, who answered the many questions that this intriguing subject apparently engendered, the secretary's report leaves us checkmated.

AT the last meeting of the **Ruislip Aquarists' Society** members heard a most interesting talk by Mr. A. Wilson on the methods he uses for fish breeding. A show of labyrinth fishes is to be held at the next meeting.

SCALARE, the **Scarborough** society, report that *Daphnia* was first obtained this year on 15th January. Breeding and rearing goldfish was the subject of Mr. F. Wardlow for his talk to members at the meeting on the sixth of this month.

IN the last issue of the bulletin of the **Scottish Aquarium Society** a member describes his method for the construction of concrete aquaria. He describes the making of the wooden mould, and writes that about four pounds of cement and twelve pounds of sharp sand are all that is required, together with some wire lath reinforcements, for an 18 in. by 9 in. by 9 in. tank.

PROGRAMME of the **Southampton and District Aquatic Society** for this year includes the award of a cup to the member gaining most awards at the year's table shows, and another cup award for the best home-furnished aquarium. A two day show is also being planned, and will be the first that this society has organised.

FOUNDED during the summer of last year, the **Thames Valley Aquatic Society** now has a full programme for 1950, including lectures, club table shows, competitions, visits to the London Zoo aquarium and well known fish breeding establishments and a naturalists' treasure hunt. A microscope study group is being formed by this society; new members and visitors are welcomed at all the Surbiton, Surrey meetings.

ELECTION of officers for 1950 was the main business at the Annual General Meeting of the **Walthamstow and District Aquarist Society** held last month. New accommodation has had to be found to meet the club's ever increasing membership.

MAYOR and Mayoress of Wimbledon joined other members of the **Wimbledon and District Aquarist Society** at the January meeting, when Mr. Cleveland gave a talk on fish keeping. Earlier this month a table show of tropical and coldwater fishes was held by this society.

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D	A	C	E	■	■	B	E	E	T	L	E	
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T	O	N	I	C	■	S	■	T	Y	N	E	

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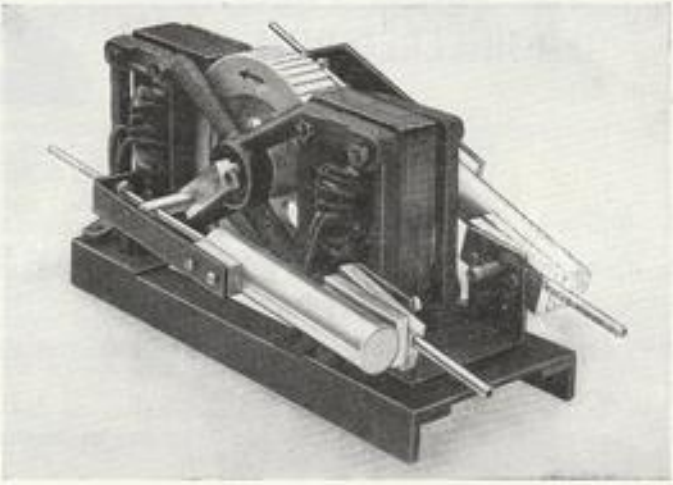

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LIVE Foods.—White worm 1/9 culture, micro-worms 2/- culture, daphnia 3/6 can. Prices include carriage. C. & O. Gregory, 536, Hobmoor Road, Yardley, Birmingham, 25.

3 TIER stand, 24 × 12 tank, 24 × 4½ tank. Thermostat, heaters, plants and assorted fish for sale. Owner going abroad. Phone Ken 9327. Seen Kensington.

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ALWAYS a good selection of well bred tropicals for disposal; plants etc. Callers only. Private aquarist Stanley Harker, 45, Ashburnham Grove, Greenwich.

WOODEN tubs for storing, rearing and breeding fish, live foods etc. Various sizes. 25 gallon approx. 22/6 each, carriage paid. Trade enquiries invited. William Ryan & Co., Temple Mill Lane, Stratford.

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FISH wanted. Top market price paid for good healthy tropical fish of all kinds. Write stating quantity, size and price, or call with samples. Aquarium Supplies Ltd., 16, Picton Place, London, W.1. Phone Welbeck 0438.

VEILTAILS. Good coloured calico-breeding pair or youngsters. Also good coloured Bristol shubunkins. Particulars and price—Hutchinson, 11, Market Street, Dalton-in-Furness.

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SITUATIONS WANTED

YOUNG man, 25, desires progressive position in or near London. Well educated to Matriculation standard. Able to take charge of retail or wholesale department from breeding to accounts, experienced in show tank management. small salary acceptable at outset. Box 2063, *The Aquarist*, The Butts, Half Acre, Brentford, Middlesex.

YOUNG single man, good mechanical and electrical knowledge, keen interest in natural history, aquaria, reptiles, seeks situation with naturalist firm, laboratory or similar establishment, anywhere, country preferred. Box 2064, *The Aquarist*, The Butts, Half Acre, Brentford, Middlesex,