

The cover of 'The Aquarist' magazine features a stylized illustration of a fish swimming to the right. The fish is white with a black outline and is set against a green background with wavy lines representing water. To the right of the fish are black and white stylized aquatic plants. The title 'The Aquarist' is written in a large, elegant, black cursive font across the top of the fish's body. Below the title, the text 'THE AQUARIUM & POND MAGAZINE WITH THE WORLD'S LARGEST CIRCULATION' is printed in a smaller, black, sans-serif font. At the bottom of the cover, the volume and issue information 'Volume XVI Number 2 May 1951' is printed in a large, black, sans-serif font. In the bottom left corner, the word 'MONTHLY' is printed in a small, black, sans-serif font. In the bottom right corner, the price 'One shilling & sixpence' is written in a black, cursive font, enclosed in a black rectangular box.

The Aquarist

THE
AQUARIUM & POND
MAGAZINE WITH THE
WORLD'S LARGEST
CIRCULATION

Volume XVI Number 2
May 1951

MONTHLY

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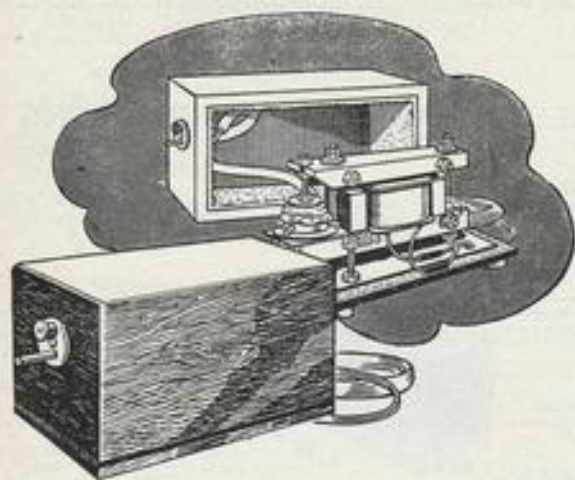
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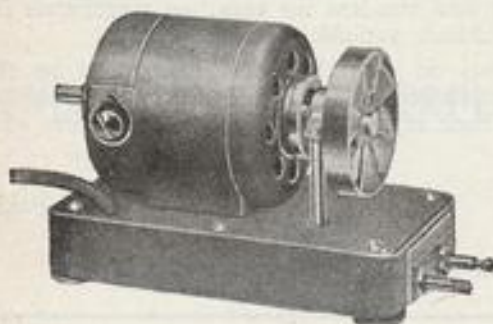
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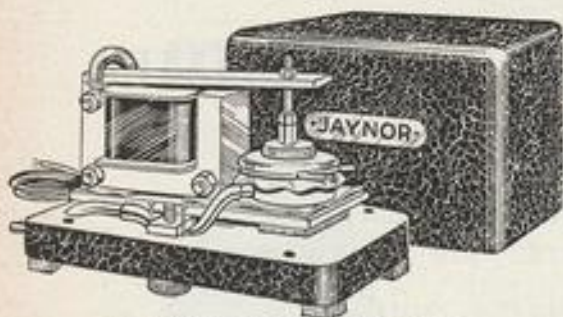
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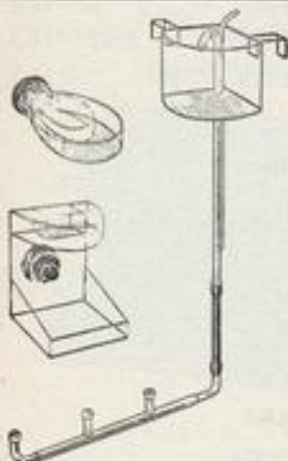
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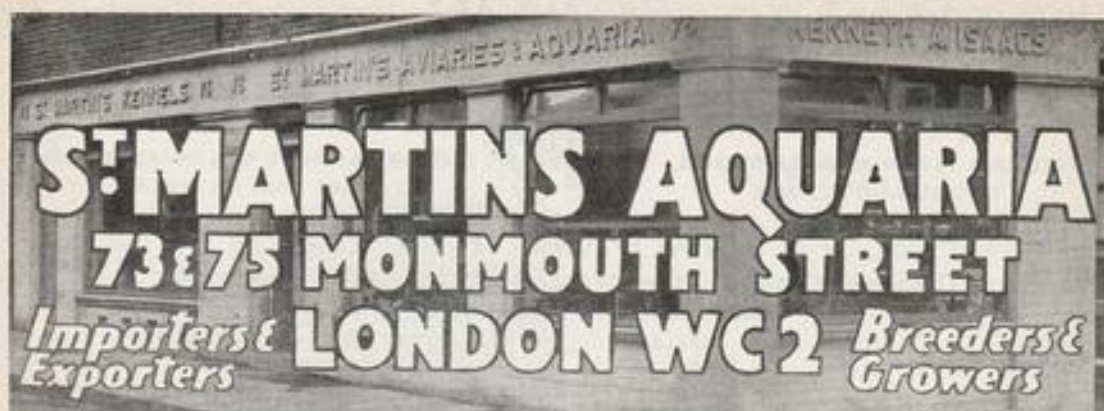
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THE BUTTS, HALF ACRE, BRENTFORD
MIDDLESEX

VOL. XVI No. 2

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Paul Jacobson

Recent arrival in Sweden from Gambia—"the climbing perch" (*Climipoma kingsleyae*) reported on our News and Reviews page

Editorial

PUBLICATION of this issue coincides with the opening of the British Aquarists' Festival in Manchester, and so provides us, the sponsors of that exhibition, with an opportunity to greet all friends, old and new, upon a historic occasion. We hope that we shall be able to meet many of them personally at our stand.

As we go to press we can have no knowledge as to the response there will be from the public towards the B.A.F., since in many ways we are breaking new ground, but to judge from the numerous signs of interest we have already received the attendance promises to be high.

This co-operation is a further demonstration of the feeling of family unity which has always existed between our paper and the aquarium world in general. That feeling was present way back in 1926—a quarter of a century ago—when we sponsored the first home aquarium exhibition ever held in this country. It established that close bond between journal and reader which we have been proud to maintain until to-day.

Over the years we have consistently pursued the policy of improving the quality of both contents and production of the magazine in so far as circumstances have allowed. Anyone comparing an issue of to-day with one of previous days will see how true this is. We wish to continue this progress, but here it is necessary to introduce a less cheering subject, with deep regret.

There is no need for us to draw readers' attention to rising costs to-day. Each and everyone of us is all too conscious of the world's rising prices. Publishers of all kinds of magazines have been forced to raise their prices in attempts to meet the drastic increases in paper and printing costs, the elevated distribution and postal charges and so on—to keep their publications on an economic footing.

The *Aquarist* is faced with the same problems; therefore it is necessary for us to announce that from next month's issue the price of this journal must be raised by threepence, making it one shilling and sixpence a copy. This small increase, representing less than three farthings a week, or three shillings a year, will help towards meeting the increased costs and enable us to maintain our size and standards.



The handsome Cussons Trophy, a silver aquarium, to be awarded for the best furnished aquarium

ADVANCE bookings and interest shown in the B.A.F. lead to expectations of a large attendance during the three and a half days event. Aquarists from Sweden, Belgium, France and Germany are visiting the Festival.

Three records have already been established by the B.A.F. First, the trophies, prizes and awards for the competitive exhibits are the largest in number and variety and the greatest in value ever to be offered at an aquarists' event. Trophies include the Messrs. Cussons Sons & Co. Ltd. Silver Model Aquarium for the best Furnished Aquarium (Section A) and the D. Hands (New Zealand)

Large Attendance Expected at B.A.F.

Belle Vue, Manchester, 2nd—5th May

Silver Rose Vase for best Junior Furnished Aquarium. Messrs. Belle Vue (Manchester) Ltd. Silver Cup for the finest Coldwater fish (Section B). The Goldfish Society of Great Britain Trophy for the best Veiltail (Twintail). The Guppy Breeders' Society Open Challenge Trophy for the most outstanding Guppy (Section C). The Fraser-Brunner Cup for the best pair of Livebearers (Section D). The *Aquarist & Pondkeeper* Challenge Trophy for the outstanding pair of Egglayers (Section E). The Federation of Northern Aquarium Societies' Trophy for the best pair of Labyrinth Fishes (Section F). The National Aquarists' Society Trophy for the best Cichlid (Section G). The Federation of British Aquatic Societies' Challenge Trophy for the most outstanding breeder's effort (Section H). The Kemsley Trophy for the best Tropical Fish. The *Aquarist & Pondkeeper* Cup for the best Water Plants. The Whitwell and Smykala Challenge Cup for the best pair of Angels. The Bland Trophy.

Secondly, the number of trade exhibitors taking space at an event purely for aquarists is the greatest known, and finally, the souvenir booklet of the B.A.F.—an introduction to the hobby in itself—promises to be a specially sought-after publication.

Judges, provided by the F.B.A.S. and the F.N.A.S. are Messrs. J. Carnell, C. W. G. Creed, R. G. Mealand, W. G. Phillips (London); H. P. Lynn, M. Welch (Nottingham); G. T. Iles, H. Loder (Manchester).

Grand Effort by Gravesend Aquarist Society

FOLLOWING a foyer display of aquaria and an appeal from the stage by the Gravesend and District Aquarist Society, collections from the Regal Cinema, Gravesend, audiences realised over thirteen pounds for *The Aquarist's* Hospital Aquarium Fund in March. This grand effort on the part of a recently-formed society is a fine example of the support aquarists all over the country are giving to this appeal for funds to provide aquaria for hospitals, at their local shows and exhibitions.



Above: Assistant matron and children's ward sister of the Gravesend and North Kent Hospital formally accept the tropical aquarium presented by Mr. T. Harman and Mr. J. Butler on behalf of the Gravesend and District Aquarist Society

Left: Display of aquaria arranged by the society in the foyer of the Regal Cinema, Gravesend, in aid of "The Aquarist's" Hospital Aquarium Fund

Planting the Water-Garden

by ————— FRANCES PERRY

LAST month I dealt with the plants which must be grown beneath the surface to provide shelter and a supply of oxygen for fishes in the pond. Having satisfactorily planted the pond itself, to secure the natural effect, bog-plants should be introduced around the water. Bog and moisture-loving plants revel in a rich loamy soil enriched with well-rotted manure, in full sun.

The glorious crimson of the *Astilbes*—amethyst, gunther, great and pink pearl—contrast well with the rich yellows and oranges of *Hemerocallis*, Margaret, Perry and Sieboldii. *Isotria medeolae* adds a deep touch of colour, and *Primula elatior*, *Trollius* (harbinger, Juliana and fire globe), *Sium amitchaticum*, and *Aconitum fischeri* blend well together. For marginal decoration, in my opinion, the aquatic weed, *Pontederia cordata*, is unrivalled. This attractive aquatic is found in almost every pond and lake in the Eastern States of America. Its involute foliage is dark olive green, very shiny and grows two to three feet high. The flowers are borne on long spikes, a beautiful light blue wash. This is one of the very few hardy aquatics with blue flowers.

Golden Club

Sparganium angustifolium, the golden club, is another American plant, and one well worth growing for its foliage alone. This is glaucous in appearance, with a beautiful silver sheen, growing some two to two and a half feet high. The narrow white spadix is covered with numerous small yellow flowers, giving it the appearance of a golden poker. Plant in deep mud, covered with three to four inches of water.

Alisma parviflora is a North American cousin of our well-known water plantain. It grows no taller than eighteen inches, bearing loose panicles of rosy-white flowers. Planted at the edge of the pool in a few inches of water, it blends very well with water forget-me-nots and marsh marigolds. During the winter months the rounded foliage becomes skeletonised, giving it a grotesque appearance.



Arrow leaves and flowers of *Sagittaria sagittifolia*, the arrowhead

Photos by
the Author



Pickerel weed flowers add a rare colour to the summer water-garden as their spikes of blue surmount the leaves

The thick stems and broad glossy leaves of the marsh marigold, *Caltha palustris*, are very small at present, but soon will lengthen, so as almost to hide the water with their large golden flowers. They will keep up a brave show of blossom for a couple of months, and are almost the first waterside plants to gladden our eyes. Tennyson describes them as shining "like fire in swamps and hollows grey," and if planted in patches in boggy depressions one can appreciate the truth of this.

Although comparatively rare, no water-garden can afford to be without *Dracocephalum palustre*. This handsome plant, growing only twelve inches or so high, requires planting in a few inches of water near the margin. The foliage is light green and the brilliant rose flowers are borne on long terminal spikes. Its intensity of colour and bearing will make such an appeal to the aquarist that, having once seen the plant growing well, I feel sure he will not wish to be without it.

Japanese Hardy

A charming Japanese plant, which has proved quite hardy in our British climate is *Houttuynia cordata*. The bluish-green leaves emanating from bright red stems, illuminated by four snow-white bracts, form a graceful background to its cone of modest white flowers. It can be planted in heavy loam, covering the rootstock with two to four inches of water, or simply grown in wet soil. Its usual height above the water is eighteen inches.

Juncus laetiovirens aureus is a Japanese rush which does not become so rampant as some of our English varieties. The smooth round stems are dark green, with a longitudinal golden band running up each one. The crowded bunches of small, brown flowers give its stem a one-sided appearance. It appears to have no leaves, but they are there, though not free to wave about in the breeze as most leaves may; these are reduced to sheaths that closely wrap their length around the stem.

Most of us know some of the arrowheads—*Sagittaria sagittifolia*, *S. natans* or *S. japonica*,—but it is surprising to note the number of people to whom *S. japonica plena* (undoubtedly the finest of this genus) is unknown. Bearing the traditional arrow-shaped leaves, the flowers of this handsome variety are best compared to a giant double stock—its dazzling whiteness unrivalled in bog flora. It grows eighteen to twenty-four inches above water-level, and flourishes in wet mud under five to seven inches of water. Another attractive member of this genus is the duck potato, *S. latifolia*. The arrow-like foliage is inclined to be broad



North American blue mimulus forms an attractive clump in the shallows of the water-garden

and reaches four feet or more in height. The snow-white flowers are simple. Plant in swamp land or shallow water.

Saururus cernuus, the American swamp lily, is a very pretty species for pondside planting in shallow water. The heart-shaped leaves are dark green, borne on very slender stems, with long terminal spikes of creamy-white flowers. *S. Loureiri* is a rare species from China, very similar in character. Both are so delicate in appearance as to give an impression of tenderness, but they have proved quite able to withstand the rigours of our English winters.

To many of us the zebra rush (*Scirpus tabernaemontani*

zebrinus) is not a stranger and certainly no pool should be without this magnificent Japanese subject. Growing four to five feet high, the fat round stems are transversely banded with white and green. At the distance these resemble huge puccupine quills. Plant in two to five inches of water near the bank.

There is one gem for the aquatic garden that I must not omit to mention. This is *Mimulus ringens*, a North American relative of our native water musk, *M. guttatus*. Dark green leaves grow thickly in pairs, up a stem some fifteen inches or so high, the whole terminating with well filled spikes of soft blue flowers. Anyone who has seen a clump of the yellow mimulus growing well can visualise the charm of this blue variety.

Pond-edge Plants

Every water-garden should have its quota of *Cyperus*—the umbrella grasses. A variety well worth growing is *C. adenocephalus*. It has a rough, round stem and broad flat leaves; but what gives it its charm are the pale green spikelets of flowers radiating from the summit of a graceful stem to eighteen to twenty-four inches above the ground.

We must not forget the edge of the pond. If the pool is a new one, there are often unsightly cement edges and rough stones to cover. Some low-growing aquatic must be planted in the wet mud or shallow water at the edges and allowed to trail in the water or climb over the sides as it will. A plant from Western Europe, suitable for this purpose, is *Prestlia cernua*. The foliage is small, quite prostrate and pleasantly aromatic, with whorls of lavender-blue flowers borne on slender stems some fifteen inches high. *Hypericum elodes*, the marsh St. John's wort, has creeping stems six to twelve inches long, with roundish leaves densely clothed with shaggy down clasping the stems. The flowers are pale yellow, and bloom in July and August.

Jottings of a Fishkeeper

Rockery—Millstone Grit

MANY tanks are spoiled by the use of unsuitable rockery or stonework. Aquarists in the north of England however should never be at a loss, as the millstone grit which comprises most of the Pennine Chain area is ideal.

This is the stone which is used to such effect in many public aquariums because it is often flat, and will layer well at the back of a tank. Anybody going out for a day's ramble in the country in Derbyshire, North Staffordshire, East Cheshire, Lancashire or West Yorkshire can pick all they require, choosing each piece ready shaped for their needs. Limestone, which also occurs in these areas, is unsuitable.

Holiday Risks

NEVER leave your fish in the care of a friend or relative unless you have satisfied yourself that they know exactly what to do. Dried food is best put out in daily feeds in a row of matchboxes, one for each day. On one occasion when I was away a whole tin of dried food was emptied into a tank on the first day of my absence! Eight days later the water was completely black, and all the fish were dead except gouramis and fighters.

Leave nets handy so that a dead fish can be removed. . . . few women will remove a dead fish with their hands if the net can't be found. Hide all dried food and chemical remedies, so that these cannot find their way into the aquarium in your absence. If you have to stress anything, stress the importance of putting on the aerator regularly.



Plants in Your Tank

PLANTS can be grown in tanks with electric light only provided that the light is near the water surface, not too weak and on for at least eight hours daily. The easiest plants to grow this way in my experience are *Cabomba*, *Ambulia* and *Salvinia*. The photograph shows a tank with a fine growth of plants which only gets eight hours electric light daily from two 60-watt bulbs.

Raymond Yates

THE AQUARIST

Platy × Swordtail Hybridisation

by MARGERY G. ELWIN

For many aquarists the possibility of producing new and interesting varieties of livebearers by hybridisation will always be a major preoccupation. Hybrids of the genus *Platyposcidium variatus* with the platy-swordtail (*P. variatus* × *X. helleri*) "complex" of hybrids is not a new idea by any means but, though aquarists have, from time to time, made tentative explorations in this direction it does seem to me a line well worth pursuing in an effort to produce new attractive strains of livebearers; the possibilities have never been more than superficially investigated. It is intended here to give the results so far achieved in the establishment of two such lines of hybrids and to sketch briefly the general method employed.

The *P. variatus* used for the cross were from a strain going about 50 per cent. of red-bellied males, with light olive-green bodies in both sexes. The "swordtails" were plain red and red wagtail, both varieties arising from the same original stock. The potential matings were arranged by setting out a number of "pairs," each consisting of one *variatus* fry and one swordtail fry, when the young fish were no more than three weeks old. Each pair was accommodated in a 3½-gallon aquarium. In this way the pregnancy of the females is assured and at maturity none of the fish will ever have seen specimens of its own type. This greatly increases the chance of inducing the fish to mate with the other species.

As the fish grow up and mature it is likely that in some of the aquariums there will be found to be two specimens of the same sex, but they can easily be swapped around so that the sexes are properly disposed, and they will still have had no contact with fish of their own type.

Successful Matings

It cannot be expected that all the matings will proceed as smoothly; in fact, one will be quite fortunate if as much as 50 per cent. of the "marriages" prove successful, so it is essential that a fair number of aquariums must be used in the process. However, the fish need not be completely isolated; all that is necessary is to keep them away from other livebearers, and some of the "pairs" can usually be housed in tanks containing egg-laying species. But those which do become pregnant must obviously be kept in individual quarters for the birth of the young and it is important to keep each brood separate.

Some pairs altogether were set up and the changes were made as these as they sexed. Eventually, four matings of male *variatus* and female swordtail, and five of the reciprocal cross (male swordtail and female *variatus*) were obtained. From about two of the latter, and in the end none of the female *variatus* produced young. Hybrid young were, however, obtained from three of the female swordtails, one plain red and two plain reds.

The young of all these females have proved to be large, healthy fish, certainly well demonstrating "hybrid vigour." The body is rather chunkier in shape than the typical swordtail and the males are noticeably bigger than the females. Apart from the "wagtail" character, which is present in the young of that parentage, the fish fall into three groups for colour: (1) plain olive, (2) very brassy, and (3) nearly typical red. The coloration, however, is very slow in developing, taking six weeks or more to show



Photo:

L. C. Mendonville

A pair of *Platy. variatus* × swordtail hybrids (male right) about natural size

instead of about two as in the normal swordtail. In the next generation it takes even longer. *P. variatus*, of course, is extremely slow to colour, taking as long as six months, so in this respect the hybrids are intermediate.

The plain olive fish have been discarded and the red and the brassy types concentrated upon. Some fish show the light speckling with black seen in the illustration. This is a character of the *variatus* stock which was used and looks well in the swordtail. The dorsal fin, too, is of the *variatus* type in these fish and the characteristic "sword" of the caudal fin is only vestigial.

Although not all fertile, from the first brood of hybrids—only nine fish—two fertile females were obtained, so there were soon enough for ordinary requirements.

Dr. Myron Gordon has had considerable experience with hybrids of this kind and he said in conversation that he found that a larger proportion of the offspring was fertile when the swordtail was the father than with the reciprocal cross. This, as has been shown, is the reverse of our experience. I think the explanation of this apparent contradiction lies in the fact that Dr. Gordon works with fish that are either actually wild specimens or have only been domesticated for two or three generations.

Dr. Gordon found in his earlier work with platy × swordtail hybrids that the results obtained from fish which had been aquarium bred for many generations were very different from those obtained when wild fish or recent hybrids were used. This, he demonstrated, was due to an upset of the normal sex mechanism by the frequent cross-breeding between swordtail and platy species which occurs under aquarium conditions.

The second generation of these *variatus* × swordtail hybrids is now coming on well and the proportion of "brassy" and red specimens is very high. Where do we go from here? Well, the first consideration is the establishment of a satisfactory line of hybrids. This may then offer possibilities of increasing the colour of the males in the strain of fish tending towards the *variatus* type and of producing a strain of wagtail swordtails with a discrete black speckling. Both these possibilities offer considerable interest and entertainment for some time to come.

More Aquaria from One Aerator

by W. H. MACEY

THE object of aerating the water in the aquarium is to replace oxygen. The amount of oxygen which is taken into solution from a given bubble of air depends on its total surface area and the time it is in contact with the water. A diffuser giving a few large bubbles is inefficient because the surface area of these bubbles is relatively small, and the time of contact when the bubbles rise freely is small. Consequently, we use a diffuser which gives a large number of small bubbles so that the surface area is greatly increased and, since the small bubbles rise more slowly, so is the time of contact.

Unfortunately, the smaller the bubbles from a diffuser the greater the resistance to the air-pump. A diffuser giving a large number of very small bubbles, such as the "Spray," has a resistance equivalent to the pressure at a depth of 14 ins. or more, while the resistance of a stone diffuser is roughly 8 ins., and a cane, 3 ins., to which must be added the actual water-pressure at the depth operated.

This resistance is a waste of power, and if it could be avoided more aquaria could be aerated from the same pump. One way of doing this is to use the large bubbles, but to restrict their upward travel so that there is ample time for the solution of oxygen to take place.

The aerator now described works on this principle, as the air is made to form bubbles in water which is lifted into a long tube, and kept in contact with it for some time on its journey through the tube. So the tube aerator supplies oxygenated water, and the large bubbles have done their work before they escape into the tank.

With this method the total surface area of the large bubbles passing through 8 ft. of tubing at a given time, and their time of contact, is comparable to a very efficient diffuser giving a very large number of small bubbles, and

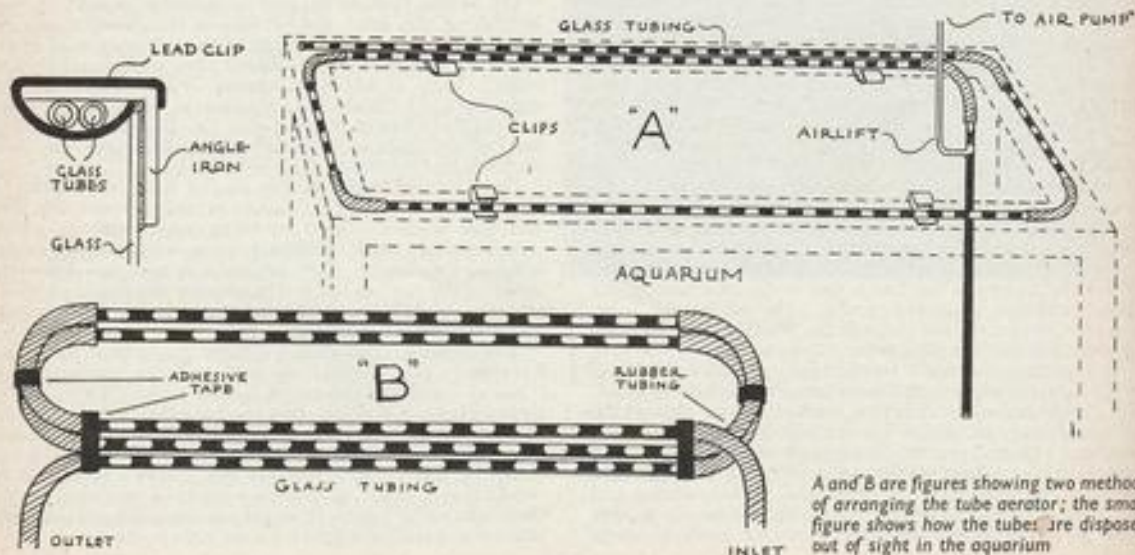
in this case the resistance is very small; not more than 5 ins., including the depth operated.

For a diffuser to be efficient it should be placed in the centre of the aquarium and as deep as possible. This tends to mar the appearance of a well set up aquarium, and many people avoid aeration for this reason alone. The tube system, however, is hidden by the top angle-iron of the aquarium with only its airlift in the water, and that at the rear of the aquarium where it can be screened by plants. Complete circulation from one end of the aquarium to the other is obtained without causing any unpleasant currents, and it allows the sediment to remain undisturbed at the bottom of the aquarium, thus tending to keep the water clear. Eight feet of tubing is required for a 24 by 12 by 12 in. and 12 feet for a 36 by 15 by 15 in. aquarium, and as the bubbles can be passed through the tube at varying speeds with little alteration to the amount of aeration, it is, more or less standardised, both for operation and different size aquaria. This means that where this system is used aeration will be similar in all aquaria, so the fish can be transferred from one to another without any ill-effects.

Straight lengths of 1/8th to 3/16th inch glass tubing are used, joined together with rubber tubing. Smaller tubing than 1/8th is liable to choke with sediment, while larger tubing than 3/16ths will allow the bubbles to slip, reducing efficiency considerably. Small sheet lead brackets half an inch wide and bent to shape with the fingers, hold the tubing. These brackets also keep the glass cover off the aquarium for ventilation. To obtain the best results the depth of the "T" piece, or airlift, should be 4 to 5 inches.

To cut lengths of glass tubing, make a mark at the required place with the edge of a smooth file, grip it on either side of the mark and break it, then smooth off the sharp edges with the file.

Another method of using this aerator is shown in sketch "B." This can be hung or stood at the back of the aquarium, or it may rest on the glass cover boxed in or, again, placed in front of the strip-light on the cover where the bubbles will be seen passing in opposite directions giving a businesslike effect.



A and B are figures showing two methods of arranging the tube aerator; the small figure shows how the tubes are disposed out of sight in the aquarium

Questions and Answers on Breeding

by A. BOARDER

MAY is one of the most important months of the year as far as the keeper of goldfish is concerned. It is the month when all expect or hope that their fishes will breed, and here are some of the questions readers have been asking, and the answers to them.

How can the sex of goldfishes be determined?

It is surprising how many would-be breeders neglect to ensure that they start with a true pair of fishes. I knew one very enthusiastic aquarist who had tried for months to spawn his two shubunkins only to be told by another aquarist that they were two males! It is not very easy to see correctly some types of goldfishes; those which have rather short tubby bodies are sometimes more difficult to see than the more slender kinds. These latter fishes as a rule are plumper in the body in the female, often on the left side of the fish. Much has been written of the easy way to tell the male fish by noting the raised white tubercles on the gill plates and the front rays of the pectoral fins, but this can be misleading sometimes. For instance, in a group of ten half a dozen fishes there may be one or two which show clearly the white spots, but it does not signify that all the other fishes are females. One or two more fishes may develop the white spots in a day or two.

What is almost a sure sign that the fish with the white spots is a male I have heard of some females which show the white spots too, even on the pectoral fins as well as on the gill plates; also I have had my own fishes spawn when none of them show the raised tubercles at all. However it can be taken that if a fish has these marks it is about fifty to one that it is a male.

Will my goldfishes in the garden lily-tub spawn, and if so, at what time of year?

Given a healthy group of fishes of mixed sexes there is no reason why spawning should not be expected if fishes are kept in a suitable pond or tank. They cannot be expected to spawn in a very small tank or in a tiny garden "pond" such as a sunken sink. Often fishes will be reluctant to spawn in a pond which has no shallow part and provision of a shelf will sometimes help the fishes to make a start. Plenty of live food is a great help and garden worms are as good as anything to get the fishes in tip-top condition.

No set times can be laid down when goldfishes may be expected to make a start at spawning but most will do so before May is out. Sometimes conditions are not quite just ideal and then one must have patience and hope that whatever has prevented them from spawning will right itself and produce the desired effect. In the south of England most breeders will have obtained some eggs by the end of this month, and I am sure from experience that fishes which are reared from this early hatching will make the best youngsters. They have the maximum sunshine of the long days in which to feed, and remember that as long as the fry can eat well so will they grow. If you are able to control your spawnings then concentrate on May and June for this purpose; those eggs which are laid later on are not as easy to handle and the resultant fry will not be so large by winter as the earlier hatched ones and will have a harder time getting through the first cold spell.

In order to breed first find your males and females! This photograph shows the head of a male goldfish bearing the pimple-like tubercles on the gill-cover, a fairly reliable guide to the sex of the fish



Photo: L. E. Perkins

I have two pairs of goldfishes in my pond—can I hope to breed a fair number of fishes from these parents this season?

One healthy true pair will give you all the fry you are likely to manage unless you are lucky enough to have almost unlimited space, for believe me, the space question is by far the most important one as far as the success of rearing many youngsters is concerned. You can easily work out how many fishes you are likely to rear by doing a little arithmetic. I will deal with fry up to the size of an inch over all. You will require twenty-four square inches of surface area to each fish and so you can see that a tank of 24 ins. by 12 ins. by 12 ins. will house twelve young fishes. You will be very fortunate if you can rear more than this in such a tank.

The depth does not make much difference. As long as there is water about three inches deep the fry will probably do better in such a shallow tank than if it were twelve or more inches deep. This disposes of the old formula which gave a gallon of water to each inch of fish. This can be seen a useless rule by putting your gallon of water in a receptacle which is bottle shaped with a tiny surface and then pouring the water out into a large shallow dish. The latter is likely to enable you to raise very many more fry than you would have done in the tall narrow container.

Do you advise placing goldfish eggs in warmed water to accelerate their development?

The method of hatching eggs can be a very important factor with regard to the number of the fry which hatch and also their quality. Where show specimen fishes are concerned I have found that a too rapid hatch produced many poor types of fry and many misshapen ones as well. I will not go into the probable reasons for this, but take my word for it, I have found it to be the case. On the other hand, a prolonged hatching, say, over a week, will not always give you as many young, for it must be realised that there are often very many pests of various kinds in the water plants which hold the eggs and these have a longer time in which to destroy eggs.

Water snails are only one of the pests which may eat many eggs but there are others which are so small as to be almost invisible to the naked eye. I am of the opinion that a four day hatch is the best one to aim at, and this can be obtained by providing the eggs with a temperature of about 70° F. Up to 75° is not harmful but over this I do not

recommend. As the temperature decreases so the time of hatching increases until a temperature of 60° F. will give a seven or eight-day hatch. You have no need to try to maintain this temperature at one level as I have found that the water can vary as much as ten degrees either way by day or night without it having a bad effect on the results.

If you have taken the eggs from where they were laid and are hatching them by themselves (an excellent plan), then see that a scum does not remain on the surface of the container. This may interfere with the fry when they are first free-swimming, for they come to the surface of the water to take in a little air. Whether this is to fill the air-bladder or not is questionable, but they do actually come up to the top as I have witnessed this myself on many occasions.

What do very young goldfishes feed on ?

Undoubtedly the best food for the fry when they first start to feed is some form of algae or Infusoria. I consider that water taken from a pond where the adult fishes are kept is ideal for this purpose and the greener it looks then the better. I find that this is invariably safer than using Infusoria which you have cultured yourself. Cultures are often inclined to become very foul, for the results of myriads of Infusoria living and breeding in a small container of water can be realised quite easily. This foul water, if introduced into the fry tank, can cause trouble. Even if one screens it so that the screen only is washed in the tank, although this is a better method, I am sure that the use of pond water only for the first week will give the best results as long as the fry have plenty of room. Do not feed the fry until they are free swimming, which will be in about a couple of days according as to whether the water is warm or not.

Do not try to feed with dried foods for at least the first week, and when you do start see that the food is always soaked first whilst the fry are still young. It does not need much imagination to realise how the dried food must swell up inside the fry, and when you consider how very tiny they are in the early days it can be well understood how distended they will become and how difficult it will be for them to digest the food. It is very unlikely that any fry in their natural state eat any form of dried food in their early days; so if you try to imitate the natural ways it will be found beneficial. You must realise though that as the fry grow so will they be able to take larger foods. It is up to you to provide these as fry are greedy things and will always go for the largest pieces of food first.

Can you tell me the points necessary for a goldfish to be considered a good specimen ? I have lemon and yellow fishes—are these valued more than plain red ones ? Are black markings desirable ?

If you are keeping goldfishes for pleasure alone and do not wish to show them at all then it does not matter much what colour they are; it is a matter of individual taste. The black and gold ones will probably all turn one colour and the black will gradually disappear. All young goldfishes are partly black at an early age. When very young they are bronze in colour and as they develop they gradually change colour to red. The first change is that the belly starts becoming paler; this paleness spreads up the sides of the body towards the back or dorsal fin. As the lower part gets gold so the upper parts become quite black. Even when the lower part of the fish is red the black will still remain for some time on the back, dorsal fin and tail. It then gradually clears away until all the black has disappeared. Occasionally a fish will develop some black patches on the body at a later age and where this happens it may persist.

For show purposes an all-red fish is the most desirable, and the colour required to comply with the standards for the common goldfish is a rich warm red. As this is the most

difficult to obtain, this type will obtain the most points for colour. Points are also given for the shape of the body. This should be of good clear curves, starting from the nose and curving up and over the back down to the tail in one long unbroken sweep. The "snouty" look when the curve dips in front of the eye giving the fish a perch-like appearance is not desired. The body should be well rounded, but not tubby like some of the fancy types of goldfish. The fins are also pointed by the judge; you will find that the dorsal and the caudal or tail fins are those which are more likely to be of a bad shape.

The dorsal should be full and firm, held erect, and should not show any tendency to flow or droop. The tail of the common goldfish is not large and is just rounded at the ends. It must not be too large or flowing and many owners are often disappointed at a show because their fish is overlooked by the judge when it had "such a lovely flowing tail." The first pair of fins just under the gills are the pectoral fins, and the second pair is the pelvic fins. These are not likely to vary very much. The next fin to the rear is the anal fin. This does not vary a lot in size and shape as a rule but it must be single in the common goldfish.

If your fish has two anal fins, which sometimes happens, this is probably due to the fact that the fish has been bred from some parents which have more or less blood from fancy fish such as fantails, veiltails or moors. These must have paired anal fins for show purposes, but in a brood of youngsters from show specimens there are often many young which have not the paired anal fins. Whilst many others have the paired anal fins they are without the paired caudal fins which are desired. So many fishes which are throwouts from fancy stock are bred from that it is no wonder that it is seldom that one sees a near-perfect common goldfish, even at the larger shows.

My aquarium fishes have taken very well to one dried food. Is it necessary for me to vary their diet at all ?

Yes! If you have a few fishes in an indoor tank then do remember that they like a change of food now and then. I have found very few eatables that goldfishes do not like, and it has been said they will eat anything that a pig will eat. Having said this it can easily be realised that to enumerate all the possible foods for your fishes would fill a page of this journal! All types of live foods are readily accepted by goldfish and among these are:—small garden worms, white worms, *Tubifex* (well washed and cleansed), gentles, flies, wasp grubs, woodlice, wireworms, meal-worms, live ant pupae, frog tadpoles, caddis fly larvae, mosquito larvae, glass worms, crane-fly larvae, some of the smooth caterpillars, and, of course, the well known *Daphnia* or water fleas.

This list could be added to, but I think that I have named enough to show what a variety there is if you care to search for it. Counting in dried foods gives a much greater number, and all the various types of cereal foods can be used as well as many baby foods. I think it is advisable to soak these foods for fish which are no larger than two inches in length.

Does the water in a goldfish tank need to be changed at all ?

If your fishes are contained in a rather small container without many water plants then it is advisable to replace some or all of the water nearly every day. I have known goldfish kept healthy for many years by this means. It is only when you have a fairly large tank that is well planted with growing water plants that you can leave the water unchanged for any length of time, and (I must only whisper this), many old hands at fish keeping would have less trouble with their fish if they changed some of the water more frequently.

Nile Aquarium Novelty

by A. FRASER-BRUNNER

IN the lakes and marshes which lie on either side of the Nile may be found a species of shrimp or prawn which looks very much like the ones we know from the seas around Britain; that is to say, it is a decapod crustacean. Because of the difficulties still surrounding the marine aquarium few people have the opportunity to keep decapods at home, for the only freshwater species found in this country is the crayfish, which is rather large, and needs running water if it is to thrive very long. So when my friend George Allan showed me these dainty little shrimps living peacefully with small fishes in his tropical tanks in Cairo I thought this would be something worth introducing to friends at home. When I left Egypt Mr. Allan generously gave me some of these little fellows along with some other things, and they were duly installed in my tanks.

Community Tank Specimens

They are quite small, none that I have seen exceeding one and a half inches in length, not counting the very long, fine, but surprisingly strong antennae, and people unfamiliar with them have difficulty in seeing them at first, because they are very transparent. They are generally active, rummaging in the sand for pieces of food, and often appear to be juggling with grains of gravel; no doubt they are excellent scavengers. When swimming they hold themselves in a nearly straight position and glide fairly swiftly through the water. They can be kept in a community tank with fishes provided the latter are not too large—they get along very well with mollusks, neon fish and the like; they even held their own against some barbs until the latter were about two and a half inches long, when the shrimps began to disappear (though this is ahead of my story, for by that time I had bred them).

For breeding, as with most other things, they need a separate tank, for the young would certainly be regarded as food by fishes. It took me some time to find just the right conditions for them, and I lost some through experimenting with temperatures. They do not like too much heat, 90° F. being fatal if maintained for long, but can stand temperatures as low as 55° F. if not too sudden. The ideal temperature seems to be 80°. They need hard water, in order to utilise the calcium salts for the formation of their armour. They like fine-leaved plants such as *Fontinalis gracilis* and some filamentous algae like *Vaucheria*, as this traps scraps of food and they spend a large part of their time exploring it, assuming all sorts of odd positions. Feeding is easy, as they will accept prepared dried food such as Derham's "Elite" or "Bristam," though fresh food such as *Tubifex* cut into very small pieces is appreciated, as well as young snails crushed.

Eggs in a Pouch

In fact they are scavengers, but they do not eat their eggs, because these are carried about by the female in a pouch between the hind pairs of legs or "swimmerets." At first they are transparent, but as the embryos develop they get darker, and can then be counted fairly easily; there are not usually more than fifty, sometimes as few as twenty. From time to time the female will be seen to shake the egg sac vigorously between the limbs to aerate them, and



Female *Caridina nilotica* carrying eggs

she does this frequently as the time for hatching approaches. Many decapod crustacea have young stages quite unlike the parents, which undergo a series of transformations in the surface layers of the ocean before settling down as crabs or whatever they may be. If this were the case in *Caridina* the rearing of the young in the aquarium would be difficult indeed. Fortunately, however, these babies, when they hatch, are almost exactly like mother, though only two millimetres long. It is advisable to introduce some Infusoria into the water when the increased shaking of the parent shows that hatching is imminent, otherwise a little powdered egg or very fine dried food should be used.

The youngsters grow very rapidly, however, doubling their size at each of a rapid series of moults during the first few days, so that after a week they may be half an inch long, and have long since been sharing food with the bigger ones. After that they grow more slowly, though of course still in "jerks" marked by the moults.

Festival Exhibits

If the light in the tank is kept on until midnight it will be seen that they get very active about that time, swimming continually round and round the aquarium; this seems to be in response to some inherent rhythm the origin and function of which is not clear. These interesting shrimps are being shown, probably for the first time in Britain, at the British Aquarists' Festival, and after that I shall pass on some breeding specimens to capable aquarists as a first step to making them available to the hobby in general.

Easy to Make:—

DAPHNIA NET FILTER

WHERE *Daphnia* flourishes one is sure to find the enemies of it: beetles, water spiders, and dragon-fly larvae, for instance. Also present may be blanket weed, snails, duckweed and other matter we do not wish to introduce to home aquaria. The gadget described here will eliminate these nuisances at the source.

Bend the shank of a net frame into a swan neck close to the net. Cut a circle of one-eighth-inch mesh net to cover and overlap the frame opening by two inches. Stitch or machine a half-inch hem around the material, and through the hem pass a length of strong elastic tape half an inch shorter than the circumference of the frame. Stitch the tape ends and hook it over the bend in the handle. Now you have a shield that will slip over the net frame and will save time, trouble and much wear and tear of the flimsy *Daphnia* net.

J. Laughland



A page for
the beginner
contributed
by

J. P. VOLRATH

NO aquarium is complete without water plants. Two plants that are excellent to begin with are *Egeria densa* and *Vallisneria spiralis* variety *torta*. The former has rather brittle stems surrounded by whorls of simple leaves which form a mass up to 1/2-inch in diameter. *E. densa* is usually propagated by cuttings. Attach a small lead weight to a few stems and allow them to sink to the bottom of the aquarium but do not bury them in the compost or they will decay. Shortly roots will appear from the bottoms of the stems and will grow into the sand.

Planting Hints

Vallisneria is a smaller plant consisting of several leaves like twisted green ribbon, and numerous white roots. The plants reproduce vegetatively by runners in much the same way as strawberry plants. Young plants, two or three inches high, should be planted so that the roots, to which weights may be attached, are just covered. Do not cover the leaf bases or they will not thrive.

Plant the back and ends of the tank fairly thickly, but leave a large space at the front of the aquarium for the fish to swim freely in. The appearance of the aquarium will be improved if a clump of plants hides each of the back frame uprights. Too few plants may help the water to turn green, but it can be cleared temporarily by adding *Daphnia* (in the absence of fish). You will remember that last month we said that the compost or sand should slope down to the middle of the front so that the sediment settles there. A couple of small plants near the glass and just to one side of the centre will do much to give the aquarium a pleasant, informal appearance. You would be wise to do without rocks or stonework until you have had a little more experience. Avoid china monstrosities, such as gnomes and underwater arches, like the plague.

Your Fish

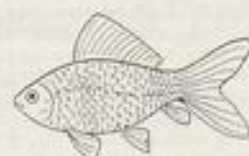
The goldfish is a very good fish with which to begin fish-keeping. Two varieties in particular commend themselves—the common goldfish and the shubunkin. Fancy varieties, including the shubunkin, are tending to oust the common goldfish from favour. Young goldfish hatch out dull black in colour and assume their adult colouring at varying ages. The fish often seen with an attractive red and black pattern will eventually lose the black and become all red. The common goldfish exists in many different shades of red, but a deep, rich red is usually favoured on the show bench.

The shubunkin is more popular than the common goldfish to-day. It is a very beautiful fish, the better specimens having many different colours. Blue is the most sought after ground colour, but red, black and orange are seen in most shubunkins. Pink fish with black eyes are often sold in dealer's shops as shubunkins. They occur frequently in some strains but are best left alone.

The best way to buy fish is to visit an amateur breeder (preferably by appointment), who will probably have some

healthy fish, which do not come up to show standards, for sale at a reasonable price. Do not buy a totally uncoloured fish, or one of either of the varieties mentioned, less than two inches long at this time of the year, unless you buy some of this season's fry.

You should know how to tell whether a fish is in good health or not. The following points will help you. A healthy fish will: (i) carry its dorsal fin (the one on its back) erect and well spread out; (ii) have a clean, smooth appearance. Its scales don't stick out and its body isn't "flaky"; (iii) have bright, well matched eyes; (iv) swim evenly, effortlessly and on an "even keel." An unhealthy fish will appear listless and its fins will not be erect. The drawings here will show you the general appearance of healthy and unhealthy fish.



A HEALTHY FISH.



AN UNHEALTHY FISH.



VALLISNERIA
SPIRALIS
V. TORTA.



EGERIA
Densa.

A Good Live Food

Small crustaceans called *Daphnia* are an excellent food for fish and if you know of a pond in your district see it contains *Daphnia*. If not it will be well worth your while introducing *Daphnia* there now. They appear as reddish, moving cloud near the surface of the water and be caught with a fine net.

Definitions

Here two terms used frequently by experienced fish keepers are explained for you. **FINNAGE**: all the fins of a fish, including the caudal fin or "tail"; or the development of the fins. **RUNT**: A fishy ne'er-do-well; a stunted fish which inexplicably refuses to grow well and is useless for breeding. Few runts survive their first winter.

Next month we will discuss setting up a tropical aquarium and some more fish foods.

THE AQUAR

AQUARIST AT HOME:

Mr. G. Mollard (RADCLIFFE)

Interviewed and photographed by JAS. STOTT

MY visit to Mr. G. Mollard, of Radcliffe, Lancashire, was made in February, and the weather on that particular day was typical of the month. If Radcliffe possesses any dykes they must certainly have been snowed out! However, upon entering the fish house of the well-known Lancashire aquarist the weather outside was forgotten under the pleasant influence of the fluorescent lighting situated well up against the glass-paned roof, and the warming effect of the house temperature and the tea and cakes provided by Mrs. Mollard.

Space-heated House

The fish house is 18 feet long by 6 feet wide and is heated by hot water pipes which are fitted low down along each side. The boiler supplying the hot water to these pipes is situated in a small brick structure built close to one end of the fish house and heated by gas. Temperature is thermostatically controlled by a gas thermostat in the fish house.

There are twenty-four tanks ranging in sizes from 24 ins. by 12 ins. by 12 ins. up to 54 ins. by 15 ins. by 15 ins. The staging for these is uniform throughout and is made from



Two useful corners in the fish house—left, a microscope always at the ready, right, a copacious square frame net

2 1/2 inch angle-iron, taking the tanks in two tiers. Staging and tank frames are painted a light shade of green. Tank heating is by immersion heaters controlled by outside fitting thermostats. Although the fish house is fitted with fluorescent lighting this is used mainly for illumination of the premises when it is desired to work therein during the darker evenings. No artificial lighting is used directly over the tanks. Mr. Mollard prefers natural light for this purpose.

Aeration is supplied to all tanks from a pump operated continuously, twenty-four hours per day in winter but sparingly in summer. Mr. Mollard is a tropical enthusiast and has had fifteen years' experience of fish keeping. I asked him if he had any advice to give beginners about the running of a fish house. He said "Absolute cleanliness of fish house and tanks; the keeping of complete records and a beginning



Mr. G. Mollard in his well-appointed fish house. Show award cards form a roof span display

with good quality fishes". . . . He also suggested that beginners, if they have not already done so, should join their nearest aquarists' society as soon as possible. Mr. Mollard is a member of the Manchester Aquarists' Society at Belle Vue and also the Bolton and District Society.

Fish Stocks

This aquarist's fish house is certainly clean and exceedingly well kept. The tanks were also clean with the fishes and plants in good condition. Most species of livebearers were to be seen. One tank contained some nice tiger barbs, and in others could be seen mountain minnows, harlequins, head and tail-lights, black widows, *Hyphessobrycon rosaceus*, neons, angels, penguins and a few scissor tails.

Regular breeding of angels is carried out by Mr. Mollard. He has a fine breeding pair which is two years of age. One tank contained a grand lot of youngsters about two months old whilst in another could be seen newly hatched angels adhering to an Amazon sword plant leaf with aeration playing along the leaf and fry. Tiger barbs are also something of a speciality with Mr. Mollard, who has had frequent spawnings.

Honorary Degree for Mr. Innes

FEW aquarists are unacquainted with the name of W. T. Innes, distinguished American fish-culturist, Editor of *The Aquarium* and author of books on the hobby, and his numerous well-wishers over here will be pleased to learn that he has recently had conferred on him by the Temple University, Philadelphia, the honorary degree of Doctor of Humane Letters (L.H.D.) of that University.



Close-cropped grass banks sloping gently downwards make a fine surround for a pond. In the Hertfordshire pond above the formal outline has been disguised by rocks placed around its top ledge to meet the grass, and paving flags, normally reserved for the formal pond, have been successfully included by placing them irregularly in front of a rock garden. Their projecting edges offer shade for the fishes in summer



Garden Ponds—

Photographs by

CAN the desires of the practical aquarist wishing to breed some fishes out of doors and those of the keen gardener who wants to include an ornamental pool in his garden, be reconciled? Most certainly, as the pond pictures on these pages demonstrate. The ponds are all examples of careful thought given to garden layout before the



A grand effect can be given by incorporating very large pieces of natural stone in the pond surround as in the one pictured in a North London garden on the left. Rushes, out of place in a strictly formal pool, form another type of edging at the left of this informal pond photograph. The sheltered and placid water encourages splendid and water-lily blooms and plant growth





Formal and Formal

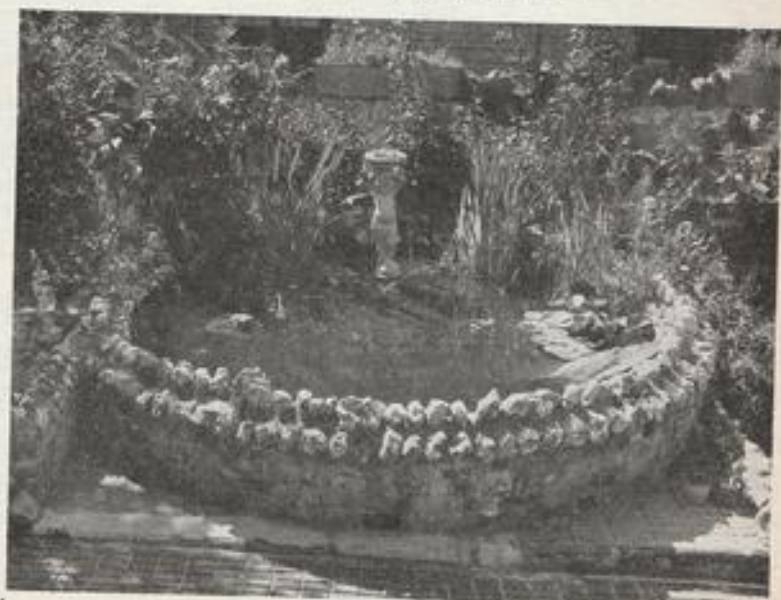
by TERA JOEL

work is commenced. All blend fittingly with the background; all are functional—if not all adapted for breeding purposes they are all capable of sustaining fish life—as well as being decorative. Large country garden and small suburban plot alike are improved by well designed ponds.

At the top of these pages a large circular pond set in a low-walled sunken garden is shown. Without pretence of natural appearance it can include a central ornamental fountain and its edges need no disguising since they are surrounded by regularly-laid paving stones. This circular sunken region is arranged centrally in a large garden and is approached from a central path joining the steps shown



A formal sunken pond forming an attractive foreground to the front lawn of a Surrey cottage. Its edges are stepped and a large rock is set in the middle. By stepping the depth suitably such a pond can be used for goldfish breeding. Below is shown a small pool from a Sussex garden as an example of a type that would fit in a small garden with a few natural amenities



Plant Propagation in the Rock Garden

by ————— W. E. SHEWELL-COOPER

MANY keen amateurs like to propagate their own plants. They buy, shall we say, a rather dear variety and hope to be able to increase its growth. The writer has received a number of queries from readers on this interesting subject and it may save a good deal of correspondence if the whole question of propagation is dealt with in a simple way. After all, the average life of an alpine in this country is about five years so we must propagate or lose our plants!

Plants may be propagated, on the whole, in four ways: firstly, by seeds, secondly, by division, thirdly by cuttings and fourthly by layers. It is very helpful in propagation to have a brick frame which faces north. It should be well built and sufficiently deep so that there can be about 8 ins. of drainage material below, about 2 ins. of roughage or horticultural peat and then about 6 ins. of pure silver sand. It is in such a frame which keeps cool and doesn't dry out so quickly, because it faces north, that the cuttings can be struck and the young plants can be placed. At Thaxted Horticultural Training Centre, we often plunge the boxes up to their rims in the sand and thus they take less room. It is only necessary to put the lights in position if the weather is very wet in the summer, and even then wooden blocks should be put underneath so that they can be lifted to allow ventilation. Of course, during frosty weather in the winter you must keep the lights closed, as a rule.

The great advantage of raising plants from seeds is that they will be healthy and vigorous and there are a number of first-class seedsmen who offer choice seeds in packets ranging from 6d. to 1/6. Most perennial alpine will bloom during the first season if they are sown sufficiently early. Some have tried sowing the seed in some bare spot where the plants are to grow and this is often successful. Others prefer to sow the seed in pots or boxes and put the plants where they are to grow later. Seed sowing is a grand method of acclimatising imported stones and a good way of raising new varieties.

Rock Garden Annuals

There are a number of annuals which are very suitable for the rock garden. There's violet cress, which is a lovely little carpeting plant that seems to scramble about to cover all the bare spots in a rock garden, producing numerous violet flowers and baby green leaves. It is a very useful plant for a shady spot. The *Leptosiphon* is much used on the sunny side and produces bright little blooms ranging from yellow to rose pink, though I have seen some that are blue in colour. It is only necessary to sow a pinch of seed and to sprinkle this over the area chosen as one would add salt and then to rake the seeds in ever so lightly. Most seeds are very tiny and can hardly be buried for that reason.

If seeds are sown in March, then the plants should be ready to put out in the early autumn. I prefer however, to sow about midsummer and then the alpine can be set out in their flowering positions the following spring. You can, if you wish, sow the seeds in a bed with a western aspect, providing it is sheltered. The earth has to be made friable: a certain amount of silver sand should be worked in plus horticultural peat at five or six ounces to the square yard. The seeds are then sown in shallow rows six inches apart and

are covered with a little silver sand or with a thin layer of sterilised soil.

If the weather is dry, it may be necessary to water the soil through the fine rose of a can; metaldehyde bait must be put down if slugs are a nuisance. Most alpine seeds are slow germinators and some gardeners therefore sow a few mustard seeds in the rows in order to mark the rows. This allows hoeing to be carried out long before the alpine comes through the earth. If you sow in pots these should be crocked to about a third of their depth, the crocks then being covered with peat, over this a compost should be placed consisting of two parts good soil, one part of horticultural peat passed through a quarter-inch sieve and one part of coarse silver sand. It is always possible to sterilise this by pouring boiling water over the soil and then waiting two days before sowing the seed.

Divide After Flowering

When propagating by division, this work should be undertaken immediately after flowering, the clumps being broken up into small pieces with roots attached. If pots are used these should be placed in a cold frame for two or three days before being plunged. With various *Dianthus* and *Phlox* many of the stems will be found to be rooted and these rooted pieces can be severed and potted up. *Androsace* send out runners like strawberries. In the case of *Senecioium* and some *Saxifrage*, the rosettes die after flowering, but a ring of young rosettes is left behind.

New young shoots are used for cuttings, the best time for taking them being just after flowering. The cutting should be from one and a half to two inches long as a rule and they may then be pushed into the damp sand in the frame an inch or so apart. Or, of course, the rooting may be done in pots, the cuttings being put firmly around the edge, before watering in. The pots should then be set into sand in a closed frame which should be aired for about half an hour each day and shaded from bright sunlight.

Layering is usually done in the autumn and is generally used in the case of *Daphne*, *Rhododendron* and *Erica*. A branch near the ground is chosen and this is cut almost through with a long slanting cut. This cut should be kept open while the branch is pegged down firmly into a heap of sandy compost. When rooted, the little branch can be severed and the layered portion can be moved a month or two later.

Salvinia and Riccia

MANY aquarists have both these floating plants in their tanks and they both do well where there is good top light and a humid atmosphere. *Salvinia* spreads out over the surface, however, very rapidly, the result that the clumps of *Riccia* are eventually put underneath the mat of *Salvinia*. This usually means the *Riccia* begins to die off. To prevent this fate for a long time the *Riccia* should be put inside a large six-inch square glass feeding ring where it will be safe from *Salvinia*.

Raymond Y.

THE AQUARIUM

Black-banded Sunfishes Arrive

An attractive American fish that has recently appeared here again and deserves attention from serious breeders

THERE was a time, in the early days of tropical aquarium keeping, when the black-banded sunfish was called the "poor man's angel fish," because it has a certain resemblance to the well-known cichlid, which at that time was an expensive novelty. Nowadays, it is likely that an angel-fish would cost rather less than the subject of this article, due to intensive concentration on breeding the former and corresponding neglect of the latter.

The black-banded sunfish is a member of the family Centrarchidae, to which all the American sunfishes and black bass belong. Most of these can be kept in coldwater aquaria, and a few can even be bred in outdoor ponds in this country, but the daintly little *Mesogonistius* is not so hardy as the rest and should not be expected to winter out of doors. It is usually kept as a tropical and is in every way more satisfactory when treated as such.

It is a small species, seldom exceeding three and a quarter inches in length, aquarium specimens being purchased when about one inch long. In the wild state it is found mainly in the Delaware River system, from New Jersey to Maryland, in very acid waters (pH 4.0 to 5.0). Breder has reported (*Zoologica* vol. XXI (1), N.Y. Zool. Soc.) that it will not thrive in water of pH 6.5 and upwards, but in this country they have been known to breed in much harder water than that. Nevertheless, it is well to give them the conditions which suit them best, so it is a good idea to place a layer of peat beneath the sand in their aquarium, this serving to keep the water more acid than usual. A two-foot tank is ideal for a pair, and it may be thickly planted, for this little sunfish does not uproot plants, nor is it very pugnacious.

Breeding is done in the manner usual for sunfishes, pits being dug in the sand, cichlid fashion, though changing from one pit to another is not often seen. Occasionally nests are dug in algae or other carpeting plants. A water depth of twelve inches seems to be preferred.

Unlike most fishes, it is the female which intensifies her colour at spawning time, the male growing paler and all but losing his black bars. Normal colouring is black markings on a darkish silver ground, the ventrals being prettily edged with orange and black.

Subsequent to preparing the nest to his own satisfaction, the male seeks out the female, who spends her time out of harm's way, and after quivering and showing off before her, escorts her to the nest, when she shows her willingness by



Photo: W. S. Pitt
The black-banded sunfish is best treated as a "half-hardy" and kept in warm water tanks

preceding him. The eggs are deposited with the pair hovering side by side over the nest, their bodies slightly inclined outwards, abdomens practically touching, and after this, in true sunfish manner, the eggs are guarded and the youngsters raised with care. The eggs take two days to hatch, and frequently several spawnings occur at short intervals.

Strictly carnivorous, the black-banded sunfish can rarely be persuaded to take prepared food of any sort, but thrives upon *Daphnia*, bloodworms, white-worms, small earth-worms, etc. and eagerly snaps up *Cyclops*, small water beetles, and other creatures frequently regarded as tank enemies under other circumstances, much as the larger members of the family eat *Dytiscus* and dragon-fly larvae with gusto.

Babies, if you are lucky enough to raise any, should be brought along on *Infusoria*, screened *Daphnia*, and so on.

Sexes are almost impossible to distinguish except at mating time, when the coloration shows the variation referred to above, and the spawn is seen clearly in the body of the female.

The black-banded sunfish is a perky, spirited little fellow and quite harmless, carrying himself with a dignity all his own. Though not seen so frequently nowadays, specimens are still to be had, and are well worth the little trouble in obtaining them and providing for them.

Twenty-Five Years Ago

(In May 1926 the first aquarium exhibition ever to be staged in Britain was being planned by "The Aquarist." The event had been hinted at in the issue of the journal preceding the one in which the following appeared).

AQUATIC EXHIBITION

THIS is the matter "of much interest and some importance" at which I hinted in the last issue (wrote the Editor). The scale on which it is run must depend on the assistance given, but what I have in mind is a competitive show lasting three days with awards (medals, ribbons and certificates) for—say, the best fish ("tropicals"

and otherwise) in various classes, the best pond-life exhibit, the best display of aquatic plants and the best representations of a "balanced aquarium." I think that the primary object of such a show should be to demonstrate to the public how an aquarium may be made to accommodate fishes in beautiful and healthful surroundings without artificial aeration or changing of water.—From *The Aquarist*, May, 1926.

The "Home Aquarium Exhibition" was held in September that year, in London, with judges from the London Zoo aquarium and reptile house, and our Mr. Fraser-Brown as curator. Despite "several failings" about which much was heard "from those who were wise after the event" the Exhibition attracted much public notice and "proved quite a success."

News and Reviews

HOLLAND

A SURVEY of Holland to elucidate the distribution of indigenous reptiles and amphibia resulting in 1,055 reports from hobbyists and the Dutch Forestry Commission was given prominence in the January issue of *Lacerta*. In a summary of the third report of the survey it is said that owing to the near extinction of some species direct protective action should be taken for *Salamandra salamandra taenata*, *Lacerta muralis* and *Emys orbicularis*.

February's *Lacerta* opens with an article on newt-keeping in winter. The author advises keeping newts in aquaria as long as the temperature is sufficiently high and water plants, such as *Elodea* and *Myriophyllum*, are present for the newts to rest on when at the surface taking air, whilst floating cork mats should be in the tank for when they wish to leave the water altogether. In the absence of these, drowning of the weaker species is inevitable. Feeding has to be continued until the temperature goes down to about 35° F., when hibernation commences. A sure sign of under-feeding is the shrinking of the tail.

Amongst the world's oldest reptiles is the iguana-resembling *Sphenodon proceratus*, a lizard formerly in abundance in New Zealand but nearly extinguished by collectors of these "living fossils." Showing features of reptiles and amphibians past and present, these lizards are now protected on the islands and rocks of Plenty Bay on the north coast of New Zealand, where an observer who writes in *Lacerta*, thinks they are slowly dying out entirely.

One of the reptiles forming a link between the herpetofauna of South Europe and North Africa is the lizard *Blanus cinereus*, found mainly in the Iberian peninsula. Little is known about this blind, subterranean-living snake-like lizard, and they may be oviparous or ovoviviparous. They live on worms, larvae, ants and soft-skinned insects.

A PART from the well-known regard in which Siamese fighting fishes are held in their home territory for fighting contests, they are also valued for their part in malaria control. A single *Betta* can devour between 10,000 and 15,000 infected gnat larvae in a year, says the writer of a review of this fish in the February *Het Aquarium*. The natural span of life of the fighting fish is short, not much greater than two years, although by special arrangements they have been kept for four years in the New York Zoo aquarium.

In a serial article "Aquarium Architecture" the propagation of *Cryptocoryne* is discussed; the writer uses well rinsed and boiled peat litter covered with well-washed coarse sand and gets very good growth. Arrangement of rockwork for show tanks is also discussed and illustrated.

About 320 healthy young white cloud mountain minnows, far better in colouring than any aquarium-bred specimens, were the result of breeding parents in the ratio of one male to each three females in an outdoor pond; according to the aquarist who made these experiments it is possible to breed neons, barbs and labyrinth fishes in outdoor ponds.

In "Letters for Beginners," the following varieties of fish food are recommended: for vegetarian fishes such as the livebearers, feed sparingly, biscuit or cake crumbs, or soaked oats and plenty of algae or boiled spinach. For most fishes scraped raw meat, raw or boiled fish, hard-boiled egg yolk, fish roe (with care not to overfeed), grated dried liver or heart, small flies, spiders or gnats are a welcome change from the *Daphnia*, *Cyclops*, *Tubifex* and white worm diet.

W. J. VAN DER KOLK

SWEDEN

THE popular Editor of *Aquarist* has recently returned from the British West African colony Gambia. The purpose of his visit was scientific research, the main interest being the lung fish, *Protopterus annectens*, and a relation of the pike family, *Polypterus senegalus senegalus*, both natives of the waters, or rather marshes, of that country. A couple of six-inch long lung fish and 62 of the pike type survived the journey to Sweden. The transport of fish from a tropical temperature to one considerably under freezing point within five days is not accomplished without a great deal of trouble and anxiety. Much to the editor's regret, none of Gambia's largest pike type *Polypterus bichir lapradii* survived, nor did what is considered the country's most beautiful fish, *Aphyosemion*.



Polypterus senegalus, a tropical introduced to Sweden from Africa

The secondary fish, from a scientific point of view, which arrived safely are *Barbus gambiensis*, four *Ctenopoma kingsleyae*, or climbing fish, so called because of its ability to leave the water and move about on the marshy land, and a couple of the Mormyrid family, *Marcusenius thuytii*. This group is peculiar to Africa and is easily recognised by its small eyes, fleshy cheeks and tapering tail. Of the three fresh-water crabs which arrived only one is now alive. This has grown and has changed its shell once. A tortoise, probably *Ameyda triunguis*, finishes the list.

The dwarf cichlids seem to be more and more popular. A series of articles on those interesting fish is promised for later publication. In a short introductory article the prominent and successful breeder, Mr. Helmut Pinter, points out that the greatest number of dwarf cichlids are to be found in the *Apistogramma* genus. Most of them are natives of the larger South American rivers, from British Guiana in the north, to La Plata in the South.

Several species inhabit the same stretch of water and as a result of interbreeding, types are found which are difficult to identify. An exception is *Apistogramma ramirezi*, whose home is in Venezuela, from the district which lies east of the Andes. The other dwarf cichlid genus is *Nannacara*. Practically the only two types known to aquarists are *Nannacara taenia*, from the Amazon district, and *Nannacara*



Photos:

Paul Jacobson

The lung fish, *Protopterus annectens*—one of the two survivors of the consignment



Photo: Paul Jacobson

A beautiful little African barb—*Barbus gambiensis*

anomala, from British Guiana. It is doubtful if the former is to be found to-day in any aquarium. In a later issue the different species will be described in detail.

In March, the 25th anniversary of the Stockholm Akvarieförening was celebrated with lectures and dinner and dance. A wonderful colour film of *Haplochromis multicolor* mating and breeding was shown. The female was shown carrying the eggs in her mouth, and later, the young were seen leaving her mouth and taking refuge there when frightened.

MORTEN GRINDAL

U.S.A.

CONSTRUCTION of a \$6,500,000 aquarium at Coney Island has been put aside because of anticipated shortages of materials and man-power, Fairfield Osborn, president of the New York Zoological Society, said in a recent speech before 1,500 members and friends attending the society's annual meeting. This announcement came just as the society was beginning a campaign to raise \$3,250,000, its share of the cost of the new aquarium. A similar sum was to have been put up by the city.



The Calflex Heater; supplied by South Western Aquarists, 2, Glenburnie Road, Trinity Road, London, S.W.17.

THIS heater, with its completely flexible element, is a new aquarium equipment departure. Consisting of a single loop of nickel chrome heating wire (six feet or so in circumference depending on wattage) it is covered with plastic insulation of very high electrical breakdown strength. This covering is chemically inert and since it is unaffected by conditions varying widely from normal aquarium working conditions it is completely innocuous in

The plans for the aquarium had been in preparation for five years and thousands of man-hours had been spent on them. Christopher W. Coates, curator of the aquarium, had lived with the project, working out details with the architects. Jubilantly the society announced the ratification (of the contract covering construction, equipment and administration of the new institution) in the November-December 1950 issue of *Animal Kingdom*, the society's bulletin. The city spent \$800,000 to acquire a twelve-acre site at the east end of Coney Island.

Even though it will not be built now the society's members at the meeting got an idea of what the aquarium is to be like. A twelve-foot model of the curved, modern building was on display and over it were hung three large paintings by Carl Burger depicting scenes that will be typical of the exhibits. One panel, sixteen feet wide and twelve feet high, showed sea elephants, sea lions, porpoises and penguins as they will appear in one of the huge outdoor tanks, and two smaller panels showed a West Indian coral reef and a tank of sharks and rays.

JOHN O'REILLY

(New York Herald Tribune)

REPTILES AND AMPHIBIA

INTEREST in herpetology is increasing now that a greater selection of reptiles and amphibians is available, and the British Herpetological Society is, fortunately, now well-established and prepared to guide beginners and arrange organised investigations of the many problems in this field. From the contents of the *British Journal of Herpetology* (Vol. 1 No. 4, December 1950), the official organ of the Society, it would seem that the original ideal, to study chiefly British specimens—few though these may be, has not been capable of realisation; foreign species win hands down in percentage of mentions in the *Journal*, but no one should quibble about that. There are two main papers, illustrated with line drawings, an anatomical study of snakes and a review of the use of amphibia in human pregnancy diagnosis, and three annotations concerning observations made by members in the field. Priced at three shillings (free to members) the *Journal* is obtainable from A. G. Leutscher, British Museum (Natural History), London, S.W.7.

the tank. On test the plastic darkened with use and became slightly less flexible; this was due to the effect of heat and neither altered the heater's efficiency nor shortened its life.

It is simplicity itself to install in a new tank but more difficult to arrange the loop beneath the sand of an established tank in which well-rooted plants are growing—one needs at least three hands armed with planting sticks! Positioning the heater in the sand is a disadvantage should failure occur for it would be troublesome to remove, but there is little to go wrong and the heater carries a year's guarantee.

The great value of the heater is the enormously increased available surface for heat transfer it offers over conventional designs. This results in economical power consumption and also minimises gradients of temperature throughout the tank. In practice the temperature difference between the top and bottom of an unheated aquarium without top-lighting was found to be 1° F. or less when heated with a "Calflex" loop, compared with 5° or 6° F. difference with an ordinary tube heater.

"Calflex" heaters are available with wattage ratings between 25 watt and 150 watt over voltages 200-220, 230-250. It is important to specify the correct operating voltage range for the wattage selected.

P. G. WRIGHT, B.Sc.

The Real Flying Saucers

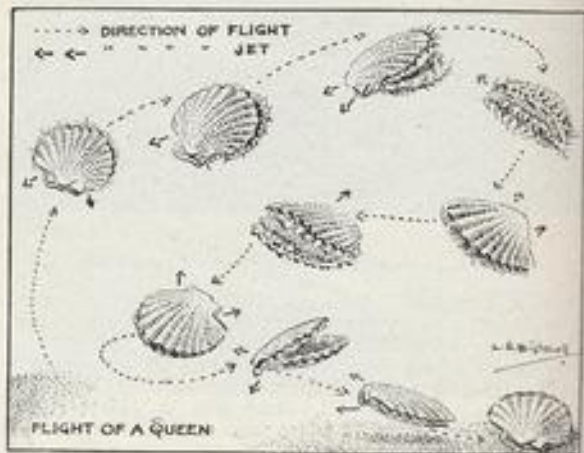
by ————— L. R. BRIGHTWELL

WE are very like the ancient Athenians, that intelligent and restless people, always seeking after some new thing, but a little prone to overlook marvels at our elbow, having both eyes trained upon some problematical horizon. The flying saucer is a case in point. Just what these wanderers in interplanetary space may be is still perhaps conjectural. But the steadily growing band of marine aquarists have some flying saucers within their grasp, ones well worth giving a trial.

These flying saucers are common enough all round our coasts—they are the scallops and their allies. None reach the huge size and extravagantly flaming colours of some tropic species, but our home-grown kinds range from the big scallops of the fish shops, to thumbnail sized species, just right for a medium-sized tank.

The aquarium scallop par excellence is the queen or quoin, *Chlamys* or *Aequipekten opercularis*. It seldom finds its way to London or big inland towns, but in the west country and many other parts of the coast it is nearly always to be had, and not at the insolent prices demanded for its giant relative—a shilling and sixpence each as against fourpence pre-war. The queen abounds on sand and shell gravel ground in from fifteen to fifty fathoms. It is almost circular, about two inches, sometimes more, in diameter, and often shows a beautiful sunset pattern of concentric rings ranging from flesh pink to deep crimson on a white, cream, or orange ground. It was once sold for a few pence per hundred, and even to-day has not rocketed beyond the modest purse. It is, unfortunately, rather bulky to transport and the shell cannot be turned to a variety of commercial uses as can the large kind. To the epicure a dish of queens fried in breadcrumbs or stewed in milk is something to dream about.

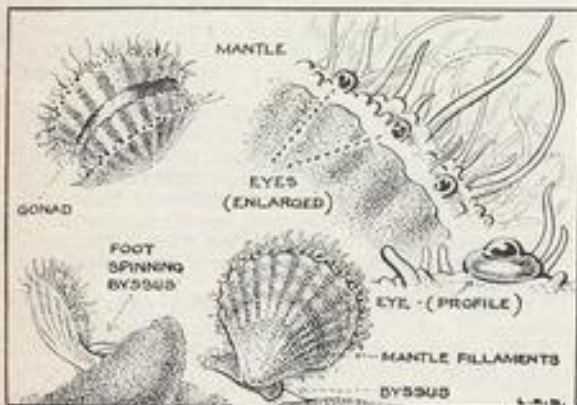
But it is as an aquarium exhibit that the queen gives most lasting pleasure, though being a plankton feeder it needs a fairly constant change of water to ensure its food supply, and a tolerably long life. Place one in a tank and it quickly opens, showing the double fringe of mantle, rimmed with innumerable waving threadlike tactile organs, and round each mantle margin a score or more of glittering gem-like



eyes, very like the eye spots on the peacock's train. These are of great interest to the anatomist, showing a structure almost analogous to the eyes of vertebrates, though, of course, there is no brain to receive the visual message. They must, however, be of real service to the animal, as a little experiment will show. Beyond the mantle there is very apparent, from January to June, the vivid orange or scarlet gonad or reproductive organ which exhaustive experiments at Plymouth and elsewhere have established as undergoing a marked lunar rhythm, being at its maximum development of bulk and brilliance with the full-moon phase of each lunar month.

The queen may rest on the tank floor quietly taking in sea water and sifting it for microscopic plants in typical bivalve fashion, for hours at a time. But place a small starfish in the tank, and it at once justifies the title of flying saucer. The starfish, guided no doubt by the eye spot at the tip of each arm, glides relentlessly forward on its hundreds of hydraulically-operated tube-feet. When within a few inches of the scallop, the latter takes to flight by a species of jet-propulsion. Rapidly opening and closing its valves it makes long curved boomerang-like flights that may cover many yards, the shells rising some feet above the tank floor. The sight of hundreds thus in motion, as in one of the big storage tanks at Plymouth is a truly amazing spectacle.

In the very young phases, from little finger to thumbnail size these beautiful little molluscs evince another strange feature. They "strap-hang" by means of a single byssal thread. A flight may take one halfway up the tank window, where it is seen to stick, and quickly anchor itself by one fine but strong strand of home-spun silk. The small size and abundance of these molluscs invite the attention of all marine aquarists, and since much yet remains to be learned of their rate of growth, duration of life, and other economic details, it is to be hoped this summer will see them added to the list of "possibles" in all marine aquaria, private and public alike.



Keeping and Breeding Axolotls

by

J. LEONARD MONK

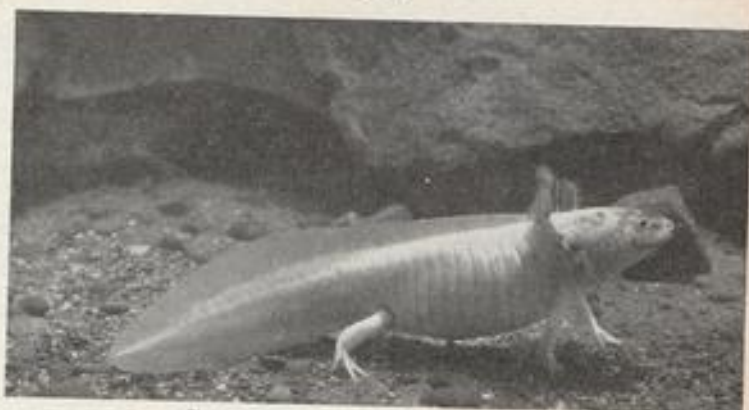


Photo: The Dominion A. & P.
An albino specimen of the larval salamander that never grows up—the axolotl

MANY of us, in our youthful days, with budding natural history instincts, have kept specimens of one or the other of our three English newts and have perhaps followed their life history from the egg to adult stage. If this proved interesting and instructive, a much magnified version can be obtained by keeping axolotls as aquarium pets. There is a paucity of literature on the subject of their care and breeding habits, and a few notes of my own experience may prove helpful.

The mystery of the permanent larval state of the Mexican species (the one with which we are dealing) and the inducement necessary to complete the metamorphosis into the land form of *Ambystoma* is well known to-day, although the riddle was not solved until about 1870, when the Jardin des Plantes in Paris successfully accomplished axolotl metamorphosis. Nearer home, my friend the late Edward Boulenger in 1912 succeeded in producing the same result at the London Zoological Gardens by gradually reducing the amount of water in which the axolotls were kept.

Strange to say, there seems to be no agreement on the size to which they grow in confinement, the estimates varying from six to twelve inches. I have three which are now three and a half years old—two are dark females, the other a white male. They commenced to spawn last year. The following are their respective measurements and characteristics:—

The females can be distinguished from the male by the more rotund bodies; their tails are broader (caused by a better developed median fin) but are shorter than in the male. The male is sleeker altogether and does not feed so voraciously. The dark females appear to be a dense black, but on close inspection they have a rugose appearance and are a deep brown. The young are distinctly a mottled light brown.

	Females	Male
Overall length	11 inches	11 inches
Length of tail	6 inches	7 inches
Circumference of body ..	7 inches	5 inches

Despite their size they do not require a great deal of space; mine are quite comfortable in a 24 ins. by 12 ins. by 12 ins. aquarium, but it is absolutely necessary to keep the water fresh and clean by a complete change once a week, wiping the interior of the tank thoroughly with a cloth. In the early days tragedy nearly overtook them; through ignorance of this necessary aquarium attention, a skin disease appeared which was only cured after salt baths, immersion in weak permanganate of potash and eventually weak T.C.P.

It is useless to attempt to hold axolotls out of water as their glutinous-like skin produces a slipperiness worse than the proverbial eel. They are lethargic and move very little unless frightened or when coming to the surface for extra air; if hungry they come to the front in anticipation of their food.

It is well to prevent them having paroxysms of fear, for they could easily come to grief against the sides of their home, therefore I accustom them to handling; this is done every time the water is emptied (to within a few inches). I also whistle to them every time their room is entered, and in recognition they flap their external gills.

Axolotls will attack anything alive. They lie motionless until their prey is within reach, then suddenly they show a surprising alertness and their victim is sucked into their capacious maws—on no account trust them with fish unless for food. They can be fed on garden worms, tadpoles, newts and strips of raw meat. The latter must be presented to them (not left on the bottom). When hungry they will come to the top and take it from the hand but it is quicker to present it in tweezers; these should not be made of metal as often in their eagerness to feed they will bite the metal. I have made a pair with bamboo strips about nine inches long.

My impression is that they prefer raw meat to anything else and during summer will want a meal every other day at least, less often in winter. The commissariat during the summer months is often taxed without a "frig," so the butcher's interest is solicited for scraps.

The courtship of axolotls is in no way boisterous, and spawning takes place at night, sometimes two or three nights in succession. The spawn is extremely adhesive and is deposited round the glass sides and bottom (I do not keep weeds or rockwork in their tank). The first spawn, about 500 eggs, occurred in January in a warm room, the second of about 1,000 eggs, a month later.

Because I saw feeding difficulties ahead at this time of the year, half of the first spawn was retarded in cold water; this delayed hatching exactly one month, by which time a nearby pond provided plenty of *Cyclops*, *Daphnia* and other small life.

The mucilaginous envelope containing the axolotl egg is about ten millimetres diameter, the egg itself about three millimetres. Unlike some amphibians, in which the envelope gradually dissolves to liberate the embryo, the axolotl

develops well within the envelope and liberates itself by its own action. Under normal conditions this takes place in two to three weeks and when first hatched the youngsters have well developed external gills. For the first few months development is rapid, about one inch a month, but by the end of twelve months the average is half an inch per month. The second year's average is a quarter inch per month, and the third's average is one twelfth inch per month, by which time I imagine they have attained maturity.

Rearing the fry in any quantity is fraught with many disappointments. Here are a few necessary precautions:—

At first a shallow pan is preferable, with about four inches of water which should be changed every day, at the same time circulating the spawn well; this also helps to liberate the fry when they are ready to hatch out.

If some of the spawn is seen to be infertile, remove it and any other eggs which show signs of disease. As soon as the fry are released or rather after two or three days when they start to feed, transfer them to smaller receptacles, to make observation easier, especially at feeding time. Change the water regularly.

Food at this stage consists of aquatic micro-organisms. To collect these in any quantity a net of coarse muslin with a small bottle tied into the bottom must be fixed up. This is the same instrument that the aquatic microscopist uses but on a larger scale. It is advisable to have a stock receptacle into which the whole of the catch is emptied and

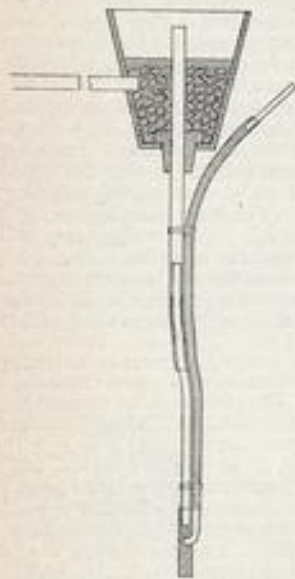
from which the daily ration of the smaller insects etc., can be served. What other life remains after the *Cyclops*, *Daphnia*, watermites, etc. have served their purpose, is ready for the next stage of the young axolotls' growth.

If by happy chance plenty of white worms are available, the position is much easier, for these will be all that are necessary for this stage. The alternative is to remove the fry into the stock aquarium in which there will doubtless be a good assortment of the larger water inhabitants, such as blood worms, and other larval worms, planarians, ephemera, the water louse (*Asellus*), the fresh water shrimp (*Gammarus*), etc. Care should be taken to eliminate leeches, large dragon fly larvae, water beetles (some are carnivorous other are herbivorous).

If this aquarium is kept well stocked the youngsters can be left until they are old enough to be fed on small worms and gentles or hand fed on small pieces of raw meat. This must be fed to them, for they will not pick up inanimate objects. It might happen that growth is not equal; this should be watched as larger ones will show cannibalistic tendencies.

The cross breeding of the white and black axolotl or white and hybrid should, according to the recognised results of the Mendelian theory, produce a percentage of whites. So far as I have been able to observe there are only about ten per cent. white produced, and these, for some reason, appear to be more difficult to rear.

Home-made Filter by P. G. BAILEY



IN introducing this very efficient and cheaply made aquarium filter, aerator operated, I am giving the dimensions of the one I have made, but, of course, these need not be strictly adhered to. Procure a flower-pot three and a half inches across and four inches deep. Enlarge the hole at the bottom to take a large cork, preferably one with a shoulder, as illustrated. The existing hole can easily be enlarged by inserting a file loosely in it and gently turning, trying the cork in the hole from time to time in order to get a good fit.

Drill another hole in the side of the pot, about half way up. This is to drain away the filtered water. Make the hole large enough to take a piece of three-eighths rubber tubing, which should reach to the other end of the aquarium.

A brace and bit can be used for this purpose, but do not use too much pressure, otherwise the pot may break. A piece of adhesive tape round the pot will help in strengthening it during the process.

A hole should now be made in the cork to take three-eighths glass tubing, which should be ten inches long. A red hot skewer can be used to start with, enlarging the hole gradually by turning it with a circular motion until it is the

right size. It is advisable first to bind the cork with adhesive tape to prevent splitting; this should be removed when finished. A piece of five-sixteenths glass tubing, nine inches long, which should fit easily into the other glass tubing, should now be inserted and wrapped round with cellophane paper to make it fit nicely, taking care not to leave any paper in the air passage. These tubes, one sliding within the other, can now be adjusted to any length necessary, depending on the depth of the aquarium.

On the bottom of the smaller glass tubing, fix a piece of three-eighths rubber tubing two inches long, and make a crosscut in it to take the air inlet. A piece of wood inserted in the tubing before cutting makes this quite easy. Now take a piece of quarter inch rubber tubing (the sort usually sold for aerators), about eighteen inches long, and insert a small piece of glass tubing in either end. One of these should be bent at right angles in a gas flame. The other end is eventually attached to the aerator pump or to a bellows.

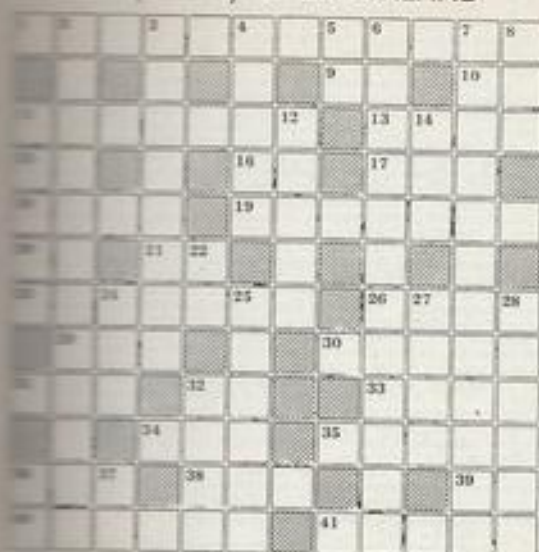
To assemble, place the cork in the bottom of the pot, push through the larger glass tube, then insert the smaller glass tube from the bottom, packing out with cellophane paper. It is now adaptable to various depths. Now place the smaller piece of three-eighths rubber tubing, which has been crosscut, on the bottom end of the smaller tube. Insert the piece of glass tubing which has a right angle bend, into the crosscut and secure to the main shaft with elastic bands.

After inserting the rubber tubing in the side of the flower pot fill up to this level with small stones or marbles and on this place a thin layer of cotton wool. The filter is now complete and ready for use. A piece of wood, one foot long, with a hole cut in it to take the pot, will be required to place across the aquarium and support the filter.

When you have a little spare time turn out your junk box and have a go at this novel filter. I am sure you will not regret the time spent in making it and you will save money too, an important consideration in these hard times!

The AQUARIST Crossword

Compiled by J. LAUGHLAND



CLUES ACROSS

- 1 Name for breeding (5, 7)
 2 One of *Silpa curvata* (2)
 3 One from leeches, look you! (3)
 4 *Limnaea* *herbacea* or *luteola* (7)
 5 Being grown (4)
 6 Not so subtle (2)
 7 Latin and of etc. (2)
 8 A fish caught holds the example of simplicity (1, 1, 1)
 9 Name follows (4)
 10 One for the loon wrecker (7)
 11 A specimen of *Rancho* (1, 1)
 12 Not army in a tank! (1, 1)
 13 One will makes British fish (7)
 14 One of Portuguese man-o-war, but not *Nausitrus* (4)
 15 Kind of hunting to outlead (3)
 16 Brought portion of stream between beads (5)

CLUES DOWN

- 17 One *Silpa curvata* (6, 6)
 18 One in a vehicle, as with some species (8)
 19 Anger basket holds the reel and the reel (3)
 20 Glass put up (2)
 21 Hornsey aquarist fish (8, 4)
 22 *Limnaea* fishes (8, 4)
 23 One (3)
 24 One looks from tangled web (3)
 25 Zoology is this of fishes (3)

PICK YOUR ANSWER

- (1) mark each. No cheating, if you please!
 1. *Limnaea* level: (a) 1703-1774, (b) 1705-1776, (c) 1707-1778, (d) 1709-1780.
 2. The upside down catfish (*Synodontis nigricans*) was named by: (a) Boulenger, (b) David, (c) Günther, (d) Norman.
 3. The purple eye is one of the popular names of: (a) *Acanthodoris acanthodes*, (b) *Acanthopneustes kishida*, (c) *Astroderus asterioides*, (d) *Mitropora angusticaudata*.
 4. The habitat of *Epileryx chaperi* is: (a) Senegal to Sierra Leone, (b) Nigeria to Angola, (c) Morocco to French Guinea, (d) Liberia to the Gulf Coast.
 5. These have been timed with a stopwatch to make (a) 231 m.p.h., (b) 281 m.p.h., (c) 271 m.p.h., (d) 291 m.p.h.
 6. The generic name of the char is: (a) *Aspenser*, (b) *Aloia*, (c) *Glopia*, (d) *Schlossia*.
 (Schlossia overpage) G. F. H.

Society News

PUBLIC show of tropical and coldwater fishes staged by the **Amersham Grove (New Cross) Aquarists' Club** last month was visited by hundreds of local people. A feature of the show was a geographical display showing the natural habitat of exhibited fishes, and this proved of great interest to the public. The Club wishes to hear from a local organisation willing to let their hall for a five day period in early June.

MR. H. C. PEPPER of Hastings Aquarium lectured to members of the **Bexhill and District Aquatic Society** on the goldfish and on pond construction last month. A quiz is to be featured this month and plans for a pond "ramble" are being made.

AT an exceptionally well-attended meeting of **Bournemouth Aquarists' Club** last month, beginners' subjects were considered by Dr. R. C. C. Clay and Dr. Crow. An exhibition of furnished aquaria is to be held at the beginning of September.

BRIXTON Aquarist Society has been accepted as an F.B.A.S. member and extends a welcome to new members. Secretary is Mr. R. D. Barrow, 37, Elcot Avenue, Peckham, S.E.15.

IN protecting his fish the aquarist must take care lest he also deprive them," said Mr. G. D. Watts, in a talk to fellow-members of the **Cambridge and District Aquarists' Society** in April. Using diagrams, Mr. Watts showed how enemies of young fishes can be identified and eliminated from ponds and also outlined methods for collecting and culturing live foods—*Infusoria*, *Daphnia*, *Tubifex*, fresh water shrimps, phantom larvae, mosquito larvae, etc., to supplement dry foods. Numerous specimens were exhibited at the lecture for members to see.

PURCHASE of 40 tanks for show purposes was arranged at the last meeting of the newly formed **Dalston and District Aquaria Society**. Weekly meetings are held (every Thursday) at the Dalston Men's Institute.

CONDITIONING exhibits for show purposes was the subject of Mr. R. Mealand's talk to members of the **East London Aquarists' and Pondkeepers' Association** in which he covered all the main points required to catch the judge's eye. Another F.B.A.S. judge, Mr. P. G. Saunders, recently lectured to the association on breeding goldfish.

AT the last table show of the **Enfield and District Aquarists' Society** (a table show is held every third month) goldfishes, guppies and other livebearers were staged. The junior section of the society is now holding separate competitive events.

RECENT addition to the activities of the **Forest Gate Aquarist Society** was the introduction of a cup to be competed for by junior members every three months with guppy specimens. Meetings are now on second and fourth Fridays each month, 7.30 p.m. at the East London Children's Convalescent Aid Society, Broadway Social Hall, North Street, Plaistow, Il.13.

TABLE show of labyrinth fishes held by the **Halifax and District Aquarist Society** last month secured first prize for Mr. D. Collingwood. A display of slides on pond life and coldwater fishes was also given and arrangements for the annual coach outing in June were made.

MEMBERSHIP of the **Hornsey and District Aquatic Society** has been steadily increasing since Christmas last. Table shows of coldwater fishes are to be held in addition to those for tropicals.

TALK by Messrs. Casson and Ewbank on coldwater fishes was much enjoyed by an audience of members of the **Hull Pondkeepers' and Aquarists' Society** at a recent meeting. Having two speakers at meetings has been found to stimulate discussion and increase the enjoyment of meetings.

VISIT to Chessington Zoo is arranged for members of the **Ilford and District Aquarists' and Pondkeepers' Society** in early June. At a recent general meeting a table show was won by Mr. T. H. Thomas with a fine pair of guppies.

PRESIDENT of the newly formed **Lambeth Aquarist Society** is the mayor of Lambeth, who has introduced a large community tropical tank to the mayor's parlour. Secretary is Mr. R. H. Billings, Trevalga, St. Gothard Road, West Norwood, S.E.27, and meetings are held twice a month on second Tuesdays and fourth Wednesdays, 8 p.m., at the Lambeth Town Hall Housing Department. New members are welcome.

AMONG recent lectures enjoyed by junior aquarists of the **Leicester Aquarist Society** (Junior Section) have been one on British aquatic plants given by Mr. W. Hunt of the Leicester Museum Botany Department, and one by their chairman, Mr. G. P. Burwell, who described his experiences breeding blue, leeri and dwarf gouramis.

KEEPING tropical fishes was the general title of Mr. W. L. Mandeville's talk to members of the **Midland Aquarium and Pool Society** recently, at the society's meeting place at the Y.M.C.A., Dale End, Birmingham.

MR. H. Loder spoke on furnished aquaria to members of the **Nelson and District Aquarists' Society** in March, and he judged a table show of guppies, awarding the first to Mr. L. Lee's frytail. A show is to be held in June.

AT the close of the Paisley Aquarist Society's recent annual general meeting an interesting talk on breeding fighter fishes and rearing fry was given by Mr. Kos. At a local florist's show the society had staged several aquaria. Last month, Mr. Strachan Kerr addressed the society.

FULL programme of activities for summer meetings is being prepared by the newly formed "Aquaria Section" of the Preston Scientific Society. A tropical aquarium installed in a local hospital has been stocked and is being maintained by members. Table shows, microscope discussions and a furnished aquaria exhibition are all on the schedule. Secretary is Mrs. B. R. Mills, 43, Mersey Street, Ashton, Preston.

TALKS on fancy goldfishes and breeding Siamese fighting fishes have been given at recently reported meetings of the Scarborough Aquarists' Society "Scalae." The society now has 55 members.

NEW secretary of the Shooters Hill and District Aquarium and Pondkeepers' Society is Mr. W. G. Hunter, 14, Eglinton Hill, S.E. 18, who will be pleased to hear from aquarists in the area who are not members of a society.

QUIZZES, lectures given by outside lecturers and by members of the Smethwick and District Aquarists' Association have formed recent meetings. This month a visit to the B.A.P. at Manchester is scheduled. New members are welcomed (Secretary: Mr. J. Hutchings, 33, Braithwaite Lane, Smethwick, Staffs.).

FOLLOWING a talk by Mr. A. Mary on glazing an aquarium members of the Staines and District Aquarists' Society heard at their next meeting a talk on keeping and breeding white cloud mountain minnows by Mr. P. N. Evans. New members will be cordially welcomed at the society's meetings on the first Wednesday each month, 8 p.m., at the Blue Anchor Hotel, Market Place, Staines. This month a talk on assessing the qualities of fishes as a guide to buying good fish and a help in showing fish will be given.

TABLE show for livebearers arranged by The Study Aquarist and Pondkeepers' Club was judged by Mr. F. Cooper, who awarded first to a pair of black mollies belonging to Mr. Yexley. Last month a talk on coldwater fishes by Mr. O'Neill was heard.

AFTER judging a table show of fighters and swordtails at last month's meeting of the Tottenham and District Aquatic Society Mr. G. W. Kingston gave a talk on these fishes that was found helpful by all members at the well-attended meeting.

IN a series of talks given by members the Tyneside Aquatic and Biological Society has had one on barbs, one on aquarium fishes and one on "How I Became an Aquarist." Forthcoming talks include "Fish-house Construction and Management," "Heating Aquaria," and "Aquarium Plants."

NEW secretary of the reorganised Wandle Aquarist and Pondkeeper Club is Mr. E. J. Orchard, 12, Hilliers Lane, Beddington, Croydon, Surrey. A programme of meetings of special interest to beginners and those starting fish-breeding has been arranged and new members will be welcomed at meetings (alternate Thursdays) in the Reading Room, The Grange Mansions, Grange Park, Wallington, Surrey.

New Societies

AQUARISTS and pondkeepers in the Aldershot, Hants., district who are interested in forming a society for that area are invited to write or visit Mr. F. Parsons, 14, Twelve Acre Crescent, Minley Estate, Farnborough, Hants.

WITH membership closed at thirty, the Riverside Aquarium Society (Secretary: Mr. N. W. Webb, 384, Goldhawk Road, Stamford Brook, Hammersmith, W.6), has been formed. Meetings take place twice monthly, 8 p.m., first and third Mondays, at "The Hampshire Hog," King Street, Hammersmith, W.6.

NEW society formed in the works of Standard Telephones and Cables, Ltd., New Southgate, is to be known as S.T.C. Aquarists. Meetings are to be held monthly for the present. There are 45 members, mostly tropical enthusiasts, who wish to hear from and visit other societies.

Aquarist's Calendar

31st May-2nd June: Winchester City Aquarists' Annual Open Show at St. Thomas' Hall, Southgate Street, Winchester.

9th June: Federation of British Aquatic Societies General Assembly, 2.30 p.m. at Friends House, Euston Road, London, N.W.1.

14th-16th June: National Aquarists' Society Annual Exhibition at the Royal Horticultural Hall, Vincent Square, Westminster, S.W.1.

28th-30th June: Wembley Pool Association's Show, Wembley, Middlesex.

EAST LONDON'S ANNUAL DINNER

BEFORE the late war one of the outstanding events each year was the dinner and dance given by the East London Aquarists' and Pondkeepers' Association, and the revival of this function on 31st March was therefore heartily welcomed by old friends. As with everything else this club undertakes, the arrangements were well-planned and smoothly operated to the last detail, helped along with the traditional jocularly and good fellowship.

A toast to the Association was proposed by Mr. A. Fraser-Brunner, who paid tribute to its vitality, remarking that it was one of the few aquarium clubs that had reached a large size while still retaining its integrity. He drew attention to the leading role played by the E.L.A.P.A. in building the hobby to its present prosperity, and remarked upon the fine Fish Exhibition staged each year, which although from a comparatively limited area rivalled the national events in its scope and presentation. There is great hope for the world, he said, when in the present circumstances an ever-increasing number of people are turning to the peaceful and delightful pastime of aquarium-keeping, and hoped the idea would spread to all lands.

In reply, Mr. T. E. Butt, the secretary, mentioned that the membership now exceeded 200, although only at the beginning of the year.

After referring to the work of the association's founders, Mr. Butt continued that the members were very proud of the association's position, and all it stood for. It was the East London Association which conceived the idea of a Federation of British Aquatic Societies to which were now affiliated 100 societies. The association was the first to install aquariums in hospitals, an idea which had caught on all over the country. Shortly the association would present its third aquarium to a hospital ward.

Responding to the toast of the guests, which was proposed by past president W. P. Bradley, Sister M. Pantock, deputising for Miss J. Smith-Johnstone, matron of St. Mary's Hospital, Plaistow, said how much the aquariums were appreciated by both staff and patients. "We are very grateful indeed to you who supply the fish and keep the tanks so clean and clear," she said.

A toast to the visitors was proposed by Mr. H. S. White and Mrs. W. Meadows, of the Enterprise Aquatic Society, responded. Absent friends were remembered by Mr. P. Campkin, the association chairman, and the president was proposed by Mr. A. Holloway. Mr. C. W. G. Creed, F.Z.S., F.R.H.S., responded.

The toastmaster was Mr. B. Howe, vice-chairman of the association. The evening concluded with dancing and a cabaret given by Marion Hull, John Cotterill and Margaret Ellison.

Entries Invited

Kodak Aquarist Section's Second Annual Competition: 26 competitive classes, four for stocked and furnished aquaria. Schedules available from R. A. Doolley, Kodak Recreation Society, Kodak Hall, Wealdstone, Middlesex. Date: 6th-8th July.

Romford Aquarist Society Open Show: 21 classes, over 250 aquaria. Schedules and entry forms obtainable from H. Maor, 78, Belgrave Avenue, Gidea Park, Romford, Essex. Date: 28th July.

Hendon and District Aquatic Society Open Festival Show: Schedules from D. Cannon, 7, Courtleigh, Bridge Lane, Golders Green, N.W.11. Date: 6th August.

Crossword Solution

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

PICK YOUR ANSWER (Solution)

1 (c), 2 (b), 3 (b), 4 (d), 5 (a), 6 (d).
6 marks—Sheer luck!; 5 marks—Excellent!; 4 marks—Very good!;
3 marks—Good!; 2 marks—Fair!; 1 mark—Poor!; 0 marks—Quite likely!

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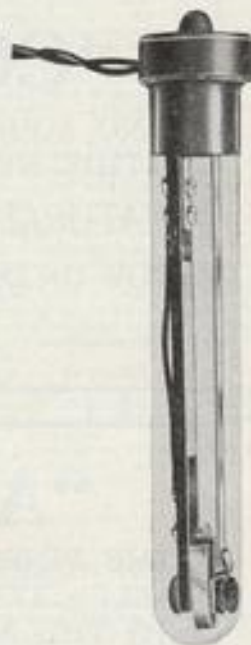
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