



The
AQUARIST

THE
ORIGINAL
MONTHLY MAGAZINE
DEVOTED TO AQUARIUM
FISH AND REPTILE
KEEPING

Volume XIII Number 4

July 1948

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The AQUARIST AND PONDKEEPER

(Incorporating "The Reptilian Review")

Founded in 1924 as "The Amateur Aquarist"



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VOL. XIII NO. 4

JULY, 1948

EDITORIAL

HAVING watched the development of our hobby in numerous countries over the last twenty-five years, we have not failed to notice one interesting phenomenon, namely, that the proportion of ornamental ponds is much higher in Britain than in most other aquarist-minded countries. Despite the very rapid increase in the number of people interested in indoor aquarium-keeping during the last few years, people with garden ponds still form a proportionate proportion of our readers, and a fair amount of our space must be given to their needs in each issue of our journal. In contrast, American and European journals devote hardly any space to ponds at all, though in America aquarium-keeping is on a comparatively enormous scale, and in such countries as Holland is proportionately more intense and highly organised.

The reason, of course, is the connection between ponds and gardens. Britain is proverbially a nation of gardeners; no house is considered complete without its garden, however small, and most Britons would choose an old-fashioned, ill-equipped house with its little piece of ground rather than a luxurious modern flat of comparable size. We think the feudal tradition has a good deal to do with this, for although the power of the feudal aristocracy was broken three hundred years ago, in Cromwell's time, the aim of each emancipated common man has ever since been to possess his own little baronial hall on his own little estate, even though held in fief. A good many have succeeded, too, and the result is that a large amount of our land is divided into squares of lawn surrounded by flower beds, and often with a pond in the middle. America has no feudal tradition, therefore fewer gardens and fewer ponds. Continental countries, it is true, were feudal to a much

later date than we, but that resulted in their being behind in the race for industrial supremacy and the common man has not had the same economic security, means or leisure to become a little baron. The only country which seems to compare with us in this matter of ponds is New Zealand, and of course that is, culturally, a piece of Britain carried overseas.

It is all very interesting, but we cannot go further into it now. The important thing is that we have a country full of beautiful gardens large and small, and since the sparkle of water adds the finishing touch, we also have numerous ponds.

That is why this journal does not devote all its space to aquaria and exotic fishes, and why it will be represented at the *Evening News* Flower Show, to be held at Olympia, on August 5th to 7th. On our stand at that show we shall have a small pond and will do our best to arouse interest in aquatic matters among the many thousands of garden lovers who will attend. Further, we shall have on exhibition some aquaria with representative plants and fishes, for there is no reason why these things also should not appeal to flower lovers—particularly if they have greenhouses. Orchid growers might find the tropical tank a decorative way of maintaining humidity, while cactus enthusiasts might find the vivarium an interesting concomitant to their study. Those of our readers interested in flowers will do well to visit this exhibition, and we shall be pleased to meet them at our stand (No. 49 in the National Hall).

This issue will be on sale at the Show, and to those who read this journal for the first time we extend a hearty invitation to enter into a hobby that for pleasure, interest, educational and scientific value and good fellowship is second to none.

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.

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

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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.

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Breeding the PEARL GOURAMI

(*Trichogaster leeri*)

E. BALLARD

This is a report of my first attempt to breed the Pearl Gourami. I thought it would be of interest to others contemplating doing the same.

I have read several articles on the habits and breeding habits of these fish, and how they heap soil near the nest, presumably to make the water less shallow, but I will carry on with my observations.

The pair of fish are approximately two years old and are housed in a 12" x 12" x 12" aquarium by the use of wire mesh. The feeding consists of Green, Blue, Orange, White Worms and Daphnia.

The male in the aquarium is about 7 years old and has a white circle around his mouth and head as he breathes. I have not a number of the cleanest water regime. The aquarium is well planted with various soil rooted Vallisneria, and, of course, a variety of plants.

The fish had been kept in several other aquariums of various sizes and conditions.

The pair had been kept in the following aquariums: 12" x 12" x 12" at the time, but it was not suitable for breeding.

The spawning commenced on June 4th, and the female appeared to lay the eggs for some hours, probably making her nest under the soil when the soil subsided, the male completely covering the female's body with the female in an upright position.

The spawning was continued for 17 seconds before the eggs were laid. The male appeared to apply considerable pressure to the female and approximately 20 eggs were released into or near the nest. The pressure was then broken and the male gave the female a strong nudge to guard her from the nest, although the male in attempt to touch the various eggs being moved. Thus the male caught at his mouth and held on to the nest.

This procedure was carried on at varying intervals and the male was still spawning at 1.30 p.m.

The eggs are brown and are not as mixed by the male but on the surface and hatch. The eggs hatch in 24 hours at a temperature of 80 degrees F. and the young were first swimming later on June 10th, and the male still attempting to keep them in position. I used Food For Fish, Dried Egg, and a



(Photo: B. & F.)

The Pearl Gourami
(*Trichogaster leeri*)

piece of raw potato on June 7th. Later, screened Daphnia was put into the tank.

The parents were left in the tank and never interfered with the young at any time.

It may be of interest that the parents spawned again on 11th, 16th, 21st of June, with approximately 200 eggs at each spawning. I removed the female on June 22nd. I admit this is rather overdoing the spawnings but I was somewhat overcrowded in other tanks with young Angel Fish and I could not risk putting the female Leeri in with these as she ate approximately 300 Angel Fish eggs on June 2nd, when I placed them in the tank for safety!

From my observations I cannot understand why these grand fish are not in better supply. There appears to be no obstacles in breeding them in quantity if they are given ample supplies of infusoria at an early age.

The youngsters I have take dried food readily, and at three weeks old were three-eighths of an inch long approximately, and they are too numerous to count.

WATER-LILIES

By _____ FRANCES PERRY, F.L.S., F.R.H.S.

THE possession of a pool creates many opportunities for achieving beautiful effects with aquatic flora, for there is no feature connected with horticulture that has a greater fascination or more charm than a water garden. No matter what the dimensions, be it tub, pond or lake, there are water plants to suit all requirements. Carefully chosen and lovingly tended, these should do much towards transforming the pool into a really delightful part of the garden. This article deals only with water-lilies—the most charming and beautiful of all water plants—but the cultural requirements and conditions here advocated might equally well suit some half-dozen other aquatics.

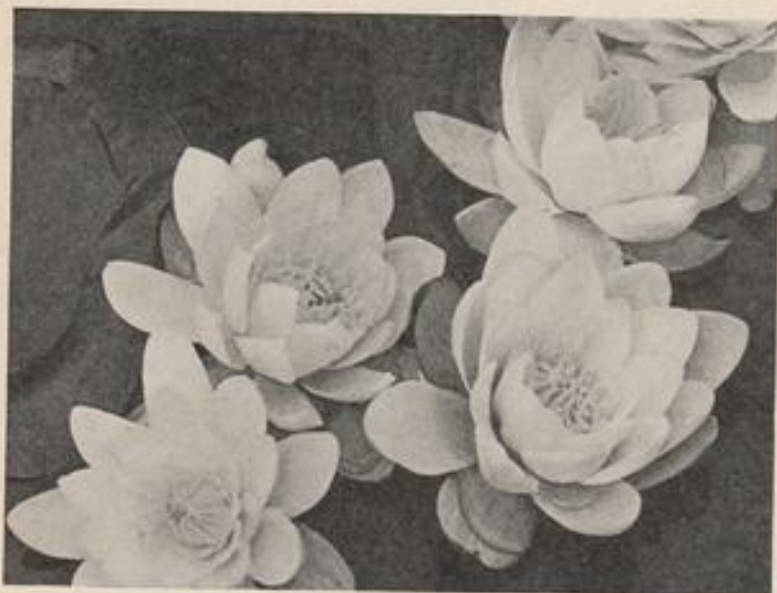
The botanical designation of the water-lily is *Nymphaea*; it is a simple dicotyledon closely related to the buttercup and magnolia, and thought by many botanists to form a connecting link between the flowering plants and cycads. These were seed-bearing, palm-like plants dominant on the earth some 75-100 million years ago; and it is interesting to note that botanists and geologists have established proof that species of *Nelumbo*, which are closely related to water-lilies, flourished on the earth in Cretaceous and Tertiary times. From these facts and those of

fossil remains we may assume that there has been plenty of time for water-lilies to develop their individual ways of life and that their evolution was accomplished millions of years ago.

The genus is varied both in colour, mode of growth and habitat; there are water-lilies in the arctic regions and they grow in our own land and are prevalent in the tropics. White, yellow, pink, red, blue and mauve forms may be found naturally but the art of the hybridist has evolved a wide range of tones and shades, increased their size and toughened their constitution.

The stem of the water-lily is not erect at all, it lies in the mud vastly thickened and swollen and containing much starchy matter after the manner of many rootstocks. As the plant grows it sends out roots and leaves and flowers, the older portions die and the newer parts, or apical portions, branch. When such branches become isolated by the eventual death of the older parts of the tuber, they become new plants. This is one way in which propagation is effected without the process of seed bearing.

The leaves are wonderfully adapted to their environment. The petiole or leaf-stalk can grow to any length—whether inches or feet—so as to bring



Nymphaea James Brydon, though appearing white in this photo, is rich crimson with golden-yellow stamens

(Photo: L. C. Mandeville)



There is much beauty in the leaves alone

the leaf blade to the surface. As a matter of fact they grow just a little longer than necessary so that the leaf floats back from the centre of the plant and thus allows new foliage room to develop. The stems are soft and supple, for strengthening cells are not needed since water as an enveloping medium is much heavier than air and thus itself acts as a support.

The leaf blade is tough and leathery, rounded in shape with a waxy protection above and heavy veining. It needs to be sturdy to withstand the assaults of tides and currents which might rend more delicate structure, and its texture nullifies the effects of heavy rain striking right on to the blade, which has no chance of yielding like that of a terrestrial plant. In the early seedling stage membranous cotyledon leaves which are quite submerged, appear before the floating ones and again in established and overgrown specimens a form of aerial foliage appears towards the end of the season. The thrusting up of these leaves hides the flowers and diminishes their size and is a sure indication that the rootstocks need dividing.

In other respects the leaves of the water-lily are much like other plants, performing photo-synthesis, respiration, etc., with the difference that the stomata (breathing pores) are on the upper surface only. A characteristic feature of the structure of water-lilies is the presence of lacunae or air canals in the rootstocks, flower stems, roots and petioles. They are variously patterned according to botanical groupings in the genus, so that identification may be made from the arrangement of these air channels alone. Their purpose has given rise to much conjecture but it is generally assumed that their

presence facilitates the interchange of gases which otherwise might present problems in the submerged parts of the plant, and it is possible that the air enclosed in these cells lessens the specific gravity of the plant.

Water-lilies are lovers of sunshine, and in most varieties the warmer the water, the more luxuriant the growth. Exceptions are found amongst natives of very northern regions such as *N. fennica*, *candida*, etc. Running water is definitely not desirable, especially for the *odorata* section of *Nymphaeas*, as it continually lowers the temperature and destroys that calm, still state so conducive to success.

The genus makes a good deal of growth annually and so needs well feeding. The compost should be on the heavy side and free from organic material of all kinds. For this reason fibrous meadow loam must be rotted down for several months before use and such substances as peat, leaf-mould, spent hops, etc., be rigorously excluded. For the same reason horse-manure is too hot and fibrous; last summer I traced back the failure of a whole planting of water-lilies in a public park to the use of this material. Well rotted cow-manure or coarse bonemeal are the best fertilisers; after twenty years' experience I will advocate nothing else.

The most successful time to transplant is in May and June as the plants are then starting into vigorous growth. They should be set very firmly, with the roots well spread out and the prepared compost coming just up to the crowns. A top dressing of two inches of pure loam or shingle is next added, to make sure that no particle of manure shall rise to the surface



(Photo: L. C. Mandeville)

Nymphaea Marliacea carnea, has large white flowers, shaded rose at base

Nymphaea Marliacea rosea is white or pink-shaded in the first year, but deepens to rich rose red in established plants



(Photos: L. C. Mandeville)



Nymphaea odorata sulphurea has yellow flowers and attractive red mottling on the leaves



The superb blue *Nymphaea stellata* is a tropical species. The sweetly-scented flower stands high above the water

and foul the water. After planting, the crowns should be just covered with water for a few days until they have somewhat recovered from the shock of moving; then add a further small quantity, wait again and continue in this way until the pool is completely filled. In an established pond adopt the same precautions by raising the basket in which the lily is planted on to bricks, and gradually lower the support.

There are many beautiful varieties to choose from, for a few inches of water up to several feet. One of my favourites is James Brydon; it can always be depended upon to give a good display. The cup-shaped flowers sit squat on the water and are a good shade of deep red. *N. marliacea rosea* is over sixty years old but still much in demand. The flowers are large, fragrant and lasting, and of a deep rose

shade which is intensified towards the centre. The full depth of the colour however is not attained until the plant is well established. *Marliacea carnea* is similar to the preceding but much paler in shade. *Odorata sulphurea* does not need very deep water, 18 ins. above the crown must be looked upon as an absolute maximum; its deep sulphur-yellow flowers stand just above water level when the plant is well established and the foliage is attractively blotched with chocolate-coloured markings.

To grow the blue varieties one must have access to warm water tanks. During the winter months the dormant tubers are lifted and stored in sand, but they need greenhouse temperatures to start them again in spring. The majority are sweetly scented and there are night-blooming as well as day-flowering kinds.



The roots of water-lilies should be taken up, divided and replanted when the leaves become crowded and rise above the water as shown in this picture

(Photo: H. A. Day)

BOOK REVIEW

A Stream in Your Garden, By "BB." Illustrated by D. Watkins-Pitchford. (Eyre & Spottiswoode, 15, Bedford Street, Strand, W.C.2. Price 6s. net.)

This is an excellent little book, covering the whole question not only of streams but of garden pools, both formal and informal, in a thoroughly practical way. Every essential for the establishment and construction of water gardens of all kinds is included, and in a manner that is never tedious or pedantic. A chatty, almost rambling style, with amusing anecdotes that are to the point, provides interesting reading from beginning to end, and the illustrations serve both to clarify and beautify the work.

"BB" particularly advocates running water, as provided by an electric pump, and there can be no doubt that the sparkle and tinkle of moving water adds greatly to the attraction of a garden; he is

careful to add however, that if water-lilies are to be grown, moving water should be avoided. Being a naturalist he favours "natural" pools and streams, stocked with plants and fishes collected from the wild, but he nevertheless does not neglect the construction of formal pools and includes a chapter on the care and breeding of goldfish. We are interested to see that he stresses the necessity to obtain goldfish acclimatised to cold water; so many people, including so-called experts, are inclined to forget that the goldfish was originally a sub-tropical species. An appendix at the end gives a good deal of valuable information about pumps, their installation and maintenance.

A handy size, well printed and strongly bound, this book can be strongly recommended to all who either contemplate making, or who already possess, a water-garden.

FISH FARMING IN THE TROPICS

THE problem of supplying food for the world's increasing population is calling forth all man's ingenuity, and has revived interest in, and promoted investigation of, an ancient Eastern cult—the farming of fish for human consumption.

Dr. C. F. Hickling, Fisheries Adviser to the Colonial Office, has written an interesting account of fish farming in the Middle and Far East in *Nature* recently,* and refers to work to be undertaken by the Colonial Office which will interest aquarists as an example of the problems to be solved by "large scale" fish-keepers.

In his article Dr. Hickling describes fresh and salt water ponds, in tropical countries where rarely is it possible to get anything like adequate supplies of fish to help satisfy the protein demands of inhabitants from natural sources. In India particularly, efforts are being made to spread the technique of fish farming. Outlay costs and recurrent costs are heavy, but Dr. Hocking points out that similar expenses occur in natural fisheries, whilst the figures he quotes for annual yields of fish per acre from fish farms in many different parts of the world are certainly impressive, when compared with the smaller yields of natural waters.

The technique of fish-keeping on such a scale is illuminating to say the least, to the aquarist maintaining a garden pond. For example—the many types of materials dumped into the ponds to supply food—either directly, or indirectly, by manuring action (encouraging microscopic aquatic life); the article mentions oil cake, cut grass, termites and silkworm faeces, among others. The excellent

yields of adult fish from the ponds indicates the complete use made of such natural and artificial foods as are available.

Fish culturists judge the productivity of ponds by examination of contained plankton, and acidity of the water is judged by taste!

In general, breeding is not attempted; fry from natural sources caught in their millions are used for stocking. The common carp is bred however, and among a few other species is a Gourami (*Ospromemus affax*) which breeds in Java, in special spawning ponds or stock pond enclosures containing bundles of brushwood or frames of coconut fibres for reception of spawn—by these means later transferred to hatching ponds. One is struck by the special techniques that have been developed, e.g., in a method for separating fry of mixed species, advantage is taken of their different oxygen requirements.

Dr. Hickling draws attention to the relationship of such ponds to human health factors, particularly to the breeding of mosquitoes and consequent risk of malaria, but apparently when the ponds are kept free of aquatic vegetation the fish can deal effectively with mosquito larvae.

The Colonial Office plans to set up a research institute to study "the fundamental processes underlying the high yields of fish ponds, to study the genetics of fish and the physiology of breeding . . . also fish culturists would be trained under experts."

Such work will doubtless throw light on matters of close interest to aquarists of all types and in view of the humanitarian applications which it will facilitate, is very welcome.

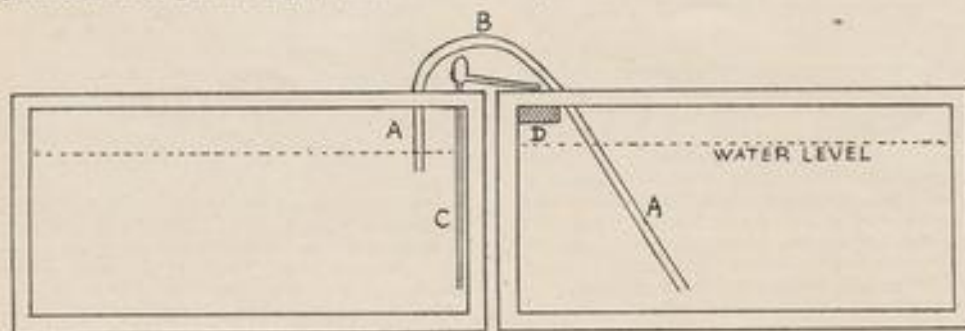
A. G. J. E.

* May 15, 1948

AERATING AND SIPHONING TWO TANKS

This diagram of a method of aerating and filtering two tanks is sent by Mr. A. R. Day of the Kingston Aquarists' Society. It will be familiar to old hands but may be helpful to newcomers. Water is siphoned from the bottom of the right-hand tank; the siphon consists of glass tubing, (A) fitted into

rubber tubing (B). An air-lift (C) takes water from bottom of left-hand tank, passes it through the filter (D) and so back into right-hand tank. The bore of the siphon should exceed that of the air-lift. Other tanks can, of course, be added, connected by similar siphons.



MARINE AQUARIA for PUBLIC EXHIBITION

By Capt. J. L. CLOUDSLEY-THOMPSON, B.A., F.Z.S.

MARINE Aquaria have recently been discussed by several contributors to *The Aquarist*. Ian Harman (1946, Vol. XI, p. 101) gave some practical instructions for the amateur, and his article was followed by a spate of constructive suggestions and criticisms from Messrs. L. R. Brightwell (pp. 138, 211), Barry Funnell (p. 188), L. E. Dickerson (p. 210) and H. Riley (p. 211) concerned primarily with the small scale rock pool type of aquarium. (See also D. P. Wilson, 1937, "Life of the Shore and Shallow Sea," p. 138.)

A. J. Claxton (1947, Vol. XII, p. 131) mentioned how little information is available on the various aspects of keeping marine life, especially in large aquaria. As he pointed out, one is working practically "in the dark"; in view of which his own observations and experiments, and the experiences of E. Peere-Spencer (1948, Vol. XII, p. 328) are of particular interest. In last month's issue (p. 80) a further article by Mr. Claxton brought his experiences and researches up to date.

The following comments, based largely on experience recently gained as consultant for the construction of a large marine aquarium designed primarily for advertising purposes, are offered not in any dogmatic or controversial spirit, but with the intention of being helpful.

Tanks

Minimum size for larger pelagic fishes, 10 x 4 x 4 feet. Avoid brass, copper, and zinc in construction. The frame must be true. Pressure of the water will be sufficient to hold the plate glass firmly in its seating. Remember that owing to diffraction, when the tanks have been filled with water distances from front to back are apparently greatly reduced. In consequence rocks, etc., will appear in an unreal position which must be allowed for when planning scenic effects. If the cement has not stopped giving off poisonous substances, it must be coated with bituminous paint: in any case the aquaria should be stabilised for as long as possible before animals are introduced. Spaces should not be left between the rocks, in which fish can die, because it may be difficult to extract corpses which otherwise foul the water. Beware of reflection on the glass from hand rails (which should be painted black), notices on opposite walls, etc.

Aeration, Temperature and Light

Aeration preferably from the bottom of the tanks. An activated carbon filter is to be recommended. The refrigerated reservoirs should be able to hold at least half as much water as the total volume of the exhibition tanks; temperature controlled at approximately 12°C. Daylight bulbs show colours to best advantage. A single bulb produces attractive ripple effects on the bottom which are eliminated by the use of strip-lighting or a number of bulbs.

Fishes

These must be caught by hook from shallow water, and not trawled up from deeper water. They should be acclimatised for at least a week in a tank, and not fed for two days before transport. Compressed oxygen may have to be supplied *en route*. Cod, plaice, sole, dabs, small rays, gurnard, etc., will live well together, but conger-eels, dogfish, lobsters and crabs are better separated from them. Blennies and gobies may be introduced with larger fish, and if small enough to escape notice, will not be eaten. Nevertheless they are useful in cleaning up scraps of food, and are amusing to watch. Chopped squid (*Loligo forbesi*) is a standard food in marine aquaria, but it must be fresh.

Finally may I draw attention to the merits of the "lemon-dab" or "merry-sole" (*Microstomus kitt*) an active, restless fish, which spends most of the day hunting for the tubicolous Polychaetes, etc., on which it normally feeds. As G. A. Steven (1930, J.Mar. Biol. Assoc. N.S. Vol. XVI, pp. 677-700) has described, it comes to rest for short periods in a characteristic and comical attitude with the head and forepart of the body raised well up. Remaining perfectly still, it scans the bottom with its very prominent mobile eyes, until it sees a worm, on which it pounces vertically. This behaviour makes it the most entertaining of flat-fishes. The common dab and plaice feed in a similar manner, but do not lift the head so high before they pounce: whilst the sole, whose eyes are small and scarcely movable, creeps slowly over the bottom feeling for its prey with the dense mass of tactile villi on its lower cheek. This is much less interesting to watch.

The ideas suggested above will, of course, be familiar to experienced aquarists and ichthyologists. The keys to successful fish-keeping are experience and common sense; without the latter no one can succeed. A primary function of *The Aquarist* is to provide a medium for the distribution of the former.

CACTI *for the* VIVARIUM

By A. BOARDER

IT may come as a surprise to many to know that a vivarium can be planted with growing cacti and other succulents and so become as decorative as a well established aquarium. I propose to give a few notes for the guidance of those who wish to set up such a vivarium. Once correctly planted this should last for many years with a minimum of attention, and a great deal of interest will be provided, not only for the vivarium keeper but also for visitors.

Cacti rarely fail to attract attention and it is surprising how many aquarists are also keen on them. I hope that these notes may be of interest to many who are not actually thinking of setting up a vivarium.

In the first place let us consider what a cactus plant is and where it comes from. Whenever some people hear the word cacti they immediately say "Oh yes! I know, those prickly things which bloom once in seven years," or else, "My aunt had one once, it had large red flowers and bloomed every twelve years or was it twenty?" Well, they are certainly prickly things, more or less, but all of

them should flower every year once they are mature. I, myself, have flowered many cacti the year after sowing the seed and they have continued to flower year after year. Many plants which are termed cacti by many people are not cacti at all but succulents. Now all cacti are succulents but all succulents are not cacti. The chief characteristic of a succulent plant is that it is able to withstand very prolonged drought without withering at all, in fact, if a succulent were thrown on the ground it would not wilt like an ordinary plant but would remain plump and green for a considerable time. Many cacti in their native habitat have to go without rain for two or more years at times and they come to no harm during that period.

All true cacti have small bunches of spines on them and the different genera and species vary considerably as to the length, strength and colour of those spines. Some are very stout and long while others are very short and hair-like. A number have strongly hooked spines which catch in anything which comes in contact with them and the plants are



The diorama in the Hoyt Cactus House at Kew Gardens. Few vivarists can work on this scale, but can achieve similar effects in miniature

(Photo: A. F. B.)

Left centre are the hoary heads of Old-man Cactus, (*Cereus senilis*), with other species of *Cereus* before and behind them. The prickly spheres, like sea-urchins, are *Echinocactus* species. In the centre is *Trichocereus chiloensis* and the massive dark column on right of it is *Cornegia gigantea*. To the right of this again is the many-fluted *Pachycereus pringlei*



Mammillaria longicoma (above) and *Astrophytum myrostigma* (right), grown from seed by the author

sometimes pulled up by their roots before the hooks give way.

All cacti originated in America and the West Indies. A few only in the latter place but the vast majority from such states as Texas, Mexico, Paraguay, Bolivia, and neighbouring states. No true cacti are found anywhere else in the world. I know that very many are found to-day growing in India, Australia, Africa, Egypt and other tropical and sub-tropical countries, but these were all introduced from America originally. Africa has, however, many varied forms of succulents which appear to mimic the true cacti, and may confuse some people but these plants have quite a different type of spine and can easily be distinguished from cacti if these spines are examined closely.

Many people grow these plants in a mixed collection, but if one wishes to be correct geographically one should try and grow in a vivarium plants which come from similar regions.

We will now consider the setting up of a vivarium. First it is essential to use a good potting soil for the plants to grow in. John Innes potting soil compost is very good if a little granulated charcoal and crushed bones are added to the compost to increase its porosity, and to add a little more nutriment to last some years. The soil can be arranged in the vivarium on the same principle as the sand in an aquarium, shallow at the front and deeper at the

back, say up to three inches deep. Pieces of sandstone to act as rocks can be added to make the scene resemble a small part of a desert, and a small pool can be arranged in the foreground with the aid of a sunken dish or similar receptacle. It may be said that a pool is not natural in a desert, but many fine cacti grow on the banks of the Rio Grande where it separates Texas from Mexico. Many of the inhabitants of the vivarium will appreciate this water. Coarse sand or gravel should then be placed over all the soil as this will tend to keep everything clean and will give a natural desert-like appearance. Remember to try to imitate a piece of a desert and then your lizards, snakes, toads, etc., will look more at home always.

There is no need to have any drainage holes in the base of the vivarium as long as you water with extreme care. You must choose your plants carefully, as, obviously, if you have frogs or other soft-skinned occupants, you will not make use of those cacti which have very sharp hard spines. There are many, however, for you to choose from



which have quite soft spines. Try to plant the tall-growing kinds towards the back of the vivarium (these are in the *Cereus* group) and keep the small cushion type, such as *Mammillaria* to the front. Plant the cacti firmly up to the old soil mark on them. Do not crowd them together but leave them space to grow. Remember that the plants are likely to be there for a very long time. Also when planting try to create a good picture by using plants of varying colours. You will find that they vary through all shades from dark green to blue-green and then to white, and their flowers include all colours—even green. Whilst many have large flowers very many more have only small ones, but these are often in such profusion as to make rings of bloom round the tops of the plants, often to be followed by coral-coloured fruits.

You have to bear in mind always that the whole art of keeping and growing cacti and other succulents is to master the problem of watering. It is possible to keep these plants alive for years without watering them, but some water is absolutely necessary to ensure growth and flowers. Over-watering will kill them quicker than anything else. They just cannot stand continual wetness at the roots, as if this happens for quite a short period the roots will die and the plant will soon rot. The most important rule to remember is not to water the soil until it has dried out completely. That should be easy, but so many people just cannot resist giving repeated waterings to any plant in a pot, cacti or otherwise, and this careless watering accounts for the death of more pot plants than anything else.

During the winter the plants should not need any water at all, but a great deal will depend on the temperature of the room, etc., where the vivarium is kept. Naturally the warmer the vivarium and the more exposed to the sun it is the sooner will it dry out. It is not advisable to water at all in very dull weather. Practically all cacti are sun lovers, and will not flower unless they get a fair amount of sun.

The following are very suitable cacti for the vivarium:—*Cereus silvestrius*, *C. Straussii*, *C. peruvianus*, *Echinopsis schoereri*, *Astrophytum myrostigma*, *A. asterias*, *Echinocactus ottonis*, *E. apricus*, *E. Quechilanus*, *Echinocereus de Laetii*, *E. pectinatus*, *Epiphyllum truncatum*, *Mammillaria scheideana*, *M. longimanua*, *M. herrerae*, *M. micromeris*, *M. perbella*, *M. campotricha*, *M. pusilla*, *M. hahniana*, *M. elegans*, *M. lenta*, *M. plumosa* and *M. albicans*.

There are hundreds more to choose from but the above will be a good guide. When choosing your plants you had better avoid those with hard sharp spines especially if the inhabitants of the vivarium have soft skins. The genus *Opuntia* (the Prickly Pear types) is best left alone as they have barbed spines which can be very troublesome.

If you would like an African desert to match particular animals, you will find many very suitable

succulents other than cacti for your purpose. Africa is very rich in succulents, some of the more interesting ones for our purpose are the *Lithops* and *Cowphyton* groups. These are popularly called "Flowering stones," as they mimic the pebbles among which they grow and are often only distinguishable from the stones when the flowers appear. Having smooth spineless skins these plants are ideal for the vivarium, being quite harmless to any occupants. There are many other dwarf or mimicry types of *Mesembrianthemum* which are both pretty and unusual. Most of these have resting periods in the late spring or early summer when they require no water at all. The outer skin eventually splits and dries up and a new plant, or more often two new ones, break through and then flower. When the new plants are showing it is time to water gradually again.

Succulents other than cacti for the vivarium are: All the *Lithops*, *Conophytum*, *Pleiospilos*, *Argyroderma*, *Faucaria*, *Glottiphyllum*, *Dinteranthus*, and last but by no means least, *Euphorbia*. Many of the latter are so very like true cacti that many people cannot tell the difference. The spines on these are not sharp like those of cacti and consequently cannot do any harm in the vivarium.

I hope that I have said enough to whet the appetite of the vivarium keeper and that I have encouraged some to set up a natural-looking miniature desert scene which will last untouched for many years, and yet be a thing of beauty always.



"He should be all right—I changed his air this morning"

We Live and

By ——— JOHN W. DAVIES

Learn

AFTER breakfasting well on Sunday mornings my usual procedure is to walk down to my pool and spend a few minutes there, watching and feeding its inmates, and the birds that gather there for their daily toilet. The feeding part of the routine is carried out every morning before leaving for work, but on Sundays I can spend much more time there, and I try to make friends with my feathered guests as I sit there watching and noting the changes that Mother Nature is making in the gardens around.

Now usually my few fish are scattered about the pool, and I amuse myself by tossing pieces of worm into the centre of the pool and gamble upon which one is going to get the most that day, and invariably if I did not use a little discretion, the same fish would take all that comes, as owing to her weight and size she is able to knock all the others out of the way regardless of their ferocity, size and shape. This Sunday, however, was not to be the same, for while feeding the birds I was surprised to see that all my fish were together amongst the weed in the shallow end, nosing and foraging it about in an alarming manner. Now to-day's date happened to be May 16th, and instantly I thought of an article I had read quite recently in which the author stated that his fish spawned each year regularly on May 16th and 17th in his pools. So down I went on to my knees beside the pool with my nose practically touching the water, and not having had my fish spawn before you can well imagine the excitement that was boiling up inside me.

The fish at first took not the slightest notice of me and carried on as they were, and as I looked I could see that they were eating something attached to the weed, something that resembled a tiny ball of transparent jelly. No doubt all you "Past Masters of The Art" will condemn and criticise my following actions, but please let me off lightly, as I am only a beginner, and excitement thrust discretion well into the background immediately I knew that I had eggs in my pond, and all the knowledge I had of the subject was practically forgotten as I made preparations for the collection of the spawn. I really think that had my wife presented me with twins, I could not have been more excited. The governing thought in my head now was to save all the eggs possible, and the folly of it never entered my head, so I mustered every possible water container I could down beside the pool, buckets and bowls, china dishes, jam-jars, everything possible, and I gently filled them all

with my precious eggs, taking care that at no time were they lifted out of the water.

As soon as I had taken all the eggs out that I could see, and I don't doubt for one moment that there were still more left in the water, I proceeded to rob my spare tanks of their weed to replace that which I had removed with the eggs. From now on only these precious eggs mattered. I was like a child with a new toy, my family had them brought up as conversation for dinner, tea, supper and every possible occasion in between times. I showed them to my wife, my year-old daughter, my mother, neighbours, friends, and in due course all my relatives near and far. Even my cat seemed to know that the fish had taken on a far greater importance, and that his life was in danger more so now if he went near.

Whit Monday saw me up and out of bed earlier than ever before, the "bug" still had me in its grip, and I felt on top of the world, and as pleased as Punch with the happenings of the day before. Down I dashed to the pool again, and yes, there they were, more spawn, and this time the fish were still driving. A call to my wife brought her out to watch them, and within a short while she was as interested as myself; in fact the interest which we were displaying brought the neighbours up to their adjoining fences to see what was going on, so the fish that morning had quite an audience to watch their courting and lovemaking. I was still determined to save all the eggs I could, and I took out as many as was possible, replacing the weed with fresh. As soon as I had replaced the weed the fish spawned in and over it; it was really remarkable to see. Three times I replaced weed that morning, and the quantity of eggs I removed from the pond must have run into thousands, as there were three separate pairs of fish in action and they carried on spawning until approx. four that afternoon. A large amount of eggs were left in the pond in the end, as I had run out of possible "Maternity Wards." My wife would not allow me to use the best china, despite my earnest pleadings, but I made sure that the fish were denied access to the eggs by bricking off the part where they were. Even then I was still going to try to rear every possible one. I even had visions of building three more ponds to accommodate these wonderful fish that were bound to be forthcoming. Snags and accidents were far from my thoughts at that time, I can assure you.

Tuesday found me as usual preparing for the daily toil, but not without scraping in a few extra minutes

to examine the fruits of the Whitsun holiday. Some of the eggs appeared to be slightly more transparent, and others were definitely looking whiter than they did before; this caused me much distress as I thought of the lives that were being lost and there was nothing I could do to prevent it. On Wednesday I could see the vague outline of a tiny black circle inside one or two of the eggs, and in one in particular I could discern two tiny black dots which I guessed were the eyes of a fish. Thursday there were more infertile ones showing, and those of the previous day were showing signs of fungus. Now the infertile eggs were in far greater proportion to the others, and I was nearly in tears over it; even the weather seemed to be against me, as it was steadily getting colder and colder. I had already written off those eggs that were left outside exposed to the weather.

The great moment occurred on Friday morning, there it was, a tiny solitary pathetic looking something clinging to the side of the aquarium, MY FIRST BABY FISH. Had it been possible I would have hugged it I am sure, but my wife proved an excellent substitute. From that moment onwards nothing else mattered, the fish in the pond were forgotten, I had a real live baby fish all of my own, this was MY YOUNG-UN; I worried over that fish all day at work, I could think of nothing else, would it still be alive when I got home? Would it come unstuck from the glass and fall and injure itself? Would it turn out to be deformed? Would it be moving by the time I arrived home? Those and a thousand other thoughts passed through my mind, and a day never seemed longer to me. When I did arrive home it was to be greeted at the front door by my wife with the news that there were now four fry in the aquarium. A subsequent examination of all the various makeshift "maternity wards" showed a total count of sixty-five in all, some were clinging to the sides, others were actually swimming around. I was in ecstasy, and really thought that I was so very, very clever. But alas, my triumph was short-lived, for unbeknown to me trouble was at work. Oh dear, why didn't I re-read all the books that I have in my possession when the spawn was first found? The following morning found me with only six fry left, four in a china dish, and two in the aquarium. I think I must have aged with disappointment and anger at my own foolishness; now I began to see the mistakes I had made all along. I used no heat at all, this was not such a bad fault admitted, but had I installed artificial heat and a thermometer I could have saved many more. Then upon examining the receptacles in use I found that they were teeming with Cyclops, thus the fry were being robbed of the valuable oxygen all the time, and Mayfly larvae were there too. I borrowed a microscope and examined the water of the aquarium, this was reasonably clear of Cyclops, but there was a fair amount of Infusoria in it. I then scooped the four fry from the dish with a spoon and put them in the aquarium, fixed a 25 watt Sunshine lamp above the water and kept it burning all through the night, thus I hoped to keep the temperature reasonably level, though whether I actually did or not I do not know as I have not got a

thermometer (a gadget I now describe as essential). I don't suppose for one moment that the temperature was kept even, but at least it did the trick for me.

After ten days the fry were swimming around quite well, and were taking interest in everything around them. So far, apart from a little pond water each day, I had not fed them with anything, but having examined that water with the borrowed microscope I knew that it contained sufficient food to be going on with. On the fourteenth day I had another shock; there were only four fry left, there was no trace at all of the other two, they had just vanished and I could not account for it in any way. I was really and truly worried as I knew that if two could go like that then the other four could. So I asked an aquarist neighbour to come and have a look at my aquarium for me, and he showed me some dozen or more miniature replicas of the octopus family clinging to the glass, namely Hydra. These he said were probably responsible for the missing fry, and they certainly appeared to be large enough; for all I know they may have caused the rest to disappear before. This taught me a lesson I shall never forget—ALWAYS EXAMINE WATER BEFORE PUTTING IT INTO YOUR AQUARIUM. Thanks to that neglect on my part I have only four fry instead of probably fifty or more.

These Hydras I quickly squashed and removed, but each day I had to examine the aquarium, for more quickly followed, and I dare not remove the fry yet so that I clear the aquarium right out.

After sixteen days I began to feed Daphnia to the fry, and they loved it, and certainly appear to be thriving on it as they are growing steadily. At the date of writing the fry are a month old, all but two days, and one measures half an inch in length besides possessing quite a thick body. The parent fish being Shubunkins, have proved themselves well in these four, as they are colouring fast, and all seem to be good specimens. I am sure that I could not be more proud of these fish if they suddenly spoke to me.

The fish in the pond have spawned again, and this time I shall take greater care with the eggs when I remove them; for one thing I shall not remove such a large quantity this time, and those I do take will all be kept indoors to avoid the weather doing the dirty on me again. But even if I get hundreds from this second spawning, it will be the first four that I shall feel the most proud of, and talk most about. I shall also keep all my copies of the *Aquarist* before me for reference too, as each time I re-read them I learn more; there always seems to be something that I have overlooked the time before, and as my mistakes have shown me, ONE CANNOT KNOW ENOUGH about this hobby of ours, and I am all out for knowledge now. Plans for my new ponds have already been made, and shortly I hope to begin on the first one so that I can raise better and healthier fry out of doors as soon as they are big enough to put out, for you cannot beat natural conditions for helping them to grow, even if a ceaseless war has to be carried on against their natural enemies. I am game at least, and I can speak for the fish too, I think.

POOLS THAT MAKE PICTURES



(Photos: L. B. Barrow)

Straight paths call for straight-edged ponds such as these, combining beauty with orderly design



(Photos: H. A. Day)

A rock-garden makes the ideal setting for a series of informal pools at varying levels



Neat walls form a background to these pools, providing a feature of elegance and interest in a well-kept garden

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OBLIQUE FISH

By _____

A. FRASER-BRUNNER

SOME while ago there appeared in the list of tropical fishes, advertised by one of the dealers, the item "Penguins." This puzzled me, for although some queer things, and much rum spelling, appear in advertisements from time to time, it was not to be supposed that penguins, which are birds, were really being offered, and it followed that the name had been tacked on to some kind of fish.

It was some time before I discovered the identity of this *rara avis*, and then it turned out to be, as I had suspected, an old friend. As a matter of fact it was in *The Aquarist*, for July, 1938—exactly ten years ago—that I had the privilege of introducing this fish to aquarists for the first time. Its name is *Thayeria obliqua*.

But I am still puzzled, for I have looked at this fish from every conceivable angle, and cannot see the slightest resemblance to a penguin; whoever chose that name is endowed with a far more elastic imagination than mine. Had I been asked to give it

a colloquial name I should have suggested "Oblique Tetra," for it belongs to the group of Characins, generally called "Tetras," and its main distinctive character is obliquity. If it were not for its habit of resting at an angle, with the head tilted upward, and certain modifications connected with this that will be discussed in a moment, it would be placed in the genus *Hemigrammus*, to which many of our favourites belong.

Thayeria obliqua was first described and named in 1910 by Eigenmann, and since then has proved to be fairly common in many parts of the Amazon basin. The generic name was given in memory of Nathaniel Thayer, and the specific name referred to the black stripe on the side, which in preserved specimens appears to sweep from upper shoulder to lower lobe of caudal fin in a continuous diagonal line. It is doubtful whether Eigenmann was aware that the fish was oblique in any other way.

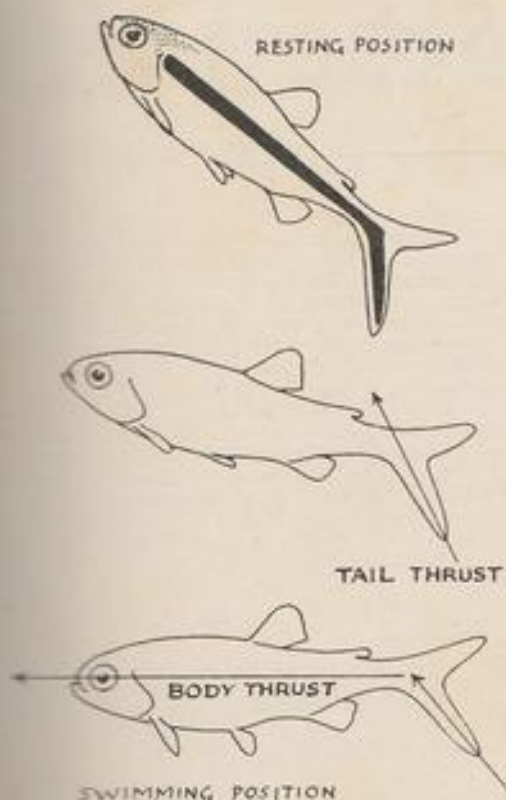
Those who have kept it in the aquarium will know that when at rest, or moving very slowly the body of this fish is tilted, the head pointing upward. One gets the impression that the air bladder is too far forward (or the front lobe of it too large), but I have dissected a specimen and compared it with a similar dissection of the Beacon fish, and cannot find any substantial difference between them. In fact it seems that this unbalanced posture is due to changes in the relative proportions of the body itself. Compared with species of *Hemigrammus* the tail (the part of the body behind the vent) of *Thayeria* is seen to be more massive, while the head is rather small and the trunk region much less deep. In other words, the tail is proportionately heavier in relation to the rest of the fish, there is no corresponding alteration in the air bladder, and so the tail end tends to sink.

But here a law of compensation seems to step in, for the increased mass of the tail is composed of muscle, thus increasing the propelling power which can operate through the caudal fin. Now the caudal fin of this fish has an enlarged lower lobe, so that the pressure exerted downwards and backwards by this fin is increased. Such a pressure will result in an upward and forward thrust to the tail, which can be resolved into an upward movement and a forward movement. The upward movement brings the axis of the body towards the horizontal, while the forward movement supplements the ordinary forward thrust of the body flexions. So when the fish exerts itself it swims through the water in the usual horizontal manner. Any tendency for the tail to be lifted too



(Photo: B. & F.)

Thayeria obliqua (Eigenman)



high is counteracted by the use of pelvic and pectoral fins.

If you now look at my diagram, in which these movements are indicated, you will notice that the arrangement of the arrows in the lowest figure corresponds with the band of black pigment on the side of the fish in the upper figure. It appears that the colour-pattern of the fish is, in fact, an expression of the forces involved in moving it. I believe that this will be found to be true in most cases, and have amassed a considerable amount of evidence of this kind which may one day demonstrate that the study of colour and pattern cannot be separated from that of the form, locomotion and general physiology of fishes.

Should you feel any doubt in this case, let me remind you of another aquarium fish, obtainable in small numbers at present, which likewise rests in a sloping position—the Pencil Fish, *Poecilobrycon auratus*. This also has an enlarged lower lobe to the caudal fin, and the pattern is fundamentally the same.

The resemblances between these fishes have nothing to do with close relationship. *Thayeria obliqua* belongs to the family Characidae (close to *Hemigrammus*) while *Poecilobrycon auratus* belongs to the Anostomatidae. But the same kind of mechanical problem has resulted in the same kind of pattern.

To make a final point concerning this matter, there is a fish, known to American aquarists, called *Abramites microcephalus* (family Anostomatidae),



Poecilobrycon auratus
(the Pencil fish)

which, like some others of its family, rests, or moves slowly, head *downwards*. In this case, correction of balance for rare bursts of speed is achieved by movements of pelvics and dorsal, and these fins are pigmented in just the way we should expect if the above hypothesis is considered.

So far I have not been able to find an account of the breeding of *Thayeria obliqua*, nor have I ever met anyone who has bred it. If any reader has had success with the species I should be happy to hear about it. One would, of course, expect its reproduction to resemble that of the Beacon Fish and other near relatives, but with fishes one can never be sure.

It is a most attractive species, easily kept, and a satisfactory community fish.

SOME LARGER CRUSTACEA

By

DENNIS LEVY

DAPHNIA is a sufficiently large organism to be eaten by freshwater fish of almost any size. But have you ever noticed that large fish have to be hungrier than small ones before bothering to chase Daphnia round their tank? The obvious conclusion is that a larger live food is needed. There is not enough nourishment in one Daphnia to make its pursuit by a sizeable fish worth while.

There are, fortunately, two very common crustacea of larger dimensions than Daphnia which are much relished by all fish of sufficient size to devour them, namely *Gammarus pulex* and *Asellus aquaticus*. Both grow to about half an inch in length and are especially useful in an aquarium if fed in large numbers, as some are then almost bound to escape immediate capture, whereupon they will go into hiding and carry on the good work of scavenging, which is their living, until such time as they are caught out of their cubby-holes, in stones, etc., and are devoured.

The Freshwater Shrimp (*Gammarus pulex*) well deserves its popular name. The outward resemblance to the sandhopper of our seashores is abundantly obvious, and there really is a close relationship. It is nearly always to be found in clear streams. The flattened body is reddish when well fed; colourless when not.

The male is considerably larger than the female, and as mating takes place over most of the year, joined pairs occur in almost every catch. The female carries a brooding-pouch on her underside, wherein the young reside not only as eggs, but also for a considerable time after hatching. Indeed, the mother is followed about for a short while even after the babies have escaped from this pouch.

As the young grow they shed their skins, in the same manner as all arthropods. These skins might

almost be termed "shells," as they are quite horny.

Normally *Gammarus* spends most of its time adhering to aquatic plants, motionless except for the constant rapid movement of the many respiratory organs on the underside of the body. However, if necessary it will not hesitate to swim, amusingly enough, on its side and with a jerky, darting motion. If it is taken out of the water, a jumping display is given.

Asellus aquaticus is far more staid in its movements. Indeed, it cannot even swim. It crawls about the bottom of the tank or pond, or amongst the weeds, very similarly to, and looking just like, the Garden Woodlouse. This has earned it the cognomen "Water Louse," although "Slater," "Hog Slater," or "Water Hog Slater" are older names for the creature.



Water Louse
(*Asellus aquaticus*)

Here again we have an excellent scavenger, who will keep your fish healthily active in trying to extricate him from his hiding-place, and who will at the same time help to keep the aquarium fresh and pure. It does, however, show a preference for vegetable matter, whereas *Gammarus* appears to be equally partial to animal and vegetable refuse.

Asellus is composed of a head, bearing long antennae, a seven-segmented equivalent of the thorax in insects, and an undivided abdomen. Again the male is much larger than the female, and again the young are carried in a brood pouch.

This species is more a creature of the stagnant pond than the last. It is thus uncommon to find the two together in a wild state, although one may do so occasionally in a slow and weedy stream, as in one I know at Whittington in Shropshire. Generally speaking, however, ponds contain *Asellus* and streams *Gammarus*. Both are very common and very easily caught.

(Continued on page 130)



Freshwater Shrimp
(*Gammarus pulex*)

Primulas

BY THE WATERSIDE

By

H. A. DAY, F.R.H.S.

THE ideal plant for the waterside is undoubtedly the Primula (primrose), even if you can only accommodate our native primrose or cowslip or the garden polyanthus. But there are other primulas more suited to waterside cultivation that give a more refined and colourful appearance, such as those from the Himalayas, China and Japan, which give us many shades in the colours white, red, yellow, orange, buff, blue, lilac, violet. In addition to the colours there is the fact that you can have an almost continuous primula display nearly all the year round.

For example, to secure this continuity, there are available the blue and white shades of *Primula denticulata* and *cashmiriana*, which commence to bloom in November, continuing right through the winter to next March; followed by the pinky-rose *Primula rosea*, starting to bloom about February. When *denticulata*, *cashmiriana* and *rosea* have finished flowering there may be a break until May, but this can be mended by our own native primrose, yellow, white, red, blue and cowslip and *Primula Julia* and hybrids. In May, June and July, *Primula japonica* (red, pink, white), *bulleyana* (orange), *beesiana* (purple) and their hybrids in several shades of the parental colours, continue the show; and in June, July and August there follows on *Primula nelodoxa* and *florindae* (yellow), *Primula waltoni* (pink shades) and *capitata* (blue).

All the foregoing have the sweet primrose scent, and the flowers last a long time, especially those of the "whorled" type—on a long 1 to 2 ft. stem, the flowers occurring in circles or "whorls" at intervals all up the stem over quite a long period. These include *japonica*, *bulleyana*, *beesiana* and *nelodoxa*. *Denticulata*, *cashmiriana*, and *capitata* bloom in single "drumstick"-like heads on one foot stems, and the others mentioned produce single primrose-like blossoms. All of them possess the typical primrose leaf, more or less like that of our native primrose.

Primulas can be planted in colonies of separate or mixed species, providing the low-growing kinds are not smothered by the tall sorts. If you have room, it is a wise plan to plant, say, half a dozen or more of each kind (together) and contiguous to one another, so that they all occupy one large space; because no sooner does one species stop flowering than another species commences—or they even overlap—so that the primula quarter is always in bloom, and there are always laggards or early blossoms to form a continuity of display. Even when flowering has ceased, the ornamental stems, covered with white "farina," and the "whorls" of



Primula nelodoxa planted at the foot of a rock-pool

seed pods, also covered with the white powder, are quite pleasant to behold.

The development of leaves is very slow at first, the plants blooming while leaves are only one-half grown; but when flowering is over the leaves develop enormously and present quite a unique sight—a scene of vigorous green growth.

There is a peculiarity about the Primula which must be observed and attended to by the cultivator. This is the fact that these Primulas, in the main, are waterside plants, and require much moisture; but the latter must be well down in the soil—the plants fail when moisture or damp soil is allowed to gather and remain around the plant on the surface of the ground, or indeed around the long fleshy roots, for

a time. The plants, in fact, like *mooring* moisture—a continuous drainage that keeps the soil just moist only. In excess moisture the “crown” and roots of the plant will raise themselves well above the soil surface, and if nothing is done to alter matters, the roots begin to decay and the plant dies. However, where proper moisture conditions are difficult to maintain, the situation can be saved by sowing seeds each year and replanting the site with young plants, thus treating the primulas as “annuals.” Thus no one need be deterred by an inability to provide exact moisture conditions, and if the land be very well drained, so that water gets away quickly, there will be no danger of “death by drowning,” so

to speak. This management of water flow and disposal is *essential* to the cultivation of moisture-loving primulas, but where the water is regulated naturally no fear need be entertained. However, on no account must the plants be allowed to suffer from lack of water.

With regard to planting, this can be done at any time from September to April, the early-flowering kinds being planted between the end of August and the beginning of November. Plant deeply enough to ensure full accommodation for the long fleshy roots, and let the crown of the plant be near enough to the surface of the soil to allow the top portion of the rootstock to be well covered with soil.



*Primula
pulverulenta*
by the
streamside

SOME LARGER CRUSTACEA (Continued from page 128)

Why not give your fish a treat once in a way, by setting out with net and can purposely to hunt these species? They will be as numerous during the coming winter as in summer.

Just one word of warning: do not feed them to breeding fish, as neither *Gammarus* nor *Asellus* will hesitate to eat fish eggs.

Far less common than either of these are the Fairy Shrimps. If you are lucky enough to find one of them, keep it separate in a jam jar, for it is an object of delicate beauty. The body is nearly transparent, with a slight pinkish tinge around the edges. Swimming is very graceful, and takes place while

the creature is inverted! The body may be nearly twice as long as *Asellus*, so this is very imposing.

For feeding purposes it is perhaps best to use infusoria, obtained in the usual way.

The eggs are not carried around, but are dropped on to the bottom of the tank. They are capable of resisting drought; indeed, will not normally hatch until they have been dry for a few days. In the wild state, of course, winds usually scatter these eggs whilst they are out of water. This probably accounts for the frequent appearances and disappearances of the species in any given waterway. Hence it is quite a prize.

THE GOLDFISH

FOR BEGINNERS

By JACK HEMS

THE common Goldfish, and many of the exalted variations of *Carassius auratus*—to give the species its scientific name—with flowing fins and grotesque outlines, originated in China, and was kept as a pet by the Chinese long before the Roman legions came to Britain.

Knowledge of the Goldfish was brought out of the East by the early Dutch and Portuguese mariners. But it was not until about the middle of the seventeenth century that living specimens were introduced into Europe.

The German doctor and missionary, Englebert Kämpfer, and the French Jesuit priest, Du Halde, made mention of Goldfish in their works, and soon after the publication of Du Halde's *Description of China* (Paris, 1735), the Marquise de Pompadour received some specimens of Goldfish from the French East India Company.

Since the days of the Pompadour, the Goldfish has been introduced into most parts of the world. It is an adaptable creature, and appears to settle down as well in sub-tropical regions as in cooler zones.

In some countries such as Portugal it has become naturalised. It is interesting to note that in those countries where the Goldfish has reverted to the wild state, it has lost its golden coloration and become as the wild Goldfish of China: sombre bronze, or olive-green on the sides, with lighter underparts. In China the wild Goldfish is highly esteemed as a food fish. Even the cultivated form is sometimes eaten in Japan.

Before the war, most of the common Goldfish offered for sale in this country came from Italy, France and the U.S.A., where Goldfish farms hundreds of acres in extent are quite common. Some of the more exotic breeds such as Lionheads and Veiltails came direct from China and Japan,



The Goldfish (Fantail variety)

where fish worth more than their weight in gold are bred for the discriminating fancier.

If kept under proper conditions the common Goldfish should live about fifteen years in an indoor aquarium, or twenty years or longer if kept in a sheltered garden pond.

The conditions in which the Goldfish usually prospers are those which afford it plenty of well oxygenated water, and plenty of nourishing food during the spring and summer months. In the winter time little or no food need be given unless the weather is very mild, or the fish are kept in a heated room, in which case treatment should be the same as for the spring and summer months.

The uninitiated in the art of Goldfish-keeping usually err in the amount of water allowed for the size of the fish. A Goldfish requires about a gallon of water for every inch of its body length, not counting the tail fin. Hence a three-inch long Goldfish should have at least three gallons of water to swim in. Surface area of the aquarium, or area coming into contact with the atmosphere, is much more important than the depth. Therefore the golden rule is to provide a tank that is either longer, or wider, than it is deep.

The floor of the aquarium should be layered to a depth of about two inches with well-washed coarse sand. About half of the total floor area should be planted with oxygen-producing aquatic plants such as *Elodea densa*, *Vallisneria spiralis* or *Sagittaria natans*.

But it must be pointed out that the above plants will not give off oxygen unless they receive plenty of bright light. So it follows that the aquarium must be placed near a window. Too much strong sunlight, however, tends to turn the water green, or brings about the growth of too much lowly plant life—the green "moss" that coats the glass sides and plants, and known as Algae. To preclude this state of affairs upsetting the artistic effect of your aquarium it is a good plan to paste tissue paper on the back of the tank. It should be removed for the autumn and winter.

Probably the best food for Goldfish is the earthworm. Tiny ones may be given whole; big ones should be cut up into pieces with a razor blade or sharp knife. If this is done quickly there is no cruelty involved. Besides earthworms, finely shredded meat, crushed dogs' biscuit and soaked vermicelli may be given. Needless to say there are many excellent fish foods on the market.

Besides dried food, Goldfish are very partial to green food such as finely-chopped lettuce leaf, or finely-minced cooked spinach. And they simply love duckweed.

This fondness for green food is a good thing, for when it comes to leaving your home for a few days you can always go away with the knowledge that your pets will not go hungry while there are fresh green shoots on the aquatic plants to nibble.

Native Lizards

ALL the indigenous British species of Lizard are shown in the photographs on these pages. Green Lizards (*Lacerta viridis*) and Wall Lizards (*L. muralis*) have been recorded occasionally but have simply escaped from captivity, though both are native to the Channel Islands. Of the strictly native species there are just three.

Of particular interest is the Sand Lizard (*L. agilis*), for its distribution, mainly in the southern parts of England and Wales, is almost exactly the same as that of the Smooth Snake (*Coronella austriaca*) described in an earlier issue. This is no doubt connected with the fact that the Sand Lizard is the favourite food of the Smooth Snake. Confined mainly to sandy and heathy localities, where it may nevertheless be quite common, it is an oviparous species, laying its eggs in shallow depressions where they are left to be hatched by the sun. There is considerable variation of colour locally, but the prevailing tint of the male is green; that of the female brown. She is usually a little larger than the male, reaching a length of eight inches. The food consists mainly of insects.

Rather smaller is the Common or Viviparous Lizard (*Lacerta vivipara*), which has a preference for hilly or mountainous country, but is more widespread than the former species and may also be found on sandhills and heaths. The colour is

variable, but usually brownish or reddish with pale spots, and a dark line down the middle of the back is nearly always present. Movement on land is swift, and it is a good swimmer. This species is ovoviviparous, giving birth to about 12 young at a time; no nest is made, and the babies, which are black in colour, take refuge under dead leaves or bark to absorb the remaining yolk until in a few days they commence hunting.

The well-known Slow-worm (*Anguis fragilis*) is also viviparous, the six or more young being born in the autumn. Though often mistaken for a snake, this is a true lizard, its serpent-like appearance being due to the absence of visible limbs. Though called slow- or blind-worm, it is none of these; its movements are rapid and its vision keen. The favourite food is slugs, and they are, therefore, beneficial to gardens.

All the lizards have the faculty of discarding the tail when alarmed and should, therefore, be handled with care. In captivity they become quite tame and form interesting pets; unless kept in heated vivaria they must be afforded means of hibernating during the cold weather. Immediately after hibernation and periodically during summer they cast their skins, and since they do not usually feed while doing this they require a hearty meal afterwards.



Slow-worm (*Anguis fragilis*)
Female



Viviparous Lizard (*Lacerta vivipara*)
Male on right



Sand Lizard (*Lacerta agilis*)
Female

(Photos: W. S. Pitt)

THE CHAMELEON FLY

(*Stratiomys chamæleon*)

By IRIS MURRAY

THE Chameleon Fly belongs to the order Diptera—that is to say, the two-winged insects.

It is rather like a bee, having a black body with distinguishable yellow markings. The overall length is about half an inch, and it may be found living on the sweet juices of plants which grow around ponds. Its flight is short, but swift, and is quite easy to follow from place to place.

Most aquatic insects lay their eggs either on the surface, or in the water of stagnant ditches or ponds, but not so the Chameleon Fly; it usually chooses the underside of a leaf which is above the surface of the water.



(Photo: Lionel E. Day, A.R.P.S.)

The larva of the Chameleon Fly
(*Stratiomys chamæleon*)

VALUE OF SURFACE VEGETATION

WE can never repeat often enough the value of a thick layer of surface vegetation in the aquarium containing livebearing fishes. For plenty of plants at the surface means security for the newly-born babies. And a tangle of stems and foliage at the surface creates just those conditions that favour the development of Infusoria. So not only are the fry assured of a high degree of safety from attacks by larger fishes, but they are also assured of a good supply of microscopic live-food. It goes without saying that water not deeper than eight inches decreases the distance the fry have to swim before they find shelter in the greenery. J. H.

The Water Plantain (*Alisma plantago*) is most often favoured, and the tiny eggs can be found on the under-surface, and arranged so that they overlap each other.

As the larva emerges, it makes its way down into the water. It is between one and two-and-a-half inches long, and is usually coloured, green, brown or yellow, showing once again Nature's art of natural camouflage.

The body is segmented and tapers towards the tiny head, and also towards the tail. The method of locomotion is by a dragging movement along the mud aided by the short hairs which grow downwards on the body. The larva clings by its mouth, and so pulls itself along. When it is alarmed the segments telescope into each other and so the body assumes a shorter and thicker appearance, while it swims by lengthening and shortening the body.

The tail is of special interest as it consists of between twenty-five and thirty hairs. It is by these that the larva suspends itself from the surface of the water, head downwards. They surround a central orifice, which is connected with the tracheal system, and remains open when they are in direct contact with the air. As the insect lowers itself into the water, the hairs close over the orifice and trap an air-bubble. This remains in position the whole time the larva is submerged, and is only released when it rises to the surface once more.

Spiracles are to be found along each side of the body, but these have no connection with the respiratory system. During suspension the small head of the larva moves to create a current and so attracts small water insects and particles on which it feeds.

When the larva is about to pupate the larval skin becomes loose and remains intact—even to the tail filaments—to form a loose protective cover for the pupa, which occupies about half of it.

This condition lasts for a few days and the full-grown Chameleon Fly emerges.

STRANGE AFFECTION

I am puzzled by the actions of my American Flag Fish—a male, I think. I noticed him sometime ago taking a good deal of interest in my biggest female Guppy; following her and rubbing his sides against her—being very gentle in his attentions. This Guppy seemed to be quite happy and would come searching for him if she lost him for a little while, whereas she would ignore the male Guppies who tried to "win her favours." I got rid of this Guppy, with many others, keeping some younger ones; my Flag Fish then kept at the back of the aquarium. Now I have another large female Guppy and my American has transferred his affections to her, and the strange part of it is that she is reacting in the same way as her predecessor. I have even seen her rubbing herself against him. Now, why? Have any of your readers had similar experiences?

(Mrs.) A. Burnet.

LET THEM LIVE — NOT JUST EXIST

By _____ WILFRID BOWEN

THIS article is composed mainly for beginners, for I come in that category myself; in fact, this profoundly interesting hobby of ours is really only in its infancy in this country and therefore, to some degree, as most true aquarists will admit, we are all beginners more or less, some with a very little knowledge, but others with a great deal, backed by the valuable experience which is gained only by diligent research and patient observation. Thanks to the latter the results of their painstaking work is freely imparted in books and periodicals for the use of those who are interested enough to go in search of them.

It is these knowledgeable people who are always the first to admit that there is probably more to be learnt about the subject than that which is already known.

It is certain, for instance, that many species of fish exist which have yet to be discovered. Indeed, much has to be learnt about the habits of some of the species already known to us and this may well fall to the credit of none other than an enthusiastic beginner with very little experience to his name.

However, the fundamental principles of aquarium management and the keeping of fish are quite definitely known; there is no question as to whether they are right or wrong. Everyone who keeps fish or is contemplating this should acquaint themselves with these simple rules and become conversant with a few important facts which mark the indelible dividing line between success and failure. You will notice that I said "everyone who keeps fish," for it must not be taken for granted that people who already keep them necessarily "know all about it." On the contrary, far too many people are suddenly fascinated by the subtle beauty of fish and on the spur of the moment they purchase them without providing a suitable place for them to live in. The inevitable result, of course, is the premature death of the fish only after they have suffered the prolonged misery of suffocation and probably starvation; to the utter disappointment of the purchaser who will more than likely blame the dealer for selling "half-dead" fish, and condemn the hobby as a whole as "far too much trouble" and "not worth the expense."

Any inexperienced person can start an aquarium and continue with success, provided always that a few simple rules are strictly followed. I would advise the reading of the following precise, clearly written, and up-to-date booklet on the subject: "Aquarium Technique for the Beginner," by A. Fraser-Brunner. This is easily procurable during the few moments

you have to spare at the station bookstall. It amazes me that the wealth of information contained in this booklet can be offered for sale at the humble price of 1s. 6d.

Apart from the only too well known common Goldfish and the numerous gorgeous varieties that have been developed from it, there are many other cold water species which are both beautiful and interesting. The Golden Orfe, for instance, justly considered to be the king of freshwater fish; and the Golden and Silver Rudd, the Golden and the Green Tench, the handsome Perch and Bass and the many varieties of the Carp family, not forgetting the Minnow and the Stickleback. Any of these can be kept in your first aquarium. The purchasing price of most of them is quite cheap, and several of them can easily be collected from our rivers and ponds, but for this reason they should not be despised as, unfortunately, some of them often are.

I remember once when collecting sticklebacks, or "tiddlers," from a local pond an interested spectator approached me in a friendly way with the question "Can you manage to keep these alive at home?" I raised myself from a kneeling position, jam jar in hand and my trousers still sticking to my knees, but before I could utter any words at all, he emphatically declared, "I can't!" and continued, "It must be something to do with the water—give 'em a couple of days and they're dead," and as he moved to continue on his way he ended, "I've given it up as a bad job."

Perhaps, I thought, there is something in what this man has said and that after all it isn't so simple as it sounded in the articles and books I had studied on the subject. I had prepared an aquarium, well furnished with plants, sand and stones, etc., to receive these interesting little fish, but I returned home with an ominous cloud of disaster darkening my outlook as an aquarist, that indeed, it may not be possible to keep these creatures alive and healthy in any other than their natural waters.

This happened a year ago, almost to the day, and these same sticklebacks are still alive, perfectly healthy and lively, and still as inquisitive as when they first probed into the mysterious appearance of a net within their midst. This is possibly the most despised of all our fish, at least by most people, but the aquarist has long since discovered that, given the proper treatment (which should be afforded to all fish) and an aquarium to themselves, it is a source of great interest and amusement.

At this moment, as I write, I find it quite difficult

to concentrate, for my eyes keep wandering in the direction of this aquarium where two of the male sticklebacks, bedecked in their gorgeous mating colours, are feverishly building their nests, ramming the odd bits of roots they have found into the bed of the aquarium and unloading mouthfuls of sand on them to keep them secure and, in the most amusing manner, rubbing into the nest the mucus from the underparts of their bodies to cement it into the required shape. Fierce and threatening looks from brilliant emerald eyes have passed through a growth of *Myriophyllum* which fortunately separates them, but short, sharp scraps have taken place with jealous fury as the females, already bulging with spawn, are offering themselves body and soul to the conqueror of each encounter.

Of course, it is impossible in so short a space to describe adequately this amazing spectacle witnessed by so few, although I have read some remarkably descriptive accounts of it and, convincing though they were, I feel that it is something which has to be seen to be believed.

When I reflect upon the occurrence which happened a year ago, I realize now how foolish I was to have doubted the knowledge I had gained by reading and the consequent preparations I had made to receive the fish upon their arrival home.

This was a man without the knowledge of the simple rules. Perhaps if he had been acquainted with them he might by now have developed into a successful aquarist—at least he was interested enough to take fish home but lacked the desire to learn, and was evidently quite content to accept his personal failure as absolutely final.

People who cannot put themselves out to learn a few simple hints on how to keep fish but nevertheless insist on keeping them and continue to do so until their feeble efforts are exhausted by their ultimate failure, can do a great deal to retard the progress of the hobby. It is easy to mislead others into condemning the hobby even before it is given the chance of a trial.

Fortunately there is a counter measure to be found for every such situation and as far as it concerns the keeping of aquaria you will always find a successful aquarist ready and willing to share his knowledge with others, especially beginners. Clubs have been formed all over the country where men and women meet in a friendly and social atmosphere to discuss their experiences; to share any new discovery they may have made, and to impart any new ideas which may serve the purpose of furthering the interest.

I eagerly follow the Club notes for hints and tips and I may say without hesitation I have been amply rewarded by the effort. For my part, like many hundreds of others, I am inclined to be the "stay-at-home" type and after a tiresome day's work I can think of nothing more relaxing than to watch the effortless movements of the fish as they glide silently through the clear water against a background of underwater beauty.

I was most pleased the other day when a friend at lunch suggested that I should call upon someone he knew who was interested in aquaria; in fact, he

told me, he constructs his own tanks and has one with several fish in it. He had been to see them for himself and, indeed, he was quite impressed.

Now my friend has a pond which he was fortunate to acquire with his house, and this is truly a great asset to any garden, however large or small, but as the charm of this lies mainly upon the surface and surrounding area, I do not think he has yet reached the stage where he can appreciate the beauty which exists beneath the surface of the water. The graceful movements and sheer beauty of the fish, so seldom, if ever, seen from above, enhanced by the delicate colouring and elegant formation of the aquatic plants, can only be seen and enjoyed to the full when in an aquarium.

Imagine my surprise and disappointment when I witnessed the appalling sight of a well-constructed tank which could have been put to better use, three-quarters full of milky-looking water, with an inch of sand entirely coated with an equal thickness of a feathery-looking fungus, absolutely devoid of any plant life and with no rocks or stones whatever—in fact, completely lacking in any suggestion of character.

In this, seven or eight bronze carp with a look of dejected prisoners glided aimlessly to and fro, but still possessing that dignity and poise with which most fish are so fortunately blessed.

My new acquaintance was eager to show me how successful he was and hurrying to a shelf he opened a box containing dog biscuits and, crushing one between his palms, he said, "This is all I feed them on and they've been in there for nine months now." I was completely dumbfounded and I suppose my silence was interpreted to be that speechless wonderment portrayed in the facial expression of a child as it gazes for the first time upon the brilliance of an illuminated Christmas tree.

Apart from my astonishment that anyone could look at and enjoy such an uninteresting spectacle as this, I was amazed that fish could have existed so long in such adverse conditions. I remember reading in "Freshwater Aquaria," by G. C. Bateman, that "the Carp will live quite contented where any other fish—except, perhaps, the Tench—would very likely die." This probably accounts for the fact that this particular species is so frequently kept in the abominably cruel contraption taking the form of a glass bowl, still, regrettably, to be seen on sale for the purpose of keeping fish.

These finny friends of ours are far too accommodating. If only they could stand up on their caudal fins and shout, "Hi! old man, what about some furniture for this dingy, miserable apartment you've given me to live in? And how would you like boiled cabbage for breakfast, boiled cabbage for lunch, boiled cabbage for tea and again for dinner, week in, week out, month in, month out!"

Well, how would you like that?

The secret of success is really quite simple and that is, to start the right way, and give the fish a chance to LIVE—not just exist—so that they can show themselves off to the best advantage, which will reward you a hundredfold for the little extra trouble you take to provide for their humble needs.

NOTES AND NEWS

HASTINGS AQUARIUM OPENED

After many difficulties and much delay the Hastings Aquarium is now open to the public. We had the privilege and pleasure of a pre-view, when Mr. and Mrs. H. C. Pepper, the directors, entertained and escorted us round the exhibits. The marine section is unfortunately not yet ready, owing to shortage of materials, but the freshwater sections make a very fine show indeed. The numerous tanks are arranged, all at eye-level, in such a way that the visitor sees everything by passing from entrance to exit without retracing his steps, and the illuminated tanks are viewed from semi-darkness.

In the temperate tanks, a number of good varieties of Goldfish are shown, as well as such reliable show-pieces as Pike, Bitterling, Sticklebacks and so forth. In the tropical section many species are to be seen, mainly in shoals. A lovely crowd of *Rasbora heteromera* deserves special mention, and we noted also Neon Fish, Rosy Tetra and other fine Characins, several species of Barbis including *B. tetrazona*, some very large Sword-tails (though lacking colour) and a large tank showing Angel Fish to advantage. A pleasant surprise was a tank containing some Striped Loaches, or "Coolies," *Acrossophthalmus semistriatus*—the first we have seen since the war.

Practically all the work connected with this fine show has been undertaken by Mr. Pepper and his able assistant, Mr. W. G. Wingrave, and they are to be congratulated on a splendid job. They have received active support and co-operation from the local authorities, who recognised the value of the aquarium as an adjunct to education. There is no doubt that when it is fully developed it will be a great asset to the town.

One of the main difficulties encountered, by the way, has been to find enough good plants for so many tanks, and if a reader can help in this direction, Mr. Pepper will be glad to hear from them.

The Aquarium was opened by the Lord Mayor of Hastings on Monday, July 12th. Charge for admission is one shilling for adults, sixpence for children, but special terms are being arranged for parties from aquarium societies, who are advised to give it full support.

The Coventry Pool and Aquarium Society has been formed, with headquarters at the B.T.H. Social Centre, Holyhead Road, Coventry. Meetings are on the first Wednesday of each month, excepting August, and new members will be welcome. The Secretary is Mr. R. G. Stock, 45, Irving Road, Coventry.

On Saturday, June 26th, the East London Aquarists' and Pondkeepers' Association visited the Aquarium at the London Zoo, and members were privileged to go behind the scenes; a further visit has been arranged for July 25th. The President, Mr. W. P. Bradley, gave an instructive talk on July 1st, entitled "Breeding and Rearing Angel Fish." He pointed out the numerous difficulties that arise in hatching and rearing the fry, and gave what he considered essential rules for success with these fishes. On July 20th Mr. G. F. Hervey gave an interesting and fully documented account of the history of the Goldfish.

A talk on "Live Foods" was the feature of the July 5th meeting of the Ilford and District A. and P. Society when the Chairman, Mr. Mullings, gave an authoritative account of the culture, propagation and uses of *Daphnia*, *Encyrtanus* and other valuable organisms. July 17th found the Society at the London Zoo Aquarium, and on July 24th they are exhibiting six aquaria at the Horticultural Show, Recreation Ground, Barking. New quarters, which it is hoped will be permanent have been found at Gents Hill Library, North Ilford. The next meeting is August 9th, when newcomers will be welcome.

A community tank presented to the local Children's Hospital is one of the good works already achieved by the Southampton and District Aquatic Society, which was formed only five months ago. Now they are planning a small show at a Trades Exhibition in September to bring the hobby to the notice of the Southampton public. Plenty of enthusiasm and hard work will be available for the project, but equipment will present a problem, as the resources of the Society are still meagre. Nevertheless the membership is out to do big things, and a good show will no doubt result.

On July 3rd, in co-operation with the Ipswich and District Natural History Society, a part from the Suffolk Aquarists & Pondkeepers' Association visited the Flatford Mill Field

Centre by kind permission of the Warden, Dr. E. A. R. Einnion, M.A. Members were privileged to see the full working of the Field Centre, which occupies the Mill, Willy Lott's Cottage and the Valley Farm, immortalised by Constable; and the collections of water plants, animals, etc. and the demonstrations of methods by which teams of students are taught to tackle the investigation of water habitats and similar problems, proved of considerable interest.

SOCIETY FOR THANET

On July 13th at the Aquarium, the Lido, Cliftonville, Margate, the Isle of Thanet Aquarist Club held its first meeting. It was proposed to cover cold water as well as tropical fish, to assist those who keep fish and also to interest those who at the present do not.

There will be a monthly meeting, which will be held on the first Tuesday in the month at the Aquarium.

FORTHCOMING EVENTS

West Surrey Pond-Keepers' and Aquarists' Club is holding a show in conjunction with the Guildford Allotment and Gardens Association on August 2nd (Bank Holiday), at Stoke Park, Guildford, Surrey.

The show is being opened at 2.45 p.m. and the admission to the marquee will cost 1/-, children 6d. 190 show tanks, complete with staging, are being loaned by East London Aquarists' Association. Every effort is to be made to put on a show interesting to the public and the Committee has decided to make the display non-competitive to permit as many "set up" aquaria as possible. Side shows will also be available in the Park grounds.

Grimsby and District Aquarists' Society are holding their first show at Yarra House, Alexandra Road, Cleethorpes, which will be open to the public from 3 p.m.-10 p.m. on Friday, August 6th; 10 a.m.-10 p.m. on Saturday; 10 a.m.-10 p.m. on Sunday and 10 a.m.-6 p.m. on Monday, August 9th. The charges for admission will be 1/- adults; 6d. children under 16 years of age. Some 40 tanks will be on show. Catalogues will be available.

A show of Exotic Fish will be staged by the Enterprise Aquatic Society at Friary Park, Friern Barnet, N.11, on Friday 20th, and Saturday 21st August.

There will be 18 classes. The first two, for furnished aquaria, will be open for entry by any aquarist club. The remaining classes will be open to all aquarists. Judges will be provided by the Federation of British Aquatic Societies.

The closing date for entries is first post, August 6th. Schedules and Entry Forms can be obtained from the Show Secretary: Mrs. W. M. Meadows, "Meadhurst," Brunswick Crescent, N.11. The show will be open to the public (admission 6d.), and light refreshments will be available. Bus service 134 stops at the gate of the Park.

The Watford Aquarists Society holds its Annual Show in conjunction with the Watford Allotment Holders' Society on Saturday, 28th August, at the Victoria Schools, Addiscombe Road, Watford. There will be 18 classes, all open, with cash prizes and award cards for each class, and many special prizes. The schedule can be obtained from the Show Secretary: Mr. H. E. Morris, "Craig-y-don," Little Bushey Lane, Bushey, Herts. The show will be open to the public (admission 1/-) from 2 p.m. until 8.30 p.m.

The Lord Mayor of Leeds will open the Annual Exhibition of the Leeds and District Aquarists' Society at 2 p.m. on September 2nd, at Trinity Church Hall, in the centre of the city. The exhibition, which will be for three days, is being designed particularly to attract the general public, and emphasis will therefore be laid on furnished aquaria—26 tropical and 4 cold water tanks. Three cups and one plaque will be competed for by members. There will be no open classes. Mr. G. T. Hes, of Belle Vue, will judge the exhibits. Members of neighbouring clubs will be welcome at the show, and light refreshments will be available.

Those who visited the fine show staged by the Nottingham and District Aquarists' Society last year will be glad to know that a larger one will be held on September 9th to 18th at the Regents Hall, Mansfield Road, Nottingham. There will be 190 tanks of tropical and temperate fish, reptiles and biological exhibits, and a water garden with waterfall and fountain. All aquarists will be welcome.

Directory of Aquarium Societies

Federation of British Aquatic Societies

Secretary: R. O. B. List, 31, Coronation Court, 31, Willesden Lane, London, N.W.6.

Federation of Northern Aquarium Societies

Secretary: G. T. Iles, F.Z.S., Longsight Lodge, Redgate Lane, Manchester, 12.

Balham and District Aquarist Club

Secretary: A. F. Price, 19, Boundaries Mansions, Boundaries Road, Balham, S.W.12.

Meetings: Every Monday, 8 p.m., at Labour Rooms, Balham Park Road, S.W.12.

Belle Vue (Manchester) Aquarium Society

Secretary: Gerald T. Iles, Longsight Lodge, Redgate Lane, Manchester, 12.

Meetings: Monthly at Belle Vue Zoological Gardens, Manchester, 12.

Benhurst Aquarium Society

Secretary: Mrs. R. Aldred, 30, Benhurst Avenue, Elm Park, Romford, Essex.

Meetings: First and third Tuesday in month, 8 p.m., at Benhurst School, Benhurst Avenue, Elm Park, Romford.

Blackburn and District Aquarists' Society

Secretary: J. P. Eldred, 47, Preston New Road, Blackburn.

Meetings: First Tuesday 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.

Meetings: Each Thursday evening at 7.30 p.m. at Blundell Street Men's Institute (entrance Brewery Road) Islington, N.7.

Bournemouth and District Aquarists' Society

Secretary: Vernon E. Poulton, 84, Shelly Road, Boscombe, Bournemouth.

Meetings: First Monday in month, 7.30 p.m. at Whitehall Hotel, Bournemouth.

Bradford and District Aquarist's Society

Secretary: R. E. Briggs, 18, Hill Crest Road, off Medway, Queensbury, Bradford.

Meetings: First Wednesday of each month.

Bristol Aquarists' Society

Secretary: H. C. B. Thomas, 46, Wobsey Road, Bristol, 7.

Meetings: First Monday of each month at Crown and Dove Hotel, Horsefair, Bristol.

Cambridge and District Aquarists' Society

Secretary: R. I. McKay, 103, Cambridge Road, Great Shelford, Cambs.

Meetings: Y.M.C.A. Cardiff, 7.30 p.m.

Cardiff and District Aquarists' Society

Secretary: L. W. Kenyon, 21, Pum-Erw Road, Birchgrove, Cardiff.

Meetings: Y.M.C.A. Cardiff, 7.30 p.m.

Chelmsford District Aquarists' Society

Secretary: Mrs. C. R. Tappenden, 33, Prykes Drive, Chelmsford, Essex.

Cleethorpes and District Aquarists' Society

Secretary: D. W. Chapman, 28, St. Peter's Avenue.

Meetings: Third Monday in each month, 7.30 p.m., at 66, St. Peter's Avenue, Cleethorpes.

Cornish Aquarists' and Pondkeepers' Association

Secretary: Mrs. Howard Spring, The White Cottage, Fenwick Road, Falmouth, Cornwall.

Meetings: First Wednesday in month, 8 p.m., at Millicans Cafe, Market Strand, Falmouth.

Coventry Pool and Aquarium Society

Secretary: R. G. Stock, 45, Irving Road, Coventry.

Meetings: First Wednesday in each month, at B.T.H. Social Centre, Holyhead Road, Coventry.

Croydon Aquarists' Society

Secretary: G. S. O. Saunders, 5, Blenheim Gardens, Wallington, Surrey.

Meetings: First Thursday in month, 7.15 p.m., at Thornton Heath Public Library, Brigstock Road, Thornton Heath.

Dagenham Aquarists' Society

Secretary: D. F. Eyres, 83, Wren Road, Dagenham, Essex.

Meetings: 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.

Meetings: First Saturday evening in each month, at Prince Charlie Room, Derby Museum and Art Gallery, Wardwick, Derby.

East Lancashire Aquatic Society

Secretary: Harry Loder, 59, Standish Street, Burnley, Lancs.

Meetings: Last Wednesday of the month at 7 p.m., Church Institute, Manchester Road, Burnley.

East London Aquarists' and Pondkeepers' Association

Secretary: T. E. Batt, 25, Humberstone Road, Plaistow, E.13.

Meetings: 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.

Meetings: Third Tuesday in each month, 7.30 p.m., at the Methodist Church Hall, Enfield.

Enterprise Aquatic Society

Secretary: H. R. Holland, 96, Ridgeview Road, Whetstone, N.20 (Phone: HILLside 7123).

Meetings: Third Thursday in each month, 7.30 p.m., at Oakleigh Primary School, Oakleigh Road, Whetstone.

Goldfish Society of Great Britain

Secretary: C. E. C. Cole, 46, Vine Gardens, Ilford, Essex.

Grimby and District Aquarists' Society

Secretary: A. J. Bakcomb, "Kilgeran," 59a, Bargate, Grimby, Lancs.

Meetings: First Monday in month, 7.30 p.m., at Victoria Cafe, Victoria Street, Grimby.

Guppy Breeders' Society

Secretary: Capt. B. T. Stacey, 20, Alverton Street, Deptford, S.E.8.

Meetings: Second Thursday in each month at 7.30 p.m. at the Club Room, Crown Hotel, Prince of Wales Road, Chalk Farm Road, N.W.4.

Halifax and District Aquarists' Society

Secretary: Frank M. Slater, 63, Green Park Road, Skircoat Green, Halifax, Yorks.

Meetings: First Monday in month at the Belle Vue Museum, Halifax.

Harrow Aquarists' Club

Secretary: S. Sandeen, 52, Church Avenue, Pinner, Middx.

Meetings: Second Monday in each month, 7.30 p.m., at 1, Cecil Park (Y.M.C.A. building), Pinner.

Hasving Park Aquarists' and Pondkeepers' Association

Secretary: A. C. Edmonds, 257, Carter Drive, Romford, Essex.

Meetings: Clockhouse Lane School, Collier Row, alternate Mondays at 7.30 p.m.

Hertfordshire Aquarists' Society

Secretary: J. H. Gloyn, 14, Rooks Hill, Welwyn Garden City.

Meetings: 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 Aquatic Society

Secretary: T. W. Tiffany, 38, Talbot Road, Tottenham, N.15.

Meetings: First and third Wednesday of each month, 7.30 p.m., at "The Priory," Hornsey.

Ilford Aquarists' Society

Secretary: S. H. Carter, 13, Kenwood Gardens, Ilford.

Meetings: First Monday of each month, 8 p.m., at Essex House, High Road, Ilford.

Kingston and District Aquarists' Society

Secretary: R. E. Alderton, 25, Park Road West, Kingston-on-Thames.

Meetings: First Thursday in each month, 7.30 p.m., Alexander Hotel, Park Road, Kingston.

Leeds and District Aquarists' Society

Secretary: H. Charles, 113, Ring Road, Cross Gates, Leeds.

Meetings: Second Wednesday of each month at the Lecture Room, Belgrave Youth Club, New Briggate, Leeds.

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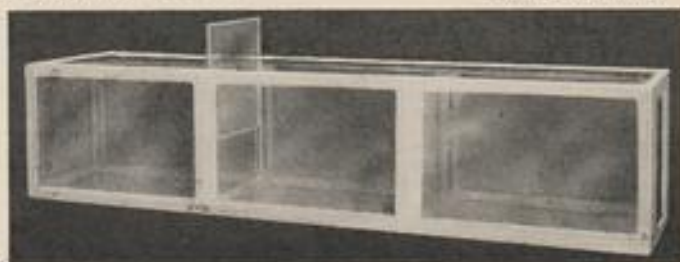
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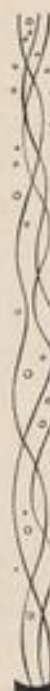
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