EDITORIAL

SINCE this is the last editorial column that I shall be writing for some time, readers will perhaps forgive me for making a more personal approach than usual.

As some of my friends are aware, aquarium matters form but a small part of my work in connection with fishes, and much of my research in the past has concerned marine species from the depths of the ocean, the coral reefs of the tropics or the fishing grounds of our own coasts, most of which are unlikely to be seen in aquaria. It is the pursuit of such studies that now makes it necessary to relinquish active editorship of this magazine for at least eight months. During that period I shall be engaged upon a survey of the fishes of the Gulf of Aden, on behalf of the Colonial Office, my task being to obtain and examine as many specimens as possible of the numerous and varied finny inhabitants of the region, and to identify them as a necessary step towards further studies which may have considerable economic importance. In particular, I shall pay attention to big species such as sharks, tunnies, and horse mackerels, which are too large to be preserved in bottles and, therefore, not available for study in museum collections; at any rate this will be a change from guppies!

Needless to say, it is not without regret that I leave a magazine with which I have been associated since its inception, twenty-four years ago, and say au revoir to my many friends in the hobby, but I shall not lose contact completely and am confident that our journal will continue to receive loyal support and encouragement, and will go from strength to strength.

This confidence is fortified by the knowledge that a capable hand will be taking the helm in my absence, and it is now my pleasant duty to introduce to you the new Acting Editor, Mr. Anthony Evans.

Mr. Evans is no newcomer to *The Aquarist*, for he was a friend of our former editor, Frank Austin Watson, and assisted him in his work on the aquarium at Chessington Zoo. He has made a number of valuable contributions to our pages from time to time, as many readers will recollect.

Young and enthusiastic, a physiologist and an able writer, Mr. Evans has risen nobly to the task of taking over, at short notice, the complexities of editorial responsibility, and I am sure that he will prove more than equal to the occasion. At the same time, he will need the encouragement and cooperation which was extended to me when I took over after the war, and I know that this will be readily forthcoming from our many readers. This is no ordinary journal; it is an integral part of the hobby, produced by aquarists for aquarists. There was no aquatic hobby worth mentioning in Britain until *The Aquarist* appeared, and the two have grown together in a spirit of mutual help and understanding. In fact the success of the journal has depended as much on its readers, who are the hobby, as on its editors, and I am anxious to record here my gratitude and thanks for the splendid support accorded me during my term of office.

If I may make a last request it is that similar support be extended to Mr. Evans, particularly in this difficult period when he is picking up the threads where I must drop them. An editor's food is "copy." In our speciality this is not supplied by legendary figures who strut Olympian heights, but by the ordinary aquarist gaining experience in practical fish-keeping; that is to say, by you. Anything you think will interest your fellow readers will be considered for publication—never mind the literary style, just let us have the facts. If you do that you are helping to maintain the journal as a living force.

With this I must say cheercio, wish you all the best of luck, and hand over the editorial pen.
THE AQUARIST

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

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

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

The Editor accepts no responsibility for views expressed by contributors.

QUERIES

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

EDITOR

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

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

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

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

THE HIGHER EDUCATION

The value of the aquarium as an aid in education is being recognised more and more by authorities, and it enters into the regular curriculum of many schools. Mr. George Tomlinson, the Minister of Education, is himself interested, and well-versed in the subject, and in the accompanying photograph

he is seen inspecting the "catch" during a visit to the camp of the Dorset County School at Carey, Wareham, Dorset.

This photo, by L. D. Frisby, is reproduced by kind permission of the Dorset Education Committee.

DICKENS AND EXOTICS

In Mr. A. E. Hodges' Tropical and Aquarian Fishes, it is stated on page 86: "The Paradise Fish may be said to be the first 'tropical' to reach Europe alive, unless we include the familiar goldfish. It was imported from Eastern China to France in 1869. Dickens, writing in 1843, in Martin Chuzzlewit, makes Martin say (Chapter 17): to some American ladies who asked after the goldfish in that Grecian fountain in such and such a nobleman's conservatory, and whether there were as many as there used to be, he gravely reported, after mature consideration, that there must be at least twice as many: and as to the exotic, Oh! well! it was of no use talking about those, they must be seen to be believed."

Martin was, of course, only making it up, but would Dickens have written it 26 years before a live exotic had reached Europe?

W. R. Burwell.

THE AQUARIST
PREPARING THE POND FOR WINTER

By M. WARD-SMITH

In the great freeze-up of early '47, many pondkeepers lost the majority, if not all, of their fish. It was a serious disaster for those who sustained losses, for at that time fish were both scarce and expensive, but more regrettable is the fact that many of these losses need not have occurred, if only a little care and attention had been given in the previous autumn. In addition to the prevention of heavy losses through the rigours of winter, such attention would encourage earlier spawning in the following spring.

Fish, being cold-blooded, become less active as the temperature falls, and during the winter month seldom feed, relying upon their stored fat to keep them alive until the return of the warmer weather. Therefore it should not be difficult for the reader to appreciate that the more fat that a fish can store up during the late summer and early autumn, the greater will be the probability of its survival of the winter, and it will be in better condition for breeding than one which has been neglected.

It is seldom realised that the average garden pond is grossly overstocked, not from the gallons per inch of fish angle, but in the matter of being self-supporting. Under natural conditions fish can find plenty of food to enable them to withstand the winter, but in the over-stocked garden pond this is not possible, since many hungry mouths are constantly seeking it out before it has a chance to mature. It is, therefore, necessary to augment this natural supply—goat larvae, etc.—by other foods. Now prepared fish foods may be very good in a aquarium, but in the garden pond they are not really satisfactory, since even the coarser grades are usually too fine for the larger fish and then again this method of feeding proves very costly if an adequate diet is to be provided, therefore an alternative must be found.

Probably the most suitable fat building food is porridge, and in many households the most convenient, since the scraps of the breakfast porringer provide a daily supply. When this is cool it should be fed to the fish in lumps about the size of a walnut, at which they can nibble, at the rate of about one lump per fish per day. If this is soon cleared up the ration should be increased. As with many other things in fish-keeping, it is a matter of experience as to how much to feed. The fish have a far greater knowledge of their food requirements than the aquarist, so if the ration is more than they will clear up in half an hour, reduce it a little. This porridge diet should be supplemented frequently, at times other than the normal porridge feeding hours by a diet of small red earth worms. These small red worms are often found under damp stones or in compost heaps and are greatly relished by all pond fish, to whom they should be fed whole, since in nature fish feed on whole creatures of a size that they can swallow. After all, which do you prefer, a nice juicy steak or mince? The answer is obvious. These worms can be collected by laying wet sacks on the ground under which they will congregate, and can be easily gathered up when an extra meal is required. The best way to feed the worms to the fish is singly, allowing one worm per fish per round, followed by a short interval to allow for mastication, before distributing a further portion. This should be continued for as long as the fish show any inclination to feed, which will probably exceed the worms available.

This diet should be concentrated upon from about the middle of September and continued until the fish go off their food, probably in late November. The object being to fill the fish to capacity all day, and every day, and thus build up the reserves required. It is possibly a little extra trouble, but well worth it.

The feeding of whole worms may possibly upset the ideas of some readers, since many writers are constantly advocating chopped worms and washed pieces, on the grounds that the earth content of the worms causes constipation and other complaints. This may be so, but I have never experienced any trouble from this source. If the internal organs of a fish are so weak as to be seriously affected by a perfectly natural diet then the fish is far better destroyed, since the weakness may be inherent and passed on to future generations, if the fish be allowed to live and breed. Weaklings only occupy space and consume food which would be of more benefit to strong healthy fish.

Apart from feeding there are a few autumn jobs to be done with the pond. These apply more particularly to the small pond, under five thousand gallons, but the large will benefit from the same treatment.

As soon as the autumn leaves have fallen remove as many as possible from the pond, a rake is an excellent implement for this purpose, and cut back all marginals and semi-submerged plants, such as water lilies, to just above the crowns. Submerged plants should be cut back to about six inches from the bottom, since these shortened stems will provide the new shoots for next season's growth.

Having dealt with the problem of decaying vegetable matter, it is now time to consider the water. During the summer and early autumn the fish have been feeding heavily and consequently producing a considerable amount of excreta, which, on breaking down, adds to the chemical contents of the water; in addition a considerable amount of water has evaporated from the pond during the summer and this loss has been made good, probably by means of the garden hose, from the tap. Now many water has a mineral content and consequently adds to the

(Continued on page 161)
A SPON-FED FEMALE

By A. FRASER-BRUNNER

One of the most remarkable of spawning performances is that given by the Characin fish Corynopoma ristesi. This species is often called the Paddle-fin, but I fear that is a grave reflection upon the powers of observation of the aquarist who bestowed the name; for the "paddle" concerned is not a fin, nor part of a fin, but an extension of one of the bones of the gill-cover. "Paddle-gill" might therefore be a better name, but in view of what I shall describe shortly, "Spoon-fish" would be still more appropriate. The generic name Corynopoma means roughly "tassel head," and the species was called ristesi by Gill, in honour of a Danish zoologist named Riese. It inhabits northern South America from the Rio Meta in Colombia to the island of Trinidad.

It is a graceful and peaceful fish, and very beautiful in its delicate quiet way. Both sexes are silvery, with metallic reflections; all the fins being transparent and rather fragile in appearance; but the male differs in possessing a more or less distinct bluish band along the side. The male further differs from the female very considerably in form, the lower lobe of the caudal fin being prolonged into a strong sword-like blade (which has earned for it the name Swordtail Characin in America), and as though to counteract the disturbance of equilibrium which this produces, the dorsal fin is also greatly enlarged.

Most curious feature of the male, however, is the enormous extension of the sub-opercular bone as a slender, stiff rod, which when lying along the side reaches nearly to the end of the anal fin. At the end of this is a spoon-shaped flap of skin which is brilliantly metallic. The sub-opercular bone is so articulated that this "paddle" or long-handled spoon can be moved sideways at right angles to the fish.

The manner in which the male makes use of his special structures is most interesting. When, after conditioning, he is placed with the female, he courts her by swimming round, as do many Characins. But so far from being interested she is actually aggressive and tries to drive him away. He continues to circle round at a safe distance, but every now and then thrusts his "spoon" rapidly in her direction, at the same time sweeping the long caudal lobe, the dorsal and the anal fins to the same side. This action appears always to be accompanied by a discharge of some of the milt, which is wafted by the fins in the direction of the spoon, so that some of it probably adheres. As the spoon flashes towards her the female bites at it, sometimes so viciously that the flap of skin is torn off completely, and the result is that she receives some of the milt in her mouth. This apparently serves as a stimulus for her egg laying, for she soon ceases to take further interest in the antics of the male, and seeks a suitably broad leaf, which she methodically caresses with her mouth, depositing the milt upon it. Then she brings her vent close to the leaf and deposits a few

(Continued on page 173)
NOTES AND NEWS

TWO EXHIBITIONS AT GUILDFORD

The West Surrey Pondkeepers’ and Aquarists’ Club recently staged two displays in the Guildford Autumn Show held at the Guildford Town Hall on Saturday 5th at Guildford House, High Street, a centre normally used for exhibitions of art, sculpture, etc. The second was held in Stoke Park in conjunction with the Guildford District Allotments and Gardens Association’s Annual Horticultural Show, and was open during the afternoon of August Bank Holiday.

Guildford House

This exhibition, which was open daily from 10 a.m. to 8 p.m., was designed to illustrate to the public the many varied interests of the Club and consisted of about 80 aquaria of all sizes, being ten separately illuminated community collections of fishes in 24 × 12 × 12 tanks. A sea-water aquarium, containing one or two crabs and a number of sea anemones was exhibited by Mr. L. R. Brightwell, F.Z.S.

Two varieties containing slow worms, viviparous lizards and toads, aroused very great interest among visitors. In addition, 54 beautifully mounted photographs of reptiles, fishes, and invertebrates, were on view. These were the originals of some of the many world-famous studies by Mr. W. S. Finn, of Walton-on-Thames, who is a member of the Club.

A glass case containing heaters, thermostats, aerators, siphons, etc., used in the hobby, was on show and for those with pond interests, members erected a realistic pool at one end of the hall. This was surrounded with rockwork, bog-plants and rushes, and by means of a pump the water was circulated and ran down over the rocks with a miniature waterfall effect.

Specially interesting exhibits were two magnificent axolotls lent by Mr. Pitt, two of the newly created “Byronic” aquaria, shown by George Fletcher of Dorset, a compartmented tank containing seven very fine veiltail fighting fish, also provided by George Fletcher, and a reinforced concrete aquarium on an oak stand, manufactured by Mr. Smiths of Marlow.

There is no doubt whatsoever that the show aroused immense interest locally, and was the same kind in the district for many years. No admission was charged, and the attendance figures for the three days totalled 8,562, a surprisingly large number of people.

The lure of aquatic literature was on sale and quite a number of new members were enrolled for the Club.

Stoke Park

During the week-end following the show at Guildford House, some of the equipment, and all the fish and living exhibits, together with additional items were transferred to the show at Stoke Park, to be held on Saturday, Sunday, and Bank Holiday.

A large number of show tanks, complete with staging, were assembled by the members of the Guildford and Pondkeepers’ Association, and these were tastefully arranged with sand, plants, and other fish, the main object again being to give the public an artistic set-up and to foster interest in home aquarium keeping. In all, 108 tanks were displayed.

A massive display tank was designed at one end of the marquee, complete with a fountain, and the tank was sponsored by the Rydon Waterfowl Company. The whole area of the marquee was placed in a prominent position and visitors were asked to guess the exact number of fish being kept as a pair of nylon stockings.

Considerable publicity was given to the show, on posters, and in the local Press, about 130 side-shows and a spacious refreshment marquee were prepared in the park, and everything was set for the usual scene of interest and activity, which, in the past, has accompanied this local horticultural event. However, the weather was not as expected this year, and at 1.30 p.m., a downpour of rain started, and continued, unabated, until the evening, so that our gage was reduced to only 000. This was most disappointing for all concerned, especially as it came after a hot spell of unbroken sunshine and the very successful show at Guildford House.

FORTHCOMING EVENTS

Two further post-war events have given the Club members and experience which will doubtless be reflected in next year’s displays.

EALING CIVIC WEEK

During the week in which a display by the West Middlesex Aquarists’ Society, was staged at the Ealing Town Hall, visitors totalled 10,000. Numbers were womanly, and the Society has received the thanks of the Mayor and Public Relations Committee for their contribution towards the success of the Arts and Civic Week Exhibition, in connection with which the display was held. The Society members greatly appreciated the words of thanks as their undertaking had been a large job of work, involving daily attendance for twelve hours, with conducted parties of local children, some 50 to 100 in number each day.

At the July meeting of the Belle Vue (Manchester) Aquarium Society, a member of the Club, Mr. R. Dearden Fielding, gave a talk on breeding Barbus seniculus, involving many useful tips from his own experience. The talk provoked a lively discussion.

Walsall and District Aquarists’ Society have been co-operating with the Wolverhampton and District Aquarist’s Society in several enjoyable meetings. The two Societies had a good time together on a visit to the Belle Vue Aquarium, under the guidance of the Superintendent of Belle Vue, Mr. Gerald T. Iles.

On Friday, August 6th, a “quiz” between the Societies proved a great success, the Walsall Society winning by a very narrow margin.

Weblinth Aquarists’ Society reports increasing membership, the Society now having over 75 per cent of its intended complement of 50. The Society is visiting the London Zoo Aquarium during August since their schoolroom headquarters will be closed during that month.

FORTHCOMING EVENTS

Harrow Aquarists’ Club’s Second Annual Public Show and Exhibition will be held at North Park Hall, South Harrow, on September 15th and 16th, 10.30 to 11.30 p.m. on the first day, and 10 a.m. to 9 p.m. on the second day. There are twenty classes in the show schedule, including the Inter-Club Competition for Furnished and Stocked Aquariums for the London Challenge Cup.

All entries should be in the hands of the Show Secretary, Mr. L. L. Leitch, 85, Bikodon Road, Wembley, Middlesex, not later than August 30th, 1948, from whom entry forms can be obtained. The hall open on Friday and Saturday is on the Piccadilly Line, and there is a car park.

The Federation of Northern Aquarium Societies is holding its third assembly on Sunday, the 3rd October, 1948, at the Zoological Gardens, Belle Vue, Manchester. The programme is as follows: 

| 2.30 p.m. | Cruising (by boat) over Lake Windermere |
| 3.30 p.m. | Guest speech |
| 4.30 p.m. | Public assembly and general meeting |

The Tentative programme for the 1949 annual conference is as follows:

| 2.30 p.m. | The Aquarium, its history, and its progress |
| 3.30 p.m. | Guest speech |
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THE AQUARIAN
This has been a good year for Indian Pythons (Python molurus) in the Reptile House at the London Zoo. During the spring three females laid batches of eggs and a number of healthy youngsters were reared from each. The period of incubation was 58 days, at the end of which time the embryos cracked the parchment-like shells by means of the egg-tooth, and emerged from the eggs. The stomachs were slightly distended with yolk, which was absorbed after three days. At five days old they were given freshly-killed half-grown mice, which they struck and constricted before eating. Feeding frequently proved a difficult business, since when one was offered a mouse, several others would strike it at the same time. Those hatched in April are now eating four or five full-grown mice each per week.

In all cases the young Pythons were aggressive at first, but very soon could be handled without biting.

An embryo Indian python uses its egg-tooth to break the egg shell, and surveys the world. When approached it popped inside again!

The danger past, young P. molurus disengages his coils from the egg-case and begins to explore.

New and shiny but every inch a python!

Though aggressive at first, young pythons soon become tame.

THE AQUARIST
Breeding the SCALED FANTAIL

By A. BOARDER

(Continued from the June issue)

The Scaled Fantail is a very good type of fish to keep in an outdoor pond, but it is necessary to attend carefully to several details in order to ensure success. It will be agreed generally that it is easy enough to keep these fish throughout the warmer months of the year, but the winter may bring several troubles that will tax the skill of the pondkeeper. I feel sure that the way that the fish are looked after in the summer and autumn will make a great deal of difference as to how they survive the winter. Once the temperature of the water drops below 50 degrees the fish will not be so active and will not be able to digest their food so well as when the water was warm. It is, therefore, useless to try to feed the fish once it does turn cold, and so in order to enable the fish to go through the winter in good health it is essential to feed up the fish whilst the weather is still warm. The fish can store up a certain amount of nourishment as a reserve, and so give as much food as they will take at all times before the winter arrives.

Some people feed worms to their fish during the winter but I am sure that it is best to refrain from feeding at all during the coldest months of the year. It does not require many dead uneaten worms to pollute a pond and nothing must be done which will in any way add to the almost inevitable part pollution which results from decaying plant life in the pond. I think that it will be agreed that goldfish can withstand any amount of cold that they are likely to get in this country. During the very severe winter of 1946-47 my Fantails came through in the outdoor pond quite safely. It is not the cold which kills the fish but the lack of oxygen in the water which causes the trouble. Now how does the water lose its oxygen, especially in the winter? There is no doubt that a number of decaying water-lily leaves will soon turn the water foul with gases that are very harmful to fish.

If your pond is one which was made with concrete it may be possible to empty it and thoroughly clean it out at the commencement of the winter. I am positive that it is much more easy to winter fish in a pond that is sweet and clean than in one which is polluted by an excess of decaying vegetable matter. The mere fact of freezing up of the pond need not cause any harm to the fish, there are many authentic cases of goldfish being quite all right after having been frozen solid in blocks of ice. This proves that it is not the actual cold that we have to contend with, but the lack of oxygen in the pond.

You will find that if an unbroken coat of ice remains on a pond which contains decaying vegetable matter for some time, the water will become very foul and smelly. This is the danger signal and you will soon have trouble. It is, therefore, essential in my opinion to break part of the ice each day so that the water can get in contact with the fresh air as much as possible. Also, if the water does smell you must run in some fresh tap water as soon as you can. I think that it is a very good plan to do this fairly frequently during the winter.

Any snow which lies on the frozen surface of the pond should be removed as soon as possible as foul gases soon form in the dark water underneath. Even fish that have been very well fed during the summer cannot survive in an unhealthy pond. The trouble is not always evident during the actual winter but when the water warms up in the Spring is the time when the dreaded fungus appears on fishes which have become weakened by unhealthy conditions in the winter.

It may not be out of place here to give a little advice to those who wish to show their fish. It is absolutely essential to show your fish against others to find out whether the fish you are breeding are in the main true to type. It is no use going to a show without your fish and then telling everyone there that you have better fish at home. We have all heard that one and it comes a bit stale. You might think that your fish are as good, but until you place them in their show tanks against the others you cannot form a correct opinion as to their actual value as show fish. Many fish look good in the pond or tank but it is only by comparison that you will be able to judge how good your fish really are. You can easily become biased towards your own fish and you will be helped greatly by the placing of the fish by the judge. I might think that I know a good scaled fantail when I see one but as I have watched the fish develop I may possibly have overlooked a slight fault which may be apparent immediately to a judge as soon as he sees it. Also when you are trying to breed

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to a type it is absolutely essential for you to show your fish against others so that you can have expert guidance as to whether your type is correct or not. I have often heard it said at a show, "what’s the use of me showing my fish against old so-and-so, he is sure to win"? Now this is the wrong attitude to adopt as it is only by showing your fish against the very best that you will be able to form an opinion as to whether you are breeding to the correct standard or not.

Although you can assess the value of your fish by showing, it is up to the judge to give a guidance by not always awarding a first or even a second prize if he considers that no fish in the class is of sufficient quality to merit such an award. It is not always enough for the judge to place the fish in their right order of merit by withholding a prize or two he can easily notify the exhibitor that the fish are not up to the required standard. Many clubs are at fault here as they may, through their show secretary, indicate to the judge that they wish all prizes to be awarded. This often means that a successful exhibitor goes home with a first prize and a fish that he thinks perfect and then goes on to breed similar fish, instead of trying to breed something nearer the correct type. It may be that the points for the annual cup are at stake, but the awarding of a cup should not be sufficient justification for the awarding of a first prize to a fish that is not somewhere near the standard.

I should very much like to see a few at least in each club make up their minds to specialise in one type of goldfish and then try to breed to the recognised standard. By this means it would be possible in a short time to have well-filled classes of good type fish and not something tragic as could be seen in the common goldfish class at the last National Exhibition. Remember too that you are not showing for the sake of pot collecting, and not only to find out the value of your fish, but to indicate to other breeders what type of fish they should breed.

It is not always easy to keep your show fish in good condition if they are kept in a pond. The water may not be clear enough for you to see the fish properly, and it is possible that they may have some recent damage which would prevent them from looking their best at the show. Not long ago I caught up three fish from my pond to take with me to a club to demonstrate the type of fish I was talking about and I was surprised and distressed to find that they had been badly damaged by fishlice. These had bitten them so badly that one had a small hole right through the dorsal fin whilst another had several bad places on it.

I had to catch all my fish and clean them from the lice and I found several signs of damage. I know that the damage soon becomes repaired but had I failed to find out the trouble until the day of a show I should have been unable to show the fish. It is essential then that you examine your fish occasionally to see if they are in good condition and that can only be done by catching them individually.

I have since placed a small bleak in my pond with the fantails, as this very quick-feeding fish will no doubt put an end to any free swimming fish lice that may still be in the pond. I shall probably lose a few eggs, which will be eaten by the bleak, but surely the labourer is worthy of his hire.

Whilst on the subject of shows I would like to remark on the fact that some schedules do not have separate classes for all the main recognised types of goldfish, and this is a great pity. It is impossible for an exhibitor to assess the value of his fish if he can only show them in a mixed class. I have been advocating for classes for fantails for some time and then when a society provides a class for them they then mix up the other classes for fancy goldfish and I get kicked to death by would-be exhibitors whose types have not been catered for separately; as if I could help it anyway.

I receive many inquiries as to how old a fish must be before it can breed. I am unable to say at present how soon it would be possible to get young fantails to breed, but last year I bred with some of my fish that were only thirteen months old. This year, however, my fish went one better and bred at eleven months. The two fantails which won 2nd and 3rd prizes for me at the National Show in June, 1948, were then only a year old, had bred once, and on being returned to the outdoor pond after the show, obliged by spawning on the following Monday, 14th June, from which spawning I appear to have quite a few good youngsters. Therefore it is quite possible that by proper feeding and attention some fish may breed even earlier. It may be questioned as to whether it is wise to allow fish to breed so young. I can see no apparent harm to my fish caused by this early breeding and providing the fish are healthy and well looked after I see no reason to try to put a brake on their natural urge to spawn.

It has always been an interesting problem to me as to how old the native fishes of this country are before they can breed. I have just had a remarkable instance of my home bred two year old green tench breeding and have young fish from them, but I also saw some year-old tench chasing as if spawning and the female looked very fat on one side. Unfortunately I have not been able to find any eggs yet and so am unable to verify the spawning of these year-old tench.

THE AQUARIST
FISH AS FILM STARS

By

N. H. BENNETT

Photographs by the Dartington Hall Film Unit.

I HAVE noted with interest that Aquarium Society's sometimes have film shows on aquatic subjects. Most of the films have been made by Gaumont British, many of which are quite good. This article deals with the experiences of an amateur in making a film connected with aquaria, under the guidance of professional film makers. I hope it will encourage some aquarium clubs to work, perhaps in collaboration with Cine Societies, to produce aquatic films. Unlike professional films, the only cost will be film stock, and there should be some return by other clubs and schools borrowing copies of the film.

A film-making course was held recently by Dartington Hall Film Unit, for teachers, and others interested in film-making for record purposes. It was an entirely practical course. The nineteen members who attended were divided into four groups, each group making a different type of film. Readers can imagine my delight as an aquarist when the Director, T. R. Stobard, B.Sc., a biologist, suggested the biology group making a film on setting up an aquarium.

I have thought for sometime that a film on this subject is badly needed in all types of schools. In my own district for instance, I am always meeting teachers wanting information on how to set up an aquarium, or who have set one up without much success. Incidentally aquarists and aquarist societies could give tremendous help to schools in their districts, by maintaining aquaria in schools and permanently interesting large numbers of young people in our hobby.

At Dartington we had fourteen days in which to make our film. You probably think, as we in our inexperience thought, the time more than sufficient. We were, however, beset by numerous difficulties that wasted a great deal of time. We had everything in the way of lighting, light meters, and cameras, the very things that would trouble the amateur. Our greatest difficulty was in obtaining water weeds and creatures in a part of Devon, conspicuous by its absence of ponds. The material for nets had to be "scrounged," and the nets made up. Also, we had but one aquarium, that developed leaks at wrong moments. The film demanded it be handled a great deal by children. In a film studio nothing can be too robust or too reliable. Pressed steel will not do, angle iron is essential. Pitch, run down the inside junctions of the glass would help to prevent glass caving in when handled empty. If there is any cement that can make the aquarium more reliable when moved, it should be used. I make this point because there will be inquiries for aquaria from studios from time to time. For instance, two films, now in production, are "The Stickleback" and "From Tadpole to Frog."

The first three days were spent in script writing. It is usual to begin by getting together ideas for the general treatment of the subject. It took us several attempts to arrive at a "general treatment" that satisfied the five of us. Continuity is a constant problem in any film, but particular attention has to be paid to it in a silent film, for one has not the sound commentary to explain it. Titles must be used here and there, but it is not desirable to have too many. We, perhaps, used too few, but we had in mind, the teacher or lecturer commenting on points of interest during the showing of the film.

In the studio the director places his young "actors."

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Those of you who have not tried to make a film will think ours fairly simple, namely to film someone setting up an aquarium from soil and gravel, etc., to put it in the soil. However, it is necessary to make quite clear to the audience that what you are putting in is soil. This could be done by placing a label on a jar. It is more interesting to show as we did, some soil being collected in a ploughed field. This confronts one with the problem of flashing from field to aquarium, and then perhaps to a pond. You may think this is done in a film, but if it is, a great deal of thought goes into the sequence. You would soon see the effect if this was done badly.

A general plan of the film is made and from this a shooting script. A shooting script gives exact details of each shot wanted. Some producers even draw a picture of the filming of each shot, indicating with arrows what movement will take place. This helps to visualise the problems, and saves time and film when shooting is being done.

A bare week was spent shooting 600 ft. of film, half an hour of screen time. Professional film makers reckon they are doing well if one-fifth of what they shoot is included in the final film. We were obliged to keep just over two-thirds, and I must admit some shots do need retaking.

Editing took nearly a week. I advise the use of negative stock. Editing is done on a copy. Great care is taken of the negative, and it is cut to match the edited copy. Further copies can then be obtained cheaply from the undamaged negative. I mention this because most amateurs use direct reversal film. The film that has been through the camera is processed in a special way, and the same film used for projection. This cuts costs a good deal where only one copy is required, but increases cost where four or more copies are required. We made the mistake of using direct reversal stock, not realising copies would be wanted. We edited on the single copy, putting on scratches in some places, and this had to be used to make further copies.

We were, however, pleased with the final film, though we felt we could have made a better one giving a little more time, and perhaps another 100 ft. of film.

I was extremely lucky to find myself with 100 ft. of film to shoot off on the various creatures we had managed to collect in the aquarium. I spent an entire afternoon and evening on this. I managed to get some passable shots of minnows, sticklebacks, a miller’s thumb, a newt eating a worm, and one or two other things. I found it a tremendous advantage to know the habits of the creatures I was filming. I also learnt a few things. For instance, it is possible to get a snail to stick on the glass on a certain spot, if you hold him there a few seconds.

In a future article I hope to deal with some of the technical problems involved in aquarium cine-photography, many of which apply also to still photography.

For the information of those societies that have not had film shows, I might add that they are not difficult to arrange, and they can be free.

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**MICRO CULTURE DE LUXE**

Little more than a year ago “Micro,” the minute nematoid worm *Ascaris*, was first made known to British aquarists through an article by Mrs. Morten-Grindal’s small tube containing a culture of the worms. They proved to be a perfect food for young fishes in that difficult stage when they are too large to eat infusoria and too small to take *Daphnia* and other large foods. The Editor carefully cultivated the worms and sent samples to clubs in various parts of the kingdom, where they were further cultivated and soon became widely used. To-day most dealers can supply them and they are as much a part of the aquarist’s equipment as whiteworms or Tubifex.

This remarkable development now reaches its climax with the production of a special device by Norgard Bros., which makes the use of the food a simple and clean process. This apparatus is called the “Microcult,” and is advertised on another page. It is beautifully made, of neat appearance, and is accompanied by a leaflet giving full instructions.

A metal stand contains six plastic hooks in each of which a desert-proofed culture can be placed. These are covered by ingenious lids having sockets in which match-sticks are inserted so that when the lid is in position the ends of the match-sticks are in contact with the culture. At a temperature of about 80 degrees F., the worms multiply rapidly and move up the match-sticks, so that all one needs to do is to feed the fish as soon as the culture is gone. The match-sticks need to be replaced when the culture is over.

The pots contain enough of the culture to allow feeding about four times a day for four days, after which they should be cleaned out and refilled.

In its simplicity, efficiency and attractive appearance, this is such a well-designed gadget that most aquarists will consider it worth 10/- to be able to possess it. By taking the messiness out of Micro culture it will give a greater incentive to use the food, and the increased stocks of healthy fishes raised will repay the cost many times over.

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THE AQUARIST
The Dwarf Gourami

By

JACK HE

THE Dwarf Gourami (Colisa lalia) stands very high in the list of aquarium fishes, and it is without good reason that this handsome fish is such a great favourite among tropical fanciers.

Not only is it of a lively, inquisitive disposition and an excellent subject for the mixed tank, but it has highly interesting habits which make it of considerable appeal to aquarists of a scientific turn of mind.

It is one of the few fishes which build a nest, if the water is clear and weed contraption of the Dwarf Gourami could be called. It also has an auxiliary breathing apparatus which enables it to collect oxygen from the surface of the water, and in consequence is not likely to become much affected by overcrowding.

The development of this auxiliary breathing apparatus is an interesting example of adaptation to environment, and without its aid the Gourami might not have survived. The fish inhabits Northern India, where it is found in shallow waters which at times become very hot and foul, perhaps often too warm to contain enough oxygen to support the respiration of fishes. But with its air-breathing system, the Dwarf Gourami is able to survive in these seemingly impossible conditions.

For the beginner in tropicaulis it is difficult to find a better fish to start with than the Dwarf Gourami. It is easy to keep in quite a small aquarium, and is very pretty and hardy. Ordinary sized specimens are not very long, but specimens up to 3 ins. are occasionally seen. These latter big ones are, however, pretty expensive and mostly for exhibition purposes.

The sexes are differently coloured. The male has the basic hue blue, and is marked with red. The sides are marked with about a dozen vertical bars of bright crimson and blue. The dorsal and anal fins are narrow, serrated at the edges, and running from a point just behind the head almost to the tail. All the major fins are pale coloured, and ornamented with red spots. The eyes are somewhat large and black, rimmed with gold, and with the top of the outer rim tinted with red.

The female is more of an olive green shade, with the characteristic bars of a pale orange hue. It is said that on spawning the female assumes colours almost as brilliant as the male, but I have not personally noticed that this is the case.

It is true, however, that Dwarf Gouramies only show their colours to the best advantage when they are kept in water maintained at a pretty high temperature—round about 78 degrees Fahr. being ideal.

Dwarf Gouramies, as may be expected from their natural habitat, are lovers of warmth, sunshine and shallow water. These lovely fishes show their colours at the best under the influence of good light. Light also plays an important part in promoting the growth of Algae, which forms their chief natural green food. Gouramies are all largely vegetarian in diet, and a feed of cooked spinach or cabbage, very finely minced, is always much appreciated.

Regarding food, Dwarf Gouramies are somewhat small-mouthed species, and so only proprietary foods of a small or medium grade should be used. They are fond of fine oatmeal, and this forms a cheap and palatable food. Live food, such as mosquito larvae and blood worms can also be given, but I doubt if they are really essential.

In disposition, the Dwarf Gourami is naturally rather shy, and newly acquired specimens have a habit of hiding away behind rockwork and water plants, but they are not unintelligent and soon get to know feeding times, and in time may even come to the top of the water to take tit-bits from their owner's fingers.

In a mixed collection, Dwarf Gouramies are usually peace-loving creatures, but occasionally a spiteful member is not out of place.

Dwarf Gouramies are not difficult to breed, and this is an extremely interesting operation. For breeding, prepare a tank about a fortnight before mating by covering the bottom with half an inch of loam pressed down firmly and covered with about 1½ ins. well-washed sand.

Plant half a dozen Vallisneria, or, better still, Myriophyllum cuttings in bunches set close together, to provide hiding places for the female. Arrange a temperature of between 75 and 85 degrees Fahr.

On being introduced to this tank, the male will almost at once commence chasing the female, and in the course of a day or so will start building the nest. This is a fascinating process to watch. He gathers pieces of plants and takes them in his mouth to the selected spot at the surface. He then takes in a mouthful of air and blows a multitude of small bubbles from the gills under the pieces of plants.

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Duckweed is the favourite "nesting material." The nest takes at least a day to complete, and measures about 3 ins. in diameter, the structure being raised in the centre just above the surface of the water.

The female sometimes takes some interest in the nest, but is usually driven away by the male, who evidently considers that her interest is not to any good purpose.

But soon his mental outlook changes, and he deliberately seeks out the female among the weeds, and shows off to her, with much stroking of fins and love-play. Finally, she is coaxed under the nest, where they embrace and the eggs are laid in small batches at a time.

The male produces bubbles under the eggs, and they float upwards to the nest. Several minutes elapse as a rule between embraces and subsequent laying of batches of eggs, and the process goes on for some hours. At the end of the mating always remove the female.

The male now works very hard indeed in the maintaining of his nest, and constantly renew the air-bubble support beneath it. The eggs hatch out in a period varying from about 30-48 hours. The fry soon leave the nest in spite of the efforts of the male to return them thereto, and can be seen chinning like bits of black cotton to the sides of the tank and to aquatics. The male fish should now be removed.

Feed the fry with cultures of Infusoria until about a fortnight old, when they will usually take freshly-hatched Brine Shrimps. They grow slowly and irregularly, however, and when two months old the largest do not measure more than ½ inch. They are at this stage exact replicas of their parents, but of a silvery grey hue. Live food in the early stages helps growth along considerably.

Beginners are advised to keep the fish in a community tank until they show desire to spawn. Another tip is to have the water well below the top of the tank, as draughts are highly detrimental to the eggs and fry.

When the fish are about ten weeks old you can begin to pick out the males from the females. The males begin to show dark smudges on their bodies, these gradually giving place to the characteristic colours. At three months old, the fish are fully grown, and ready to mate.
Umbrella Grass

By H. A. DAY

(Photos by the author)

If you want something of a grassy or reedlike appearance at the edge of your lily or fish pool or stream, turn your attention to the great desirability of the Cyperus (Umbrella Grass) which is far more ornamental and graceful than most other grasslike subjects, and you will begin to want to plant the Cyperus. Unfortunately, however, you cannot, with any degree of assurance, plant Cyperus out of doors in this country—except the notoriously warm parts of it—and you may think this fact prohibits you from employing those plants as outdoor waterside subjects. This is not the case, because you may plant the Cyperus in a pot or a bowl, thus enabling you to put it in position out of doors in warm weather and to take it under shelter—not necessarily a hot-house for the colder portion of the year. Although there are reputed hardy species and varieties there can be no guarantee that even these will stand up to severe weather conditions.

These hardier plants include Cyperus para motensis, Cyperus longus (Sweet Galangale), Cyperus eschscholzicus, and Cyperus rotundus (Nut Grass). Cyperus vegetus is hardy, but it is wise to take no chances with this plant—it comes to us from Chile and it may resent the English climate. All these hardy plants could be put out in warm sheltered positions, and some means of protection devised for them in very severe weather, when there is the possibility of their becoming established as permanent occupants of the garden.

Nevertheless, the flower-pot solves the difficulty. In pots, the plants can be placed anywhere—by the side of the water, in the water, or the pot can be buried and hidden in the soil. The plants may be placed in a different position each year, if desired, for

Cyperus vegetus which remains in this condition all through the winter.

Cyperus alternifolius gracilis successfully hiding its pot

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change or improvement, which is an advantage, and this advantage may be accompanied by another—the use of the more tender and beautiful kinds, such as *Cyperus haspan viviparous*, *Cyperus alternifolius* (the "Umbrella Plant," which is so useful for growing in a bowl of water and keeping in an ordinary living-room as a decorative plant), the "Papyrus," *Cyperus papyrus antiquorum* (from which the ancients make paper), and *Cyperus adenophorus*. All that is needed to shelter these plants during the winter is a glasshouse, unheated, except by sunshine, or even in a living-room! All the species of *Cyperus* make useful table plants when planted in bowls of water. All of them have grass or reed-like stems topped with umbrella-shaped heads of bracts and glumes of a red or brown colour.

The soil for these plants should be good—loam, for example; but it need not be special—good garden soil will do. Water is the chief requirement, and the plants grow well in a few inches depth of water, or planted in a wet soil. In drier conditions, the soil must be kept moist, and should never become dried out.

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**THE AQUARIST AT OLYMPIA**

**Thousands** of people visiting the *Evening News* Flower Show at Olympia, on August 5th to 7th, found the stand of *The Aquarist* one of the major attractions, and a constant stream of people filed past the exhibits from the moment of opening until the doors closed. Situated on a busy corner, brilliantly lit and attractively decorated, the stand displayed four major aspects of the hobby—the cold water aquarium, the tropical aquarium, the vivarium and the pond. It further displayed the close bond that exists between the journal and its readers and advertisers, for the plants for the pond were supplied by Messrs. Perry of Enfield, the aquarium tanks by Messrs. George Fletcher of Harrow, and the aquaria were furnished by members of the Twenty Club. Much interest was shown in a young crocodile and two baby caiman alligators, kindly loaned by our advisor on reptiles, Mr. J. W. Lester, of the London Zoo. Mr. Frier's two splendid Veiltail Goldfish were greatly admired, while the high quality tropicals shown by Mr. R. G. Mealand, and others, were an eye-opener to most of the visitors. We had regrettfully to decline offers of help from other sources owing to the limited space, but to all these friends we extend our heartfelt thanks for their practical expression of affection for the old journal. A special word of gratitude must be extended to our good friend, C. W. G. Creed, who gave up three days of his vacation in order to deal with the bombardment of inquiries.

Altogether this was fine propaganda not only for the journal, but for the hobby as a whole, as we expected it would be. The *Evening News* organisers were sufficiently impressed by our display to place a special poster outside advertising the "fancy fishes as bright as the flowers," and for this gesture as well as their friendly co-operation throughout the show we thank them also.

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A USEFUL WIRING BOARD

By D. W. JONES

ANY aquarists use one thermostat to control the temperature in two or more tanks—most thermostats will take up to 500 watts, that is five heaters of 100 watts or their equivalent—but the resultant joining of the various leads is sometimes a problem and, if insulating tape is used to bind the joints, a great deal of work is caused when one or more heaters has to be disconnected.

The following "Wiring Board" may be of interest to readers—

The thermostat is inserted into one tank and the lead which is normally joined to the heater led to a board on which are mounted three or four ordinary two point electric sockets which are joined one to the other by short lengths of ordinary twin flex, the two points of one socket being carried to the two points of the next and so on to the end of the board. The heater from each tank is then plugged in to a socket, the result being that when the mains lead from the thermostat is connected to the electric supply in the normal way all the sockets become "live" or not according to whether the thermostat is switched on or off, which is of course governed by the temperature of the main tank.

This system will be found of great use when tanks of varying sizes are used or when different depths of water are needed, the factor to be considered being the heater inserted in proportion to the water in the tank. Thus, for example, if the main tank (the one containing the thermostat) has a 200 watt heater, a tank with six gallons to be heated will need a 100 watt heater and the other tanks in proportion.

Should one tank be out of use for some reason the heater plug is pulled from the socket and that is all.

In some cases two heaters can be inserted and as long as the proportion of heat to water is remembered the temperature will be controlled as set on the thermostat.

A SPOON-FED FEMALE—(Continued from page 162)

Eggs, after which she proceeds to other leaves to repeat the procedure, occasionally taking another snap at the male on the way, to collect more milt. In this way she eventually deposits from sixty to a hundred eggs, which she next proceeds to rearrange to her satisfaction, taking them from one place and sticking them on another with her mouth (in which there possibly remains some milt to increase the chances of fertilisation).

From this point the female guards her eggs, and the young when they hatch (in 24 hours or so), very assiduously against all dangers, including the male, whom she continues to regard with hostility, though he takes no special interest in his offspring. Until the fry are several days old and active, the female takes no food, though the male will be hungry after his exertions.

Though the fry will not commence feeding until about three days after hatching, it is advisable to start a drip-feed well before this in order to have a plentiful supply awaiting them.

Corynopoma riusi is usually obtainable in small numbers from dealers in tropical fishes, and is well worth keeping, if only to observe the strange performance described. This is of considerable interest to students of behaviour and adaptation, for the hostility of the female which would ordinarily militate against reproduction is here turned to good account by quite extraordinary modifications of the male.

The breeding tank should be at least 24×12×12 ins., well-established and, of course, containing some broad-leaved plants such as Cryptocoryne or small Amazon Swordplants. A temperature of 80 degrees F. is suitable, if the fishes have been conditioned in an average temperature of 75 degrees.

The sexes must be conditioned separately, with live food such as small Daphnia and whiteworms, though when not in breeding condition they swim together peaceably enough, and are excellent community fishes.

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THE DIVING BEETLE

By IRIS MURRAY

(DYTISCUS marginalis) is one of our largest and most powerful aquatic insects (Fig. 1). It belongs to the family Dytiscidae, and is only one species of about a hundred and twenty which go to make up the whole family. They vary in length between one-tenth of an inch to an inch and a quarter, and the Great Diving Beetle is the largest.

It is oval in shape, and has hard elytra or wing cases, of a rich chestnut shade, while all round the margins of the thorax and elytra is a yellow band—hence the name marginalis. The head is small in comparison with the rest of the body and the eyes are large and compound. They have the power to see above and below at the same time. The antennae are long, segmented and slender, and dwarf the palpi.

The beetle has three pairs of legs, which, in this particular family are especially adapted for swimming. The fore-legs and the middle legs are placed fairly closely together, and the hind legs are placed further away from the others, to allow them plenty of room for swimming. It is with these hind legs that the insect swims. They are long, while the tibia and five-jointed tarsus are flat, and have an edging of stiff hairs along one side. Each leg ends in a powerful claw, although this is not so pronounced as in some other members of the family.

These legs propel the beetle through the water by striking it with the broad side at the beginning of the stroke, while during the return part of the stroke the thinner blade side of the leg is presented to the water—we must much like expert rower feathers his oars. The beetle is enabled to perform this movement owing to the fact that where the legs join the body there is a kind of axis on which they can rotate (Fig. 2).

It is interesting to note that both hind legs move together, therefore the Dytiscus swims with the same kind of movement as a frog. The middle and fore legs are fringed and shorter, and the middle pair appear to steer the insect's course when swimming.

It is easy to distinguish the male and female Dytiscus. The female has longitudinal sulkations down the wing-cases (Fig. 3 inset), while the male has smooth elytra, although there are a few exceptions to this rule. The infallible difference between the sexes is the modified foreleg of the male.

The three first segments of the tarsi in the male are enlarged and flattened to form a disc. This sucker is used during mating, when the male may be seen clinging to the female for many hours.

The under surface of the disc is roughened by the formation of tiny stalked growths. There are also two larger bodies, which are also stalked and are of unequal size, although their formation is on the same principal as the smaller ones. They are like open umbrellas, with numerous minute ribs enclosed in a web, the stalks are hollow, and through them flows a gelatinous substance, which strengthens the male's clinging power.

The middle legs are also slightly modified in the same manner, but these are mostly used to grasp the prey during feeding. During mating the fore legs grasp the female round the pro-thorax and the middle legs grasp her round the smooth margin of the wing cases.

These insects have insatiable appetites, and as such, must be feared denizens of the ponds, and any stagnant waters. They will attack, and devour any small fish, larvae, water insects, and even their own kind. The females are particularly pugnacious, and their appetites are only surpassed by those of the larvae.

Although this particular beetle is definitely aquatic it must have fresh air to breathe, and if trapped for any length of time, and unable to rise to the surface, will easily drown. It is lighter in weight than water, and when a fresh supply of air is needed, it floats carelessly to the surface. Once there, the rear portion is pushed through the surface film into the air, and the elytra are slightly lifted. The air is trapped by two spiracles, and travels into the mass of hairs beneath the wing cases. It is retained here to be used later when the beetle has once more descended.

When sufficient air has been obtained the insect sinks once more into the water, in search of food (Fig. 3).

It is often possible to see the respiratory operation in progress, on a still summer day in almost any pond,
The Pond Builder

By Major R. LANE

Readers of this journal should know all about little diagrams—reminding one of Adam the Gardener of the Sunday Express, who forever works in a little paradise of precision and neatness.

If you do not take it too seriously, you can still build one of these ponds, but let me again describe how it is done.

There is always that rather neglected part of the garden which is crying out for a pool. Aquarists, of course, always call a pond a "pool," and I don't blame them—a lovely word nearly as satisfying as "mere."

We select a flat piece of ground, and just beyond, there must be a gentle slope, so that we can have a useful overflow. If the whole of our ground is level, however, we can either sink a deep well, or just trust to luck about emptying the pool, which, by the way, will empty itself quite easily unless we follow the instructions carefully.

Now mark out the area and remove the top spit of earth—which is simple—just a few barrow loads. The turf will make a nice bank under the hedge. Start digging in earnest to about one and a half feet in depth. Goodness knows how many barrow loads this will be, and as the work progresses they will each have to be raised somehow to the surface level. You may know where to put this earth, but when excavated it will be found to have increased its bulk considerably. We'll skip this problem. It will now be found that we have reached a hard impermeable layer of clayey consistency (samples may be taken up from the drawing room carpet later and studied at leisure). This layer usually becomes the bottom of the future pond, or should I say, pool.

As I have stated before, the removal of earth has been accomplished by dropping the barrow into the not so shallow depression—filling it endlessly, honking it up and wheeling it away, the track of the wheelbarrow making a little canal, which it is quite worthwhile to cement up later, should you desire to keep an eel or two.

So far so good. Blisters should be carefully cleansed with soap and water, then methylated spirit and then pierced sideways. Give them forty-eight hours to settle down.

We have now got to rock-bottom—as far as we are concerned anyway, with sloping sides, so that the ice will not burst open the edges.

We note that the top few inches of soil are much more loose and crumbly than the lower strata—so we smack it with the spade. This will make it look better, but really makes no difference, and anyhow it was time we got a new handle for the spade.

It is now time to mix the concrete. Mix the appropriate proportions on a wooden platform on the ground, not at the bottom of the pond, for I don't mind betting you that there will have been a good shower of rain, and the whole show will be nearly full of water by now. On no account be discouraged. From my calculations these things must happen. On this occasion the pond will be found to be fairly watertight and while the water is subsiding, the first lot of blisters should be practically healed. At any rate sufficiently to enable one to scoop out the residual moisture, and to get the concrete mixed. This should be laid evenly round to a depth of about six inches and allowed to harden.

It is not easy to judge when this process is complete, but if the acuter backache pains have subsided and there is no more paralysis, the concrete is probably ready for its final dressing.

Of course it will have to be baled out, and this activity will incidentally help to soften up the shoes again after the concrete mixing. The pond is baled out and it only remains to mix a soft creamy mixture of cement and sand and to brush it over the concrete. We should now get either a heavy downpour of rain or some very hot sun. Both will spoil the work, so it is best to choose a fine day and cover with some burlap sacks, which should be dampened.

After emptying and refilling the pond several times, over a period of some weeks, the sand can go in for the plants, and fish can be cautiously introduced, or bunged in according to taste. Avoid Carp as they certainly stir up the mud. I would advise Rudd if obtainable. The water will remain crystal clear and the fish will soon become tame and visible all the time.

You will now be all set for a visit from the nearest heron.
Directory of Aquarium Societies

Federation of British Aquarium Societies

Federation of Northern Aquarium Societies
Secretary: O. T. Dids, P.E.S., Longsight Lodge, Redgate Lane, Manchester, 12.

Balham and District Aquarist Club
Secretary: A. P. Price, 19, Boundary Mansions, Boundary Road, Balham, S.W. 12.
Meeting: Every Monday, 8 p.m., at Labour Rooms, Balham Park Road, S.W. 12.

Bathe's (Manchester) Aquarium Society
Secretary: Gerald T. Hes, Longsight Lodge, Redgate Lane, Manchester, 12.
Meetings: Monthly at Belle Vue Zoological Gardens, Manchester, 12.

Benshurst Aquarium Society
Secretary: Mrs. R. Aldred, 30, Benshurst Avenue, Elm Park, Rivelinford, Enfield, Middlesex.
Meetings: First and third Tuesday in month, 8 p.m., at Benshurst School, Benshurst Avenue, Elm Park, Romford.

Blackburn and District Aquarists' Society
Secretary: J. P. Aldred, 47, Preston New Road, Blackburn.
Meetings: First Thursday in month, 7.30 p.m., at the Reform Club, Victoria Street, Blackburn.

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

Bournemouth and District Aquarists' Society
Secretary: Vernon E. Poulton, 84, Shady Road, Boscombe, Bournemouth.
Meetings: Monday, Monday, 7.30 p.m. at Whitehall Hotel, Bournemouth.

Bracknell and District Aquarium's Society
Secretary: A. H. B. Thomas, 46, Welwley Road, Bracknell, 7.
Meeting: Second Wednesday of each month.

Bristol Aquarium Society
Secretary: H. C. B. Thomas, 46, Welwley Road, Bracknell, 7.
Meeting: Second Monday of each month at Grand Hotel Broad Street, Bristol.

Cambridge and District Aquarium Society
Secretary: R. W. McKay, 103, Cambridge Road, Great Stretford, Manchester.
Meetings: Monday, Monday, 7.30 p.m., at the Belle Vue Museum, Halifax.

Cardiff Aquarium Society
Secretary: L. W. Kenyon, 21, Pum-Ew road, Birchgrove, Cardiff.
Meeting: Midday, 7.30 p.m.

Chelmsford District Aquarium Society
Secretary: Mrs. C. R. Tappenden, 33, Pyrus Drive, Chelmsford, Essex.
Meeting: Third Monday in each month, 7.30 p.m., at St. Peter's Avenue, Chelmsford.

Cleethorpes and District Aquarium's Society
Secretary: D. W. Chapman, 26, St. Peter's Avenue, Cleethorpes.
Meeting: Third Monday in each month, 7.30 p.m., at St. Peter's Avenue, Cleethorpes.

Cocklefish Aquariums and Pondkeepers' Association
Secretary: Mrs. Howard Sprigg, The White Cottage, Fenwick Road, Falmouth, Cornwall.
Meeting: First Wednesday in month, 6 p.m., at Millbrook, Carlisle.

Coventry Pool and Aquarium Society
Secretary: R. G. Stock, 45, Irving Road, Coventry.
Meeting: First Wednesday in each month, 11 A.M., at B.T.H. Social Centre, Holyhead Road, Coventry.

Croydon Aquariums' Society
Secretary: G. S. O. Saunders, 5, Blenheim Gardens, Wellingham, Kent.
Meeting: First Thursday in month, 7.15 p.m., at Thornton Heath Public Library, Birtgowth Road, Thornton Heath.

Dawson Aquarium Society
Secretary: D. E. Ely, 83, Wong Road, Dagenham, Essex.
Meeting: First and third Monday of month, 7.30 p.m., at Dawson School, Ellerton Road, Becontree.

Derby and District Aquarists' Society
Secretary: T. S. White, F.Z.S., 25, Riddings Street, Derby.
Meeting: First Saturday evening in each month, at Prince Charlie Room, Derby Museum and Art Gallery, Warrick, Derby.

East Lancashire Aquarium Society
Secretary: H. E. Hodson, 59, Standish Street, Burnley, Lancs.
Meeting: Last Wednesday of the month at 7 p.m., Church Institute, Manchester Road, Burnley.

East London Aquarists' and Pondkeepers' Association
Secretary: T. B. But, 25, Humberstone Road, Platow, Ilford.
Meeting: First Thursday and third Tuesday in each month, 7.45 p.m., at St. Margaret's Hall, Ripple Road, Barking.

Enfield and District Aquarists' Society
Secretary: Mrs. Frances Perry, F.L.S., Bull's Cross Cottage, Enfield, Middx.
Meeting: Third Tuesday in each month, 7.30 p.m., at the Methodist Church Hall, Enfield.

Enterprise Aquatic Society
Secretary: H. R. T. Holland, 87, Ridgeway Road, Whetstone, N. 20 (Pinner, H. L. Cross 71223).
Meeting: Third Thursday in each month, 7.30 p.m., at Oakeleigh Primary School, Oakeleigh Road, Whetstone.

Goldfish Society of Great Britain

Grimsby and District Aquarists' Society
Meeting: First Monday in month, 7.30 p.m., at Victoria Cafe, Victoria Street, Grimsby.

Guyper Breeder's Society
Secretary: Capt. B. T. Stacey, 20, Alverton Street, Deptford, S. E. 8.
Meeting: Second Thursday in each month at 7.30 p.m. at the Club Room, Crown Hotel, Prince of Wales Road, Chalke Farm Road, N.W. 4.

Halifax and District Aquariums Society
Secretary: Frank M. Slater, 83, Green Park Road, Skircoat Green, Halifax, Yorks.
Meeting: Monday in month at the Belle Vue Museum, Halifax.

Harrow Aquarists' Club
Secretary: S. Sanders, 52, Church Avenue, Pinner, Middx.
Meeting: Second Monday in month, 7.30 p.m., at 1, Cecil Park (Y.M.C.A. building), Pinner.

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

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

Hornchurch and District Aquarists' Society
Secretary: V. F. Swettenham, 5, Devonshire Road, Hornchurch, Essex.

Hornsey Aquarium Society
Secretary: T. W. Tiffany, 98, Talbot Road, Tottenham, N. 15.
Meeting: First and third Wednesday of each month, 7.30 p.m., at "The Priory," Hornsey.

Ilford Aquarists' Society
Meeting: Second Monday of each month, 8 p.m., at House, High Road, Ilford.

Kingston and District Aquarists' Society
Secretary: R. H. Alderton, 25, Park Road West, Kingston-on-Thames.
Meeting: Thursday in each month, 7.30 p.m., Alexander Hotel, Park Road, Kingston.

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

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

Liverpool and District Aquarium Society
Secretary: L. P. Plant, 66, Ferguson Road, Liverpool, 11.
(Phone: 15249 Stanley, 1)
Meetings: Third Tuesday in month, 7.30 p.m.

Luton and District Pondkeepers’ and Aquarists’ Society
Secretary: Mrs. F. Smith, 190a, Old Bedzed Road, Luton.
(Phone: 84006.3)
Meetings: Every Tuesday in month, 7.30 p.m., at Luton Grammar School.

Merseyside Aquarists’ Society
Secretary: R. Baird, 34, Montpellier Crescent, Wallasey, Cheshire.
Meetings: First and third Thursday in each month.

Midland Aquarium and Pool Society
Secretary: E. C. Batley, 33, Tipton Street, Tipton, West Midlands.
Meetings: Every Wednesday in month, 7.30 p.m., at Chamber of Commerce, Birmingham.

Mid-Somerset Aquarists and Pondkeepers’ Society
Secretary: D. H. Ferrett, 15, Perioulc Shrubs, Bridgwater, Somerset.
Meetings: Every Wednesday in month, 7.30 p.m.

National Aquarists’ Society
Secretary: Kathleen Cooke, P.R.H.S., 32, Poulters Gardens, Twickenham, Middlesex.
Meetings: Every Tuesday in month, 7.30 p.m., at the Chamber of Commerce, Birmingham.

Northampton Aquarists’ Society
Secretary: Mrs. M. E. Hunt, 19, Windsor Crescent, St. James’s, Northampton.
Meetings: Every Tuesday in month, 7.30 p.m.

North West Yorkshire Aquarists’ Society
Secretary: E. R. Thompson, 76, Strachmore Avenue, Hitchin, Herts.
Meetings: Third Tuesday in month, 7.30 p.m., at Hitchin Public Library.

North London Aquarists’ Society
Secretary: J. H. Anderson, 54, Croydon Road, Highbury, N.W.5.
Meetings: Every Wednesday in month, 7.30 p.m., at Holne’s Road School, N.W.1.

North Yorkshire and District Aquarist Society
Meetings: First Wednesday of each month at the Church Institute, Church Street, Skipton.

Nottingham and District Aquarists’ Society
Secretary: H. B. Best, 20, Spencer Street, Arnold, Nottingham (Phone: 64765).
Meetings: Every Saturday in month, 7.30 p.m., at People’s Hall, Heathcote Street, Nottingham.

Oxford and District Aquarium Society
Secretary: M. H. Alderton, 35, Philips Road, Cowley, Oxford.
Meetings: Second Monday in month, 7.30 p.m., New Baptist Church, New Iron Hall Street, Oxford.

Potters Bar Aquarists’ Society
Secretary: F. D. Willis, South Lodge, Cockfosters Road, Hadley Wood, Herts. (Phone: Barnet 9042).
Meetings: Third Wednesday in month, 7.30 p.m., Laburno Brook School, High Street, Potters Bar.

Preston and District Aquarists’ Society
Secretary: M. H. Robinson, 18, Bank Place, Ashton, Preston.
Meetings: Second Wednesday of each month, 7.30 p.m., at Foxhill Methodist Schoolrooms.

Scottish Aquarium Society
Secretary: Dr. Stewart, 42, Ayres Road, Glasgow, S.1.
Meetings: Christian Institute, 70, Borthwic Street, Glasgow, C.2 (as per syllabus).

Sheffield and District Aquarists’ Society
Secretary: E. Chapman, 170, Gibraltar Street, Sheffield, 3.
Meetings: First Monday of each month, 7.30 p.m., Trinity Church School Hall, Beresford Street, Woolwich, S.E.16.

Southampton and District Aquarist Society
Secretary: C. C. Parrott, 63, Upper Brownhill Road, Nursling, Southampton.
Meetings: Every second and fourth Thursday in month, 7.30 p.m., at the Queen’s Hotel, Hampshire Road, Southampton.

Southend, Leigh and District Aquarists’ Society
Secretary: E. L. Day, 26, Howesmouth Park Road, Southend.
Meetings: Every Wednesday in month, 7.30 p.m., at Girl Guides Hall, Westcliff, Southend-on-Sea.

South London Aquarists’ Society
Meetings: Every Tuesday in month, 7.30 p.m., at Wilbury Willows, Member of Men’s Club Ltd., B1, The Broadway, Wimbledon, S.W.19.

South Ruislip Aquarists’ Society
Secretary: C. J. Darby, 76, Ryedale Gardens, Greenford, Middlesex. (Phone: W.3006).
Meetings: Every Tuesday in month, 7.30 p.m., at Old Tauntonian Pavillion, Long Drive, South Ruislip.

South-West London Aquarists’ Society
Secretary: Mrs. Bulmer, 6, Kelvin Court, Spencer Road, Chiswick, W.4.
Meetings: Every Wednesday in month, 7.30 p.m., at 86a, Fulham Road, Parsons Green, S.W.6, at 7.30 p.m.

Suffolk Aquarists’ and Pondkeepers’ Association
Secretary: F. Binkley, 267, Walpole Road, Ipswich, Suffolk.
Meetings: Every Wednesday in month, 7.30 p.m., at Lecture Room, Ipswich Museum.

Tottenham and District Aquarium Society
Secretary: T. W. Tiffany, 38, Talbot Road, Tottenham, N.15.
Meetings: Every Tuesday in month, 7.30 p.m., at Revis House, N.15.

Tropical Aquatic Society
Secretary: D. F. Kerrison, 26, George Street, Camden Town, N.W.1.
Meetings: Every Tuesday in month, 7.30 p.m., at Torrington House, N.15.

The Twenty Club
Secretary: G. Griffr, 29, Melrose Avenue, Wimbledon Park, S.W.19.
Meetings: Every Wednesday in month, 7.30 p.m., at 29, Redgrave Road, Putney, S.W.15.

Ulster Aquarium Society
Secretary: G. E. Crisp, 31, Murmore Park, Belfast.
Meetings: Every Tuesday in month, 7.30 p.m., at 31, Lisburn Street, Belfast.

Walsall and District Aquarist Society
Secretary: S. Miller-Collins, 54, Walsgrave Road, Walsall, Staffs.
Meetings: Every Tuesday in month, 7.30 p.m., at the Club Room, New Inn’s Park Street, Walsall.

Watford Aquarist Society
Secretary: F. R. Bett, 66, Fuller Road, Watford, Herts.
Meetings: Second and Fourth Saturday in month, 7.30 p.m., at Watford Civic Centre, Watford Field House, Watford.

Welling and District Aquarists and Pondkeepers’ Club
Secretary: E. F. Sturman, 36, Cornwall Avenue, Welling, Kent.
Meetings: Third Monday in month, 8.15 p.m., at Falconwood Social Club, 1, Falconwood Avenue, Welling.

Wembridge Aquarist Society
Secretary: D. Yankes, 9, Abbot Drive, Wembley.
Meetings: Every Tuesday in month, 7.30 p.m., at Park Lane School, Wembley.

West Middlesex Aquarist Society
Secretary: A. H. Charles, 41, Uxbridge Road, Hanwell, W.7. (Middlesex.
Meetings: Second Tuesday in each month, 7.30 p.m., at Methodist Church, Windsor Road, Ealing, W.9.

West Surrey Pondkeepers’ and Aquarists’ Club
Secretary: F. F. Geraldo, 8, Orchard Way, Aldershot.
Meetings: Second Wednesday in month, 7.30 p.m., Guildford, House, 16, High Street, Guildford.

Willesden Aquarists’ Society
Secretary: R. O. B. Lewis, 31, Coronation Court, 31, Willesden Lane, N.W.4 (Phone: MALE 9872).
Meetings: Every Thursday in month, 7.30 p.m., at Salisbury Road School, N.W.8.

Wolverhampton and District Aquarists’ Society
Secretary: T. S. Pick, 44, Green Lane, Tettenhall, Wolverhampton.
Meetings: First and Third Fridays in each month, 7.30 p.m., Eastfield Road, Primary School Hall, Walsall Street, Wolverhampton.
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