

The AQUARIST AND PONDKEEPER

Founded in 1924 as "The Amateur Aquarist"



THE BUTTS, HALF ACRE, BRENTFORD
MIDDLESEX

VOL. XVII. No. 1

1952

PUBLISHED MONTHLY

Editor: ANTHONY EVANS

Advisory Editor: A. FRASER-BRUNNER

SUBSCRIPTION RATES

The *Aquarist* will be sent post free for one year to any address for 19/6. Half-yearly 9/9. Canada and U.S.A. \$3.00 yearly; \$1.75 half-yearly.

QUERIES

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

Correspondence with intending contributors is welcomed.

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

The Editor accepts no responsibility for views expressed by contributors.



Photo:

Lionel E. Day

Inseparable from the thought of spring in the pond-hunter's mind is the memory of frog-filled waters choked with dense masses of jelly-like spawn

Editorial

WHITE spot disease is again one of the tropical aquarist's chief worries. We say "again" advisedly, for it is not thought that the incidence of white spot is any greater than it has been at any other time since aquarium-keeping began in this country, apart from the war years. There are more aquarists to-day than ever before and thus more is heard about the disease.

It seems fairly obvious that imported fishes are responsible for keeping up the level of white spot, since our only period of relative freedom from the scourge was when a ban on imports was in operation. It is also certain that white spot can be cured, and but for reports from aquarists saying that it has reappeared after a time without a readily discernible infective source in their tanks, it is difficult to believe that it cannot be eliminated as well. As aquarists are not adherents to the theory of spontaneous generation it must be that white spot can "go into hiding" and appear again when conditions suit it.

According to scientists who have studied the *Ichthyophthirius* parasite, the encysted form which develops after the mature organism leaves the fish has no protection against harmful chemicals and it should be killed by proper treatment of the infected aquarium. Water plants are, of course, the main problem in this respect. They cannot be adequately sterilised without harming them, and if white spot parasites have encysted on plants then these will be reservoirs of fresh infection when used in an aquarium with fishes. Sand and rocks are easy to treat with boiling water, and the empty aquarium itself can be disinfected with chemical agents such as chlorine-containing solutions.

As readers' letters have shown, quinine solutions are efficient in curing most fishes if these are not overcrowded during the treatment. With fishes free from the disease, and clean tank contents, the old advice that all new stocks should spend a week in a "quarantine aquarium" is all that needs to be followed to ensure no further outbreak.

April, 1952

1



AQUARIUM SCIENCE



At first sight it seemed that the various antibiotic substances introduced to medicine after the great success of penicillin had been realised, would find their only application in the therapeutic field. More recent investigations show that some of these compounds may be of additional use in animal feeding. Aureomycin is the name of one such antibiotic, which, according to reports from America, will greatly stimulate growth of chicks and pigs when added to their diet. British scientists are examining the possibilities in aureomycin feeding for pig-breeders at the present time.

Some American aquarists' suppliers have this past year or so been marketing fish foods containing aureomycin, though there does not appear to have been any serious examination of its value as an addition to the diets of fishes. The growth-promoting action of the antibiotic for other animals is thought to result from its effects on microbes living in their digestive tracts; aureomycin stops the development of some of the microbes which produce poisonous materials and hinder animal growth.

To what extent harmful organisms of this kind are found in the guts of fishes is unknown. If they are present and if they do check growth, then including aureomycin or other antibiotics in fish foods should produce for us some larger and specially healthy strains of aquarium fish.

Since the announcement of some research into green algae being done by workers in Cambridge, U.S.A., aquarists may have been viewing these primitive plant nuisances growing in their tanks with a changed outlook. For the scientists have been trying to grow the single-celled, free-swimming alga known as *Chlorella* in quantities sufficient to provide raw materials from which oils and greases and substances of use as animal fodder may profitably be extracted. It has even been suggested that one day humans will not be too proud to eat foods which are products of the algae "factories."

In the experimental plant now being worked fresh water containing the *Chlorella* is circulated continuously through tubes and troughs, made of transparent plastic so that the growth-encouraging sun's rays can reach the alga. It has already been shown that whereas in nature over 100,000 gallons of pond water are needed to obtain about a pound of algae, in the laboratory this weight can be grown in two gallons of water kept well supplied with carbon dioxide gas.

From electric eels to the mechanism of nervous control of muscular contractions in mammals may seem a far cry, but valuable supporting evidence for current theories about this mechanism has been obtained by physiologists who have studied electricity-producing fishes in aquaria.

It has been found that fish electric organs arise from body tissue that is indistinguishable from muscle in the embryo fish. The muscle becomes specialised during growth, when in the formation of "electric organs" it develops into closely-packed plates each receiving a rich supply of nerves on one side—the negative poles of these living batteries. Although several different kinds of fish with electric organs of various sizes have been studied it is remarkable that all of them appear able to generate about a tenth of a volt for each plate in the organs. These can be shown to contain large amounts of a substance called acetylcholine, which is

the chemical initiating muscular contraction when released at the ends of nerves supplying muscles in vertebrate animals and man.

The electric ray (*Torpedo*) has two organs behind head which are capable of developing 30-40 volts, give rise to electric currents of short duration which may be great as 60 amps. With these "shocks" the prey can be stunned or killed; a frog six feet away from the fish is paralysed by this means. One gymnotid fish grows to three or four feet in length has electric organs along five-sixths of its body-length and packs 400-600 v in its head is found to be positive and the tail negative. The charge on this fish makes the two or three volts carried by the electric skate seem quite mild, but here the sharks apparently have a defensive and not an offensive function.

by
ANTHONY EVANS

When the chemistry of a natural water is discussed in relation to fishes and aquaria its "hardness" is usually considered to be the factor of greatest importance. This is strictly true, for the total amount of solids dissolved in the water is information most needed to assess the suitability of a water for breeding purposes, and the figure for this value is

necessarily related to figures expressing hardness and

Hardness is measured by chemical methods which determine only some of the substances natural waters contain—compounds responsible for "furring" in boilers and water pipes, which also promote wastage of soap by excessive scum formation. These are the salts of calcium and magnesium, and they often form the bulk of the dissolved solids, but sodium chloride, with which hardness measurements are not concerned, is commonly present in well water. Thus a water described as "soft" could conceivably have an amount of solids dissolved in it that would make it unsuitable for use if nearly pure water was required.

The acidity or alkalinity of water (expressed by its pH value) is sometimes taken by aquarists to be indicative of the content of solids, but this too can be a misleading assumption. Water without any solids dissolved in it is neutral (pH 7.0); if carbon dioxide gas is bubbled through it, the pH is 5.0—an acid level. Moorland water in Yorkshire and Lancashire, for example, can be as acid as this though boiling them may not shift the pH back to 7.0—water treated with carbon dioxide does change pH in this way when boiled—for their low pH is due to dissolved carbonic acid rather than carbonic acid. So that these "soft" waters are still contaminated with solids. Similarly, although all waters (with pH values greater than 7.0) are usually considered to be "hard" and have large amounts of dissolved salts in them, this does not follow as a matter of course.

Unfortunately, without some laboratory facilities it is difficult to obtain all the information about a sample of water that one would like to have, and the above remarks are meant to show that detailed analyses are required in all cases rather than descriptions in general terms. Public water supplies in Scotland and Wales are the softest in Britain; general descriptions are wanted; Metropolitan Water Board supplies are termed "moderately hard" to "hard."

Brief item for those who pander to fish gourmands: when fishery foodstuffs were in short supply in Germany it was found that mushrooms were taken with reluctance by pond trout, carp, tench and goldfish.

Obtaining Improved Strains of Fish

by MARGERY G. ELWIN

IN the last article we discussed the way in which a strain of fish showing certain desirable characters could be established and improved by line-breeding. Closely related fish are bred together and the best of the progeny selected for further breeding, the poorer specimens being rigorously culled. We will now consider other ways of obtaining "improved" strains.

First of all we must remember that while, broadly speaking, the young always resemble their progenitors, this does not mean that they are all exactly alike. Ancestral characters appear in new combinations and fresh characters arise by "mutation." These mutations, or "sports" as they are sometimes called, appear suddenly among the normal progeny and they differ in some character not only from their parents but also from all their other ancestors. The character is, in fact, a new one. Usually only one individual shows the mutation, but sometimes the change occurs at an earlier stage in the formation of the egg cells and more than one "changed" egg may be formed, giving rise to more than one individual showing the new character. Some of these mutations occur repeatedly. Albino and melanistic (black) forms, for instance, have arisen on a number of occasions and in many species.

Black Mollie Crossing

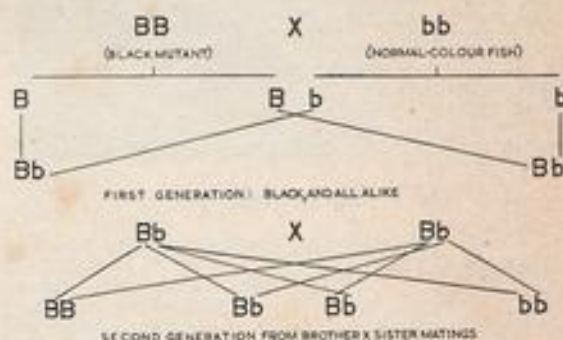
Mutations are usually inherited. Our black mollies, for example, have all arisen from "black" sports. The black mollie bred with a normal coloured mate will produce offspring all of which show some degree of black pigmentation, since "black" is "dominant" to normal pigmentation. The best of these offspring are bred together. In the next generation a proportion, probably about a quarter of the youngsters, will be the normal colour and these, when bred together, will only produce normal coloured fish. Of the black fish some, again probably about a quarter, will breed true to type. The rest will throw a proportion of normal coloured fish. The difference between the two black types is due to the fact that the pure breeding individual has inherited the potentiality to produce black pigment from both the father and the mother, whereas the other type has only inherited this potentiality from one parent. Diagrammatically this may be represented as shown in the adjacent column.

Sometimes the individual which has received a "double dose" of the mutant factor shows the character to a more marked degree than the one which only received a "single dose." In other cases the two types are indistinguishable to the eye and can only be identified by the progeny.

With the other example which we have mentioned, the albino, the result of breeding with a normal fish is somewhat different. The albino character is recessive and when an albino individual is bred with a normal all the progeny show the normal coloration. But the character is not lost. When these apparently normal individuals are bred together a proportion of the next generation will be albinos. Theoretically the expected proportion will be a quarter, but as the albino is much more delicate and consequently has a higher death rate the proportion which is actually produced

is usually less. In the case of the albino swordtail the divergence between the expected ratio and the number actually produced varies with the individual female. In the albino guppy the difference is extremely marked, very few albinos surviving till birth. Dr. Myron Gordon found, by killing and examining pregnant females at various stages, that the proportion of albinos among the embryos was quite normal but that many of these albino embryos died before birth.

Although it is more difficult to obtain albino stock in the first instance, than it is to produce a number of black fish from a black mutant, the next stage is easier, since albinos, when bred together, always produce 100 per cent. albino young, i.e. they always breed true to type. Moreover (at any rate in the case of albino swordtails), though they certainly are more delicate than normally pigmented fish, they get along quite well when not forced to compete with these.



Three types of fish are produced in the second generation: 1, pure black (BB), which breeds true; 2, black (Bb), which "throws" some fish of normal colour; 3, normal coloured fish (bb)

In my experience it is only in the early stages that they are really difficult.

Some species are by nature much more variable in colour and form than others, and these naturally offer more scope to the aquarist who wishes to produce "improved" strains. Two such species are *Lebistes reticulatus* and *Xiphophorus (Platypoecilus) maculatus*, commonly known to us all as the guppy and the platy. In the guppy there are many colour patterns and also great variation in the form of the fins. Selection for the latter has resulted in such types as the "upper sword," "lower sword," "double sword," "lyre tail" etc. Professor Winge, who has studied the inheritance of many colour patterns in guppies, found that most of these are inherited directly from father to son and are not transmitted by the female. A few are, however, transmitted from grandfather to grandson through the mother. Only by experiment can you find which is the manner of inheritance in a given case.

If you find that the female does affect the inheritance in your particular case the best way to assess her potentialities is by the colour of her sons or, failing this, by her father. Do not judge her by her brothers. If the female does not affect the colour pattern in which you are interested you



Photo: G. Timmerman
Pair of wagtail platys (male below)

may as well use a female from another stock; this will avoid weakness due to close inbreeding. With fin formation the female is probably just as important as the male, although she will not show the character herself, so here you must use either a related female or a female from another line showing the same character.

We now come to the platy \times swordtail complex. We have to consider these fish as a "complex" because in our aquaria nowadays there is no such thing as a pure platy or a pure swordtail. The two species have been hybridised so much in the past in attempts to improve the colours that all the fish we have now are of mixed origin. Those which

approximate closely to the form of the wild *X. maculatus* are called platys; the larger, longer and shallower-bodied fish with swordlike extension of the lower rays of the caudal fin are known as swordtails.

The wild platy is very variable in colour and markings. The swordtail, on the other hand, shows little variation. Under aquarium conditions the two species readily breed together and the introduction of swordtail blood has a remarkable effect on the pigmentation of the platy. In all cases it seems to intensify it greatly and increase its distribution. The red, black, etc. of the wild platy is limited to quite small patches or spots, but when mated with an ordinary green swordtail, offspring are obtained which are red, or black as the case may be, practically all over. When the colour has been perfected and "fixed" by judicious hybridisation the original form of the platy can be regained by crossing back, repeatedly if necessary, with fish of the true platy shape. In this way most of our very attractive strains of swordtails and platys have been produced. Apart from the albino probably the only exception is the golden swordtail, which also appears to have arisen as a mutant.

The black platy is a good-looking and healthy animal but for some reason the black pigmentation goes wrong in the swordtail. The more swordtail blood there is in the hybrid the more does black pigment (melanin) formation seem to get out of hand; invariably swordtails with a large amount of black pigment suffer from some degree of cancerous erosion of the tail.

Wagtail Platys and Swords

Finally we will describe the origin of one of our more recent acquisitions, the wagtail platy and wagtail sword. This pattern was first produced in the course of one of Dr. Myron Gordon's experiments. The wild platy has a variety of markings at the base of the caudal fin: twin spots, crescent, moon, comet, etc. It was while experimenting with the inheritance of these markings that Dr. Gordon found that in the case of the comet marking, hybridising with a swordtail had an extraordinary effect. This comet mark in the platy is quite insignificant; it consists merely of two dark lines running outwards from the caudal peduncle along the top and bottom rays respectively of the caudal fin. Dr. Gordon found that when such a fish was crossed with a swordtail, the degree of pigmentation in the young was greatly increased. Not only did it cover the caudal peduncle and extend along all the rays of the caudal fin, but it also appeared in the dorsal and pectoral fins and along the fish's mouth. The distribution is in fact very similar to that of the dark pigment in the Siamese cat.

THE PRACTICAL AQUARIST

Some hints about siphoning



Weeding the WATER PLANTS

WEEDS have been defined as being "plants in the wrong place," and this principle is applicable to both aquatic and terrestrial species. To the owner of ornamental water, from a large lake complete with swans, to the small garden pool with its solitary water lily and a few goldfish, weeds are an ever-present threat. Many treasured aquatic plants are sensitive to weed competition and may be lost entirely or at least have their vigour seriously impaired if weeds are allowed to grow unchecked. In addition, whilst plants produce oxygen during the day, at night they consume oxygen and give out carbon dioxide, and if the volume of weed is excessive, in proportion to the volume of water, it is quite possible for fish and small aquatic animals to die of suffocation.

Harm Caused by Weeds

The oxygen content of the water is liable to be even more drastically reduced when the weeds finally die, as the bacteria responsible for their decay will use up oxygen, whilst the gas is no longer produced by the plant even during the day. Rampant weed growth is also to be deplored from a purely aesthetic point of view; few can enjoy the spectacle of a pool blanketed with green slime or choked by a monotonous growth of submerged aquatics. This description may be an exaggeration, so far as the vast majority of garden pools are concerned; but these things *can* occur.

The control of water weeds is a rather special problem, in which a number of factors must be considered which do not arise in connection with the control of weeds in the garden generally. Firstly, it must be remembered that many of the weeds constitute a natural fish food and their complete destruction would therefore be undesirable if fish are kept in the ornamental pool. Control should therefore be the key word, rather than destruction. Secondly, the pool probably contains ornamental aquatics as well as fish, and it is of course necessary that neither should be harmed in any way by the methods used for weed control. The ideal to be aimed at is to achieve a condition of balance by biological control, whereby none of the inhabitants of the pool are allowed to become dominant at the expense of their neighbours. The "balanced pool" may not be quite so easy to maintain as the "balanced aquarium," as external factors are not so easy to control, but a slight shifting of the balance need not necessarily be detrimental.

Types of Weeds

In considering the different types of water-weeds, it is convenient to divide them arbitrarily into the following groups:—

1. Submerged higher plants.
2. Floating higher plants.
3. Algae.
4. Marginal plants.

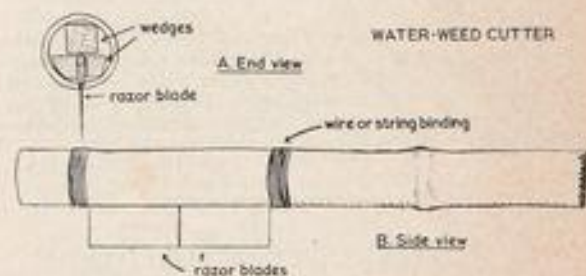
The submerged higher plants may grow entirely under water or may have some of their leaves floating on the surface. They resemble ordinary land plants in having stems, leaves, and soil roots, although they usually possess characteristic anatomical modifications which enable them to live their lives in the water. The species most likely to grow too rampantly are Canadian water-weed (*Elodea canadensis*) and some of the pond weeds (*Potamogeton* spp.). They can be kept under control to some extent by periodic cutting, but once they become established they are very difficult to get rid of completely, except by such drastic measures as draining the pool and allowing them to dry out in the sun. An inexpensive instrument for cutting water

Aquaria and ponds need to be weeded just as any garden. What the water weeds are and how to control them is this article's concern

weeds can easily be made out of a bamboo cane and a few old single-edged razor blades, as shown in the sketch.

The garden cane is slit open on one side only, the length of the slit being enough to accommodate the required number of blades, plus the binding. The blades are inserted into the slit and secured by wedges. Finally they are further secured by binding with wire or strong string. Of course, for larger pools this tool would be quite inadequate and weeds may have to be cut with a scythe. Pond weeds can also be killed by spraying with one part of arsenic trioxide equivalent to a million parts of water, but this method cannot be recommended for small garden pools as it would result in the indiscriminate slaughter of all the plants in the pool, and would persist for too long afterwards. Swans and other water-fowl feed on *Elodea canadensis*, but they can hardly be considered suitable for a small garden pool. It is better to avoid introducing these weeds, prevention being so much easier than the cure.

Floating higher plants such as duckweed (*Lemna* spp.) and



fairy moss (*Azolla*), can easily be controlled by hand-netting, where the area of the pond is small. Duckweeds increase very rapidly under favourable conditions unless the fish population is large enough to keep them under control. *Azolla* is an attractive little thing, but it grows rapidly too, so don't introduce it unless you are prepared to thin it out with a net periodically.

The higher plants are comparatively large, and their accidental introduction to small ornamental pools can usually be guarded against. Not so, unfortunately, with the algae. Algae are the worst potential weeds of ornamental pools, but, to commence on a cheerful note, it must be remembered that some of them are a food for fish and other aquatic animals, and, provided a proper balance is maintained, algae need never get out of control. Once let them get out of hand, however, and the result will really be deplorable—a green or brownish slime covering the sides and bottom of the pool, and threatening to smother your treasured aquatics, or else a brighter green blanket of slime covering the surface. Its appearance can be bad enough, but unless it is removed, on a hot summer day it is liable to produce an aroma of putrefaction to add to your discomfort.

Algae range in size from a single cell to giants up to 50 yards in length, but the latter are seaweeds confined to the American Pacific coast, so we don't need to worry about

them. It is actually the small size of the algae common to our pools which makes them such a nuisance, as it so greatly facilitates their accidental introduction. Algae can enter by way of the water supply, in specks of wind-borne dust, on the feet of wading birds, or on introduced aquatic plants. In fact it is almost impossible to avoid the entry of algae into a garden pool. To control them, remember that snails can eat considerable quantities of bottom living algae and that algae are green plants and therefore need light. Shading the surface of the water, either artificially or by planting water-lilies will help to reduce algal growth—and the snails won't mind the shade.

Copper as Algicide

Many algae can also be destroyed by copper sulphate or permanganate of potash, without materially affecting the ornamental aquatic plants, fish and other legitimate inhabitants of the pool. Permanganate at a strength of one teaspoonful per gallon of water should be sprayed on to patches of surface algae, whilst copper sulphate should not be used in quantities exceeding 1 oz. per 1,200 gallons of water in the pool. Unfortunately the algicidal power of copper sulphate is less in hard water than in soft water, whilst its toxicity to fish remains the same. In hard water, therefore, concentrations harmless to fish are also liable to be harmless to algae. Also it appears that fish vary in their ability to exist when copper sulphate is used—goldfish, for instance, can stand more than twice as much of the chemical as can trout, whilst perch can stand even more. The range of toxicity of these chemicals to various species is not fully understood, so the above methods should be used with care. Sometimes a small lump of salt is effective in reducing algal growths, and may actually have a tonic effect upon the fish.

Marginal plants can be dismissed briefly, as they are confined to the edge of the pool or its banks and are usually within reach of hand-weeding. Whilst some of them can be very persistent, their eradication is usually possible by ordinary garden methods, so long as it is remembered that weed-killers may seep through the soil into the pool.

S. G. H.

A Fishkeeper's Jottings

SOME time ago a very large silver tetra (three and a half inches long) was alarmed and jumped out of the water. In doing so it hit a 60-watt lamp in the aquarium cover and smashed it. The tetra fell back in the water and the lamp was removed. The next day I noticed that the tetra had almost lost its tail and anal fin with tail rot, and furthermore it had a burnt area on its side covering a one-inch square.

Fish in this state are usually disposed of very quickly but for some reason I put it in a tank with three small swordtails. The next day I discovered that due to an oversight the temperature of this tank had fallen to 60° F. Nevertheless the fish all appeared normal, so I increased the temperature slowly to 80° and added five tablespoonsful of salt to the water. Within a week the silver tetra had grown a completely new tail and anal fin, whilst the huge burn on the side had completely disappeared.

THE paradise fish is very attractive but is looked upon with doubt by many aquarists, who hesitate to introduce it to community tanks.

It grows to a fair size and can be a formidable customer where small fish are concerned, but need not be a danger if you understand fish psychology. They should never be kept unless you keep two or three males to one female.

Spotted Callichthys

MY specimens of the spotted Callichthys (*Hoplosternum littorale*) were bought when only about one inch long. These active scavengers are very similar to *Callichthys callichthys* but are smaller when adult and are spotted. They grew quickly and soon became mature and very tame, taking white worms or *Tubifex* from the fingers.

I kept my fishes in a community tank when full grown, in company with nine other catfishes, two large ange's and numerous platys, and here they decided to spawn on the under surface of a tropical water lily leaf (*N. stellata*); it was only whilst damaged leaves were being removed from this plant that the spawn was discovered—200 or more eggs.

The eggs were fully adhesive and when the leaf was lifted



Photo:

G. Timmerman

Hoplosternum littorale, the spotted Callichthys

the parent fish, or at least one of them, appeared most agitated, which suggests that there is some form of parental protection given to the spawn. They were grouped in much the same way as cichlid eggs are.

The leaf bearing the eggs was placed in a 24 ins. tank in which a pair of ticto barbs had spawned. In about five days the eggs hatched, at a temperature of 80° F. When hatched the newly released fry were rather tadpole like and were inclined to hide away in the plants. One which died soon after hatching was examined under a low powered microscope and was seen to resemble the adult fish in shape, with "whiskers" and bony plates.

Unfortunately none of the fishes were reared, possibly owing to the fact that the ticto barb fry grew much faster and probably worried them. There was little mulm in the hatching tank, and the water was from the tap (very hard in this area). The lighting was subdued, natural light without direct sun being the source.

It has been suggested that this species is a bubble-nest breeder, but as recorded, my fishes spawned under a leaf, and there was no sign of bubbles to be seen.

A. J. Bland

The three males will then always be very conscious of the other males in the tank and there will be a great deal of threatening behaviour to each other, raised gill covers and the like, but no actual fighting will ever happen. They all have too much to think about with each other to bother about any of the other inhabitants of the tank.

Paradise fish never seem to sleep or rest like most tropicals and they cruise around at night when other fish are resting just below the surface. It is then, if at all, that they attack small fish.

RAYMOND YATES

THE AQUARIST

From Breeder to Reader

1. Diary of an Angel Fish Spawning

by F. D. J. HOCKEY

IN my experience angel fishes are easy to breed and rear, and as encouragement to those who have not had success with the angel I offer the following breeding records.

The parent angels were about three inches in body length, were rather plump and possessed stout finnage. Prior to spawning they were fed on nothing but chopped red earthworms. A 30 ins. by 12 ins. by 12 ins. aquarium containing a solitary giant Amazon sword plant and water fresh from the tap (district Alvaston, Derby) was used. Water temperature was 78° F.; its pH value was not measured.

First day: the female was observed vigorously cleaning the leaves of the sword plant.

Second day: spawning took place, and when I arrived on the scene the parents were fighting and making meals of the eggs. I removed them from the aquarium and introduced another female angel fish. To my surprise she soon took to the eggs and behaved like a good mother should—fanning them continuously with her large fins. A small amount of Infusoria culture was siphoned into the tank and I added an eggcupful of dried, crushed lettuce leaves.

Fourth day: a few of the eggs had become white, but the foster mother was still fanning them.

Fifth day: first signs of hatching were seen and the female was transferring the tiny fishes to another leaf she had cleaned ready for them. I fed her well with red earthworms.

Sixth day: all the eggs had hatched except a dozen white ones, and the fry were still being moved by the foster mother from leaf to leaf. Liberal feeding with worms was continued.

Seventh day: as the female appeared to be tired and was not bothering much about the fry I lured her to the other end of the aquarium with food, slid in a glass partition be-



Photo:

Valerie Lilley

A breeding pair of angel fishes. Compare the body outline of the female (left) with that of the male

hind her and then netted her for removal to my community tank. The fry were wriggling on the leaves and some were falling off, so I scraped away some of the gravel from under the plant to expose the glass base, where they could easily be seen when they fell.

Ninth day: the fry were swimming free and eating Infusoria, which could be seen to be multiplying in the tank. I left them alone until six days later, when they appeared more like angel fishes in shape, and I fed them well with screened *Daphnia*. This food I continued to provide for another six days, when the fishes were large enough to take unscreened water fleas and usual aquarium diet. The total number reared to this stage was 117.

On a previous occasion I have had the angels spawn in my community tank, and I removed the eggs to a two pound jam jar with water in it floated in the aquarium. When hatching took place I floated them out of the jar into another aquarium and reared them in the same way as the above. From this spawning 84 fishes were reared.

2. Breeding the Harlequin Fish (*Rasbora heteromorpha*)

THIS fish has been known in Europe for 50 years, and few of its brethren have given the average aquarist so much worry. For many years its breeding habits were a mystery and it was only in the late 30s that really successful breeding was attained.

Neither the hardness of the water nor the pH value seems to be of much importance in its breeding. In its native country—Malaya and Sumatra—the water is generally very soft, often measuring as low as 27-44 p.p.m., yet spawnings are claimed with 107 p.p.m. Experience has shown however, that as in the case of most tropical fish, slightly acid water is preferable. With all respect for the composition of the water, the most important factor is the fish themselves. The best age for spawning is between one and two years, but as harlequin fishes generally live to a comparatively old age, good breeders can be found amongst older fish.

For breeding, a six gallon aquarium, the bottom of which is covered with a cemented plate of glass, is recommended.

by Mrs. MORTEN GRINDAL

The underside of this is painted black to mitigate the mirror reflection thrown by transparent glass. In addition it gives greater facilities for studying the progress of the hatching of the eggs; an all-glass aquarium is ideal. The sole furnishings of the aquarium are a couple of *Cryptocoryne* plants (*C. griffithii* or *C. ciliata*) held down by a glass rod. Naturally the aquarium and its contents are perfectly clean, as Infusoria are fatal to *Rasbora* eggs. The fish refuse to breed in Infusoria infected waters.

Unfortunately very few male harlequins are suitable for breeding purposes. This has been experienced when three males and four females were used. There was the usual chasing, and while the females appeared willing enough, the males, when their mates swam over or under the plants,

seemed to lose all interest. After many failures a fresh start was made with eight males and 12 females of which three of the males bred. With the other five no results were ever attained.

Often it occurs that an active male, after a few successful spawnings, gives no results. The best spawnings have always occurred in the early morning hours. The eggs are not very adhesive and many fall to the bottom. During the intervals of spawning at least, the fish do not eat the eggs, but afterwards it is advisable to remove them with an absolutely clean net. The aquarium is then darkened. After 24 hours the eggs hatch, and by the light of a weak lamp—15 watt—the young can be seen sprawling on the bottom.

At the end of seven days they are free swimming and can be fed on nauplius and rotifers and as they grow quickly

they soon eat brine shrimps. At the age of four weeks the distinctive markings of the species are evident. The diet mentioned is only one of many, as these fish eat almost any food. There is one fact that must be remembered—the water must be clear. Should Infusoria occur and the fish show signs of distress use eufavin in the proportion of 7 grains to each gallon of water. In a short time the Infusoria disappear. This has been practised when the fish were only a few days old without harming them. It is important that the temperature is kept constant.

The conditions necessary for the successful breeding of *Rasbora heteromorpha* can be summarised as follows. A selected breeding pair; slightly acid water which is perfectly clear, and which has been allowed to ripen 14 days; a temperature between 77°-82° F.; and last of all, unlimited patience.

3. A Breeding Record with Neon Fishes

by R. E. BILLINGS

EARLY last year I obtained several young neon fishes from a reliable source, and fed them well on growing foods so that at 10 months of age they were of full adult size (1½ ins.) and in tip-top condition.

A standby aquarium, 36 ins. by 10 ins. by 10 ins., was scrubbed and cleaned, and layered with sharp sand and gravel. Several pieces of York stone (well scrubbed) were placed so as to offer flat surfaces and several other smooth-surfaced stones were used as supports. The tank was three-quarters filled with water from a large community tank which had been set up for four years; pH was 6.9. The planting was very heavy, being mainly *Gabomba* and *Valisneria*, with a handful of *Salvinia* on the surface. Water direct from the cold main was used for topping up.

In four days the aquarium was completely settled and crystal clear. Little or no direct daylight reached it, light being supplied by two 60 watt 12 ins. strip lights, switched on for a maximum of five hours every evening. An outside thermostat controlled the immersion heater (100 watt) to give a temperature range of 76°-79° F. The neon fishes were introduced to the tank one evening and were perfectly at home within minutes.

Sex Characteristics

Two females and three males were used; the females were easily recognised by their plumpness and the deeper "tench-like" colouring of the underparts of the body. They were fed only once a day, not heavily but well—all proprietary foods being used in turn with live food in addition when available. (Strangely, I find micro worms are by far the most preferred food by my adult neons.)

Three days after introduction unusual activity by one of the males towards the more rotund of the two females was noticed, so the other three fishes were placed back in the community tank; the intrusion of the net in no way upset the other two.

Close observation for the next few hours revealed quite an amazing performance. The male had assumed a positively "electric" colour, all fins bearing a strong milky-coloured edging tinged with blue. The characin dance and "standing to," with many threatening darts and coy retreats, went on for well over an hour, culminating in a quick rush to a space between the base of some *Gabomba* and overhanging York stone. A sort of V attitude was adopted by the pair and eggs were seen to be released by the

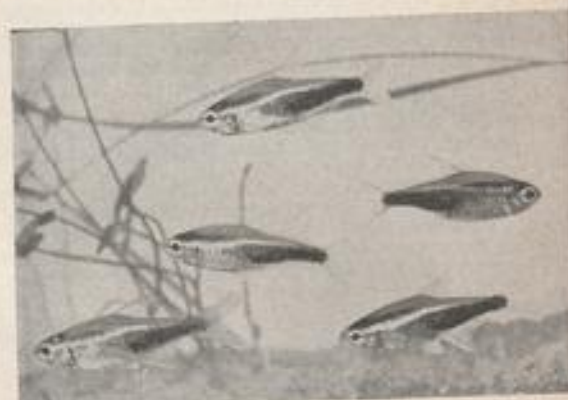


Photo:

New York Aquarium

Neon fishes are always a challenge for the breeder, but patience does bring its rewards

female. A desperate flurry then ensued and when the disturbance had died down somewhat a batch of 16 eggs was seen adhering to the side of the stone.

The fishes whizzed around the tank a few times and then resumed their previous activities; altogether they visited the spawning space five times, after which I deemed it expedient to remove the female, who was looking somewhat the worse for wear.

Neon eggs are very similar to those of zebra fishes, and if anything are a trifle more "woolly-looking." Nothing occurred within the next three days but on the fourth day several typical characin fry could be seen. I did exactly nothing until the eighth day, when water from a tank of *Ampullaria* snails was slowly dripped in. I had counted 32 youngsters. At a temperature of 76° F. growth was fairly rapid over the next five days.

On the tenth day after spawning I could only find 11 fishes. Next day four more had disappeared. All went well for a week until the 19th day, when only five fry remained. These grew well and were lively, taking "flour food" (dried egg etc.) and a daily helping of micro worms. At six weeks they were three-eighths of an inch in length and the blue-green colour was predominant. From then onwards progress was rapid and no special care was given or seemed to be necessary.

I am still puzzled why five of the brood should stay the course and yet the others should disappear with no signs of their going.

THE AQUARIST

seemed to lose all interest. After many failures a fresh start was made with eight males and 12 females of which three of the males bred. With the other five no results were ever attained.

Often it occurs that an active male, after a few successful spawnings, gives no results. The best spawnings have always occurred in the early morning hours. The eggs are not very adhesive and many fall to the bottom. During the intervals of spawning at least, the fish do not eat the eggs, but afterwards it is advisable to remove them with an absolutely clean net. The aquarium is then darkened. After 24 hours the eggs hatch, and by the light of a weak lamp—15 watt—the young can be seen sprawling on the bottom.

At the end of seven days they are free swimming and can be fed on nauplius and rotifers and as they grow quickly

they soon eat brine shrimps. At the age of four weeks distinctive markings of the species are evident. The mentioned is only one of many, as these fish eat almost any food. There is one fact that must be remembered: water must be clear. Should Infusoria occur and the fish show signs of distress use eufavin in the proportion of 7 grains to each gallon of water. In a short time the Infusoria disappear. This has been practised with these fish were only a few days old without harming them. It is important that the temperature is kept constant.

The conditions necessary for the successful breeding of *Rasbora heteromorpha* can be summarised as follows: selected breeding pair; slightly acid water which is perfectly clear, and which has been allowed to ripen for a few days; a temperature between 77°-82° F.; and last of all, unending patience.

3. A Breeding Record with Neon Fishes

by R. E. BILLINGS

EARLY last year I obtained several young neon fishes from a reliable source, and fed them well on growing foods so that at 10 months of age they were of full adult size (1½ ins.) and in tip-top condition.

A standby aquarium, 36 ins. by 10 ins., was scrubbed and cleaned, and layered with sharp sand and gravel. Several pieces of York stone (well scrubbed) were placed so as to offer flat surfaces and several other smooth-surfaced stones were used as supports. The tank was three-quarters filled with water from a large community tank which had been set up for four years; pH was 6.9. The planting was very heavy, being mainly *Cabomba* and *Vallisneria*, with a handful of *Salvinia* on the surface. Water direct from the cold main was used for topping up.

In four days the aquarium was completely settled and crystal clear. Little or no direct daylight reached it, light being supplied by two 60 watt 12 ins. strip lights, switched on for a maximum of five hours every evening. An outside thermostat controlled the immersion heater (100 watt) to give a temperature range of 76°-79° F. The neon fishes were introduced to the tank one evening and were perfectly at home within minutes.

Sex Characteristics

Two females and three males were used; the females were easily recognised by their plumpness and the deeper "tench-like" colouring of the underparts of the body. They were fed only once a day, not heavily but well—all proprietary foods being used in turn with live food in addition when available. (Strangely, I find micro worms are by far the most preferred food by my adult neons.)

Three days after introduction unusual activity by one of the males towards the more round of the two females was noticed, so the other three fishes were placed back in the community tank; the intrusion of the net in no way upset the other two.

Close observation for the next few hours revealed quite an amazing performance. The male had assumed a positively "electric" colour, all fins bearing a strong milky-coloured edging tinged with blue. The characin dance and "standing to," with many threatening darts and coy retreats, went on for well over an hour, culminating in a quick rush to a space between the base of some *Cabomba* and overhanging York stone. A sort of V attitude was adopted by the pair and eggs were seen to be released by the



Photo: New York
Neon fishes are always a challenge for the breeder, but does bring its rewards

female. A desperate flurry then ensued and with disturbance had died down somewhat a batch of 16 eggs seen adhering to the side of the stone.

The fishes whizzed around the tank a few times and resumed their previous activities; altogether they the spawning space five times, after which I deemed it expedient to remove the female, who was looking somewhat the worse for wear.

Neon eggs are very similar to those of zebra fish if anything are a trifle more "woolly-looking." They occurred within the next three days but on the fourth several typical characin fry could be seen. I did nothing until the eighth day, when water from *Ampullaria* snails was slowly dripped in. I had 32 youngsters. At a temperature of 76° F. growth was fairly rapid over the next five days.

On the tenth day after spawning I could only see five fishes. Next day four more had disappeared. The remaining one survived well for a week until the 19th day, when only one remained. These grew well and were live "flour food" (dried egg etc.) and a daily helping of worms. At six weeks they were three-eighths of full length and the blue-green colour was predominant. Then onwards progress was rapid and no special care given or seemed to be necessary.

I am still puzzled why five of the brood should have gone and yet the others should disappear with their going.

Operation Octopus

by H. B. SINCLAIR

(Southsea Aquarium)



"We must have an octopus" said the directors. Harry put down the very large and very dead rat with which he had been tempting the appetite of Henry the alligator. "All right" he said, "I'd better go and get one."

When the directors had left I remarked a trifle acidly: "Plymouth haven't seen an octopus for weeks. How are you going to find one?" "At least we can try" said Harry. "Get your bonnet on, we'll hop down to Devon. I've got a hunch!" So "hop" we did, in the Company's very bright yellow utility van, advertisements covering its sides. The ladies in the upstairs flat kindly offered to feed the cat during our absence "on safari" for an indefinite period, and our equipment consisted of two large and several small fish cans, together with an oxygen cylinder, a very large fish net and a couple of wooden crates "for luck," all rattling about happily in the back of the van. Pedestrians taking a quiet stroll along the country lanes looked round apprehensively at our approach and hastily flattened themselves against the hedge, no doubt under the quite understandable impression that we were about to explode at any moment.

Barrel Organ Fisherman

However, after some five hours' steady going we arrived at one of Devon's most picturesque small resorts and after making preliminary enquiries, sought out one Jim, the best-known local fisherman. Nothing was further from his mind than fishing, as it happened, since we finally tracked him down vigorously trundling a barrel organ around the streets as part of a campaign for the local Carnival week. When he stopped, we drew up alongside to the plaintive strains of "Nellie Dean" and Harry took the opportunity when the collecting box was thrust under our noses to put the all-important question.

A wary look crossed Jim's face—clearly he had a madman to deal with, or at best, his leg was being pulled, but he hadn't time to bother much one way or the other. "Octopus?" he said, "aven't seen none o' them for weeks!" and rattling the collecting box vigorously, departed up the hill behind his mates now trundling the barrel organ. Dejectedly we turned back to our van. Not only the octopus quest but a brand new curatorship looked like suffering a severe setback almost before either had really got under way. Then suddenly Jim re-appeared at the top of the hill.

"Try Bill Smith at the Cove" he shouted. "Six miles further along!" He waved an arm vaguely indicating the middle distance and finally disappeared.

"There you are!" said Harry, as if it was all my fault that no one had produced an octopus out of a hat. "I told you I had a hunch!" He started up the van and off we went, bump, bang, rattle, up the hill and on our way. "We haven't got an octopus yet" I said gloomily. We seemed to have been travelling for days and I was developing a tendency to view the whole expedition with a somewhat saddened eye.

The Cove was the kind that one dreams about. We approached along a narrow winding lane, climbing for miles, and suddenly there it lay beneath us, peaceful in the

late afternoon sunlight, not a luxury hotel or even a car park in sight. It was a roughly square shaped stretch of golden sand ringed with high cliffs which gave way to broken rocks scattered all round the edge. The roadway led down to a thick rock wall and at the far side from where we stopped was a black shed in front of a slipway where several small boats were pulled up. The only signs of life, apart from the gulls, were a group of fishermen in dark jerseys around the door of the hut and some three or four holidaymakers pottering about on the sands as the tide slowly came in.

Interesting the Natives

The fishermen showed not the slightest sign of interest as our gaudy looking equipage drew up and we got out to peer over the wall and survey the beach: obviously a naturalist's paradise, hundreds and hundreds of rock pools, probably thick with anemones, crabs, small fish and—who could tell?—perhaps an octopus. We approached the group outside the hut. Most wore peaked fishermen's caps; there were one or two cloth caps and one trilby—old, weather stained, but still a trilby. Their desultory conversation ceased as we reached them and trilby hat spat in a leisurely manner. Customers for a boat, perhaps. One of the younger men, hatless, squinted round us at the van.

"Good afternoon" said Harry pleasantly. "Afternoon" said trilby, touching the brim of his hat politely, while the others nodded. "I'm looking for Bill Smith" Harry continued. One of them detached himself from the group, a pleasant looking man in the early forties, with typical dark Devonian looks and alert blue eyes. "What are the chances of your catching me a decent sized octopus?" asked Harry.

All ears had been attuned to our request, and a ripple ran through the group. Bill Smith looked at first astonished and then puzzled. "An octopus?" he said. "We've had plenty of them this season, but we kill 'em when we find 'em. They get in our paws after the catch. A darn nuisance they are, too." Harry shot a triumphant glance at me. "But you could get me one if you wanted to?" he persisted.

A Bargain is Made

Bill Smith thought it over, and trilby hat spat again and shook his head to indicate that the less they had to do with us the better. "It's a live one I'm after" said Harry, and explained the circumstances, when Bill evidently recognised that it was a serious proposition. "Not much I can do, really, sir" he said. "You see, it means giving up a night's catch." "A-r-r" said trilby hat.

"How much is a night's catch worth to you?" asked Harry. "About £5," said Bill. He evidently thought this was the end of the matter, and smiled and shrugged his shoulders slightly. "All that?" said Harry. "It's rather a lot." "Ah, but it's a very short season" explained Bill. "If I give you £6 will you get me an octopus to-night?" asked Harry slowly.

The group was by this time thoroughly interested. Bill hesitated, plainly doubtful whether or not a joke was being

played on him. One or two of the younger men stood up and came over towards us, and I beamed at them and made some comment about the weather in an effort to bridge the silence which had developed. Trilby hat gave judgment once more: "Ow do 'e know as you'll be back?" he asked. Harry appeared to do some rapid thinking.

"If I leave £6 with your local publican now" he said, "will you believe me?" This was evidently a master stroke, and while I wondered why he said the publican and not the vicar, Bill smiled, one or two chuckled and Trilby hat clinched the deal. "The genel'man's all right!" he said. They settled down to discuss ways and means while I took some of the others over to have a look at our equipment.

It was very late when we trundled up the hill again, nothing further having been said about our actually leaving the cash. We made our way inland to the home of some friends who put us up for the night, and went back early in the afternoon of the next day, Harry having decided to make a late start to avoid travelling through the heat of the day. We were spotted and hailed instantly as we topped the road leading down to the Cove and it was evident that we were in luck. Trilby nodded amiably and the others came across to greet us. Bill had baited his lobster pots with live crabs and put them down some distance out, at the other side of the cliff. On going out that morning to inspect, there were two good sized octopuses and these he transferred to a box which he had rigged up specially with long rope handles so that it could remain under the water during the heat of the day, and he then baited the pots and put them down again. On our arrival he got into his boat to row out to the point and see whether he'd had any further luck.

Meanwhile, as he was likely to be some time, we did some private collecting, resulting in two tins full of magnificent beadlet and strawberry anemones with which the rocks around the cove abounded, and also, to my delight, we found some 10 or 12 quite sizeable crabs tucked away underneath the rocks where the "curtains" of long seaweed hid them from view. So excited was I that, in splashing about from pool to pool, I nearly trod on a beautiful bright red spider crab and just managed to catch myself from overbalancing into the pool where he was, partly covered with seaweed floating gently on the ripples of the receding tide. I put down my tin of crabs, stepped gingerly down into the pool, which was about ankle deep, and slowly moved aside the seaweed—my crab was an octopus!

"Quick!" I shouted. "Here! An octopus! A beauty. Come and look!" Proud though I was of my find, nothing could have induced me to pick it up, but Harry splashed over with much more haste than dignity, stopping only to grab a large tin. This he filled with sea water from the pool, plunged his hand in and whipped the octopus into the tin, and we promptly bumped heads leaning over to peer inside to have a look at our "catch."

Very handsome he was, only a small one, but resplendent in mottled red, his small tentacles with their queer suckers curling in and out as he sat on the bottom of his strange new home. "Bit too small to bother with I think" said Harry. "Oh no!" I said. "Let's take him for luck" and this we agreed to do provided we had a spare tin when Bill's catch was finally available.

Two or three holidaymakers had appeared by now and vied with each other for peeps inside the tin, and as Bill approached in his small boat one or two of the fishermen came down towards the water's edge bringing our large tins. "Five, sir!" called Bill. We were delighted. He shipped his oars, splashed about in his long sea boots and hauled the wooden box up on to the sand and opened it. Inside a squirming mass met our eyes. No time must be wasted.

"I thought you might like this too" said Bill and handed over a magnificent bright red crawfish. "Oh, what a beauty!" we thought. "What a wonderful exhibit!" was quite the largest I had ever seen, and Bill gave it to a young chap standing nearby. I stood aside while they on with the serious business of selecting the best specimen for our purpose: one was plainly past his prime, he was ghastly grey colour and flopped back in the box, a revolting mass, his evil-looking eyes mere slits. Harry shook his head and Bill whipped out a large knife and slashed the unfortunate creature across and across, leaving him a grisly heap on the sand. The other four it was decided to take a chance with, and a small cavalcade set off up the beach, myself and the boy with the crawfish bringing the rear, carrying the tin containing "the babe" (my name between us). By the time we reached the van, Harry had the other two tins installed and the oxygen cylinder aerated both, though there was no more equipment for the one who would have to take his chance.

One of the fishermen went into the hut and fetched a box filled with sawdust for the crawfish and at that moment a tragedy occurred. Evidently overcome by the solemnity of the occasion and the crowd—some seven or eight persons—who had by now collected, the lad suddenly let the crawfish fall and it hit the hard roadway with a sickening "thwack." Harry picked it up and could find no immediate signs of injury so he put it in the box of sawdust and covered it with seaweed.

Then we said goodbye, and as we climbed slowly up the hill away I looked back and waved. The little group outside the hut all waved in return with the exception of Bill, who still stood with a rather dazed expression on his face, clutching in his hand six crisp, new £1 notes.

It followed a long, tedious trip, with a stop only for a couple of hot coffee and peeks into the tins to see whether the "haul" was still alive; we chugged into the rear of the aquarium at about 2.30 a.m. With the aid of a night watchman, we heaved the tins inside and put the octopuses in a 1,000-gallon tank, and the fourth in the babe in a smaller one. Then we got a taxi, I greeted the cat, removed the grime of travel and fell to bed.

All went well for the next few days, our "bag" met with gratifying appreciation all round. The only immediate casualty was the crawfish, which only just survived the journey, and we discussed its demise with sorrow, consuming its remains with relish. Alas, before weeks elapsed we were to behold the gruesome sight of crabs scuttling around the tanks festooned in red strips of dead octopus, while "shoes" from octopus tentacles floated around like tiny smoke rings.

The babe was the last but one survivor and one of us were standing beside the tank anxiously watching him when, alas, grey and pallid when a lady visitor approached her male escort. Clutching his arm, she screeched, "How horrible! Don't let it get me! Oh! What a thing," and so on, more or less *ad lib*.

We regarded her with the baleful look of parent whose offspring has been slighted, but refrained from comment.

Post-Mortem Examination of Fishes:

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

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

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

IN THE Water Garden— by W. E. SHEWELL-COOPER

THOSE who are fond of their Shakespeare will know that he talks about the greenness of the carpet and how there were in his day lawns entirely composed of camomile. The advantage of the camomile is that the lawn remains green even in the worst drought, and that may be a very great advantage to those who have to garden on sandy soil.

The particular kind of camomile used for lawns is *Anthemis nobilis*; it is possible to buy plants to-day, or if preferred, seed at 6d. a packet. (If readers have any difficulty in getting either and they care to write to me, I can give them the name of reliable suppliers.) This camomile is, of course, a well known medicinal herb. It lasts almost for ever. It's a perennial and free branching at that. Though it is officially described as a half spreader it isn't long before it establishes itself and spreads on any ordinary soil. The leaves are downy and they are fragrant, and this makes the lawn pleasant to walk upon. A camomile lawn can be cut just as much as can ordinary grass. It's stronger on the whole than most lawn grasses and so will stand far more wear and tear.

The seed should be sown early in April at the rate of a quarter ounce to the square yard. It is worth while dividing the seed up into little lots of the right weight and then mixing it with about four times its bulk of dry soil or sand. This carrier makes it easier to apply. Some gardeners even mix it with 20 parts of sand or peat dust for this reason. No one can say that a camomile lawn is cheap to establish but those who want to have a beautiful dark green sward around the pool won't mind the few extra pennies entailed, especially if they know that the lawn will last for years and will stand very rough treatment.

Some people have faced the problem of buying plants, and those have got a lawn established very quickly indeed. This is even more expensive because first-class specimens will probably cost about 1s. each. Mind you, these can be planted as far apart as five or six inches square and before the end of the season they will have covered the area

and have produced a lovely scented carpet. For those who want an unusual lawn—a lawn such as the one at Buckingham Palace—a lawn which will last and a lawn which will cut just as easily as any grass, I well recommend *Anthemis nobilis* and I don't think anyone will ever regret using this charming medicinal perennial.

The alternative to the camomile lawn is a lawn composed of all kinds of other plants. After all, that is what the usual pasture is. As a matter of fact the farmer's field does far better than the ordinary gardener's lawn because it is growing in the way that nature likes. Mother Nature hates monoculture—the growing of one plant alone by itself. For this reason, an Alpine lawn will be very popular with all the plants that you are going to put in it. First of all, it is very important to see that the land chosen is perfectly drained. You won't get these carpeting plants doing well on sodden soil. It will help too, if you fork into the ground horticultural sedge peat at a bucketful to the square yard, and if the soil is heavy, it would do good if sand were added at a similar rate.

The only difficulty about such a lawn is its expense, because it is impossible to get it going from seed; you must buy plants. It is best to get these as pot-grown specimens. The nurseryman will probably knock them out of the pots just before you get them but he will wrap each ball of soil up in plenty of paper before despatching the order. You may plant at this time of the year. If you are very clever you can arrange these carpets to form a kind of pattern, or if preferred you can just plant them at will so as to form drifts. Don't dot plants here and there. In my opinion it is always wiser to have regular splashes of colour rather than to make this Alpine carpet look bitzy or something like a patchwork quilt.

There are a large number of varieties of *Thymus serpyllum*. Ask for these first, because they will stand being walked on. They give off delicious scent when this happens and they are at their best during the summer from the beginning of

(Continued at the foot of next page)



Pond in the Picture—8

An informal pool in a Somerset garden that is completely in harmony. Flat stones have been used with great effect in the lawn towards the edges of the lily-covered pond.

Photos:

H. & V. Joel

The Firemouth Cichlid (*Cichlasoma meeki*)

by JACK HEMS

CICHLASOMA MEEKI, commonly known to most tropical aquarium keepers as the firemouth cichlid, is native to Yucatan and Guatemala. It is one of the larger cichlids, and may attain a length of six inches, though it is not often that it reaches this size in the ordinary home aquarium. Unlike so many of its close relatives, it is not noticeably antagonistic towards other fishes, and, in the opinion of the writer, may safely be kept in a roomy aquarium housing a collection of species of about its own size. Young firemouths may be placed with every confidence with the sturdier livebearers.

The basic colour of the firemouth cichlid is leaden-grey lightening on the lower sides and underparts to vivid robin red. The fact that the red colour spills over the lower lip—the upper lip is smoky blue—into the interior of the mouth makes it quite clear, I fancy, how the species derived its popular name. Five or six dark blue bars cross the upper side of the body but these cross bars appear and disappear according to the mood of the fish. Sometimes the fish shows a horizontal stripe. This, when it is seen, extends from the eye to the caudal peduncle. At all times, however, the fish shows two dark spots on the body: one just below the centre of the dorsal fin; the other at the tail base. These dark markings are prettily ringed with gold and pale blue and in certain lights are seen to be sprinkled with blue or blue-green dots. A number of similar coloured dots and streaky markings are scattered over the head, from the domed crown to the pointed snout.

Sexing the Firemouths

The eye is beady black and alert to every movement around it. The base of the gill plate is ornamented with a dark blue patch outlined with metallic green shot with gold. The pectoral and ventral fins are faintly blue; the other fins are definitely red and profusely spotted and edged with blue. Although both male and female are coloured alike, and grow to about the same size, they may be told apart by the shape of the dorsal fin; for in the adult male, this fin extends well over the tail and terminates in a wispy filament formed by the prolongation, and what looks like fusion, of the back rays.

The fish has a hearty appetite and is not finicky about what it is given to eat. Livebearer fry, soaked vermicelli, pieces of raw or cooked meat, small woodlice, gentles and crushed cheese biscuit all go the same way. But like all cichlids, it should always be given a rich meaty diet rather than a starchy one. Earthworms are an ideal food for it, for they seem to contain all the elements that go to make for bright colours and sturdy growth.

Firemouths may be bred in any tank holding seven gallons or preferably more, of clear, matured, slightly acid water kept at a temperature of about 80° F. (Normally, any temperature between 68° and 78° F. suits this fish very well.) The floor of the tank should be layered to a depth of about two inches with well-washed sand. Some pieces of scrubbed slate or similar smooth surfaced stone may be placed on it to provide a choice of spawning grounds, though as likely as not the eggs will be deposited on the bare floor of the aquarium itself—that is, of course, after the sand has been pushed away to expose the glass or slate base.

A few tied bunches of *Myriophyllum* or *Gabomba* may be

floated in the water to give shelter when it is needed; I must add, may be any time, for the fish are rough-ready in their courtship and sometimes one of them tire of it all and seek a place to hide. But if all goes well the female will deposit her several hundreds of adhesive eggs on the chosen surface, and after fertilisation by male, both sexes watch over them. As a rule, the hatch out in about three days, but sometimes they take a little longer than the customary 72 hours. The parents follow the same behaviour pattern as the majority of cichlids and often move the eggs or freshly hatched babies to a home every little while over a period of about a week.

As soon as the baby fish have absorbed their yolk sac become free-swimming, they become perfect gluttons for food and need plenty of it to plump out their little bodies. Large Infusorians, followed in a day or two by microscopic *Daphnia*, brine shrimps and the like will suffice for the first two weeks of their existence, after which they can be fed with larger live food or fragments of scraped lean meat. The babies can usually be induced to take powdered food when the supply of live food runs low, but as food retards development, they should be got on to a diet as quickly as possible. Cooked liver rubbed between the fingers, and then stirred into a glass of water to remove the blood and scum, makes a good substitute for live food so also does scrambled egg.

When the baby fish are swimming strongly, the parents often lead them about the aquarium. Sometimes they take them for a tour of inspection the moment they begin free swimming; while one parent forms the head of the procession, the other hovers in the background to protect the rear and drive stragglers back into the ranks. When the babies are swimming and feeding well, it is not difficult to separate them from their parents, for no-one can see the babies as clearly as the parents, and they are not so certain as the parents how long they will continue as doting parents and not degenerate into greedy cannibals.

It may come as a surprise to some readers to learn that the firemouth cichlid was unknown as an aquarium fish until about 1933. When it first arrived in Europe and America it caused something of a sensation, for the fish, by denying that few fishes surpass it for brilliance of colour and dignity of appearance.

In the Water Garden

(Continued from the previous page)

June until the end of August. They are great spreaders and have known one plant take up 18 square inches and always keep dwarf and compact-looking. *Veronica* spreads even further than *Thymus*. One specimen will cover up 24 square inches quite easily.

Campanula arvensis only grows an inch high but covers a foot square. It particularly likes a sunny position and flowers wonderfully in June and July. Another which is very similar in height is *Potentilla verna nana*. It has a spread of about 18 inches and will love all the peat you can fork over it covered with dainty little blossoms in June. Another which is very similar in height is *Raoulia lutescens*. It flowers from June through to the end of August, especially if it gets a good deal of sun. There are others too, as you will get the catalogue of a firm that specialises in water garden plants. They can always help you in this if you wish.



A page for
the beginner
contributed
by

A. BOARDER

THIS month I am dealing with the feeding of young goldfish fry and the necessary spreading out so that they may grow at the maximum rate. If you are able to maintain a temperature of 70° F. for the hatching I advise that you keep the water at this same level as long as the fish are under half an inch in overall length. Some aquarists are of the opinion that to provide the fry with warm conditions they are coddling them unnecessarily. This is not so. It is quite natural for the fry to require some extra warmth when young. Most fish in natural waters spawn in shallow water usually warmer than that in the deeper part.

As I have emphasised before, the whole process of eating, assimilation of the food and subsequent growth are tied up very closely with this temperature question. The amount of food which the fry require will depend on how warm the water is and this will also have a great effect on the frequency of the feeds. The drip method of feeding Infusoria to the fry is a very good one, especially if you are away from home for most of the day. The Infusoria tank must be suspended over the fry tank so that a small drip can be allowed to drop into it every second or so. The fry tank water must first be lowered to allow for this or else some form of overflow should be arranged with a screen so that no fry are washed away.

It is possible, in a fairly large tank, to add a small amount of crushed lettuce leaves so that some Infusoria can actually form in the fry tank, but it must not be over-done as otherwise the water can become polluted and the fry may die. When the fry are very tiny they are feeding almost all the day long, so it is imperative that some food is always present for at least the first fortnight. To supplement the Infusoria feed there are several foods which can be tried. Some success can be achieved with dried foods as long as you do not give too much at a time. You will find that finely shredded earth worms and also white worms can be fed at this stage as long as a few points are kept in mind.

Do not wash the shredded worm straight into the fry tank but always place it in a fine net so that only the smallest pieces are added. The larger pieces can then be given to older fishes. Small amounts of liver can be shredded and fed to the fry after a few days. A fairly good substitute for the above mentioned foods is the yolk of a hard boiled egg. A small quantity at a time should be squeezed through fine material in the form of a cloud, but too much can cause the water to become foul. I have at times tried feeding with dried milk and dried egg powders but have never been very successful with them.

I find that up to a fortnight fry can be crowded fairly thickly without coming to any harm, but after that time unless they are given more room you will not get many fish to grow and may soon be in trouble with them. If you are breeding any of the double-tailed types of fancy goldfish it is possible to tell at a fortnight all those which will never make winners or very good fish. I do not suggest that it is possible to pick out the winners at this early age but it is a

fact that all those which can never make good ones can be seen. The fry which have single tails can be picked out easily as long as you place a few at a time in a white bowl. Look out the best for keeping: the others, that is, those with single tails or very poorly shaped ones, will never be worth the food and space which they take up.

After the fry are over this age providing they have made good progress there are several other types of food which can be given. Should you have a good supply of micro worms these may now be used. The next stage is more shredded worm and then very small *Daphnia* or water-fleas can be given. Do not use the large fleas as any *Daphnia* uneaten in the tank will eat the Infusoria and help to starve the smaller fry. Strain the *Daphnia* through a sieve and then watch when you feed to see that the fry are able to take them readily. Feeding with any type of food of too large a size may mean that one or two of the fry manage to eat these larger pieces and will then soon out-grow the others to such an extent that later on they may be able to eat their own kith and kin.

For dried foods you can try sifted ground Bemax when the fry are over a fortnight old, but even this is better soaked before being given. It will be better to soak all foods of a dry nature for the fry while they are under an inch in length. The fine types of prepared foods suitable for small tropicals can also be given from now on but always remember that too much prepared food can cause the water to become polluted in a short time. It is an advantage to try to vary the foods if possible as soon as you can, as the mixed diet will help the fry to obtain all the essentials to healthy growth. While the water is at 70° F. I think that you can feed as often as every hour providing that you only give at each meal as much food as can quickly be cleared up.

The youngsters should grow quickly with this treatment and then they must be given much more room. Whereas you can keep over a thousand fry in a six gallon tank, as soon as they are about a fortnight old each fish will require at least 12 square inches of surface area, which must be increased as the fish grow to the minimum of 24 square inches of surface to each inch of fish. Even with aeration, although you may be able to keep more fish alive, they will not all grow without this most important surface space. I have often proved by experiments that one fish in a large tank can be left unfed and it will out-grow others which are crowded but yet fed repeatedly. Be quite sure of this: you will never rear a good number of fish without plenty of space.

I am often asked why particular fish refuse to spawn and although I can give many reasons why breeding does not happen there must obviously be many things to be taken into consideration before one can be quite sure. First and foremost the fish must be healthy, well fed and have plenty of room. It is not very helpful to house the fish in a very small tank and I do not advise that any tank under 24 ins. by

(Please turn to page 16)

Friends and Foes of the Aquarist

Introducing the first of a series of notes on common freshwater invertebrates

In addition to fishes, many highly interesting and easily visible creatures inhabit fresh water. Some use water merely as a temporary abode, others live in it for several different stages of their development, but many are hatched, grow up, reproduce, and die without ever leaving it.

Eggs of parents may be scattered at random over the bottom of the pond, moored to the sides, fastened into clefts at the stems of aquatic plants, secured to stones, fixed to the underside of water lily pads, or floated in masses upon the surface of the water. Other creatures have specially designed brood chambers in which their eggs are laid and developed while normal life is proceeded with. Some of these eggs require fertilisation, but not all of them.

The creatures which hatch from these eggs in many cases bear no resemblance whatever to their parents—others are miniature replicas as far as appearance goes. Growth in a lot of them is normal, but where a hard, chitinous covering encloses the vital organs, moulting is undergone. The best way of describing a moult is to liken the hard outer "skeleton" to a suit of clothes worn by a growing child. As the child grows its clothes become tighter, until they burst with the pressure of the body inside them. Something simply has to give. It is often quite surprising to see the size of the creature which emerges from its moulted outer casing.

Locomotion and Requirements

The method of locomotion is considerably varied. Many of these invertebrates can swim freely and powerfully—others creep slowly over the surface of the bottom, or run swiftly on many pairs of legs. Some combine two ways of moving about, being able to swim or creep, or swim and run with equal ease. The majority do not bother to build shelters in which to live, but a few construct temporary mud igloos, or little homes of scraps of leaves or grains of sand.

All, however, need two things in common in order to

by C. E. C. COLE

exist: food and oxygen. Once more the kinds of food and methods of obtaining oxygen are varied. One group feeds on bacteria, another on diatom skeletons and desmic blood nourishes some and flesh others. To secure oxygen many possess gills, of different kinds and in different parts of their anatomy; others extract oxygen from the water of the whole of their bodies. Quite a large group are dependent upon atmospheric air, and compelled in most cases to make periodic visits to the surface of the water in order to replenish their store.

Importance

In one stage or another many of these creatures form extremely important links in the food chain of British fresh-water fishes. This fact is generally appreciated by an ever growing army of aquarists, who spend considerable time and money procuring a supply for their finny charges. Unfortunately, imperfect knowledge of exactly what constitutes good food and what is a potential menace might result in introducing pests or ecto-parasites into hitherto clean stock. The case of the aquarist who introduced a fish into an aquarium under the impression it was a worm, and spent months afterwards trying to get rid of young leeches, is only one of many.

More than one aquarist has destroyed large numbers of beneficial creatures under the impression they were parasites. By the time this series of articles is completed it is hoped that readers will be in a better position to realise what they are doing, and the slaughter of the innocents will be ceased.

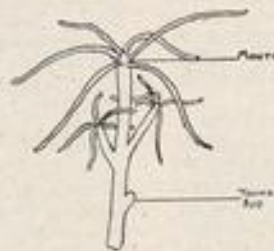
No. 1. *Hydra*—the Freshwater Polyp

HYDRA

PHYLUM—Coelenterata, from Greek *choilon*—hollow, and *enteron*—intestine.

CLASS—Hydrozoa, from Greek *hydro*—water, and *zoon*—animal.

THERE exist a brilliant green, a greyish brown, and a grey species of British *Hydra*. The colour is caused by the presence of microscopic plants living in the inner body cells of the animal. In exchange for oxygen from the plants *Hydra* gives them nitrogen. Fully extended, the body of the largest species is little more than half an inch. Tentacles, equipped throughout their length with sting cells, surround the creature's mouth. These sting cells throw out long whip-like threads and emit a paralyzing fluid immediately small creatures blunder carelessly into them. The action appears to be entirely automatic, and often more creatures are held captive than



BEFORE LUNCH



AFTER LUNCH

can possibly be eaten. Sufficient for a meal is drawn to the mouth and swallowed whole. Undesired or

undigested portions of food are ejected from the mouth some time later.

Hydra at rest contract themselves into almost invisible jelly-like balls. They adhere anywhere—to the sides of an aquarium or pond—to a stem or a grain of sand. I have seen them adhering to the meniscus of the water, the shells of snails, and, rarely, to the sides of glass. They are little more than a nuisance to fishes over half an inch long, but in sufficient numbers, can destroy very small fry and decimate cultures of *Daphnia*.

Reproduction is of two kinds: asexual and sexual. Young *Hydras* bud out of the sides of their parents and when sufficiently developed separate away to start a separate colony. Fertilised eggs, in a hard outer shell and capable of withstanding adverse conditions, are also produced, and are probably the cause of *Hydras* appearing in tanks that have been drained and dried.

READERS' QUERIES ON COLDWATER FISHKEEPING

The Worth of the Veiltail Goldfish

I am thinking of breeding veiltails. Shall I have any difficulty in disposing of the broods and what should I have to pay for a reasonably good pair of veils?

It will be fairly easy to dispose of all the good veils which you may breed. You will undoubtedly breed only a very small proportion of these and you will find that the remainder are not nearly as easy to sell. All types of fancy goldfish do not reproduce young exactly like themselves and the varied types have to be seen to be believed. Ask a successful exhibitor of veils if he has any trouble finding six fish for a breeder's class in a large show and if he answers truthfully he will admit that it is most difficult to find even six perfectly well matched fish from hundreds which he has bred.

To get the best prices for your fish it is necessary that you establish yourself as a successful exhibitor. Once you are in the winning cards at a big show people will soon find out all about your fish and you will then have no difficulty in selling the best. All buyers expect the best and so you will find that the great majority of aquarists will not want to look at the poorer types among the fry; you will be left with these on your hands unless you practically give them away.

answered by A. BOARDER

You may have to pay anything from five to 15 pounds for a good pair of veils and if they are very good they will be worth all of that. It is only when you start looking for a good pair that you realise how scarce they are. It is similar when buying any animal; you could buy a young bull for 40 guineas but you could also pay 1,000 guineas for a first prize winner perhaps. Do not be too particular at first; buy from an established strain—even if the pair are not themselves winners they may quite easily breed some.

At my school there are some goldfish with black markings on the tail and fins. Does this indicate sex, or is it caused by age or unhealthy conditions?

If the fish are fairly young the black markings will soon disappear. All goldfish are bronze when young and as they change to the red colour parts of them become quite black. This colour gradually fades, remaining the longest on the dorsal and caudal fins.

Sometimes if an older fish is damaged the new growth is black at first. Occasionally a fish will develop some black markings through some derangement of the pigment cells. The black colouring is no indication of sex.

I have a tank 18 ins. by 9 ins. containing a golden orfe, two shubunkins, one comet and two goldfish. I have an aerator and a filter but the fish are continually swimming with their fins down and the water clouds up very quickly. What is the trouble?

Many queries from readers of "The Aquarist" are answered by post each month, all aspects of fish-keeping being covered. Not all queries and answers can be published, and a stamped self-addressed envelope should be sent so that a direct reply can be given.

You do not mention the size of the fishes. This is most important. According to the size of the tank your limit is about seven inches of fish. If you have been exceeding this even the aerator and filter may not be enough to keep the fish healthy. Golden orfe are essentially river fish and you say one died through no apparent reason. It may have been from overcrowding, as orfe will die very quickly if there is insufficient oxygen in the water. A fish which dies from lack of oxygen generally shows no signs of illness or damage. You may also have been over-feeding. As the temperature of the water decreases towards the winter so the fish can eat less food. Stop all dried foods for a time and withhold all food for a week. This may improve matters.

I have recently bought a pair of goldfish. I have been told that the male fish has a smaller dorsal fin. Is this correct please?

This is an idea which dies hard. It is impossible to tell the sex of a goldfish by the shape or size of the dorsal fin. When in breeding condition the male shows small raised white dots on the gill plates. The female is usually more rounded in the belly. Look at the photograph of a pair of fish on page 221 of the February issue of *The Aquarist*. You will notice that the leading fish has a pronounced distended body; this is the female, the following fish showing a slimmer outline is the male. All types do not show this difference so markedly but a little experience will soon teach you how to sex the fishes.

I have a well-planted and aerated tank with some goldfish, shubunkins, carp, etc. They appear healthy but spend most of the time lying at the surface of the water. Can something be wrong with the water, tank or the food?

If you have a top light over the tank this may warm up the top layer of water and fish often like to lie in the warmer section. Often too, the lower regions of a tank hold foul gases caused by decaying uneaten food. Again, the upper stratum of water is usually the part with the most oxygen and the fish prefer this. It may be that the tank has too many fish therein. Your tank should not contain more than 10 inches of fish for them to keep in good health.

I have bred some shubunkins from a spawning last December. You say it is unusual to rear such fry but mine are now over two months old. I have warmed the water to 62° F; how soon should I cease to give warmth and light, what are the chances of rearing the fry and can you suggest why the fish did not spawn in the summer?

When I wrote of the difficulty of rearing late hatched fry I had in mind cold water conditions. By using an overhead lamp you have produced temperate conditions and supplied artificial light. Without this you may not have reared even the 17 which you have now. Although it is not impossible to rear late-hatched fry, it is a sure thing that for every one reared a 100 may die. If you have been able to keep the fry alive through the winter there is no reason why you should not keep them going now. Do not be in a hurry

to take away the light and when you do, see that it is gradually withdrawn.

There may be several reasons why the fish did not spawn earlier last year. They may not then have been in breeding condition. You state that you set up your tank in May, which means that the fish may have taken some time to settle down and that the water in the tank took a few months to get to that state which would encourage the fish to spawn. Perhaps your tank was in such a position that the early morning sun did not reach it in the summer but did so as the sun got lower in the sky towards the winter.

I have a shubunkin about 18 months old which has developed a grey swelling under the mouth. It seems unable to eat. It is worth keeping?

The swelling may be caused by one of several events. It may be a form of cyst or perhaps fungus due to some damage. A fish can injure itself, for example, on a rock in the tank, and then fungus may form on the injury. I have had a fish which sometimes develops a small water blister on the nose which disperses when pricked with a needle. Try painting the spot with an equal mixture of iodine and glycerine while the fish is held out of the water in a net.

If the fish is a good one it may be worth while trying to cure it and whilst so doing it will help if you can forcibly feed it. Fill a fountain pen filler with the "top" of the milk and gently insert this well into the mouth of the fish. Squeeze a small drop in at a time and allow the fish to return to the water for a time before giving any more. Keep the fish by itself and add a tablespoonful of sea-salt to the water.

I have a slate tank 42 ins. by 22 ins. by 16 ins. in a greenhouse. It has a narrow border round it. What plants will soon grow up in the border and can I rear fancy goldfish in the tank? How many young fish could I rear, which type is most suitable and could I plant a water-lily in the tank?

The tank you describe will be quite suitable for rearing goldfish. You should be able to rear about 40 fish to the size of one inch body length. You can choose from common goldfish, shubunkins, fantails, comets or veiltails. As you have some protection I recommend either fantails or veiltails. I do not recommend a water-lily for the tank as under your conditions even a small one could soon cover the surface of the water and get too large.

As for the narrow border, why not use *Lynimachia nummularia*, commonly known as creeping jenny, herb-two-pence, two-penny cress, loose-strife or money-wort? This likes a damp situation and will even grow in the water. It will soon cover the slate edges and it flowers with a yellow flower. In the tank you can use *Ceratophyllum demersum* (hornwort), which has no roots, *Vallisneria spiralis torta*, *Myriophyllum*, *Egeria densa* or *Lagarosiphon major*. A little duckweed can be placed on the surface to provide some shade.

There is no need to place any compost at the bottom of the tank. If you plant in small containers these can be removed quite easily for cleansing purposes. If you have room in the border to the tank you can add some of the new *Mimulus* types. These have very attractive flowers and being almost bog plants will thrive under your conditions.

I have two goldfish, two fantails, a shubunkin and a veiltail in my tank 18 ins. by 10 ins. by 10 ins. Is this large enough?

Your tank will hold only about seven inches of fish excluding the tail. You do not say how large your fish are and so I am unable to say if you are overcrowding. If any of your fish has a body over an inch you may be overstocking, and if this is the case you may not be able to get the fish to grow and they may soon go wrong.

I have made a pond in the garden and wish to it with fancy goldfish later on. For the time being I am thinking of putting in some fish I netted when small from a river. Will they be all right in the pond and what do you think they are?

From your description and sketch I should think the fish which are slim with reddish fins are dace or slightly thicker silvery ones are bleak. Other fish of the type which you are likely to get from a river are:—rudd, chub. When very small they all look somewhat similar. As the fish grow they take on their own variety and it will be easier for you to name them.

I have kept different types of fish many years but now have decided to start again and have a breeding. Which type do you recommend I obtain?

It is difficult to advise on a subject like this as I do not know your tastes. It is like trying to tell someone what type of picture to buy; what appeals to one person is just the opposite to others. You say that you have experience and so I suggest that you try something from the fancy goldfish types such as fantails, veiltails or comets. Try to see some of these types and if one type appeals to you then make up your mind and stick to one type only. Many people start by having too many varieties and when they wish to breed from them there are only a few breeds among the fry.

You may have to pay more for good types of fish but you will repay you as the fish you breed will fetch a better price than more common ones. It is only the initial outlay which will be large, for poor fish cost just as much to feed as good ones, and apart from the fact that good ones always breed better, the higher price which the young ones will command will repay you for your trouble. You will need more than one tank if you expect to rear many fish. Tanks which have a large surface area are the best and they need not be deep.

Will readers wishing to write to me please address letters to "The Aquarist"? Some have attempted to find my address of a namesake in the telephone directory; my address does not appear there.—A. BOARDER.

Stepping Stones

(Continued from page 13)

12 ins. by 12 ins. is used. The water must have a high oxygen content; the provision of aeration may assist in a tank. Very often I have noticed that fishes spawn better if the early morning sun can reach the water. The addition of a quantity of fresh water will often assist spawning as also will the temporary removal of the female fish. Give plenty of earth worms or other food and see that the fishes are not over-crowded. So the changing of the site of a tank will bring the best results, but have plenty of patience and providing you have both sexes there is no reason why the fishes should not spawn in their own good time.

I had promised to deal also this month with the spawning of goldfish as described by me some time ago but the subject has been dealt with in a recent issue of *Aquarist* by Mr. C. E. C. Cole and so I need not deal with it further except to state that the fish must be ready to spawn; I doubt if many aquarists find it so easy as swimming about shedding their eggs promiscuously as described.

Next month I will deal with fry troubles and the care of good class fish as well as the foods for older fish.

News and Reviews

HOLLAND

ALTHOUGH the egg-laying tooth carp fishes belong to one of the most colourful groups they are not often seen in aquaria because they are said to be voracious and predators of smaller fish. The writer of an article on *Pachypanchax playfairi* in the January issue of *The Aquarium* points out, however, that when purchased young and reared with other fish this species is quite harmless provided that plenty of live foods are given.

Coming from the Seychelles islands and Zanzibar, these fishes can attain a length of four inches, and grow rapidly if given blood worms as diet. The golden *Haplocheilichthys*, as it is often called, is a most beautiful fish; the male is emerald green and covered along his body with bright red dots. Dorsal, anal and tail fins are yellowish with red, pointed markings. Other fins are brown-yellow with dark borders. The female is duller in colour; she lacks the red dots and her fins are colourless. She has a characteristic marking however in the black spot at the base of the dorsal fin.

In a roomy aquarium planted with fine-leaved plants this species is extremely prolific, and hundreds of young ones were reared from the first pair possessed by the writer of the article.

One Dutch aquarist reports hearing a strange sound one day whilst feeding *Tubifex* worms to his half-beak fishes. It was made by the fishes chewing the worms: in doing this the upper jaw moves up and down slightly and each time a "gnashing" of teeth is audible. The sound is specially noticed if the fishes are in a small tank placed on a hard supporting surface. It is not known whether the teeth gnash over one another or whether friction between the jaws makes the noise.

But gnashing of teeth is not rare in aquaria. It can be noticed in the lung fish (*Protopterus annectens*) and in most cichlids. Presumably most fishes which chew make a sound, but it is most unexpected coming from such a delicate fish as the half-beak.

IN the January issue of *Lacerta* the Caspian terrapin is recommended for the terrarium as a striking yet not too large species. There are two sub-species: *Clemmys caspica caspica* and *C. caspica rivulata*, the latter differing in lacking the rather bright yellow coloured shell design and darker iris of the eye of the former. Young specimens are about four inches long, and the long slender neck is a prominent feature. The Caspian terrapin's head, too, is much smaller than that of North American water tortoises.

Its shell is covered with a reticulated design which continues over the neck and legs. It is a lively yet rather shy terrapin—at the least sound it will jump into the water, soon coming up to the surface to watch from a safe hiding place. Caspian terrapins are climbers and in nature may be found in trees which overhang the water, so that it is necessary to cover its terrarium with wire netting. Small fishes, tadpoles, worms, snails and insects form its diet, though vegetable food is not despised.

An Italian herpetologist has noticed several times that the wall lizard (*Lacerta muralis*) takes one of its eggs in its mouth and carries it, when approached, away from the sunny spot in which it was lying to the darker and more inaccessible parts of the cave in which the lizards live. He assumes that this is a form of parental care, but has never noticed the behaviour in the wall gecko (*Tarentola mauritanica*) or the smaller and rarer *Hemidactylus turcicus* and asks if any other herpetologist has ever observed similar happenings.

W. J. VAN DER KOLK

GERMANY

THE February issue of the *Deutsch Aquarier & Terrarienzeitschrift* commences with an article on the Egyptian mouthbreeder (*Haplochromis multicolor*), a small cichlid, easily bred. The author discounts the commonly held opinion that the females of this species will not take any food while they carry the eggs in their mouths. He confirms the observation of another German aquarist, published in the same journal in 1950, that female mouth-breeders will feed during the hatching period. Innes, however, states in his book that no food is taken during that period; neither has the reviewer ever seen females with eggs in their mouths take any food. It would be interesting to hear what other aquarists in this country have to say regarding this question.

Two articles describe the recently imported *Aphyosemion singa* (see *The Aquarist*, February). There are also some very instructive remarks on breeding of fishes of the genus *Aphyosemion* in general. The water is kept on the acid side (pH 6.5 to 6.0) by using filters containing horticultural peat. This appears to keep the Infusoria and fungi in check, to which the *Aphyosemion* eggs are particularly sensitive. If, however, the eggs should be attacked by fungi, trypaflavine is added at a rate of approximately 0.05 grammes to every two gallons of water. Concluding, the author states that it should not be too difficult to breed *Aphyosemion* in clear, old water without any artificial help and even without separating the fry from the breeding pair. *Daphnia* should be given regularly, and the fry will then feed on newly hatched water fleas.

A description of the metabolism of water plants is given in another article. Four different groups of water plants are described. Firstly, those plants that take nearly all the substances necessary for the building up of their bodies out of the water, like *Myriophyllum*, *Elodea* and *Cabomba*. Plants in the second group take about half of their body building substances out of the water, the rest is supplied from the soil via the roots; *Vallisneria*, *Sagittaria* and *Ludwigia* belong to this group. *Cryptocoryne* and *Aponogeton*, in the third group, take nearly all their body building materials from the soil. Lastly, the water lilies feed entirely through the roots.

Artificial light for the aquarium is discussed at some length in one article advocating the use of fluorescent light. Ordinary electric light bulbs are condemned on account of their relatively high consumption of current. Fluorescent light is no doubt much cheaper as far as running expenses are concerned but the author does not mention the high initial outlay for fluorescent tubes and installation.

German coldwater fishes suitable for indoor aquaria are described, dealing chiefly with carp, tench and perch. An interesting report on two excursions on the Baltic Sea relates some of the difficulties and problems of collecting specimens of sea water life for a German zoo.

The poisonous effect of traces of copper and zinc in the aquarium water are also dealt with. This, however, will hardly apply to conditions in this country. In Germany the majority of aquarium heaters have an outer covering of enamelled metal instead of pyrex glass. Other articles in the same issue deal with subjects especially interesting for the vivarium keeper.

R. HELLER

U.S.A.

HATCHING the eggs of the brine shrimp, a most useful form of live food for rearing tropical fish fry, was described in detail in an article in *The Aquarium Journal* (January).

The author recommends the use of large shallow glass dishes (Pyrex pie dishes) as hatching containers for the eggs. Sea salt (not table salt) is dissolved in hot water, using a tablespoonful to each quart of water and the solution allowed to cool to room temperature. A half-teaspoonful

of the brine shrimp eggs is then added to a dish containing two quarts of the saline so that they are evenly spread over its surface. After this the container must not be disturbed and kept in a warm (75° F.) situation.

Under these conditions most eggs hatch in 36 hours, and hatching is complete within 48 hours. In colder water the eggs may take over a week to hatch. The newly hatched shrimps can be seen as a reddish cloud in the water and may be washed free of salt before use in the aquarium by holding them in a fine net under a tap.

Book Review

British Water Life

The Freshwater Life of the British Isles, by John Clegg. 351 pages. 16 colour plates, 51 black and white photographs, 95 line drawings. Frederick Warne & Co., Ltd., Strand, W.C.2. 21s. net.

ANYONE familiar with the books in the Wayside and Woodland series will approach this latest addition to the titles with every anticipation of a well-presented and well-illustrated text. Although, in the nature of his subject, the author has set himself a most difficult task, *Freshwater Life* does not disappoint the anticipator.

The book deals most readably with the animals and plants commonly found in British freshwaters, from protozoans to otters, from algae to water lilies. It avoids becoming a mere catalogue of the various types, however, and Mr. Clegg has shown considerable ingenuity in introducing biological principles in a painless manner for readers without scientific background. Thus it is no effort to read through the pages from start to finish if the reader is minded to survey the whole field in one go. It is equally pleasurable and profitable to dip into the different chapters as interest becomes roused by pondside or riparian observation.

Photographs (the work of the author) and line illustrations are numerous and excellent, and are nicely disposed within the book. The plates in colour are attractive but cannot be called faithful to nature in all cases; the Mediterranean blues in some of the waterscapes are bad examples. There is a useful bibliography and a detailed index. In all, a book warmly recommended to all aquatic naturalists.

Questions and Answers

1,001 Questions Answered About Your Aquarium, by Ida Mellen and R. J. Lanier. 450 pages. Line illustrations and photographs. George G. Harrap & Co., Ltd., 182, High Holborn, London, W.C.1. 21s. net.

THIS book is a reprint of the edition first published in 1936 and it was originally written for the American aquarist. 1,074 questions are posed and answered in the various sections dealing with aquarium apparatus, tropical and freshwater fishes, marine aquaria, garden ponds, fish diseases, terraria, etc. The authors are both experienced professional aquarists.

Much useful information is given in the answers, but the British aquarist must be prepared to find some of his fishes described under unfamiliar names; allowance also needs to be made for the age of the text. The illustrations are on the whole good; some of the photograph reproductions lack clarity. The bibliography, originally a valuable inclusion for the advanced aquarist, is now quite out of date. It is a pity that the whole work could not have been presented as a revised edition instead of a reprint.

Address letters:

The Editor, *The Aquarist*,
The Butts, Half Acre
Brentford, N

Poor Service

FROM the advertisements of certain aquarists' centre of London I was led to believe that the service. So I armed myself with several carry sufficient cash to obtain two *Otocinclus affinis* harlequins. I also had sufficient cash in hand to if I saw anything else I really liked.

On going into the first establishment I managed to catch the eye of a youth who, from ance, had no interest in fish or his job. I en wants and was asked what they were and what like! The answer was "We've got none of the asked if it was possible for them to obtain the The answer: "Come back in a fortnight—we'll some more fish in by then!"

My next attempt was answered with a "My assistant did an about turn and left me stand no one wants to be pestered to buy I feel t concerned wish to live up to their advertise should incorporate in large type, CUSTOM COURAGED!

A. G. EDMONDS
London, S.

Ageing Heaters

HAVING read something on this matter in journal I wish to ask if any profession engineers among your readers can settle this suggested that with age and constant use the aquarium heater becomes oxidised and in alters in its heating efficiency, a heater of a st then being equivalent to a new one of much lo This may be an academic point but it is of inte Can anyone help?

J. SAYERS,
Esher, Sur



No!

OUR READERS

Write—

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



International Federation

WITH reference to the statement in your November, 1951 issue, in which Mr. Fraser-Brunner writes on the suggested formation of an International Federation, may I be permitted to mention that this matter was discussed at a meeting of the North-West Group of Aquarists' Clubs some months ago?

Mr. F. P. Clarke, one of the delegates, spoke on the matter at some length, and after discussion, it was agreed that Mr. Clarke should be empowered to contact interested parties in other countries to ascertain if they would be prepared to associate themselves in this proposition. Mr. Clarke had, he stated, already been in communication with some people from abroad, and he had also been in touch with Mr. Gene Wolfsheimer, who has had the idea in mind for some long time past, but owing to his own commitments could not spare time to investigate the prospects, and therefore asked Mr. Clarke to undertake the preliminary investigation.

I might mention that I too received advice from Mr. Wolfsheimer regarding this matter in 1950, and when replying mentioned that it would be quite a job of work to get such an organisation started, etc., etc. There is no doubt that it would have advantages, and if it is possible for such a body to be formed a meeting centre will prove another difficulty. By what I can gather, there appears to be a lack of interest, and this opinion is held by both Mr. Wolfsheimer and Mr. W. T. Innes. However, the N.W.G.A.C. have made a start and I feel certain that support will be forthcoming from that group.

A. H. CHARLES,
Hanwell, Middlesex.

Hardy Apple Snails

PERHAPS the following experience with *Ampullaria* snails may be of interest.

Last year I obtained three of these snails to provide Infusoria, and during the summer months, kept them in a small unheated tank where they thrived on lettuce leaves, producing both eggs and large quantities of Infusoria (*Paramecium*).

During the winter months I did not require Infusoria, but wished to retain the snails, and as these originate from tropical climes, it appeared that some form of heating would be necessary. The cost of providing a separately heated tank however, would, over a period, be more costly than purchasing some more snails for the next breeding season, or alternatively, housing them in a set up tank would mean the complete stripping of the plants owing to their colossal appetites. I therefore decided to see if the snails would "hibernate" for the winter months.

They were left in their unheated tank, which naturally

varied with outside temperature, the lowest temperature recorded being 38° F. As the water cooled the snails became less active, moving occasionally at night, but taking no food (a good thing when lettuce is expensive) and finally remaining completely still and tightly closed for weeks on end.

About a month ago, the snails not having moved for about two months, I decided to see if they were still alive, and placing them in a jar with some water from their tank, I floated the jar in the community tank. Within an hour all three were on the move, and were feeding on some old plant leaves which I had placed in the jar. They remained floating for about a week in the jar, which I then transferred to a carrying case, where they have been in complete darkness ever since. They seem a little more active in their new quarters. Although they are still not feeding, the water in the jar, which has not been changed, is quite rich in Infusoria (not *Paramecium*, but a smaller circular form).

It seems, therefore, that contrary to previous information I had received, these snails will tolerate quite a low temperature with no apparent ill-effects. I hope later to ascertain if they will still breed.

FRANK L. HOWE,
Hampstead, N.W.3.

An Appeal

WOULD you be kind enough to consider helping the boys of Rossie House? We provide a Christian undenominational home for boys from all parts of the British Isles, who for any reason have no home of their own in which they can live, and have found employment in London.

Every effort is made to make their spare time activities as interesting and instructive as possible, by encouraging hobbies. Recently we have started a small warm and cold-water aquaria section in our Palm Court, and quite a number of our boys have taken a very keen interest in it.

Our great handicap is lack of funds to provide the necessary equipment, and we are hoping that you will kindly assist us, by printing a small note in your magazine which might attract the notice of affiliated societies. It may be that some of their members have some worn equipment which our lads could renovate, and if they would consider donating some to us, we would be responsible for collection. We do hope that you will feel able to help us, and any assistance you may give will be most warmly appreciated.

L. TEASDALE, Warden,
Homes for Working Boys in London,
Rossie House, 15, Champion Hill, S.E.5.

Our Colour Supplement

PLEASE allow me to congratulate you on the very fine colour supplement to your February issue. My only criticism is that you do not publish more like it, thereby competing more with American illustrations.

F. D. M. BROWN, Secretary,
The Suffolk Aquarists' Association

The extremely high cost and scarcity in this country of the paper required for colour work are factors preventing us from complying more often with our reader's desirable suggestion.

White Spot Treatment

I HAVE tried the quinine treatment suggested for white spot in *The Aquarist*, and have read all the subsequent correspondence on this subject, and all I can say is that the quinine hydrochloride was 100 per cent. successful. The fish in question were platys.

P. MCGREGOR,
Glasgow, S.1.

A WEEK ago I had an outbreak of white spot and decided to try out the quinine hydrochloride treatment as described in *The Aquarist* (January), using two grains to a gallon. As a result half my fish died overnight, those remaining showing no ill-effects after a change of water.

A post-mortem examination report informed me: "Most of the quinine treatments are bordering on the verge of toxicity to certain species of fishes. In certain kinds of water at high temperatures the toxicity is accentuated."

Altogether it seems rather too expensive and dangerous a cure. Readers would be well warned to take great care with such a drug as this.

K. HASLAM,
Dronfield, Nr. Sheffield.

I AM pleased to say that I have successfully cured fishes in my 24 ins. by 12 ins. by 12 ins. aquarium, of white spot, the information being obtained from *The Aquarist* (October, 1951).

B. FARNFIELD,
Tottenham, N.15.

No Roach

IN "Press Comments" of your December, 1951, issue, a roach of 4 lbs. 8½ ozs. is mentioned. This fish, I understand, had been submitted to the curator of Worcester Museum and then submitted to the British Museum (Natural History). It was there found to be a pure bred chub. This was recorded in an issue of the *Fishing Gazette*.

H. WORTHINGTON,
Stoke-on-Trent, Staffs.

Sealing Leaky Apparatus

HERE is a way of keeping water out of leaky aquarium heaters and thermostats which I have found useful. Where water is seeping through or round the rubber bung purchase a tube of "plastic skin" (1s 9d. from any chemist) and spread it round the leak. It will keep out moisture and is easy to remove if the heater needs repairing at any time. If the "skin" is spread round the brass bases of electric light bulbs in the aquarium hood it does a good job there as well. It sets in about half a minute and gives speedy and lasting protection.

A. L. MYATT,
Birmingham, 15.

The AQUARIST Crossword

Compiled by J. LAUGHLAND



CLUES ACROSS

- Small female fighters or plants? (5, 7)
- Tetra from — (3)
- His decision is final! (2)
- Pezomachus* (5)
- On tanks they indicate kinds (6)
- Half a policeman to act dishonestly (3)
- He turns in vulgar interrogation (2)
- This fish is *Hyphessobrycon flammeus* (5)
- Perfect stage of insect life (5)
- Fish trap, or aquarists' comparison of water clarity (3)
- Nearly a leak (3)
- Negative (2)
- Cot soup (anagram) (7)
- This grass is a tank favour (4)
- Alternative in *Corydoras* (2)
- Belonging to me (2)
- Pristella* this is X-ray fish (6)
- The sea (4)
- Small advertisements (3)
- These fish are dearer than without 10 across (4)
- Objective case of I (2)
- Welsh son (2)
- Broken lags (4)
- English river (4)
- Scottish river (3)
- Soak (3)

CLUES DOWN

- Colisa lalia* (5, 7)
- Family of air-breathing fishes (10)
- Skeleton of fish or tank (5)
- First class in plaice (1, 1)
- Dusky fire-bearers (7)
- Striped fish (5)
- Form for music (3)
- Frame for glass (4)
- Colonic disease (5)
- Appearance of lionhead (7)
- Mother of imago (2)
- Bait (4)
- Same as 27 (2)
- Fresh-water coral (5)
- One of 25 down (5)
- Beware of these (not plus 10) (4)
- Flowering dog plant (4)
- British fish born in Sag Sea (4)
- Nuisance (4)
- As you see (2)
- River in Italy or China (4)

PICK YOUR ANSWER

- The optimum temperature for *Riccia* is: (a) 65° F. (b) 68° F. (c) 78° F. (d) 79° F.
- Periophthalmus kalbousleri* (the mud skipper) was named by Pa (a) 1770. (b) 1795. (c) 1820. (d) 1845.
- The trivial name *marconata*, as in *Eleotris marconata*, implies the fish is: (a) striped. (b) spotted. (c) barred. (d) marbled.
- The fish known as *Mollinella formosa* is a natural cross between: (a) *M. latipinna* × *M. velifera*. (b) *M. latipinna* × *M. sp.* (c) *M. sp.* × *M. latipinna*. (d) *M. velifera* × *M. latipinna*.
- Washington grass is the popular name of: (a) *Caboomba*. (b) *phyllon*. (c) *Fortinella*. (d) *Myriophyllum*.
- Limia caudofasciata* is native to: (a) Florida. (b) Mexico. (c) Venezuela. (d) Venezuela.

(Solutions on page 23)

RECENT talks heard by members of the York and District Aquarist Society were on aquatic plant life, breeding dwarf gouramies and Siamese fighters. Last month a talk on macroscopic water life was followed by a film show on the subject, and the meeting also included an open table show. The society has installed its second tropical aquarium in another tank hospital this year.

A COLLECTION of freshly-caught specimens from a winter pond accompanied Mr. R. N. Allenby when he spoke about water insects and their larvae to the Wilmslow Guild Aquarium Society. The habits of the animals and their relations with fish, as enemies or as food, were amply followed. More recently a talk on breeding zebra fish, gouramies and cichlids was given by Mr. T. G. Honeybill.

CHANGE of meeting place is announced by the Wilmsden and District Aquarists' Club. Meetings are now held on the second and fourth Wednesdays of each month at the Court Restaurant, 74, High Street, Harlesden, N.W.10. Table shows have been popular recent items for this society and at a "Novice's Show" first in tropicals was taken by a black mollie belonging to Mrs. K. Lynch, and in coldwater fish by a miniscopy-eyed moor of Mr. H. W. Higginson.

MEMBERS of the Wembley Aquarist Society have been busy stocking and furnishing coldwater aquaria for the pupils of Park Lane School, Wembley, where their twice monthly meetings are held (7.30 p.m., first and third Tuesdays). At the meeting scheduled for 29th April, Mr. R. Wood is to give a lecture on live foods.

AT the March meeting of the Welsh National Aquarists' Society a table show of mollies was staged. Mr. D. C. Chant took first and the event was judged by Mr. E. Gethin, who afterwards gave a talk on the modern technique of fishkeeping.

ANAESTHESIA for fishes was demonstrated to members of the Watworth Aquarist Club by Mr. R. Billings, who also judged a table show of swordtails at a recent meeting. Urethane was the anaesthetic used and a common goldfish was employed for the demonstration.

News

from AQUARISTS' SOCIETIES

Monthly reports from Secretaries of aquarists' societies for inclusion on this page should reach the Editor by the 5th of the month preceding the month of publication.

A copy of *The Aquarist's Directory of Aquarium Societies* will be sent free to any reader on receipt of a stamped, self-addressed envelope.

SEVENTY members and friends attended a lecture on practical fishkeeping given by Mr. W. L. Mandeville to the Walsall and District Aquatic Society. Last month Dr. A. McDonogh spoke on the interdependence of pond life to the society.

TWICE monthly meetings are now held by the Urmston and District Aquarium Society, lectures and general discussions alternating. At a lecture on the evolution of fish given by Mr. T. Warburton from Belle Vue a full attendance of members was present.

TITLE of the Suffolk group of aquarists has been abbreviated to the Suffolk Aquarists' Association. About 50 members attended a social evening given by their president last month, at which event a small show of coldwater and tropical fish, together with reptiles and a lobster, was staged. A short film show was also given.

LECTURES enjoyed recently by members of The Study Aquarist and Pondkeepers' Club have been on guppies (by Mr. P. Hewitt), conditioning of fish (by Mr. T. Lambert), and line breeding shubunkins (by Mr. E. Weatherley).

THE goldfish and its fancy varieties was the subject of discussion for members of the Stonehouse and District Aquarist Society at last month's meeting; the discussion was led by Mr. L. Cox of Cheltenham. A club outing

to Shirley Aquatics is being organised for a future date.

PROBLEM night is a new feature of the meetings of the Southport Aquarist Society, when members can have their own particular fish problems solved. Methods of arranging aquaria to conceal the tank frames has been one topic of discussion, and letting the aquarium into a wall over a fireplace, into a partition wall or framing it with wood were methods suggested. Last month a ramble was planned.

LIVE specimens of pond life were viewed through the microscope by those attending a lecture on them given at the February meeting of the Southampton and District Aquatic Society by Miss L. Moon. Members have been appointed to set up furnished aquaria on behalf of the society at aquarists' open shows this summer, and other members are on a rota to service an aquarium at a local children's hospital.

WITH the co-operation of the management a tropical aquarium has been set up in the foyer of the Odeon Cinema, Southall, by members of the Southall Aquarist Society to give publicity to the hobby. Table shows have proved popular at evening meetings, and these have attracted large numbers of entries and fishes of high quality.

EXPERIMENTATION in marine aquarium keeping was urged by Mr. H. Sinclair when he spoke on various aspects of fish keeping to the



The 30 ins. aquarium displayed in a prominent position in the window of the Streatham National Savings branch was the property of Mr. H. Whittaker, show secretary of the Streatham & D.A.S. It was displayed for four weeks and in addition to the attention it drew to the Savings movement the brightly illuminated tank brought well over a score of new members for the society.

Photo: Courtesy South Thames Studios

Hyde Aquarist Society. He pointed out the great scope for amateur aquarium keepers in the marine branch of the hobby and also recommended the keeping of amphibia and reptiles as fascinating partners to aquaria.

A REVIEW of books of interest to the aquarist given by Mr. J. Carnell was the main item of the last meeting of the **Ruislip Aquarists' Society**, and much useful information and guidance in the selection of books was provided for members by the speaker.

IN view of the success of the one day open show held by the **Romford Aquarists' Society** last year it has been decided to extend the showing period to three days in August this season. Meeting nights of this society are now the first and third Thursdays of each month (at Lambourne Hall, Western Road, Romford).

CHANGE of meeting days to the first and third Fridays of each month at the Nag's Head, Slough is announced by the **Slough and District Aquarists' Society**.

AN organised visit to Blackpool Tower Aquarium was made by the **Preston Scientific Society Aquaria Group** earlier this year. The curator showed members round the hatchery where among other items of interest were seen several hundred young angel fishes in all stages of development; all of them had been the progeny of the same parents. A member of the *microscopists* section of the society provided an instructional evening for the aquarists, who brought along their own specimens for examination and raised many queries.

AN interesting film show on trout, *Hydra* and news, was held by the **Potters Bar Aquarists' Society** recently. At a lecture given by the society's chairman on livebearers an informal discussion permitted many additional points to be raised. Growing aquarium plants and the effect of artificial light is the subject of the lecture to be given at the next meeting.

THE **Portsmouth Aquarists' Club** has now adopted this form as its official title, following a decision taken at the annual general meeting of the society.

AQUARIUM plants was the subject of Mrs. A. Campion's lecture to the **Pontypool and District Pondkeepers' and Aquarists' Society** last month. The discussion which followed the lecture revealed the many diverse opinions on the growing of plants.

FUTURE meetings of the **Pontefract and District Aquarists' Society** will include table shows and general discussions as well as lectures by visiting speakers. Last month 23 members attended a meeting to hear a talk on livebearers given by Mr. T. Marshall of Leeds.

WINNER of the home aquarium competition staged by the **Peterborough and District Aquarists' Society** was Mr. T. Murfit. Film shows and lectures (lectures supplied by the P.B.A.S.) have been recent activities of the society.

LIVING specimens were demonstrated by Mr. D. Carr when he spoke to members of the **Paisley Aquarist Society** on amphibians and reptiles in February. Last month an "inter-

club" night was held together with Singer's Aquarium Society.

"AROUND the President's Table" was the title given to the meeting of the **National Aquarists' Society** held in London, arranged by Mr. L. B. Katern. The president showed how a goldfish placed in water to which urethane crystals had been added could be anaesthetised for special examination or surgery. Whilst the fish was anaesthetised it was taken from the aquarium and passed around the meeting on a cloth; when replaced in fresh water the "patient" recovered before the meeting ended. A 20 questions contest and a quiz programme were other features of the evening. In February last, Mr. A. Boarder addressed the society on the keeping and breeding of goldfish varieties.

SECRETARY of the **Midland Aquarium and Pool Society**, Mr. T. L. Dodge, gave a talk to members on the show standards for cold-water fish at the society's February meeting.



Miss Lind Joyce seen after making presentation of a tropical aquarium, talking to the Matron of the Children's Hospital in Chelsea, London

TABLE show of danios staged in February by the **Luton and District Aquarists' and Pondkeepers' Society** attracted 23 entries. First prize was taken by a giant danio belonging to Mr. J. H. R. Leggett. A film show on water spiders, frogs and marine life around the British coast was also held. Last month a table show of catfish and common goldfish formed part of the evening meeting in addition to a lecture given by Mr. C. E. Cole on aquatic insects and pond construction.

A FULL meeting room heard Mr. W. Cotton speak on fish diseases at the February meeting of the **Leicester Aquarist Society**. Last month a film show was followed by a table show of fishes bred by members in 1951. New secretary of the junior section of this society is Mr. R. Coleman, 21, Ravenhurst Road, Leicester.

AN official of the Ouse and Cam Fishery Board gave a talk on river pollution to members of the **King's Lynn and District Aquarists' Society** in February. Last month, Mr. J. Gloyn spoke on artistic aquaria and plants at the regular monthly meeting of the society. Early this month a fish auction was planned and a session of 20 questions was also arranged. A competition for the best home aquarium is to be held next month.

MISS Kathleen Cooke gave a lantern slide and film show with aquaria and vivaria as subjects at

the February meeting of the **Horn District Aquarist Society**; this answered many questions put by those

THE **Hornsey and District Aquarists** have recently held table shows of goldfish danios, good entries being obtained. A group formed within the society has a feeding and water pollution experiment first project, many members participating.

HORLEY and District **Aquarist Pondkeepers' Society** held its 6th dinner in February. Last month gourmatics was given to the society. *Misette*.

AT the first table show held by **Wycombe and District Aquarists** cup presented by the president to Mr. G. Gosman, who exhibited a *Hyg rosoma*. Last month Mr. A. Boarder lecture to the society.

CHARACINS were the fishes showing at the first March meeting of the **Wycombe and District Aquarist Society**, a entries were made. Mr. J. Carnell fishes and gave a talk on points arising group. At later meetings a film talk on attraction were given.

Scottish "Herald"

FIN rot in fishes was one of the subjects mentioned in the February issue of the *Scottish Aquarium Herald*, official magazine of the **Scottish Aquarium Society**. It recommends cutting away the infected fin and then painting the raw part with a 2.5 per cent. mercurochrome solution. Small fishes should be kept in containers containing 10 drops of 2 per cent. blue solution for each gallon, change hours. An amusing article on ponds one who has obviously met all the also included.

Guppy "Bulletin"

THE **Federation of Guppy Societies** has commenced publishing monthly bulletin giving news of the meetings and of the meetings of affiliated sections. An enlightening recapitulatory mood recalls the record of the *Guppy Breeders'* So July, 1938, with surprisingly large

Australian Monthly

RECENTLY received from Australia is the *Journal of the Australian N.S.W.* (secretary, P. Jensen, E. Mans Road, Haberfield, N.S.W.) notes within the journal concern practical interest to aquarists, this country interested in exchange with this society are invited to write address.

Holiday To

AQUARISTS and secretaries towns and country areas will likely to be holiday-making. asked to write to the Editor, willing to meet visiting aquarist society meetings. Details will in subsequent issues of *TH*

...will not make arrangements directly with the... Advance notice of events of particular... to aquarists occurring in holiday towns... separately requested for publication.

Goldfish Standards

THE two main aims of *Show Standards of British Fancy Goldfish Varieties*, a publication of the British Aquarists' Society, are stated to be the presentation of the revised standards of the new defunct British Aquarists' Association and the provision of practical advice on fish-keeping for the beginner. The 46-page booklet is divided into two parts each serving these aims. In Part I a page each is devoted to 13 varieties of goldfishes, including the famous Oranda shubunkin. Large, clear outline drawings of each variety are given together with descriptions of body, fins and colour, and tables of points given for each of the characters comprise the information. Part II is illustrated with photographs of water plants and aquatic life; it sets out in an informative way with setting up aquaria, plants, the shubunkin, pond construction and management, goldfish diseases, live tanks, fish house construction and general fish. This attractively produced booklet is priced 2s. 6d. and can be obtained from R. V. Collins, Esq., 9, Mackinnon Road, Bristol, 4.

Notts "Bulletin"

DETAILS for culturing earthworms were given in an article included in the February Bulletin of the Nottingham and District Aquarists' Society. It is suggested that worms can be kept in stacked shallow wooden boxes containing compost and moist leaves; as their egg capsules are deposited every week or so and hatch in two to three weeks it is advisable to work through such boxes every fortnight to recover the capsules and baby worms for transference to new boxes. Gooder beds of compost can also be used and it is recommended to plant these with barley. The plans for the society's annual outing to London (see 18th May) were also given in this issue of the Bulletin, together with reports of recent meetings at which members had passed on information about foods and feeding fish fry.

North and South

It will be seen from the advertisement pages of this issue a London wholesale branch of the Spanish Fisheries (Edinburgh) has now been opened at 61, Grafton Road, Kentish Town, N.W.3, for the convenience of southern patrons at one well-known firm of aquatic suppliers.

New Societies

Croney Aquarist Society: Secretary: A. W. Steward, 40, Oakleigh Drive, Croney Green, Kent.

Percival Aircraft Aquarists' Society: Secretary: A. R. Lewis, 121, Cambridge Street, Luton, Beds. Meetings: Last Thursday of each month, 8 p.m., at the Percival Aircraft Works Canteen.

South Glasgow Aquarium Society: Secretary: J. B. Brown, 24, Dryburn Avenue, Glasgow, S.W.2. Meetings: Monthly at the Cannock Junior Secondary School, Paisley Road West, Glasgow, S.W.2.

South-East London Section Guppy Breeders' Society: Secretary: R. V. Channon, 247, Hither Green Lane, Lewisham, S.E.13. Meetings: Second and fourth Thursday of each month, 8 p.m., at 23, Alverton Green, Deptford, S.E.8.

British Aquarists' Festival, 1952

This event will be staged at Belle Vue, Manchester, by the Federation of Northern Aquarium Societies in collaboration with *The Aquarist* in October this year.

Show entries are invited from all aquarists and schedules and entry forms will soon be available from George W. Cooke, Esq., Spring Grove, Field Hill, Batley, Yorks.

The unique collection of trophies, first put up for competition last year, will again form the main prize attraction.

South Shields Cage Birds and Aquarist Society: Secretary: L. G. Duncan, 201, Laygate Lane, South Shields, Co. Durham. Meetings: Second Tuesday each month, 7.30 p.m., at the Miners' Ambulance Room, Lowden Street, South Shields.

Stockport and District Aquarist Society: Secretary: A. Jordan, 47, Woodmoor Lane, Stockport, Lancs. Meetings: First Thursday each month, 7.45 p.m., at Unity Hall, Greek Street, Stockport.

Sunderland and District Aquarists' Club: Secretary: W. Brindley, 13, Blind Lane, New Silksworth, Co. Durham. Meetings: Second and fourth Thursday each month, at the Parks Social Hut, Park Lane, Sunderland.

Wickford Poultry and Rabbit Club Aquarist Section: Secretary: C. Villion, Mountview, Waverley Crest, Wickford, Essex.

Secretary Changes

CHANGES of secretaries and addresses have been reported from the following societies:

Banbury and District Aquaria Society (Mrs. M. Harris, 38, Orchard Way, Banbury, Oxon.); **Burton and District Aquarists' Society** (Mr. T. H. Cotton, 11, Newton Road, Burton-on-Trent); **Colne and District Aquatic Society** (Mr. H. Anness, 11, Ludgate Circus, Colne, Lancs.); **Dewsbury and District Aquarist Society** (Mr. A. Scott, 6, Park Row, Earlsheaton, Dewsbury, Yorks.); **Rochdale and District Aquarist Society** (Mr. J. Whittle, 1, Bramhall Street, Rochdale, Lancs.); **Scarborough Aquarists' Society "Sealark"** (Miss A. O. P. Fenton, 15, Falconer's Road, Scarborough, Yorks.); **Southport Aqua-Art Club** (Mr. J. Blinkhorn, 25, Cobden Road, Southport, Lancs.); **Sutton and Cheam Aquarist Society** (Mr. P. Rycroft, 14, Kenley Walk, Cheam, Surrey); **Torquay and District Aquatic and Pondkeepers' Society** (Mrs. J. Brooking, The Westbury, Belgrave Road, Torquay, Devon); **Wolverhampton and District Aquarists' Society** (Mr. F. V. Hillman, Pendrell Hall, Godsal Wood, Wolverhampton, Staffs.).

Aquarist's Calendar

12th April: **Amersham Grove Aquarist Club Show** in the All Saints Church Institute, Monson Road, London, S.E.14.

17th-19th April: **City of Salford Aquarist Society Show** in the Lancaster Road School, Lancaster Road, Salford, 6, Lancs.

10th and 11th May: **Rochdale and District Aquarist Society Open Show.** Full details from J. Dodsworth, Esq., 251, Rooley Moor Road, Rochdale, Lancs.

14th-18th May (amended dates): **Edinburgh and East of Scotland Aquarium Society's Premier Show**, in the Waverley Market, Princes Street, Edinburgh.

16th May: **British Herpetological Society** (London Group) meeting "Snakes (Ophidia)", 7 p.m. at the meeting room of the Zoological Society of London, Regent's Park, London, N.W.8.

31st May: **Wembley Aquarist Society Annual Cup Show**, noon to 6 p.m.

2nd June: **South-East Essex Junior Aquarists' Society's Exhibition** of tropical fishes, 11 a.m. to 9 p.m., at the Girl Guide's Hall, Electric Avenue, Westcliff. Admission 1s. adults, 6d. children.

5th-7th June: **East London Aquarists' and Pondkeepers' Association Annual Show** at St. Margaret's Hall, Ripple Road, Barking.

12th-14th June: **National Aquarists' Society Annual Exhibition** in the Royal Horticultural Hall, London, S.W.1.

Entries Invited

Blackpool and Fylde Aquatic Society. Open show of furnished aquaria. Details from G. Robinson, Esq., 17, Victoria Road, Poulton-le-Fylde, Blackpool. Date: 4th-11th August.

Bournemouth Aquarists' Club. Second Exhibition and Open Show. Details from R. Matley, Esq., Breezeland, Dean Swift Crescent, Parkstone, Dorset. Date: 12th-16th August.

Romford Aquarists' Society. Open Show. Schedule and entry forms from R. Alley, Esq., 13, Hayburn Way, Romford, Essex. Date: 28th-30th August.

Wembley and District Aquarium and Pool Association. Second Annual Open Show, 23 classes. Schedules from B. H. Gates, Esq., 40, Queens Court, Kenton Lane, Harrow, Middlesex. Date: 18th-21st June.

Winchester City Aquarists. Second Annual Show. Schedules from Mrs. P. M. Inge, 31, Hursley Road, Chandlers Ford, Eastleigh, Hants. Date: 6th, 7th June.

Crossword Solution

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

PICK YOUR ANSWER (Solution)
1 (c). 2 (a). 3 (d). 4 (c). 5 (a). 6 (b).

ANGEL FISH

SPECIAL PURCHASE OF 1,000

Size approximately that of a shilling piece

price **2/-** each

SNAP UP THIS REAL BARGAIN!

Visit the finest AQUATIC & AVIARY SHOWROOMS in the country and see the wonderful selection of

**TROPICAL AND COLDWATER FISH
AND BUDGERIGARS**

Youngsters from 25/- each, breeding pairs also stocked

PLANTS

AMBULIA	6d.
CABOMBA	1/-
INDIAN FERNS	1/3
CRYPTOCORYNES	2/-
APONOGETUM	3/-
DWARF RUSHES	2/-
AMAZON SWORDS	3/-

AQUARIA

ANGLE IRON	24×12×15	59/-
ditto	24×12×12	53/-
PRESSED STEEL	12×8×8	13/6
ditto	14×9×9	16/-
ditto	16×10×10	18/3
ditto	18×10×10	21/-

A wide range of Live and Dried foods always in stock, also PUMPS
THERMOSTATS, Heaters, Thermometers etc.

LAKESIDE Aquatic & Aviary Supplies

Only address — 49, Edgware Road, Marble Arch, W.

Phone: PAD 7916

Open all day Saturday