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WATER LIFE

and Aquaria World



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Breeding Celestial Goldfish

Those British-bred Pompadours

Twenty Questions on Labyrinth Fishes

Running Water

Hybrid Vigour in Fishes

Avoiding Rust on Aquarium Frames

WATER LIFE

AND AQUARIA WORLD

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FRONT
COVER



Pair of Leeri, Pearl or Mosaic Gouramies (*Trichogaster leeri*), one of the Labyrinth Fishes discussed by Peter Hewitt on pages 58-60. The male is the lower fish. It has lengthier dorsal and anal fins and its dorsal is more pointed.

Photograph]

[G. J. M. Timmerman

Out in the Open

TO keep fish in good fettle under aquarium conditions and to breed them regularly is the aim of all serious fishkeepers. All aquarists have respect for a species that eludes them for a time by just refusing to breed when they lavish the best treatment on it. For instance, one of the most distinguished tropical fish, and certainly one of the most capricious in the breeding tank, is *Symphysodon discus*, popularly known as the Pompadour.

Difficulties Encountered

Up to barely a year ago the limited breeding reports on Pompadours told only of an occasional successful spawning. On many occasions eggs were laid, and frequently these hatched, but the youngsters were generally lost because they refused to catch any food. Obviously they were finicky; but to find out exactly which type of food would tempt them seemed a task so formidable that most aquarists shrunk from it.

That was the situation until early last year; but now, thanks to the articles of Roy and Gwen Skipper, the breeding of the Pompadour is practically an open book. Through WATER LIFE these two aquarists have brought to fishkeepers here and abroad the full story; their final chapter appears in this issue. In the February number, Gene Wolfsheimer, of California, added his experiences with Pompadour Fish to those of the British couple.

Made Freely Available

These fishkeepers were ready and willing to share their experience with others; surely the hallmark of a genuine hobbyist. It is no credit to hide your light under a bushel. By making experiences known you can increase the enjoyment of others and, in addition, inspire fresh enthusiasm.

When you feel you have achieved something with your fish and have convinced yourself that it is not by idle chance, talk to your friends about it, speak at your club meeting and let WATER LIFE know. By so doing you will contribute significantly to the hobby which gives to many so much pleasure.

Twenty Questions on Labyrinth Fishes

Full Information on an Interesting Group of Fishes which Have Distinctive Breeding Ways

By Peter Hewitt

Q *QUESTION. Why is a Labyrinth Fish so called?*

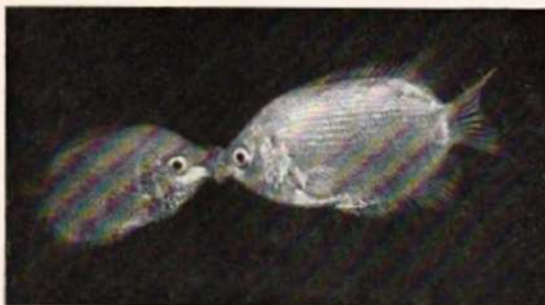
A. Labyrinth Fish derive their name from the fact that they have an auxiliary breathing apparatus in addition to the normal gills. This apparatus, by the nature of its labyrinth-like structure, enables them to extract oxygen from the atmosphere.

Q. What makes a Labyrinth Fish so attractive as aquarium inmates?

A. Many varieties of Labyrinth Fish are very beautiful in colour, and certain species make excellent community fish. The fact that their tank requirements are considerably less than those of other fishes (due to the fact that they breathe direct from the atmosphere) means that more can be kept in a community aquarium.

Q. Are there any species suitable for a mixed collection of fishes?

A. Most species can be kept in a community tank



Photograph [G.J.M. Timmerman] Kissing Gouramies in typical pose. The enlarged lips may be an adaptation for removing algae from plants, etc.

although some of them do tend to grow to rather a large size. In general, the best community fish among the Labyrinths are the Dwarf Gourami, which is a very lively and colourful little fish, the Thick-lipped Gourami, the Leeri Gourami and young Three-spot or Blue Gouramies. The latter tend to grow rather large and, when fully adult, can become quite vicious, but young fish are very often found in community tanks, adding a colour not otherwise obtainable.

Q. Can you recommend species that are especially colourful, reasonably easy to breed and generally peaceful?

A. The easiest of the Labyrinth Fish to breed is the Blue or Three-spot Gourami but, as previously stated, it cannot be guaranteed to remain peaceful when adult. However, the Dwarf Gourami will breed fairly readily and is an extremely good community fish, as also is the Thick-lipped Gourami.

Q. Please supply general information on the care of Labyrinth species, the type of tank they require, the food, etc.

A. Although these fish will stand overcrowding without apparent ill-effects when they are adult, it is necessary to provide them with ample space when young in order to ensure that they reach a reasonable size. In general, they prefer a tank fairly well planted and with not too strong a source of illumination. Floating plants are always appreciated by them. The tank should be kept clean and the food should consist of as much livefood as possible; *Daphnia* and chopped Earthworms are the best. Although Labyrinths

will survive quite well on prepared dried foods, it is very difficult to maintain them in first-class condition without livefoods.

Q. What is the breeding pattern of this group of fishes?

A. The male fish constructs a floating nest of bubbles by taking in air from the water surface and exuding it as a mass of bubbles coated with a film which prevents them from bursting. Some species interweave pieces of plant, algae, etc., to form a compact nest and others will simply form a mass of bubbles scattered over the surface of the water. When the nest is complete the male entices the female under the nest and curls his body around hers, squeezing the eggs out and fertilizing them as they are expelled; this process is repeated until all the eggs are laid.

The male collects any eggs that have dropped and replaces them among the bubbles. He will maintain the nest and guard the eggs and young until they are about seven to ten days old. The eggs hatch fairly quickly and the young hang from the underside of the bubbles for a few days before becoming free-swimming.

Q. Do some Labyrinths differ in certain ways from this general breeding procedure?

A. The Combtails (*Belontia signata*) and Kissing Gourami (*Helostoma temminckii*) do not build a bubble nest but just scatter their eggs at the surface of the water where they float. However, there is no real difference in the breeding procedure with regard to the other essentials.

Preparing the Breeding Tank

Q. How should the breeding aquarium be set up?

A. The size of the aquarium should be relative to the size of the fish; 18 x 10 x 10 in. is quite suitable for Dwarf Gouramies, Thick-lipped Gouramies or Siamese Fighting Fish, but the Three-spot or Blue Gouramies, Giant Gouramies, Leeri Gouramies and the larger Labyrinth Fish require a tank at least 24 x 12 x 12 in. The best depth of water is 5-6 in. and, in most districts, tap water can be used. The tank should be thoroughly cleaned and heavily planted in one corner with some floating plants on the top. The top surface should be shaded. It is also essential that a tight-fitting glass cover be provided for the tank, as it is essential that cool air should not be allowed on the water surface.

Q. What preparations do I make prior to a breeding attempt being made?

A. Male and female fish should be conditioned separately at a temperature of 70-72 deg. F. This conditioning process should consist of extensive feeding on livefood only, for about three weeks. At the end of this period the males will have a heightened colour and the females will be nicely plump and seen to be full of roe.

About three days before the breeding attempt is to be made the temperature in the conditioning tanks should be raised a few degrees and then the pair can be placed together for spawning at a temperature of about 76-78 deg. Most species will then immediately start the breeding process. Exceptions to this rule are Leeri Gouramies, which should be conditioned together in their breeding tank, and should be in as undisturbed and secluded a position as possible. They will generally choose their own time to breed.

Q. What attention do the young fish need from the time they hatch from the egg until they are able to take adult food?

A. For the first two or three days the young fish will hang from the inside of the bubble nest occasionally losing their grip and falling, but being replaced by the male parent who will continue to maintain the nest. After this period the fry will become free-swimming and first feedings should be made from small Infusoria which can be cultured using such infusions as hay, banana, etc. For the average spawning I find that a 1 lb. jar of Infusoria three times a day is sufficient to promote quick growth.

After about three days newly-hatched Brine Shrimp may



Photograph] [G.J.M. Timmerman
Combtails, an unpredictable Labyrinth species of large size.

be fed and the Infusoria dispensed with. When the Brine Shrimps are fed it is quite a good idea to provide gentle aeration to the tank in order to ensure that the food is circulated around. Also the introduction of a few snails at this time will prevent any uneaten shrimps decaying and polluting the tank. After the Brine Shrimp stage, screened *Daphnia*, adult *Daphnia* and, finally, chopped Earthworms, etc., may be fed in progressive stages.

During the first three weeks severe losses will be occasioned if a cold draught of air is allowed to hit the surface of the water. This can be very damaging when the young fish are developing their labyrinth organs. With correct feeding, all types of Labyrinth Fish show extremely fast growth during the first month and should be carefully observed to ensure that their stomachs are fully distended, indicating that enough food is being given.

Siamese Fighting Fish

Q. Siamese Fighting Fish require special conditions, I understand. How does one provide them?

A. The Siamese Fighting Fish is one of the most attractive of all Labyrinth Fish and, while the female fish are relatively peaceful, the male fish will fight and rip each other to pieces if allowed in the same tank. Therefore, not more than one male Fighting Fish, once it is approaching maturity, may be kept in the same tank, although a whole community of females is quite safe. There are many different methods adopted for keeping Fighting Fish but probably the best one is to have a long, narrow tank partitioned off at about 4 in. intervals and one male fish can be kept in each of these partitions. If the partitions are made of glass the male fish will display to each other through the glass.

In general, Fighting Fish will not keep full colour and condition unless they are fed exclusively on livefoods. Having extremely elongated finnage the males are liable to bacterial fin infection and, to combat this, it is essential that that tank be kept clean, otherwise ragged finnage is almost certain to result.

Q. How many colour varieties of Siamese Fighting Fish are there? Is it very difficult to breed pure coloured strains?

A. Seven colour varieties of Siamese Fighting Fish are recognized by the Federation of British Aquatic Societies in their show standards. These are Cambridge Blue, Cornflower Blue, Black, Crimson, Claret, Emerald Green and the

so-called "Cambodia" Fighter with a cream body and red fins. Good show specimens of most of these fish have been seen recently, the one exception being the Black Fighter.

It is an extremely difficult thing to breed pure colour strains from multi-coloured varieties but it should be possible to obtain pure-bred strains of most of the colour varieties, and then it is up to the aquarist to improve on these colour strains. Probably the most difficult to produce is the Cornflower Blue, and for this fish it has been found that, when two Cornflower Blue Fighters are mated together, a few Blues are produced together with a large number of Grey and Green Fighters. In line-bred stock, by mating Grey and Green together practically all the offspring prove to be Cornflower Blue. The dominant colour in Fighters seems to be red and when any of the other colour varieties produce red markings, it is very difficult to breed them out.

Q. Thick-lipped Gouramies (*Colisa labiosa*), Giant Gouramies (*Colisa fasciata*) and Dwarf Gouramies (*Colisa lalia*) are often advertised. Could you describe them and give any individual peculiarities?

A. The Thick-lipped Gourami is a colourful fish in which the female has a brown body striped with red and blue, and the male has the same basic colouring, although intensified. In addition, the fins are quite heavily coloured, being blue in the front of the dorsal with the rear becoming red. The anal fin is mainly blue bordered with red. When in breeding condition the body colour of the male intensifies to a deep, velvety brown and it becomes one of the most beautiful of all the Labyrinth Fish, growing to about 3½-3¾ in.

The Giant Gourami is rather similar in appearance to the Thick-lipped but the blue stripes on the sides are of greater intensity and the gill plates have a deep blue sheen. It is not really a giant fish, good specimens attaining a maximum length of 4½ in. The Dwarf Gourami is probably the most popular of all Labyrinth Fish, and the male has



Photograph] [G.J.M. Timmerman
Paradise Fish, a species well able to tolerate low temperatures.

a grey-brown body, evenly striped with bright red and blue bars. When in condition, the underside of its head and its throat are a bright blue. The fins are patterned in red and blue and the "feelers" (adapted pelvic fins) are orange-red on the male. The female fish has not the bright hues of the male fish, having a greyish-brown body striped with red and blue and her "feelers" are a greyish-brown.

Q. I understand that Paradise Fish (*Macropodus opercularis*) have been kept in aquariums for many years and are easy to maintain. Why are they not seen more often today?

A. Paradise Fish were extremely popular just before the war and three strains are known, the brown, the black and albino. They are very hardy fish and, while requiring a temperature of 70-75 deg.F. for breeding purposes, they will live quite happily at 48-50 deg. They are very easy to breed

and, providing livefood is given, suffer from few ailments, but unfortunately they are not good community fish as they tend to become rather vicious when fully adult.

However, I have successfully kept tanks containing six or seven pairs of adult fish, and although they have had their fights on occasions they have remained in good health for many years. If it is desired to keep a community of these fish it is essential that the tank should be heavily planted and a good cover of top plants be provided. Paradise Fish become extremely tame and, in my own view, are one of the most interesting, although not the most beautiful, of the Labyrinth Fish.

Q. I believe there is a group of quite large Labyrinth Fish which belongs to the Genus Trichogaster. It includes the Leeri Gourami (T. leeri). What is the colour pattern of this fish, and can the sexes be easily identified?

A. The Leeri Gourami is a very attractive fish. The other two names by which it is known, the Lace or Pearl Gourami, give a clue to its colour, shown in the cover illustration. General body shade is greyish-brown with a lace pattern of pearly coloured spots distributed evenly over it. A dark line passes from the mouth through the eye and along the lateral line to about half the length of the body. There is a dark spot on the caudal peduncle. In the male fish the dorsal fin is produced to a blunt point and the anal fin has the last rays extending beyond the membranes giving a fringed appearance to the fin. The throat and lower part of

the body of the male are bright orange. Good specimens grow to about 4 to 4½ in.

Q. Do Kissing Gouramies (Helostoma temminckii) actually "kiss"? Are these fish all right for home aquariums?

A. The Kissing Gourami is a large Gourami and its name derives from the fact that they appear to kiss. The fish meet head-on and place their mouths together, continuing with this action for several minutes. The purpose of this "kissing" has not been finally established; it does not appear to be connected with the breeding process nor is it a trial of a strength such as occurs with some of the Cichlids. The fish attain a size of about 10 in. and are not really suitable for small community tanks, but many are kept in larger tanks in communities of fishes approaching their own size. They are hardy fish and a creamy white in colour.

Popularity of Combtails

Q. I am told that Combtails (Belontia signata) are now quite popular. What do they look like and are they easy to breed?

A. Combtails are a reddish-brown fish and their main characteristic is the fact that the rays of the caudal fin extend well beyond the web of the fin, giving a ragged appearance to the fin and forming a comb. There is reddish colour in the dorsal, anal and caudal fins and two rays of each pelvic fin of the male are extended. This is an unpredictable fish, some males will prove quite vicious and will attack and severely damage or kill females, whilst others will be quite peaceful. They attain a length of about 4 in. and are best kept in a tank at least 36 × 15 in. Breeding has been carried out by a reasonably large number of aquarists but Combtails cannot be classed as easy to breed.

Q. What points should one look for when selecting Labyrinth fishes for breeding purposes?

A. It is always difficult to generalize on a class of fish, but the main points to be borne in mind are that the fish must be in first-class condition and of good body shape and colour. Usually the male fish will start blowing bubbles before being introduced to the female and the female must be full of roe before any attempt is made. Male fish will usually come into condition before females and, as the courtship is likely to be violent, great care must be taken to ensure that the female fish is in top breeding condition before an attempt is made.

Q. Do Labyrinths make good show fishes? What are the points to aim for?

A. Dwarf Gouramies, Leeri Gouramies and Siamese Fighters are three of the most popular show fish, and most types of Labyrinth Fishes are seen regularly on the show benches. The Labyrinth Fish are quite good for show purposes as they are not so liable to lose colour as some other tropicals.

The main points to be borne in mind when selecting show fish are: (a) Are the pelvic "feelers" straight and correct? A common fault with Leeri Gourami is extra feelers and, with Fighters, a complete lack of pelvic fins. (b) Do the colours conform to the recognized pattern? In the case of the Dwarf Gourami the fewer broken bars on the body the better the fish and, in the case of Fighters, the fish must be a self-coloured fish or cream and red. A common fault with Three-spot Gourami is an extra spot on the body. (c) Are the fins complete? Ragged fins cause the loss of many points at most shows. (d) Ensure that the body shape is reasonably correct. Many of the Labyrinths show signs of old age by becoming hump-backed and this is almost certain to doom the exhibitor to disappointment with that fish.

Q. Are there show standards for any of the Labyrinth fishes?

A. The F.B.A.S. have published a standard for the Siamese Fighting Fish and have issued Guides for the Leeri Gourami, the Snakeskin Gourami and the Three-spot Gourami. I understand that other Guides will be issued in the future.

Fish Philately

Hammerheaded Shark



THE small Spanish territory of Ifni on the coast of Northern Morocco has issued several stamps bearing pictures of fish and other marine animals. Vigorous and pleasing though most of the designs have been they have fallen short of perfection in their failure to identify the species depicted. In the present case, however, the omission is not particularly important, since the Hammer-headed Shark is unlikely to be mistaken for anything else.

The Genus *Sphyrna* belongs to the *Carcharinidae*, a family of large, voracious sharks found in all the warm seas. The curious "hammer-head" is formed by an outward extension of the skull, the eyes being set at the end of these long outgrowths.

Readers may recall seeing a fine close-up of this shark in Dr. Hans Hass' underwater films, shown some time ago on B.B.C. television. The Hammerhead is closely allied to the Blue Shark, which visits British shores in Summer.

The 60-centavo stamp illustrated is printed in crimson lake; the same design, in violet, appears on the 10-centavo value. Both these stamps, together with two others depicting a lobster, were issued in 1954 to commemorate Colonial Stamp Day.

John Wakefield

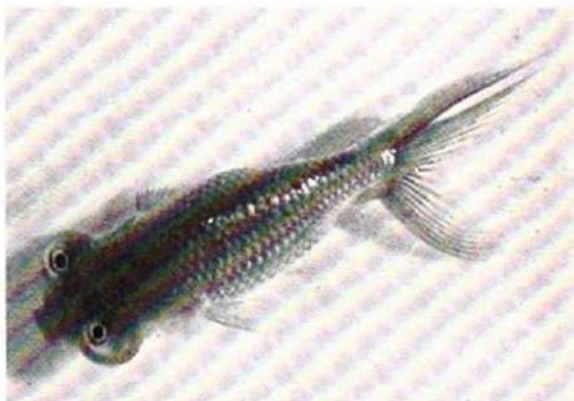
Here it might be as well to comment on the different types of Celestial eye. In the original pair the male fish had completely spherical eyes but they did not rise very much above the upper surface of the head. In the female, however, the eye spheres were larger and slightly more above the head level. This difference in eye has resulted in a difference of behaviour for, whereas the male can see food by standing on his head, the female is unable to do so and has adopted the curious habit of pushing herself over sideways until she can swim upside down with eyes actually sweeping the bottom of the tank. The food located, she adopts the normal position and consumes what has been found.

Method of Feeding

This behaviour is only noticeable when food is rather sparse. At other times she appears to manage quite well by biting at everything; in fact, so adept are all these fish at engulfing food that on occasions, when I have kept them in company with Veiltails, Fantails and even Singletails, I fear that the Celestials have had the lion's share of the food almost as soon as it has been introduced to the tank.

I have now noticed that the daughter also adopts this queer behaviour when food is less plentiful but I have never seen any of the others do it. One might suppose that the fish were unbalanced, as frequently occurs in Veiltails, were it not for the tremendous effort required to achieve this abnormal position and the perfect ease with which they recover, quite apart from the fact that, if well fed (i.e. if there is sufficient available food all the time) then it does not occur at all.

In conclusion, I would like to say that in my experience



Dorsal view of a seven-month Celestial which has the completely spherical type of eye that does not rise very much above the head level. Other fish in the author's spawning had larger eyes that developed slightly higher above the head level.

these are a very hardy, active type of fish (I have had them feeding voraciously when the temperature was in the thirties and when all other types were dormant) and, furthermore, their dietary requirements are easily met. My fish have existed on gentles and biscuits for some time now and appear to relish the maggots, something I have not found in other varieties unless they have had to eat them because nothing else was available.



Twisted Vallisneria

Aquatic Plants

ONE of the stock plants for aquarium use is the so-called Tape Grass, Eel Grass or Ribbon Grass—*Vallisneria spiralis*. Virtually everyone uses it in an indoor aquarium; there are few better plants for a background, for a contrast to fine-leaved species and for getting

a severe effect when this is needed.

Leaves in the *V. spiralis* are lengthy (generally between 12 and 18 in.), narrow and strap-like and of a bright green shade. Propagation is easy as the plant throws out runners freely, along which young plants develop at intervals. These can be severed when of fair size.

Flowers are also produced, the female and male blossoms coming on separate plants. The female flowers are carried to the water surface on spiral stalks whilst the less frequently seen male ones develop at the base of their plants, break off and surface for pollination. However, the seeds are not produced in Britain.

Another variety is Twisted or Corkscrew Vallisneria (*V. spiralis* var. *torta*), where the leaves are broader, evenly twisted along their length but rather more dwarf.

A rarer type is Giant Vallisneria (*V. spiralis* var. *gigantea*) which is reputed to grow up to 6 ft. high although generally it is content with 24 in. Obviously this plant is only of limited appeal.

Vallisneria spiralis will thrive in cold water and

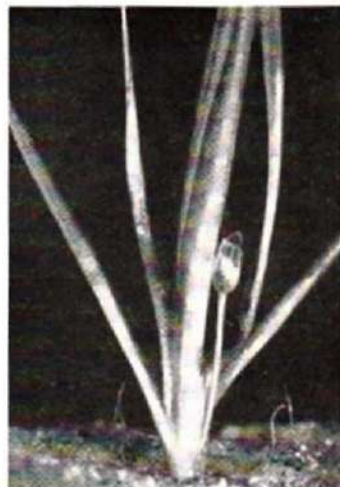
Tape Grass

(*Vallisneria spiralis*)

tropical aquariums and also in sheltered garden pools. When obtaining the plants it is worth enquiring the water temperature at which they have been kept. Although *Vallisneria* used to coldwater will adjust itself to tropical conditions and vice-versa, there will usually be quite considerable wilting of leaves whilst it is acclimatizing itself. Twisted *Vallisneria* prefers rather warmer conditions and is best used only in aquariums, especially heated ones. Giant *Vallisneria* is tropical.

Ordinary aquarium gravel suits all the *Vallisnerias* as a planting medium, but it is important to see that the plants are not set too deeply which will encourage them to rot. The crown (point of origin of the leaves) must be above the gravel surface. A good light is required by all the Tape Grasses which are native to Southern Europe and North America.

Male flower of *Vallisneria spiralis*



Those British-bred Pompadours— the Story Completed

By Roy and Gwen Skipper

EARLY last year Mr. and Mrs. R. Skipper (Hendon A.S.) successfully bred Pompadour Fish for the first time in Britain. They have repeated their achievement several times since. A full report was given by them in our June, 1956, issue and further observations were included in the December number. Now the last part can be written; what exactly is the first food of the young fishes has recently been ascertained.

AT the end of the previous article in the story of the Pompadour Fish (*Symphysodon discus*) which appeared in the December issue we stated our intention of attempting to feed the newly hatched fish on *Vorticella*. A local pond was visited and a search made for this protozoan. Examination of floating twigs and leaves recorded large colonies and, with hopes again high, we transported a goodly quantity home.

A small twig with a *Vorticella* colony attached was introduced to a nursery of some 100 or so *S. discus* fry. One or two seemed quite interested and pecked at the twig repeatedly, but even these soon lost interest and joined the main throng who obviously knew what they wanted and were not going to be put off with substitutes. This twig was removed and, on examination, the colonies of *Vorticella* showed they were still intact. Such a check was made because it was realised that the marked change in water conditions, i.e., water hardness, pH and temperature might well have killed the *Vorticella*. So yet another attempt at raising Pompadours without the aid of the parents met with failure.

Young Fish Again Feeding from Parents

However, a further spawning had taken place meanwhile and the parents seemed intent on raising another brood. Once again it transpired that on the first day the fry were free-swimming we witnessed the remarkable sight of a "cloud" of tiny fish feeding from the sides of the parent fishes.

A few days later we were talking to Dr. H. G. Vevers, M.B.E., Curator of the Aquarium at the London Zoo, about this phenomenon and invited him along to witness the unusual behaviour. About the same time we had the good fortune to meet Dr. W. H. Hildemann, an American scientist working at University College, London. Dr. Hildemann was fully conversant with the anaesthetizing of fishes and suggested that he be allowed to anaesthetize one of the adults that were bringing up the brood and examine the skin of this fish under a microscope. This would be a certain way of finding the nature of the food that the fry were feeding on.

We agreed that an experiment under laboratory conditions was necessary and, although many doubts assailed us an appointment was made. Dr. Vevers also helped with the experiment and thus had the opportunity of substantiating his own theories.

Here, then, is Dr. Hildemann's report, as a result of the microscopic examination of the female parent. "The skin and scales of anaesthetized, non-breeding adults revealed nothing extraordinary—only the dense melanin pigmentation



Dr. W. H. Hildemann and Dr. H. G. Vevers, M.B.E., examining one of Mr. Skipper's Pompadour Fish in breeding condition. A heavy mucous coating was found on the body.

and scattered guanin crystals which make this species so attractive. Adult breeders with young, however, presented an entirely different appearance.

"Even to the naked eye it was apparent that both parents possessed a whitish material over the entire surface of the body. Under the microscope it was soon evident that no alga, *Protozoa* or Rotifer was present on the fish, but it was an abundant mucous secretion looking almost like a fungus with a granular composition covering the entire body including the fins. The secretion appeared to be more concentrated dorsally. Rubbing the secretion gently with the finger caused it to become filamentous. Clumps and filaments of this mucus were readily dislodged into the surrounding water. That the mucus has considerable cohesiveness is attested by the fact that even the larger young must tug and jerk to remove it from the parents.

"A bit of the mucus was placed on a glass slide and inspected under high magnification. This revealed that the material was indeed acellular and amorphous and, therefore, unquestionably a secretion. To complete the picture we plan to section some of the coated scales so as to identify the cells responsible for the secretion.

Remaining Problems

Several other interesting questions remain to be answered. Presumably the secretion is hormonally controlled, but probably not by the sex hormones since both parents produce it. This is a problem for a physiologist. One might guess that the secretion starts to develop after the eggs are laid and continues to be produced until the young seek food elsewhere. With luck, we should know the answer to this one within the year.

"Virtually all attempts to rear newly hatched *Discus* on a variety of micro-organisms have resulted in failure. Apparently the young are unwilling or unable to subsist on any first food other than the mucous secretion. It is possible that sufficient mucus could be eluted from the

(Continued next page.)

An Insect Aquarium

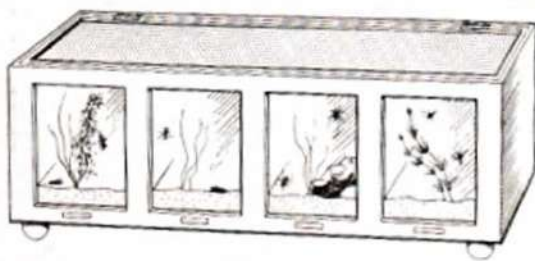
Widen Your Interest in Aquatic Life by Making
a Cabinet to Contain the Smaller Creatures

By Maurice Colbeck

THE construction of a simple insect aquarium presents few difficulties to the aquarist-handyman willing to revert to the aquarium of his childhood—a glass jar.

About four or six jars are required. The square pickle jars are the most suitable, though round ones can also be used. They should all be of the same size and should have their necks, which are usually narrower than the "body" of the jar itself, cut off.

In the case of the round jars this is quite easy. Tie a thick piece of string, previously soaked in paraffin, around the jar just below the spot where it narrows in to the neck. The string should then be lighted in several places as quickly



The insect aquarium fitted with square glass jars.

as possible. As the string burns, the heat will crack the glass, usually in a tolerably straight line. In order to obtain a straight cut, it might be best to remove any labels from the jars by soaking them in water for a few seconds. Although the square jar is more suitable, it is not so easily cut, and it is better to take the jars to a glazier.

The next step is to obtain, and cut to size, six pieces of wood to make a rectangular box, just large enough to hold your jars as they are standing in line, each touching the other. In the piece of wood which is to form the "lid" of the box, a large rectangular space should be cut—a fretsaw makes this easy—and covered with perforated zinc on the side which will be out of sight when the lid (which is hinged to the box) is closed.

A fretsaw is also the most suitable tool with which to cut out the "windows", which are to be made in each long side of the box. These should be as large as possible, though the wood remaining between them should be wide enough to hide the point at which the jars touch. Some adaptation is necessary in the case of round jars which, of course, project some distance through the opening in the wood. When properly done, however, this "bay-window" effect is not without its decorative appeal.

The end product may be compared to that of one of the large public aquaria in miniature. When square jars are used, the impression is given of one long, continuous tank, divided by several windows. In such an aquarium the tiniest creatures are "focused" in such a small space that they are much more conveniently observed. Small feet for the box to stand on, a coat of stain and, perhaps, a few strips of beading, enhance the appearance considerably.

Fine sand is the most suitable compost with which to line the bottom of the jars, since many of your specimens are likely to be burrowers at some stage of their existence. Aquatic plants are in some cases necessary, and in every

instance attractive, and one of the most suitable for this purpose is the aquarist's old friend, *Elodea (Anacharis)*. Care should be taken that the sand reaches the same level in each jar so that the effect of continuity is preserved.

The best way to obtain specimens for the insect aquarium is to visit a pond containing plenty of aquatic plant life. With a stick, preferably hooked, large masses of this vegetation may be removed from the water. When examined over a sheet of newspaper spread on the bank, the plants will usually be found to contain a wide variety of insect life.

On the surface of almost every still piece of water small creatures will be seen to rise periodically to the surface and then to sink to the bottom again. These are usually the larvae of water flies and beetles. They are worthy of study, usually having very interesting metamorphoses, and are easily caught if a fine muslin net is placed under them.

Investigating Caddis Larvae

Perhaps the most interesting of these is the cruciform caddis larva, which makes a cylindrical shell by gluing around its body tiny stones and straws. Its unprotected body is soft and white and absolutely defenceless. Fishes regard it as a delicacy and it is often used as bait by anglers. This little insect will be torn in two, rather than allow itself to be pulled from its case. There is one method of ejecting it, however, and this is by poking it gently with a straw through the aperture at the rear of the shell. If it is thus deprived of its armour and is provided with materials small enough, it will at once set to work to build another home. There is also the Water Spider, which spins its web between the branches of an aquatic plant.

The curious little Freshwater Shrimp may be found in almost every pond or stream. I once found scores of them by turning over a piece of turnip which was lying in a stream.

There are many varieties of water beetle, large and small, which may be adapted to life in aquaria, though generally speaking they should be kept to themselves. Trouble is likely to ensue if even two of the same species are confined in the same tank. The larger ones would, of course, be unsuitable for an aquarium made on the above lines.

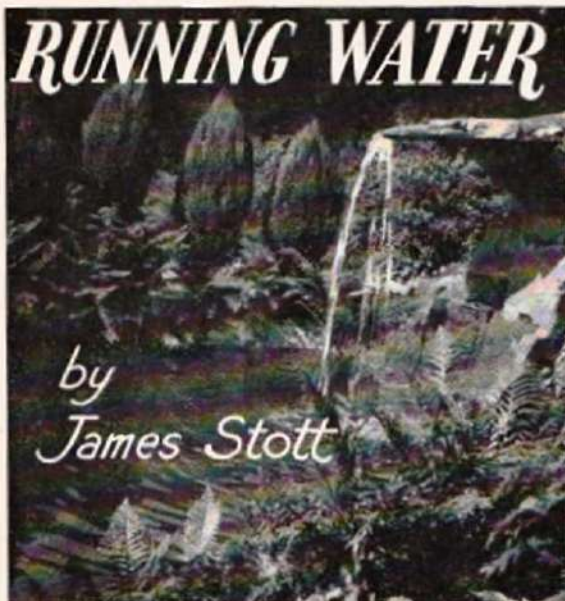
Those British-bred Pompadours

(Continued from previous page.)

parents under suitable conditions to sustain offspring kept in the same water without benefit of direct feeding off the parents.

"The fascinating parent-offspring relationship in *Symphysodon discus* appears to be unique among fishes bred by aquarists to date. A distant analogy could be made to the mammary glands in mammals. However, some newly discovered species of Cichlids, perhaps related to the Pompadour, may reveal a comparable specialization of parental care."

We would like to add that the anesthetized fish recovered perfectly and was later put back with its mate and family. It was very evident that the male resented the female's absence and, for a while, we wondered if perhaps we had gone too far this time and envisaged a domestic upset resulting in the loss of a brood. However, after a few "digs" the female was accepted back and the pair became engrossed in raising their babies. These have since been removed and are growing well.

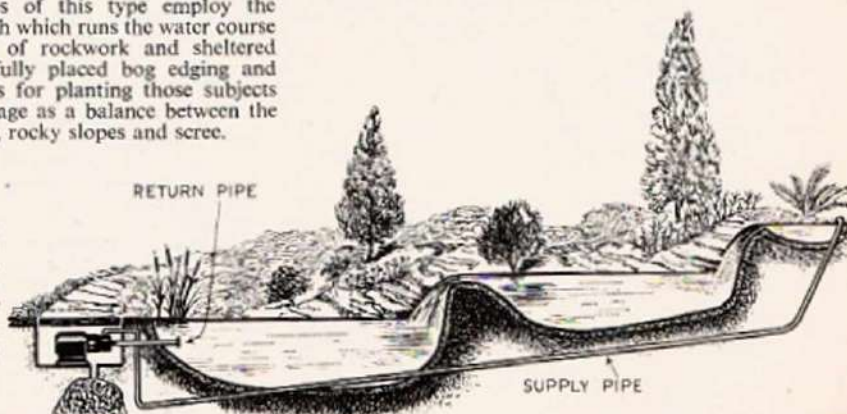


THERE is something fascinating about a waterfall and this is illustrated by the fact that people will travel many miles to see famous falls not only in this country but also abroad. It is not surprising, therefore, to find that when a water garden has provision for running water with falls in its lay-out this is the part which immediately attracts attention.

The enthusiast who has natural flowing water running through his garden in the form of a stream or even a spring is indeed fortunate. What so frequently happens, however, is that the person who would appreciate a stream for such a purpose possesses a garden devoid of anything so helpful and has to resort to the use of artificial methods to obtain the desired effect. This is made much easier if two factors are present, electricity and sloping ground. For easy operation electricity is almost essential but the ground level question is not quite so important, because in a garden where the surface is completely flat, varying levels can be built up to provide the necessary drop for falls.

A water garden in which it is intended to have falls and running water is usually designed on informal lines with any tendency to geometrical severity associated with the formal layout strictly avoided. Some of the most beautiful and successful water gardens of this type employ the "alpine garden" setting through which runs the water course with prominent outcropping of rockwork and sheltered pools. Here and there skilfully placed bog edging and areas of marsh offer facilities for planting those subjects which provide fresh, lush foliage as a balance between the actual water and well-drained, rocky slopes and scree.

Position of a pump when a series of waterfalls is to be served in an informal water garden. Here the pump is set beneath a movable slab of paving and the cavity in which it is placed is fitted with a sump to prevent flooding.



The small, modern, electric centrifugal water pump is an efficient piece of mechanism, surprisingly powerful and comparatively economical to run. Although certain modifications are made in the design of different makes they operate on the same fundamental principles.

A series of blades mounted on a shaft collectively form the unit known as the impeller. This is enclosed in the pump casing or volute chamber and by way of the shaft, which is connected to the electric motor, is made to revolve at very high speeds. As the blades rotate the water is carried round and forced through the discharge pipe. The

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Add a Touch of Distinction to Your Water Garden by Including a Fountain or Waterfall in the Set-up

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revolving action of the impeller, driving the water with it, tends to create a vacuum at its axis causing water to rush into the volute chamber through the centrally placed inlet pipe. A pipe, the mouth of which should be protected with a filter screen to prevent the entry of debris, leads from the basin of the lowest pond in the water garden system and is connected to the inlet of the pump. Another pipe, taken from the pump outlet to feed the water back into the highest point of the water course, is the usual lay-out and completes the system for forced water circulation.

When constructing the water garden some sort of concealed housing is usually made for the pump and this can be situated at a point in close proximity to the lowest water level which, of course, will be the lowest pond. The question of concealed housing for the pump sometimes poses a problem for the beginner but there are quite a number of ways to do this, some of which not only provide concealment and adequate protection for the pump but are also capable of adding charm to the scene.

A Suitable Situation

First of all it is a good idea to look around and find out if there is a "ready-made" position where the pump can be situated with no unnecessary work involved. It might be a conservatory, greenhouse or perhaps a summer-house situated close enough to the site of the lowest pond. I might say, incidentally, that a small summer-house often looks quite well when placed near the side of a pool, especially if it is constructed of rustic work, and a pump could be adequately concealed in a small compartment under the floor of such a structure.

Another method is to construct a small sunken concrete

pit or box when the general concrete work is done. It can be situated near the lower pond and covered with a stone slab. Shrubs may be planted around to conceal the slab, or a garden seat, either rustic or stone, could be placed over the top in such a manner as to make it possible to move the slab when it is necessary to get at the pump. A concrete pit of this description should have a drainage sump incorporated in its base.

Skillfully placed rockwork around the slab or flagstone will also give excellent concealment offering attractive possibilities by the use of suitable planting in the soil-filled crevices between the rocks. Ornamental covering may also be employed in the form of an artificial well head, sun-dials, bird baths or, alternatively, the stone can be so placed as to become one of the flags in a paved pathway.

Position of Pump

When selecting the site for the pump, however, the question of the power supply to operate the electric motor should always be kept in mind. If a "ready-made" position is available, such as a nearby greenhouse or conservatory, the power may be close at hand, whereas if a separate housing has to be made the cable will, of course, have to be taken to the nearest suitable supply point.

Care should always be exercised when wiring the circuit of any electrical installation but where appliances are used in close proximity to water or damp conditions (such as to take power to water pumps) extreme care is necessary to ensure that correct principles are employed and, thereby, every measure of safety taken. Where any doubt exists the local electricity authority should be consulted.

The cable strongly recommended by the authorities is known as the mineral insulated, metal-sheathed cable which



There are several ways of concealing the pump used in a water garden. Here it is placed in an ornamental well head.

may be taken underground without the necessity of enclosing it in any protective tubing and details concerning the use of this can be obtained from the supplier. Another type of cable which can be used is PVC but this should be laid in galvanized tubing.

It is also recommended that a control switch should be included in the circuit at both ends of the power supply, i.e., at the point from which the supply is taken and another, if not already fitted to the pump motor as part of the manufacturer's specification, in the actual pump housing. This makes an added precaution against the possibility of

the control switch at the supply point being closed when some person is carrying out maintenance on the pump which might be situated in a position completely out of sight of anyone at the supply point.

If the horse-power rating of the motor should exceed $\frac{1}{2}$ h.p. there are certain regulations to be complied with and the particulars can be obtained from the handbook "Regulations for The Technical Equipment Of Buildings, 13th Edition, 1955"; the details will be found under Section 3 of the book. This handbook may be seen at most public libraries.

The pipes through which the water is circulated should, of course, be made from materials that will be non-injurious to the fish and plant life. Copper, zinc or galvanized pipe should be avoided. The new polythene piping would appear to have much to recommend it for this purpose. It is non-corrosive, flexible, can be sunk below ground level, is not affected by frost and is highly durable; it also compares favourably in price with other forms of suitable piping. If the pump is situated in a position above the lowest level of water and, therefore, a suction lift is necessary, the end of the intake pipe should be fitted with a foot valve. This may be obtained as a combined foot valve and screen strainer thus doing the work of a valve and a trap for debris.

Small Set-ups Possible

While it is true to say that a large area of ground offers greater facilities for laying out a water garden employing falls and running water with bold and impressive landscaping, this need not deter the enthusiast who has only a small amount of ground at his disposal. Extremely attractive gardens of small dimensions can be constructed in which falls and running water can be included. The important thing, when designing such a lay-out, is to keep everything in proportion and to scale the design to the area of ground available.

While designs of an informal style are generally the accepted setting for falls it is the formal pond and surround with which one usually associates the fountain. Here again the modern type of installation is compact, efficient and comparatively easy to assemble. Fountains may be operated by the small, centrifugal pump of the kind used for lifting water to run waterfalls but, of course, when used for this purpose the pump is forcing the water through the jets or the fountain nozzle.

Other forms of electrically-operated apparatus can be obtained which do not use the rotary principle to produce a fountain spray. The nozzle and power unit are combined to form a small complete unit and this may be placed straight into the pond with the nozzle just clear of the water surface. The waterproof cable attached to the unit is connected direct to the mains supply through a switch and it is ready for immediate use. These units are capable of throwing a spray 10-15 feet high. Adjustment is provided to regulate the height.

Alternative Positions

So frequently does one see fountains placed in a central position in garden ponds that it would almost appear to have become a custom whereas, if a little imagination is used, some delightful effects can be produced by selecting a different position, especially if this is supported by a little structural work at the time of installing the fountain mechanism. For instance, if the supply pipe from the pump is fitted with two or three nozzles along its length and taken along the side of the pond just above the water surface and set at an angle to throw the spray upwards and towards the centre of the pond, the result is quite attractive. With the rectangular-shaped pond where across two opposite corners bog edging is placed, one nozzle situated in each of the other corners, set at an angle to throw the spray towards the centre of the pond, provides a pleasing pattern

and greatly enhances the appearance of the plants in the bog pockets when the fountains are playing. Alternatively the nozzles may be situated centrally between the two sides of the pond but one towards each end so that the jets throw a vertical spray in front of each corner bog pocket.

When a fountain is used with a circular shaped pond the central position is undoubtedly the best but, of course, the round pond depends, to a great extent, upon the design of the immediate surround for the success of its appearance. A centrally placed rock island from which the fountain plays will often soften the severe, formal appearance of the pond, if so desired, especially if some of the moisture-loving

ferns can be persuaded to establish themselves in the crevices between the rockwork.

When constructing such an island the rocks should be cemented together so as to form pockets here and there into which soil may be packed. Some of the crevices between the rocks should lead down into these pockets so that the roots of the ferns can be securely planted. A little care when forming these pockets to ensure that an overhanging stone or rock is placed above these particular crevices will prevent the soil being washed out by any surplus overflow from the fountain jet. The ferns should preferably be planted in the late Autumn.

Culture your own livefood

Mikro-worms for Young Fishes

A DECADE ago a minute worm was introduced to fishkeepers in this country and given the convenient name of Mikro-worm (or Micro-worm), which was subsequently abbreviated to Mikro. It does not seem possible now that there ever was a "pre-Mikro" era, so universally has this livefood been adopted. The term Mikro covers several kinds of very small worms only just visible to the naked eye and if my remarks do not seem to apply to your cultures, perhaps you are in possession of a different variety.

It is quite likely that our cultures each consist of several varieties. However, Mikro-worms are greatly appreciated as food by all young fish after they have left the Infusoria or green water stage. The fry grow rapidly once they are large enough to assimilate this easily-produced form of body building protein.

High Rate of Production

Mikro-worms are livebearers and, if kept under favourable conditions, will multiply at an amazing rate; a spoonful of worms and media producing sufficient offspring for the aquarist to start feeding them to his fish within a few hours.

The production of Mikro-worms is very simple. All that is needed is a covered dish, such as a glass casserole, enamelled dish with a sheet of glass on top or a plastics sandwich box from one of our popular chain stores. Something with a lid is essential, as it prevents undue evaporation and the entry of flies, ants and other unwelcome intruders. Do not, however, have the lid fitting too tightly, as the worms, in spite of living in a semi-liquid, must have plenty of air.

The food for culturing the Mikro is the same as I recommended for Dwarf White Worms in the last issue—simply ready-cooked baby cereal mixed with lukewarm water to form a creamy paste. Do not boil the cereal and do not use milk as it will only turn the medium sour in a very few hours. There are many different brands of ready-cooked baby cereals at your chemists and all of them appear to be equally effective. They also contain dried yeast, so there is no need to add any more. If you do, the mixture may begin to ferment when it is warmed up.

A large starter culture of Mikro-worms is not necessary, just enough to cover the proverbial sixpence is more than sufficient as Mikro are so prolific. For this reason, too, the

By

Frank Arnold



utmost care should be taken to ensure that Mikro-worms do not get into your stocks of White Worms or Dwarf White Worms. The cultures should be kept as far apart as possible and all apparatus that has been in contact with Mikro should be immediately washed in boiling hot water.

If these precautions are not taken Mikro-worms will surely enter into your other worm cultures, and just as surely oust them from their rightful place. If this happens drastic measures will be necessary. Jettison the infected cultures and start anew. There is no other effective way.

Sufficient of the baby cereal food is mixed with lukewarm water to form a creamy paste. The consistency of this paste is important. If too much water is added it will separate out on standing and form a layer of liquid on top of the paste and the worms will not thrive. If too thick, the worms will have difficulty in moving and the medium will quickly dry out. Pour the paste into the receptacle so that it covers the bottom to a thickness of about $\frac{1}{4}$ in. The worms only inhabit the surface of the medium so, if you have it thicker, there is only so much more to decompose.

Next, stir in your culture of worms. Do not just pour them in one spot; stir them in with a stick or spoon so that they are present all over the medium. Cover the worms with a lid or piece of glass and place near a source of heat so that they keep at about 75 deg.F. Soon the worms will start to crawl out of the medium and up the sides of the dish. They can then be brushed off with a camel hair brush or scraped off with a razor blade and fed to the fish.

Feeding Infusoria

After feeding, rinse the brush in a large jar of tank water and in a few days you will have plenty of Infusoria also! If you want green water just keep the jar where it can get some sunlight and you will soon have plenty. This green water can be used as a first food to bring up fish fry or poured into an old tub to feed a small culture of *Daphnia*! The good aquarist wastes nothing.

There are many other ways of cultivating Mikro. One which I have used for many years is to put a layer of the

worms and medium into 1 lb. jam jars, place a few icelolly sticks therein and then wash the sticks in the tank as soon as the worms have crawled up them.

An interesting refinement in Mikro-worm feeding is to obtain a small test tube, get it red hot over a gas jet and pierce with a needle so as to leave a small hole in the bottom when it cools. This tube can then be fastened to the side of the tank with the top just above the surface of the water. The Mikro can then be brushed or scraped into the tube and, according to the size of the hole and the amount of worms, a varying quantity of livefood will be released over a long period.

To keep the Mikro culture sweet it is a good plan to stir it daily so that the medium is thoroughly remixed, and also to throw away at least half of it about once a week, adding sufficient new medium to bring it up to the same quantity as you had when you started. In this way cultures can be kept going almost indefinitely and also kept sweet smelling as well. There is no need to have smelly cultures; they are a sure sign that something is wrong.

Mikro is nothing if not accommodating and it can be kept at a very low temperature if not required for immediate use, when it will increase very slowly. It also has the power of resisting desiccation, and an old culture that has dried up and been stowed away can nearly always be brought to life again by the addition of a very little water.

In addition, although not an aquatic worm, Mikro will live for a long while in a tank if not eaten by hungry fry, and can be seen some time after being put into the tank.

A variety of Mikro known as the "vinegar eel" can sometimes be found free-swimming in a bottle of vinegar, especially if the vinegar has been watered down.

To sum up; use a covered receptacle in which to culture the medium; mix up a creamy paste, not too thin, and stir in the starter culture so that it spreads rapidly; keep at 75 deg.F. minimum. Stir the culture up daily to aerate it and discard half the culture weekly, making up the bulk with a fresh quantity of creamy paste. Above all, keep your Mikro away from your White Worms and Dwarf White Worms.

For Those New to Fishkeeping . . .

Setting up an Indoor Aquarium

By C. Woodland

SOME folk start in fishkeeping by being over-cautious, others let their new found interest get the better of them. A compromise is best, consisting of a medium-sized tank, moderately priced fishes and nothing very extravagant in the way of plants.

The most suitable size for the beginner's first tank is one 24 in. long—neither too small to make management difficult, nor too large to make stocking it unduly costly. Certainly resist the temptation to have a tank less than 18 in. long unless you plan to keep the really tiny fishes. You will find that a container any smaller will prove frustrating in just a few weeks as you see more and more lovely fishes you would wish to own but dare not for fear of overstocking.

Avoiding Problems

Further, there are bound to be some minor mistakes in tank maintenance during the early stages. Just a little uneaten food in a small tank can cause trouble, whereas a larger volume of water has a chance of adjusting itself. Larger sizes of aquaria can be used and are even preferable for the bulkier coldwater fishes, but there is a lot to be said for beginning with a tank of manageable proportions.

A light canopy of some form will be needed if the aquarium is to be a decorative feature of the room and especially if strong sunlight is absent. These light hoods are in various designs.

What wattage light to use often troubles the novice and a useful formula for sorting this out is:

$$\frac{\text{Length of tank (ins.)} \times 32}{\text{Number of hours the light is on}} = \text{Wattage needed}$$

Working this out for a 24 in. long tank where the light will be on for ten hours per day, shows that a 75-watt tungsten lamp or strip light will be needed.

But fishkeeping cannot be done with the precision of mathematics and each tank varies in its lighting requirements, depending on position of the aquarium, what type of plants are included, etc. etc. If the water goes green too much light is being given whilst, if a brownish scum forms on the glass panels and the plants do not make satisfactory growth, inadequate light is no doubt the cause.

For a first attempt at setting up a tank use standard

products; medium grade aquarium gravel with a moderate amount of rockwork to match is satisfactory. Aquatic plants are available in quite astonishing and confusing diversity. A very useful and economical way of stocking the aquarium initially is to buy one of the mixed plant parcels offered by our advertisers. In this fashion it is possible to find out for yourself which plants thrive under the conditions you are able to provide. Some of the species will die back, others will flourish and provide cuttings or off-sets to fill in the gaps.

A little later on rather more expensive specimen plants can be bought—Nuphars (Spatterdocks), Amazon Sword Plants and *Echinodorus* for tropical tanks plus the rewarding *Cryptocorynes*, slow growers but remarkably tolerant to changed conditions.

The gravel and rockwork are washed really thoroughly and put in the tank. Then a sheet of newspaper is spread on the bottom and water poured in gently (a percentage of boiled tap water if the mains supply is exceptionally hard). When the tank is nearly filled with water, remove the newspaper.

Time for Planting

Allow the water to settle for a day or two and connect up the heater and thermostat if the tank is a tropical one. Then the plants can be introduced, setting the fine-leaved subjects from cuttings in small bunches to get a massed effect. Some designs that could be adapted were given in our October, 1956, issue. Finally, top up the tank.

If the back of the aquarium is a plain glass panel some form of exterior background will improve the appearance considerably. Sheets of paper stuck to the aquarium frame with adhesive tape are as good as anything. Do not use backgrounds that are too ornamental; remember that the idea is to focus attention on the tank occupants. Some aquarists use light blue or green backgrounds, but black is by far the most popular and adaptable, although sheets with a grey stone effect are now widely used.

The tank can then be left for a further day or so with reasonable illumination provided, so that the plants can dig their roots in before fishes are introduced. Suitable fishes will be listed in the next issue.

Avoiding Rust on Aquarium Frames

Zinc-rich Paints Can Prevent Excessive Corrosion

By C. W. Massey

MANY of us who obtain a new aquarium become very concerned when, after months of use, the enamel blisters and lifts away from underneath the top angle iron of the frame. If the parts affected are rubbed down with abrasive paper and a fresh coat of enamel applied it is not long before we are back again with the enamel leaving the metal and showing the unsightly appearance of rust corrosion which continues to spread causing deterioration of the metal in time to the extent of deep pitting. Tanks with galvanized frames can, of course, be had by special order, but are more expensive.

If enamel or any good quality paint is applied over a slightly rusty iron or steel surface the rust will continue to spread underneath the paint film and, in time, will cause the enamel again to lift and come away. Before dealing with the way in which we can try to prevent this we should know something of why the angle iron tank frame is so prone to rust corrosion.

The common approach to the problem is to prevent the corrosion of ferrous metal by applying paint films formulated to exclude air and water from the surface to be protected. Unfortunately paint films are not completely or permanently impervious to water or humidity. If the coating is applied faultily, leaving tiny pinhole gaps, or is broken through by abrasion such as the scraping action of the light hood on the top of the aquarium, rust will

has been demonstrated by Dr. Ulick Evans and his research workers. The importance of this corrosion mechanism is that corrosion occurs only at the anode; hence the extreme causes of pitting due to the non-uniform incidence of corrosion attack.

Such coatings as zinc are anodic to iron and steel and, while they remain intact, no corrosion of the underlying metal in the vicinity is possible. Such a metal as zinc only corrodes one twentieth as quickly as steel in normal humid atmospheres. This metal has been used for a number of years in the process of hot dip galvanizing, sheradising and in metal spraying, such as the spraying of molten particles of metal on to a perfectly clean shot blasted surface. Where such methods have been used the protection conferred has been superior to paints in that such coatings give cathodic protection in addition to physical protection.

A Recent Discovery

The application of zinc by the thermal or electrical process requiring specialised plant and labour has for some considerable time been available to us but it has only been within recent years that the application of heavy deposits of zinc have become available in paint form. This zinc-rich paint actually shows a metallic zinc content of dried film as high as 92-95 per cent. It is touch dry in 30 minutes, firm and hard in four hours. Colour is light grey matt; temperature resistance is up to 240 deg.F.

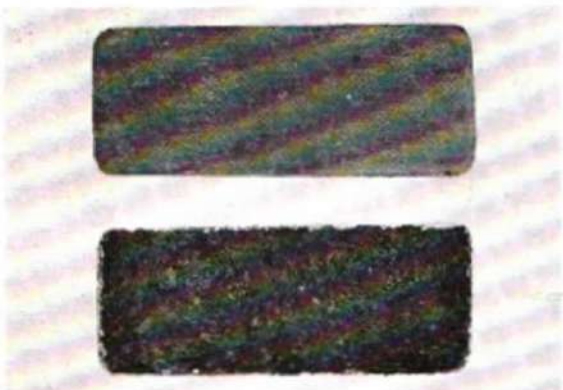
The adhesive properties depend on the special binders but bond of hardness of coat will improve progressively and this can be hastened by soaking with water once the coating is hard dry. As a finishing coat it should not be subjected to abrasion or impact. If, however, the surface is broken through—and this is worth knowing—rust will form on the exposed underneath metal but will not spread sideways due to cathodic protection.

The corroded part can be covered again with zinc. The corrosive resistance is superior to red lead paints and similar inhibitory paints and is comparable to hot dip galvanizing. Obviously a top coat of a suitable paint will enhance the performance particularly if conditions are alkaline or acid. In this case a chlorinated rubber paint has proved most satisfactory. One of the chief advantages of cold galvanizing is that it can be brushed on over existent rust that has had the loose rust and scale removed with a wire brush.

Cleaning the Aquarium Frame

Let us assume we have a bare metal steel aquarium frame to process and this frame is covered with rust. All loose rust and scale should be thoroughly wire brushed or scraped off. Any rust that is not loose can be left, for it will be simply converted to harmless, conducting black oxide of iron. The whole of the frame is given a full brush coat of zinc-rich paint. When this is dry a second coat should be given, particularly to above and underneath the top angle iron of the frame.

In the case of a glazed secondhand tank all loose rust and old paint should be removed and particular attention must be paid to underneath the top angle iron where so much corrosion occurs. Owing to the possible toxic effects of zinc it is advisable to paint over the zinc coating and so give added protection and enhance the appearance. The paint most suitable for water conditions is chlorinated



Photograph [WATER LIFE] Reverse sides of a piece of metal which had been fully exposed to the weather for 4½ years. Above:—Side treated with two coats of zinc-rich paint before being put outside (cleaned just to remove dirt prior to being photographed). No rust was present under the paint. Below:—Untreated side of the metal heavily corroded with rust and showing deep pitting.

immediately appear, and will creep sideways underneath the paint causing it to lose adhesion.

The corrosion of metal is always accompanied by certain electrolytic phenomena; it is a fact that there is a flow of electric current between numerous areas in a metal surface which have different electrical potentials due to intrinsic chemical or environmental differences in the metal itself. In the presence of moisture, electrolytic cells are set up and ions flow between the anodic and the cathodic areas, the moisture being the electrolyte or bridge. These currents are measurable and the corrosion of metal by this means

rubber or latex paint, but this is affected by most glazing compounds if applied to inside the frame, so should only be used on the outside and edges of the frame and underneath the top angle iron where the glazing compound does not make contact. Any good quality paint can be used but not tar or bituminous paint.

Apart from chlorinated rubber paint I have found synthetic enamel, cellulose enamel and a good quality oil-bound paint satisfactory. If it is desirable to get a high-class finish on the outside of the frame, two coats of primer-filler should be brushed on and, when thoroughly dry, should be smoothed down by abrasive paper and the final coat of enamel applied. It is not really advisable to brush cellulose over an oil base filler coat as there is the danger of the filler coat lifting due to the stringent action of the

cellulose solvents. Bright new steel surfaces should be allowed to weather and it is most essential to remove any traces of grease. Carbon tetrachloride is a suitable grease solvent but care should be exercised not to inhale the fumes and the work should be done out-of-doors.

Any desired thickness of zinc can be built up by adding various coats after the previous one has fully dried and is hard. The coverage of zinc-rich paint on a weathered and rusty surface can be 21 sq. ft. per lb. for a single coat so it will be seen that there will be sufficient material in a 1-lb. tin to process several aquarium frames of standard size. Before using this material it is essential to stir the contents of the tin very well to ensure a complete dispersion of the zinc particles; this is most important as it is essential for the zinc particles to be in electrical contact with each other.



Pom-pon ideal. Note enlarged nasal septa, short and deep body, fins long and pointed and divided tail fin.

Goldfish Society's Four New Basic Varieties

Provisional Standards for Bubble-eyes,
Pearl Scales, Celestials and Pom-pons

By R. J. Affleck, M.Sc.

(President, Goldfish Society of Gt. Britain)

ALTHOUGH over 100 different varieties of Goldfish are known there are really only a few variations of the wild-type characters. The 100 or so varieties merely represent different combinations of the few basic variations.

The main variations that were available in Britain in 1948 were as follows:

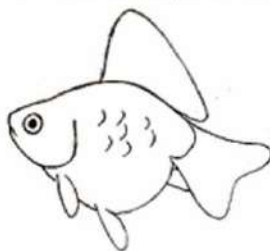
Body—long and slim	or short and deep
Fins—short	or long
rounded	or pointed
Dorsal—present	or absent
Eyes—normal	or protruding
Head—normal	or bramble growth
Reflecting tissue—full amount/intermediate/little.	

Everybody knows that energy and enthusiasm spread over many enterprises is certain to be dissipated and the Goldfish Society of Gt. Britain decided therefore to concentrate its efforts on four basic varieties which would include the above variations and, what is more important, which could not be bred as throw-outs from other varieties. This policy has been successful.

Since 1953, however, four additional major variations (the Bubble-eye, the Pearl Scale, the Celestial and the Pom-pon) have become available in this country and so it

STANDARD PEARL SCALE

In the Goldfish Society's provisional standard for the Pearl Scale the body is short and deep, the fins short and the tail fin double. The scales are domed.



was inevitable that the G.S.G.B. should investigate the new characters and eventually recognize additional varieties.

When the original four basic varieties were being considered there was a considerable amount of data available on the fishes and so it was possible to make

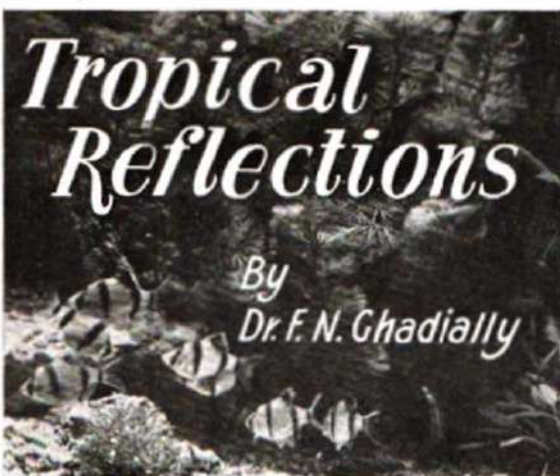


G.S.G.B. Celestial (eyes protruding upwards, body short and deep, short fins, tail divided, dorsal fin absent) and Bubble-eye (fluid-filled sacs beneath eyes, body short and deep, short fins, double tail fin, dorsal absent).

definite standards. These standards, which are almost 10 years old, have stood the test of time.

With these later major variations comparatively little is known of their breeding potentials and all specimens seen have a number of undesirable features (poorly shaped bodies, especially) so it is not possible to make definite proposals at the moment. In spite of the lack of detailed information, members who were interested in the new varieties needed guidance when selecting young fish and it is for such aquarists that the G.S.G.B. has issued four provisional standards, illustrated here. These will be reviewed when the new varieties have been developed.

Intermediate characters have been avoided in the new standards, i.e., the bodies and fins are not intermediate in length or depth—as it has been shown conclusively that the recognition of intermediate characters leads only to deterioration in strains. It is interesting to note in this connection that Nymphs, Fantails, etc., are recognized in China and Japan only as throw-outs and are, therefore, discarded.



[Roy Skipper photograph]

FEEDING fishes is quite a problem during the Winter months but with the advent of Spring and livefoods in the ponds this difficulty rapidly vanishes. Without doubt the most important single livefood is *Daphnia* but there are numerous others which are often overlooked by aquarists. One such item is frog tadpoles. While large sized tadpoles are only suitable for feeding Cichlids and Goldfish, newly hatched ones are often acceptable to medium sized tropicals. Frog tadpoles are good scavengers and will clear a tank of either Brown or Green algae. There is no problem in obtaining large numbers of them. During the early part of Spring large quantities of frog and toad eggs may be found in small ponds and ditches. These are jelly-like masses studded with numerous small, black, spherical pepper-seed like bodies. It is easy to distinguish frog spawn from toad spawn as the photographs show. It will be observed that while the black eggs or embryos are scattered more or less homogeneously in frog spawn they are arranged like beads on a string in toad spawn. Toad tadpoles are invariably rejected by aquarium fishes whilst those of frogs are relished.

It is best to bring home a quantity of frog spawn and allow the eggs to develop into tadpoles in containers such as water butts, old sinks or aquaria. Aeration is helpful when a large amount of spawn is handled in a small container.

Easing *Daphnia* Collection

MOST people consider that one of the necessary pieces of equipment for a *Daphnia* collecting expedition is some form of private transport, such as a car or a motor bike. Most of us have, some time or another, had the embarrassing experience of being stared at by the masses or followed by hordes of little boys in the streets arguing loudly as to the nature of the object or objects concealed in our cans. This has acted as a strong deterrent to many aquarists.

However, this embarrassment can be avoided by carrying *Daphnia* on small trays stacked in a tin or similar container instead of in cans of water. The framework of these trays is made from strips of wood and the base consists of a piece of cloth, preferably nylon, tacked on the frames. The trays are dampened thoroughly and then the *Daphnia* are spread out in the tray to form a layer of about $\frac{1}{2}$ in. to $\frac{3}{4}$ in. thick. These trays are so constructed that when stacked an air space is left between adjacent trays. If the *Daphnia* are kept moist and cold they can survive in this state for many hours.

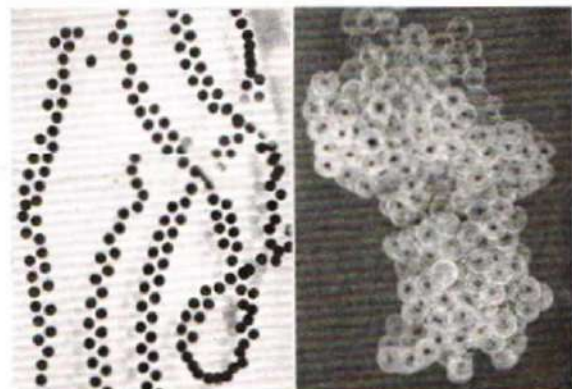
This method of carrying *Daphnia* is very space and weight saving. A single 6-inch square tray can hold as many as can be safely carried in the popular 12-inch diameter fish can. Thus a small, light biscuit tin can bring home more *Daphnia* than many cans of water. The net shown on the next page is 10 in. in diameter and is fixed on an aluminium pole, but it would not be difficult to make a smaller net or a collapsible net (just like some anglers' landing nets) mounted on a sectional pole which could be easily and inconspicuously carried. With such equipment aquarists who have no private transport can go *Daphnia* hunting without embarrassment.

Glowlight Tetras

BREEDING Glowlights is no mean feat. This Characin is undoubtedly one of the difficult-to-breed fishes. Some aquarists consider that it is only a little less difficult to breed than the Neon. I tried for a long time to breed Glowlights but without any success. I adjusted the pH and the hardness of the water to the recommended values but it made no difference. Indeed numerous attempts in waters ranging in pH from 6.2 to 7.2 and hardness of 0.5 to 3 deg. (German) failed to produce the desired results over a period of about two years.

Numerous pairs were used during that time to exclude the possibility that the fish were at fault. There was never any difficulty in obtaining eggs. Almost all the pairs laid large numbers within a few hours to a day of being brought together in a spawning tank, but none ever hatched. Various spawning set-ups using finely-leaved plants and willow root (WATER LIFE, February, 1953 issue) were tried but again with no avail. Neither did covering the tank up to exclude the light improve matters.

As the crux of the whole trouble was that the eggs were going bad I added some acriflavine to the water after the eggs were deposited, just as we add acriflavine or methylene blue when hatching out Angel Fish eggs. Only two youngsters developed from these spawnings. I now thought it might be a good idea to put in acriflavine in advance so I added enough acriflavine to attain a concentration of 1 mg. per gallon in a bare tank containing tap water (pH. 6.8, 1.5 deg. German hardness). I let this stand for a couple of days and



Photographs [Dr. F. N. Ghadially]
Left: Strings of toad's eggs. Right: Mass of frog's spawn.

then added a portion of boiled willow root and introduced the pair into the tank.

An hour or two later I was rather surprised to see that the water was crystal clear, all the yellow colour, due to the acriflavine, had disappeared. I had not bargained for this but there is, of course, no difficulty in explaining the phenomenon. The willow root adsorbed the dye. I felt the idea had failed but nevertheless I left the fish in the tank and they spawned the next day. I removed the parents and excluded

most of the light by covering up the tank with the towel I keep in the fish room, for wiping my hands on.

The next day I expected to find the usual chalky white eggs, but when I did have a look I was pleasantly surprised. As I moved the towel aside the cover glass moved and drops of condensed water fell into the tank. This was followed by a shower of glass-like splinters dropping from the willow root to the bottom of the tank—Glowlight fry!

It was about three to four days before the fry became free-swimming and there was no further trouble in rearing them by adopting the usual procedure. Since then I have used this technique many times. Best results so far have been 120 fish reared from a single spawning though the average number obtained is quite low; only about 30. This is not really good enough as these fish often deposit 300 to 500 eggs. There are some aquarists who have reared



LIVEFOOD COLLECTING BOX

Dr. Ghadially's photograph of the box he uses for transporting Daphnia. The trays fit into the box and each is layered with Daphnia to a depth of a 1/4 in. The light-weight collecting net has a pole of aluminium.

over 300 fish from a single spawning without acriflavine. Probably their water is more suitable for breeding these fish than that which is available in Sheffield where I live. However, I am passing the idea on for the benefit of those who have failed to breed this fish by conventional methods.

Many of my friends have now tried this "acriflavine adsorption technique" and succeeded. This must not be confused with the well-known technique of adding acriflavine or methylene blue to prevent eggs going mouldy. In the acriflavine adsorption technique there is no acriflavine in the water when the eggs are hatching, the water is crystal clear.

How it acts is anybody's guess. One suggestion that can be made is that it probably "cleans" the water by killing off bacteria and Infusoria which may be harmful to the eggs. Having done this work, it in turn is got rid of by the willow root, leaving behind water which is fairly good for breeding Glowlights. If nylon wool or nylon scouring pads are used (WATER LIFE, December, 1955) as spawning media they will not adsorb the acriflavine. Spawnings in such tanks containing acriflavine have yielded very poor results.

I have now employed this technique for other Characins and feel that it enhances one's chances of success. Since discovering the method it has come to my notice that a similar technique was used by D. L. Jacobs and described some time ago in an American journal. He recommended this method not only for Glowlights but also for Neons.

Effect of Light on Fish Eggs

WHETHER light is detrimental to the eggs and fry of fish, particularly fish such as Glowlights and Neons, is a debatable point. I myself have been rather sceptical in the past about the injurious effects of light but, since my experience with Glowlights, I think there may be some truth in it. About the effect of light on eggs one cannot say a lot without performing proper experiments. Anyone who has bred Glowlights must have observed that the

young fry simply abhor the light. Even a week or two after they have become free-swimming they still show this peculiar photophobia.

For instance I noticed that every time I moved even a corner of the towel covering my Glowlight tank to peep in I saw fry dashing about to hide in the dark corners or under the willow root. Of course, this behaviour could have been produced either by the entering light or by slight vibration created during moving the towel. I therefore shone a shaft of light from an electric torch into a dark corner of the tank and the fry again scattered in panic in all directions.

Now, as is well known, Fighter, Zebra Fish and Tiger Barb fry—to take just a few examples—do not behave in this peculiar manner; they actually go to the surface seeking light and certainly do not run away from it. It is difficult to understand the meaning of this difference in behaviour. Infusoria and *Daphnia* also go towards the light and no doubt most fry do the same for the very good reason that that is where they are likely to find their natural food. How Glowlight fry manage to find sufficient of the Infusoria we put in their tanks I do not know. Be that as it may, the fact remains that these fish do not like the light; that might not be the same as saying that light is actually injurious, but I like to play safe and cover up the tanks.

Colour Intensity in Glowlights

THE beauty of the Glowlight is mainly dependent on the intensity and brilliance of the glowing red line that runs across it. It is therefore very disappointing to find that after overcoming numerous breeding difficulties the young fish show only a pale orange or a lemon yellow line rather than a brilliant vermilion one.

Nobody really knows the answer to this problem. From my experience I feel that it is mainly a matter of breeding from good stock to begin with and carrying on with only the best youngsters later on. Some believe that it is a matter of pH, the introduction of peat and water conditions, whilst others say it is the diet. I know a very successful Glowlight breeder who insists that feeding *Cyclops* puts colour in his Glowlights. Anyway this is an extremely interesting fish to pit your skill against, so why not have a try?

Midget Submarine

I SAT quietly by a pond and watched a group of female Sticklebacks excavating in the mud—sucking up great mouthfuls. Apparently their sensitive mouths were able to sort out the bits of edible matter; then, with a mighty huff, they blew out the unwanted mud and soon their meal caused quite a "fog" in the otherwise crystal clear water.

Suddenly there was a flash of green and silver, as a male Stickleback darted through the fog—stopping just as abruptly as he came, by violent back-peddling of his fins. He moved among the female fish until he found the one he was looking for. Then he drove her over to the nest which he had carefully prepared—having previously wriggled his own body through, apparently to ensure it was the right size!

When he thought his chosen mate had been in the nest long enough, he bit her tail, which was protruding from the "back door". She went—her job completed and the eggs laid. Now father Stickleback became "lord of all he surveyed"—tending the eggs with the utmost care.

I watched a large, sleepy Carp drifting towards him. Father Stickleback, with all his senses alert, felt the vibration of the intruder from a long distance off and, with his spines projecting vertically and rigid on his back, he dashed into battle. He knew just *where* to attack this large fish, so many times bigger than himself. Like a midget submarine, the Stickleback, using the sharp spines on his back, jabbed the innocent Carp under its stomach—causing a hasty retreat!

—JOAN BLEWITT COX.

one takes a number of lines and crosses them together, then some will show up with excellent first cross hybrids, whilst others will not give anything worth looking at. In general, however, the hybrids do frequently tend to show hybrid vigour and to be better than the parents, particularly if the parents are somewhat degenerate in appearance as a result of inbreeding.

My most extensive experiments have been with the Neon Tetra (*Hyphessobrycon innesi*). My own strain of Neons had reached its fourth generation in my tanks about two years ago and had undergone an unknown previous number of generations of inbreeding. Although the fish were quite satisfactory in appearance and size, they were poorly fertile, rarely giving me more than a dozen per batch and very often giving me none or only one or two in an attempted spawning.

Results with Neon Tetras

A little while ago I acquired a new batch of German-bred Neons which had almost undoubtedly undergone a number of generations of aquarium inbreeding and were, therefore, very suitable for a first experiment. These I found were also poorly fertile with one another, although somewhat more fertile than my own. I, myself, had recently not been able to produce more than 17 Neons at a spawning from my own fishes and with the new ones I once obtained about 30, but that was the best I could do. On crossing the two lines I found that, although I had a number of poor batches, I got for the first time several of round about 100 young per spawning.

Upon breeding these fishes more extensively it furthermore appeared that only one of the two possible crosses between the two strains was in fact highly fertile. This was the cross between my own males and the new German females. The reverse cross was very poor in fertility indeed. Offspring from these crosses have evoked very favourable comment and are themselves quite fertile. They are large, vigorous fishes, growing well beyond the size of their parents and with good coloration which they curiously enough develop rather late—particularly the red. However, by the time they are half-grown fishes, aged about three months old, they are very fine-looking specimens.

Encouraged by the results with Neons I went on to experiment with a number of other fishes. The Blue Gularis (*Aphyosemion caruleum*) gave me virtually the same type of result. A strain of Blue Gularis coming from America about four years ago had been maintained in my own tanks with great difficulty, being so poorly fertile that I had almost lost them. A little over a year ago I obtained further Blue Gularis from Germany and, upon crossing with my earlier strain, produced very much greater fertility. "Hybrids" from this source are now breeding easily in my own tanks, the only peculiarity is that a considerable preponderance of males always seems to occur. As it happens this is not a great drawback since the male Blue Gularis is the show fish.

Unusual Effect with Cherry Barbs

With Cherry Barbs (*Barbus titteya*) the results were equally successful. There is a strain of Cherry Barbs which has been tank bred in Australia for something like the past 20 years. Recently, of course, new strains have been arriving and I chose to cross the very long established Australian female fish with new, wild-type males from Ceylon. I have never seen such fertility in Cherry Barbs and can easily obtain 300-400 per spawning with the added advantage that for some curious reason the eggs and young of the hybrids are not all eaten by the parents.

A local dealer to whom I sold some of the offspring astonished me by showing me a tank consisting of 100 or so adult Cherry Barbs together with several hundred young at different stages of development—a sight that neither of us had seen before. This in a fish notorious for eating its own eggs!

With Zebra Danios (*Brachydanio rerio*) I used new



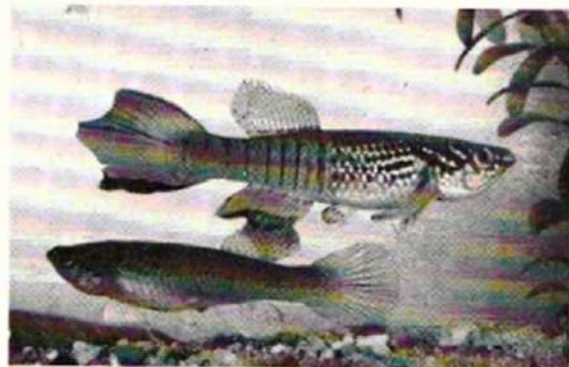
Photograph] G. J. M. Timmerman
Increased fertility and a disinclination for the parents to eat their eggs resulted when unrelated Cherry Barbs were crossed.

importations from India and crossed them with my own long inbred stock and the same with *Epiplatys chaperti*, crossing unrelated stock both ways. The local strain of *Epiplatys chaperti* is not at all colourful and somehow has, on the way, lost the characteristic red under the jaw. While the newly imported strain had this it again was not outstanding, but the hybrids produced from them are really beautiful fishes. I am now in process of breeding from these hybrids but have not yet had the opportunity of seeing what the second generation adults look like.

About the only fishes which have not given the hoped for result have been Giant Danios (*Danio malabaricus*) and Spotted Danios (*Brachydanio nigrofasciatus*). For some reason the particular strains that I have been trying to hybridize, although giving some offspring, have not shown the type of result outlined above. However, as will be seen from this account, the percentage success has been extremely encouraging.

It seems, therefore, a sound recommendation for breeders to try as far as they can to cross unrelated stocks for the production of tropical fishes. It appears likely that a few generations after hybridization has occurred it will be necessary to run further crosses as the gain cannot be expected to last for ever. A really ambitious plan, of course, but one rather difficult for maintenance of more than a very few species, would be for a commercial breeder to maintain two or more independent lines of inbred or semi-inbred fish of each species and always to cross these when producing

(Continued next page.)



Photograph] G. J. M. Timmerman
The Blue Gularis, another species which showed hybrid vigour.



Cherry Barbs
reared
used.

Tea-chest Vivarium

An Easily-made Indoor Enclosure for Reptiles

By D. O. Carr

BEING rather short of space for new additions to my collection of reptiles some time ago I decided to try to convert two tea-chests into vivaria. These have now been in use for a considerable period and I feel it is safe to say that they have filled the bill admirably. No doubt others would care to try fitting some up, especially as it is so simply done, with no intricate woodworking involved.

The first thing needed is, obviously, a tea-chest; this should preferably be a new one and an undamaged one at that. If possible, it is as well to obtain one of the large ones that have the slats down the sides and round the bottom as these are a far stronger job. After stripping out all the tissue and lead foil lining, the box is laid on its side, and a start can be made in fixing the front frame which will hold the glass and lamp fitting.

As there would appear to be various sizes of chests on the market, I will not give specific measurements but just the placing of the various pieces of wood. Reference to the diagram will help.

Materials Required

First of all, two pieces of tongued and grooved boarding 5 in. wide by $\frac{1}{2}$ in. thick are screwed along the top and bottom (B and C). The piece B has the tongue planed off and is screwed at either end, so that it is flush with the top edge of the box, the groove pointing downwards. The piece C, also with the tongue planed off, is screwed in a similar way flush with the bottom edge of the box. Before screwing B and C into position it is as well to bore the ventilation holes and tack pieces of perforated zinc over them on the inside. This saves work later on.

The pieces marked A are lengths of lathe cut to fit snugly between B and C. They are screwed, using countersunk-headed screws, flush with the sides of the box. It will be found that these more or less coincide in thickness with the groove edge of B.

When B and C, also the pieces of lathe A, have been fitted, two further pieces of lathe D are cut to fit along the length of the side, to give a neater finish.

A piece of window glass is now cut to fit the frame so formed, the measurements being D to D x B to C + $\frac{1}{2}$ in. It is inserted into the groove of B, and rests along the top of C. To stop the glass from being pushed out, a thin slat of wood, E, is glued along the front edge of C. In this connection, care should be taken that the glass is not a tight fit between B and C. There should be enough "play"

Hybrid Vigour in Fishes

(Continued from previous page.)

young for the market. Then, like the producers of hybrid corn, he would be selling a very uniform stock of good, fertile fishes and maintaining the parent strain from which to go on producing this stock indefinitely.

Variation in tropical fish is usually much smaller than in many domestic animals or plants and so purchasers of hybrids will not be disappointed by finding that their breeders are giving a lot of runts or useless progeny. On the other hand, within a few generations it must be expected that other strains would have to be crossed with them to prevent degeneration. That is where the originator of the hybrids, maintaining his parent stocks intact, would score, for he would be able to go on producing vigorous crosses indefinitely as long as his parent strains were sufficiently fertile to keep going.

for it to be lifted up into the groove of B to enable it to be withdrawn over E.

To lift the glass out a small suction disc, such as is supplied for aquarium thermometers, is applied to the bottom edge of the glass, in the middle. The glass can then be lifted up into the groove, out over slat E, and lowered, when the top will slide out. When in position, the glass is held in at the

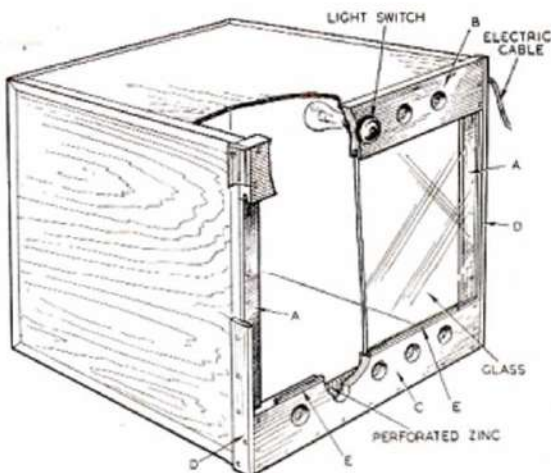


Diagram showing how a tea-chest may be converted into a vivarium by inserting a glass front and a light-bulb.

bottom by E, and at the top, by that small part of it which projects into the groove of B.

All that now remains to be done is to fit a batten lamp-holder in the inside at the top, preferably at the back of the middle of B. This is connected to a switch, which can be situated on the outside of B opposite the lamp. The lead to the mains is run along the inside and brought out near the top, as shown in the diagram. Make sure that the cable is a tight fit in the hole, to prevent the egress of small snakes or lizards. It will be found that a 60-watt bulb will give a temperature of 60-70 deg.F., depending on outside conditions. As a refinement a thermostat can be used in conjunction with a higher wattage bulb to give a more even temperature.

A coat of bitumastic or other waterproof paint round the bottom, and white or cream paint for the rest of the interior, gives the vivarium a bright appearance. To show it up well, dark green or black paint should be used for the outside of the case.

A word of warning—some may be inclined to use the grooved wood for sliding the glass in from the side. It is as well not to do this, as besides a fair amount of room being needed for this manoeuvre, the grooves will ultimately become clogged with sand, etc., which will cause the glass to jam and could result in accidents.

The total cost of such a vivarium should not come to more than about 15s., although a lot depends on the price of the tea-chest, and this seems to vary.

Marine Aquarium Keeping (7)

Anemones for the Seawater Tank

By J. S. Vinden

LAST issue we discussed some aspects of Sea-anemone culture and in this article I shall begin by describing the Plumose, Beadlet and Dahlia species.

The Plumose Anemone cannot feed on large pieces of food and in a state of Nature lives on the small animal plankton. Many books suggest dropping finely minced food on the disc. I have not been successful with this method and I lost my original stock. Since then I have acquired seven more individuals of various sizes and colours. I have fed them daily on newly hatched Brine Shrimps, and so far they seem to be flourishing, but I have not had them long enough to state positively that they will live indefinitely on such a diet.

Variable Experiences

The Plumose Anemone is one of those strange creatures that some aquarists appear to keep with no trouble at all, and others are unable to keep for more than a few days. When fully expanded it is, perhaps, the most beautiful of all, and it resembles the flower from which it is named. Since it shuns the light, night is the best time to catch it in its full glory. As Gosse said, "Visit your tank with a candle an hour or two after nightfall".

Sometimes, when this species creeps along a rock or other surface, a little of the base adheres strongly and is torn from the anemone. Should this so-called "pedal laceration" occur in your tank do not remove the detached piece in the fear that it will decay and pollute the water, for left where it is it may develop into a new but small anemone within two weeks! This species has also been known to divide itself down the centre thus forming two new individuals.

Unrivalled Works of Reference**Guide to Tropical Fishkeeping**

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"We heartily recommend it . . . Marvellous illustrations".—*Aquario, Cuba*."No President of any aquarium organization can afford to be without this book and it should be on the table at all monthly meetings of such organizations to be used as a ready reference because it has no equal".—*Canadian Aquaria*.**Diseases of Fishes**

By C. van Duijn, Jr. Price 14/6d (15/4d by post)

"Chapter eight alone is worth the modest price of the complete book . . . 'Diseases of Fishes' should be found on every enthusiastic aquarist's bookshelf, such is its value to the hobby".—*New Zealand Aquatic World*.**PUBLISHED BY:—**WATER LIFE, Dorset House,
Stamford Street, London, S.E.1.

Plumose Anemones (Metridium senile).

The commonest of our anemones is to be found on every rocky coast between the tide marks. This anemone, the Beadlet, gets its common name from a band of blue, bead-like excrescences, to be seen just below the outer row of tentacles. The Beadlet is found in a wide variety of colours, bright red, liver-coloured, dark and pale brown, green and, in one variety known as the Strawberry Anemone, brightly spotted white and red. It is an exceptionally hardy species, and has been kept alive in an aquarium for over 60 years! Bennett* and other writers say that after a large meal it will remain closed for a considerable time. This is not my experience, but since he fed his on beef perhaps they were suffering from indigestion!

If several are kept in the same tank and all remain closed, conditions might be unfavourable and a check-up of the tank should be made. When one individual is fed the others seem to be aware of it, for they open to their fullest extent in an expectant manner. If any fail to open at feeding time they can generally be persuaded to do so by gently rubbing them with a piece of the food.

We are often warned that it is dangerous to keep shrimps, prawns, and other small animals in the same tank with anemones. I have never lost any of these animals in this way, perhaps because my anemones are too well fed to bother to catch more food. Prawns will soon learn to avoid touching an anemone. If crabs are kept in the same tank with anemones it is as well to feed them before feeding the anemones, otherwise the crabs may plunge their claws into the anemones' mouths and remove their dinner!

Anemones in Association

There are two species of anemone that live in very close association with hermit crabs but, for reasons of convenience, I will leave any discussion of these until dealing with the latter animals.

Some species of anemone are difficult to keep in home aquaria and those from deep water in particular. The great Dahlia Wartlet, *Tealia felina* (*Tealia crassicornis* of Gosse) is a difficult one to acclimatize but very beautiful and impressive if you succeed. I, personally, have never been able to keep it for long, but have only had very large ones, and it would be easier, perhaps, if one could start with small individuals. When ill they invert their "stomach" and it sticks up through the mouth like a translucent balloon. If they show signs of doing this they should be removed at

* R. A. R. Bennett, "Marine Aquaria", London (1889).

once and put in a separate container of clean, well-aerated sea-water where they may recover. The Dove Marine Laboratory suggest a variety of this anemone *Tealia felina* var. *coriacea* as being suitable for home aquaria, and they can sometimes supply it.

The greatest living authority on sea-anemones is Professor T. A. Stephenson,† and his monograph on these animals is a delight to read. Gosse's century-old book is still of value, but as the reader no doubt has noticed by now, many of his scientific names have had to be altered in the light of more recent knowledge.

Temperature Range

The best temperature in which to keep British sea-anemones is between 50 deg.F. and 55 deg.F. Heat is dangerous, and temperatures below 40 deg.F. are to be avoided. When it is necessary to move an anemone either from its original home or from tank to tank, if it cannot be taken on a piece of rock it should be gently peeled off its support by means of the thumb-nail. If the base is injured it rarely recovers. Knives, chisels and the like should not be used for this purpose, but a thin paper-knife made of ivory or some similar smooth material may be employed to prise off some of the more stubborn specimens.

Some species of anemone, though relatively common, are difficult to find on the shore owing to their habit of disguising themselves with pebbles and bits of rubbish. A few species of sea-anemones live buried in sand and a spade is necessary to secure them uninjured. Amongst the British species that can be kept in aquaria, the following is a list given by Professor Stephenson of those he considers good aquarium subjects and showy ones to boot. A tank with but a few of these species would rival any collection of small tropical fish: *Tealia felina*, *Bunodactis verrucosa*, *Anthopleura ballii*, *Sagartia anguicomu*, *Sagartia elegans*, *Cereus pedunculatus*, *Calliaetis parasitica*, *Anemonia sulcata*, *Peachia hastata*, *Ilyanthus mitchellii*, *Edwardsia callimorpha* and the Mediterranean species, *Ceractis aurantiaca* and *Andresia parthenopia*.

The identification of sea-anemones is not always easy, but



Photograph

(Douglas Wilson, F.R.P.S.)

Dahlia Anemones (Tealia felina) a beautiful species but not easy to keep under aquarium conditions. The variety T. felina var. coriacea has been recommended for use in aquaria.

a study of Professor Stephenson's book should put the interested aquarist on the right path. Anemones frequently shed their outer layer of skin. This sometimes forms a dirty-looking collar round the animal. It should be removed gently with a pair of forceps and taken from the tank.

† T. A. Stephenson, "The British Sea Anemones". London (1928).

Plants for the Aquarium Surround

Christmas Cactus



Zygocactus truncatus with flower buds well formed.

NOT often do we come across a cactus where ease of cultivation is accompanied by a happy abandon in producing flowers, yet the Christmas Cactus (*Zygocactus truncatus*) is just such a plant. Readers will no doubt have seen it in cottage windows with its pendulous growths drooping over the sides of the pot and its purplish-red flowers, very like double fuchsias, growing from the tips.

Extremely Tolerant

This is one of the easiest cactus species to grow indoors and it will tolerate bad conditions. In fact, we saw one plant bravely flowering in a one pound jam jar where it had been placed after its pot had been broken. But, like all living things, the Christmas Cactus shows its gratitude when some attention is given to it. Soil should comprise turfy loam with leaf soil and peat. A little well-rotted manure is also appreciated.

The plants have branched growths above soil level which are fairly evenly notched along their length. Flower buds appear in late Autumn or early Winter. When flowering is finished the plant can be kept on the dry side for a few weeks but at other times a moderately moist soil should be aimed for, never allowing it to become completely dry. The plant appreciates humid conditions and would therefore seem ideal for the fishhouse. If kept indoors an occasional syringing will provide it with the atmosphere it likes.

A Satisfactory Room Plant

This *Zygocactus* will do quite well under room conditions but it likes light of good intensity during the growing season, although it should be protected from mid-summer scorching rays if it is kept in a greenhouse.

The individual segments can be severed in Spring and rooted as cuttings at a temperature of 70 deg.F. These rooted cuttings can be purchased in Summer but a more satisfying, if more expensive, way of buying the plant is when it is in bud around Christmas time.

Ichthyophonus Disease in Fishes

By W. Harold Cotton, F.R.M.S.
(Illustrations by David Cotton)

ICHTHYOPHONUS HOFERI is the name of an endoparasitic fungus of fishes. It is also called *Ichthyosporidium hoferi*, which is a nuisance when anyone wants to tell other people in different parts of the world anything about it. To understand how this comes about means delving a little into early history, but it is not without interest and, in view of certain recent developments, rather necessary so that even we know what we are talking about, in the course of these articles.

In 1905 Caullery and Mesnil created the Genus



Fig. 1. Bubble-eye which had died from *Ichthyophonus* disease.

Ichthyosporidium to include what is now accepted as a fungoid (plant) organism, and put it in the *Sporozoa* (animal) group as a Haplosporidium. Between then and 1911 several observers wrote about it, after careful study, and began to conclude that the organism was certainly more of a plant than an animal. In 1911 Plehn and Mulsow decided that the physical characteristics and development justified moving the organism from the animal world to the fungoid plant world, and created a new Genus, *Ichthyophonus*.

In 1913 Pettitt re-examined the organism, agreed it was a fungus, but said that a new Generic name was not justified—presumably on ethics—and went back to the original *Ichthyosporidium*. From then on it seems that many Continental observers continued to use the generic name *Ichthyophonus*—and still do, whilst British and American observers have used the original *Ichthyosporidium*.

An Animal Named

This did not matter overmuch so long as everyone agreed that in using either of the two generic names, they were referring to the same organism. Unfortunately, however, the Genus *Ichthyosporidium* was not suppressed in the animal nomenclature and was taken up by a genuine Haplosporidium *Sporozoa* (animal) which happens to be also a parasite of fishes, fortunately, not frequently encountered in domesticated fishes. Recently, however, Porter and Vinall identified one form of Neon Disease as caused by a species of *Ichthyosporidium*, this being the Haplosporidium *Sporozoa*.

In case you are not quite with me, what this really means is that it is now possible for a Neon Tetra to have a sporozoan infection (*Ichthyosporidium*) in the muscle tissue and a fungoid infection (*Ichthyosporidium*) in the kidneys, both quite different yet sharing the same generic name.

Because of this I have reverted to the generic name *Ichthyophonus* in describing the fungoid form. All post-

mortem diagnoses of *Ichthyosporidium* which I have made since 1951 refer to the endoparasitic fungus, since I have never found the sporozoan of that name in any domesticated fish.

This internal parasitic fungus, *Ichthyophonus hoferi*, attacks some of the tissue and most organs of the body, producing acute degeneration and necrosis. The disease attacks marine fishes and has been studied in them in some detail, particularly the Herring and Mackerel as food fishes, because of the economic effect of the disease in marketing such fishes. Some observations have also been made on infection of Salmon and Trout, but little progress has been made in studying the disease on domesticated fishes.

The incidence of infection in coldwater and tropical fishes is very much higher than is suspected as difficulty in diagnosis means that it is rarely detected in living fish. The incidence of infection in some species of tropical fishes is alarmingly high, and probably accounts for the death of 70 to 80 per cent of those species.

Its occurrence among Goldfish, including the fancy varieties, is an increasing one and may eventually arrive at the same high percentage as in some of the tropics. Diagnosis in post-mortem examination by microscopical technique is, in most cases, positive and quite unmistakable, and it is on such diagnoses that I have assessed the incidence of infection.

Original recognition of the disease may be attributed to B. Hofer (1893) and he refers to it in his "Handbuch der Fischkrankheiten" (1906). M. Plehn and K. Mulsow (1911) and E. Nerresheimer and C. Clodi (1914) were amongst those who enlarged upon Hofer's observations. Much of their combined work is covered by W. Schäperclaus in his "Fischkrankheiten", republished as a 2nd edition in 1941 and as a third and much enlarged edition since the War.

An academic report, detailed in its description of the physiology of the parasite, was presented by Nora G.



Fig. 2. Infected Bubble-eye showing nodules on its organs.

Sproston in 1944, covering specifically infection of the Mackerel. The most recent report which I have studied is that by C. J. Sinderman and L. W. Scattergood (1954). It is a research bulletin of the Dept. of Sea and Shore Fisheries, U.S.A., and covers infection in the Herring. Schäperclaus is the only observer, whose works I have read, in which detailed reference is made to the infection in domesticated fishes accompanied by some first-class illustrations. He uses the original nomenclature, *Ichthyophonus hoferi*.

(Continued next page.)

I began studying this disease seriously some seven years ago when it started to turn up with alarming regularity amongst my post-mortem specimens, most particularly in Siamese Fighters. My interest in it was aroused not only by the problems it presented but also by its fascination as a subject for microscopical study. It continues to give me many hours of stimulating study since nearly every specimen provides some slight variation in the complex development of the disease. During the past few years I have had the advantage of being able to investigate many hundreds of specimens in which I have been able to follow the different aspects of the disease in a variety of species described by others only in specific types of fishes.

Despite this wealth of material it is still not possible to present a complete picture of the parasite, nor of all its effects. On broad lines those details which emerge from the study of the Mackerel and Herring in so far as the effect of the disease on the physiology of the fish, and the development of the fungus itself are concerned, apply to domesticated and tropical fishes. Let me detail then what is known about *Ichthyophonus hoferi* and correlate it with my own experience during these past few years of study.

Diagnosis in Living Specimens

It is always as well to begin at the most difficult part and nothing could be more difficult than recognizing this disease in many fishes which are actually carrying it.

I have examined a large number of fishes, coldwater and tropical, which have died for no obvious reason, without presenting any peculiar pattern of behaviour nor displaying the slightest external, visual evidence of anything being wrong with them. They have maintained an appearance of being well-nourished, have kept their colour and shape, kept their finnage erect without loss of swim balance and have been swimming normally, excepting perhaps for a



Fig. 3. Emaciated condition of a fish with *Ichthyophonus*.

slight lassitude. This latter is more typical of older and larger fishes, particularly Goldfish, and such specimens drift to the surface of the pond or tank and die quietly in a normal upright attitude. In some cases the owners had not realized that the fishes were even dead.

The presence of *Ichthyophonus* was determined in each instance only by the post-mortem examination. Such a fish was the Bubble-eye which appears in Fig. 1, and when brought to me for examination I was struck by the apparent perfection of its condition and its puzzled owner had no warning of its impending death. Curiously enough, the internal condition of this fish was typical of the most obvious visible symptom which the disease presents, illustrated in Fig. 2 and which I shall describe in greater detail when discussing post-mortem diagnosis.

It is only fair to add that every fish which displays lassitude is not bound to be suffering from *Ichthyophonus*, as lassitude and torpid behaviour constitute symptoms of many other troubles. Opposed to the "no-symptom" type of infection, there are two extremes of external symptom, one being slightly more positive than the other.

Those fishes in which the disease is widespread rather than

localised, but nevertheless where it probably began in the kidneys, tend to become very emaciated and may even take on a permanent "crick" in the body, and usually die in this curled-up position. This emaciation may be sufficient in the belly to give the appearance of the ribs sticking out, but it is also as equally defined on the back of the fish in front of the dorsal fin and between it and the top of the head. This is well illustrated in Fig. 3 where it will be seen that the back of the Goldfish has caved in so sharply that it looks like the underside of a boat. I describe this as the "keel-back" effect and it is a very typical and fairly conclusive clue to infection.

Appearance of the Scales

With such fishes the scales have a coarse appearance which I have always attributed to the contraction of the under tissue. Sinderman and Scattergood, discussing the Herring, talk about a "sandpaper effect" which is particularly noticeable in the rear ventro-lateral regions of the fish. They state it is due to large numbers of small raised papules caused by proliferation of the fungus and the formation of necrotic areas in the sub-epidermal tissue, and this reasonably agrees with my own conclusion.

In any case the formation of such papules may be peculiar to the Herring and fairly large marine fishes, but I cannot claim to have found them even in the largest Goldfish, although I must agree that the term "sandpaper effect" is more graphic in its descriptive power than my own description of "coarse-scales".

I have had under observation for the past eight months three Goldfishes infected with *Ichthyophonus* in which has been developing the emaciation and "keel-back" symptoms. One died seven months after infection was suspected, in the typical "curled-up" or "cricked" position, and post-mortem examination definitely confirmed the infection. The remaining two Goldfishes are still alive. The larger of the two has a deep cleft behind the head and is becoming thin in the posterior, ventro-lateral region, but could not yet be described as emaciated. The other fish has developed rather less of a cleft behind the head, but it is sufficiently distinct to break the clean sweep of the body line. In both cases the "sandpaper effect" is clearly visible.

Few Visible Symptoms

In both cases finnage is generally erect, colour is unaffected, feeding—on dried food only—is normal, and swimming ability—apart from an occasional slight "off-balance"—is little affected. In fact, the general behaviour of the fishes is such that they can often be mistaken for perfectly healthy specimens. Since all fishes selected for observation have been chosen because of their exceptionally good body shape, the changes which occur are very obvious. In the case of these observation fishes, the development of the disease has been very slow, mainly because they were chosen as extremely sturdy specimens and have been kept under first-rate living conditions.

Quite opposite to the emaciated condition is that of a distended belly sometimes accompanied by an anal discharge. This is essentially a symptom of Dropsy, which incidentally need not be necessarily and often is not accompanied by protruding scales. It is Dropsy, of course, but that arising from internally trapped fluid which has been caused by necrosis of the viscera attacked by *Ichthyophonus*. Examination of the discharging fluid may confirm this, but the difficulty is that Dropsy resulting from pathogenic bacteria is identical in appearance. Dropsical symptoms appear particularly in Goldfish, are well marked in Siamese Fighters, but less definable in many Gouramies.

The presence of body lesions is reported from Herring and Mackerel, but they are very rare in most of the fishes I have examined, although sometimes they are found in Siamese Fighters. Schäperclaus, in talking of Salmon, describes a typical body flexure as an indicative symptom

of infection. This spasmodic flexing of the body is reminiscent of "tumbling" and the disease is commonly named "Taumelkrankheit" (Tumbling Disease) in Germany. This aspect of the disease is not always present, but where I have encountered it in Goldfish it has always been within a very short period of the fish dying. It is probably due to infection of the nervous system as the fungus, as we shall see later, affects the spinal column and the brain.

Post-mortem Examination

The presence of the disease can be readily visible to the naked eye in the form of raised white or cream nodules standing out clearly on one or more of the organs, which is illustrated in the dissection of the "Bubble-eye" in Fig. 2. In this fish they were about the size of pin-heads and spread over the kidneys, liver and ovaries. Sinderman and Scattergood describing a similar appearance in the Herring say of it, "The heart constitutes the most constant site of gross internal infection. This may take the form of a few raised white nodules on the surface of the organ, through intergrades to a point where the heart is enlarged two or three times, is misshapen, and appears as a yellow-white mass of fungus tissue, completely filling the pericardial cavity. The mesenteries frequently contain small scattered white nodules of fungus material, especially in heavy infections. The liver and kidneys occasionally contain small scattered nodules."

This is indeed a fair description of the Bubble-eye but is not common to most infected fishes, as the nodules are rarely so well defined. In fact I believe they are present only when the disease has attacked the organs externally as well as internally, or putting it another way, if the fish has lived long enough for the disease to spread from the inside to the outside of the organ.

In Siamese Fighters and Gouramies, particularly, the disease is also visible to the naked eye by nodulation but in a rather different way. The nodules are mostly contained within the organs, and one finds the internal viscera squeezed and distorted in all directions by interlocking odd-shaped nodules varying in colour from a light cream to a deep yellow. Sometimes, in fact, there are more nodules than visible internal organs. The nodules feel leathery and gritty when handled in forceps, and their presence in great numbers is always accompanied by a sweet, sickly pungent and penetrating odour. This odour, which I just cannot define as being like anything else I know, accompanies, in varying degrees of intensity, every infection I have examined. It cannot be mistaken after one has done two or three post-mortems.

Presence of Nodules

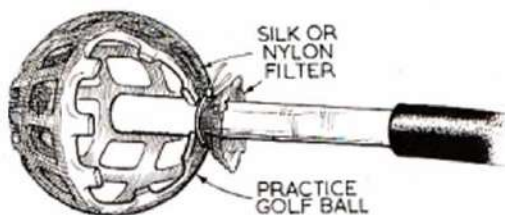
The presence of the nodules is much more marked in some species of tropicals than in others, but I have never found them so well developed in coldwater fishes, in which the size of the nodules, even in large fishes, rarely exceeds that of a rice-grain and more generally are only as large as pin-heads. Perhaps it is that the extreme proliferation of the fungus within the smaller bulk of the internal organs of the tropicals makes them so very much more distinct.

Where there is no nodulation recognition of the disease, without the aid of the microscope, it is not so easy. The odour is a good guide once one has learned to associate it, and it may be accompanied by an excessive amount of reddish-brown fluid. Very minute black, light brown or cream flecks scattered about the various organs and just visible with a high-powered pocket lens might probably confirm the presence of the disease, but fuller microscopic investigation to determine the actual character of these flecks would be necessary. Microscopical identification of the actual fungus in its different aspects brings us to the general histological features of the organism, which I will discuss and illustrate in my next article.

READERS' HINTS AND TIPS

SIPHONING FROM A BREEDING TANK

WANTING to remove a quantity of water from a tank containing three-day, free-swimming Cherry Barbs I devised the apparatus illustrated.



A piece of glass tubing was pushed into the centre of a practice golf ball (the plastics type with holes). The ball was then covered with a piece of silk or nylon stocking, a length of rubber tube was fixed to the free end of the glass tube and siphoning of water was then done without any risk to the fish fry.—(T. R. HALLARD, Lancing, Sussex.)

WHITE WORMS IN POLYTHENE

MOST aquarists find the culturing of White Worms a fairly simple matter but separation of these worms from the culture medium for feeding provides rather a problem. Some favour collecting them on the cover glass of the container of the culture, but when required in quantity for feeding to fishes in several tanks this is not always easy.

I think I have now solved this problem, thanks to that indispensable introduction, the polythene bag. Here is my method.

Fill a pie dish with compost rich in worms, then add water until the compost is completely covered. Stand the dish on the cover glass of a tank and within an hour or two the worms will swarm out, and are easily collected and put into a polythene bag (6 in. x 3 in.). They are rinsed and the bag is drained and closed with a rubber band. The worms will keep in good condition for over a week.—(E. S. HEADLEY, Glenrothes, Fife.)

REMOVING FISH EGGS



TO remove fish eggs deposited in a community tank on the glass sides of the aquarium or on stones, you take the lid of a small soap box made of plastics and fix on one edge of it a razor blade, using two or three screw-

bolts. The holes can be made in the lid by drilling or using a heated stem.

When the blade is passed gently under the eggs they will fall in the lid of the box and collection is then easily effected.—(G. HELFFER, Paris, 20.)

Readers are invited to send details of hints and tips they have found helpful in their fish-keeping. 10s. 6d. is paid for each one published

Know Your Fishes

No. 50

Red-spotted Copeina (*Copeina guttata*)

THE Red-spotted Copeina (*C. guttata*) is a species which has neither achieved tremendous popularity at any time nor gone into complete obscurity. Most aquarists have seen or kept a few. Possibly its peak period in post-war years was the 1948 show season when some superb specimens were entered for the first National Aquarists' Society's exhibition.

Since then, fish to equal them have been seen only rarely. This *Copeina's* body shape is not especially attractive and individual variations often occur which can give a rather ugly contour.

Nevertheless, a Red-spotted Copeina of good shape and in full colour is a beautiful fish. The male is an olive brown above, lavender blue on its sides and whitish on the underparts. Rows of red spots are usually visible. Fins are yellowish with the pelvics, anal and tail flushed red, especially on their edges.

A black mark (not shown in the photograph) is present in the dorsal fin. Iris of the eye is reddish. The male does not show its full colours all the time but will do so when in breeding condition. Females are rather duller and lack, often entirely, the red body flecks although the black spot in the dorsal is more conspicuous.

In the aquarium this fish will grow up to 4 in. whereas naturally-caught specimens rarely exceed 3 in., which is an unusual happening among aquarium fishes. Some authorities give the fish as peaceful and this is largely true but truculent specimens are found and it is safer to keep it only with species of comparable size.

This *Copeina* lacks the adipose fin which many Characins possess and also differs fundamentally from the normal Characin breeding pattern. Its breeding behaviour is, in fact, more akin to that of the Cichlids.

It has a wide temperature range (60-90 deg.F.) but 70-75 deg. is a good average. One of the reasons why Red-spotted Copeinas have not been more widely kept is their slow and almost sluggish movements, although they are not shy and will jump clear of the water on occasion.

A tank of reasonable size (at least 10 gallons) is needed for a breeding attempt and the pair of fishes should be well conditioned on livefoods. When ready for breeding the parent

fish generally fan a depression in the bottom gravel but occasionally clean a piece of rockwork to receive the eggs.

The ova are then laid and fertilized and immediately the male chases the female away. She is best taken from the tank at this stage. The male fans the eggs which are up to 1,000 in number but generally about 250.

The young fish hatch out in about two days at 75 deg. and once the fry are free-swimming it is safer to take out the male parent. The young fish are fed on Infusoria initially, followed by newly-hatched Brine Shrimps, sifted *Daphnia*, etc. Adults take practically any type of food.

The species is found in Brazil. It was originally called *Pyrrhulina guttata*. Class: Pisces. Order: Ostariophys. Family: Characidae. Genus: *Copeina*. Species: *C. guttata*.



[New York Aquarium photograph]

From *Continental Journals*

By H. O. Munro

Cichlid Species of Unusual Shape

PETER CHLUPATY wrote in the August issue of *DATZ* on the African Cichlid *Steatochromis casuarinus* or (?) *Steatochromis elongatus*. It is a species which can be distinguished by a most unusual shape of the head which has a pronounced forepart giving the head of the male fish especially the appearance of a German-type steel helmet. Mr. Chlupaty's five fishes, which were 1 and 1½ in. long, were kept at about 80 deg.F. and fed on various livefoods. They were very peaceful, and even when, after some six months, they started to chase and pair off their fights were rather good-natured. Chlupaty added a broken

flower pot to the tank which was soon occupied by one pair and completely cleaned of sand, until the glass bottom of the tank was visible inside the pot. These activities lasted for four weeks.

Feeding their Young

Finally Chlupaty could observe how both fishes carried food, especially *Tubifex*, to the pot, apparently to feed fry. After another 10 days the first fry were visible at the entrance to the pot and then the two parent fishes chased the remaining three *Steatochromis* whenever they put in an appearance. The parent fishes now dug several holes in the ground, and the whole

hatching of some 40 fishes immediately hid in the holes when there was any disturbance. They were carefully guarded by the parents.

In addition to the usual interesting care of the parents for the fry these Cichlids amazed Chlupaty by their punctuality! The fry left the cave every morning at 6 a.m. and were gathered together by the parents exactly 12 hours later in a highly organised manner. One fish would chase the fry into the flower pot whilst the other guarded the opening and prevented the young rascals from getting out when mother was looking for their brothers. At the time of writing the young fishes had grown to about 1 in. and were becoming more independent. The parent fishes stayed the "perfect couple" all the time and had none of the usual Cichlid matrimonial quarrels concerning the upbringing of the babies.



The Editor is not responsible for the opinions expressed by correspondents.

BUMBLE BEES

SIR.—I notice that on page 288 of the December, 1956, issue you ask for information on breeding Bumble Bee Fish (*Brachyobius*).

In my opinion Mrs. Smythies, whose letter you published, is handling her Bumble Bees correctly but I would remove the Angel Fish from the tank rather than the eggs of the Bumble Bees. My results in breeding this fish are very similar to those of Mr. S. G. Tiller, quoted by you, except that my male fish did not turn black, the eggs were laid inside the flower-pot and the female cared for the ova.

A brief description of my work with this fish was published in *The Aquarium* for January, 1951.

Como,
Western Australia.

H. C. WELLS.

BREEDERS' SHOW RULING

SIR.—In view of the growing practice of transferring eggs from one owner to another, I have been asked by the Judges' and Standards Committee of the F.B.A.S. to point out that fish raised from such eggs do not qualify for entry in the breeders' class at shows.

Rule one of this class states, "All fishes must be the property of, and have been bred and reared by the named exhibitor". In the view of the Committee "bred" means, in the case of egg-layers, spawned from parents owned by the exhibitor at the time of spawning.

For the time being, fish raised from eggs that have been hand stripped, will qualify for entry, provided the parents were owned by the exhibitor at the time of stripping.

Welwyn Garden City, J. H. GLOYN,
(Secretary, F.B.A.S. Judges' & Standards Committee).

SELECTIVE APPROACH

SIR.—I think that Mr. Dodge, in his article "Show Points for Goldfish Fanciers", has a defeatist's attitude when discussing preferences in varieties. In the first place a matter of preference would never arise (except perhaps for table shows in small clubs) if fanciers concentrated on the main variations in Goldfish and adopted a more logical approach to standards.

The Goldfish Society of Gt. Britain has shown how to avoid this state of affairs. Concentrate on four varieties, which between them include all the major variations. With efforts concentrated in

this way more good fish would become available for fanciers and the increased numbers would only have to fill four classes at the most.

I fully endorse Mr. Dodge's opinions on disqualifying fish with bad faults. Again the G.S.G.B. shows the way with a type test which every fish must pass before being considered by the judge.

Mr. Dodge's plea that the subject of Fantails should be cleared up is a good one. I could then once again bring out my preserved specimens and challenge the experts to say which came from Fantail stock and which were throwouts.

I must point out that a "black eye" is most certainly not synonymous with albinism. Albinism is a lack of black pigment but a black eye is caused by the absence of reflecting tissues in the sclerotic and iris which enables one to see the black pigment behind the retina. Fish with black eyes do not necessarily throw large numbers of colourless fry.

London, S.W.16. R. J. AFFLECK, M.Sc.
(President, Goldfish Society of Gt. Britain).

PHOTOFLOOD LIGHTING

SIR.—Having been approached by an aquarist friend for an interpretation of the circuit diagram for series/parallel running of photoflood bulbs accompanying Mr. L. E. Perkins' excellent article "Elements of

Fish Photography" in the February issue, it seems to me possible that others may find some clarification helpful.

The circuit may be understood more easily when set out as in Fig. 1, which makes no pretensions to being a layout and from which the desirable refinement of fuses has been omitted as they can often be located in a plug supplying the lamp circuit. It will be seen that it is necessary to operate both switches to change from dimmed to bright and that if the switches are worked incorrectly it is possible to obtain one bulb at full brightness and the other completely extinguished.

Series/parallel switches are obtainable, though perhaps not easily, and are apt to be unnecessarily robust and expensive for this application, but a double-pole, two-way switch can be employed to give a change-over in one operation as in Fig. 2. A single-way, on/off switch can, of course, be included in the supply leads if required and this should preferably also be a double-pole one.

Faversham,
Kent.

C. W. THOMAS.

EARTHING AQUARIA

SIR.—The article "Pros and Cons of Earthing", in the February issue of *WATER LIFE* was read with interest and, factual as the rules quoted by Mr. Thomas are, it should be observed that rules and regulations are somewhat flexible in the electrical and other industries.

In fact, "working to rule" or strictly to the regulations, is today sometimes used as a factor in industrial relations, and can speedily bring public services to a standstill, proof indeed that rules should be taken as a guide, and not too literally. This applies to all ways of life; industry, club, or any other interest.

With reference to the suggested use of a neon lamp in place of a mains lamp as an earth indication, I would point out that this is much too sensitive and will give the impression of trouble where none actually exists. Also, it will not earth and make harmless the always-present small capacity and leakage currents, which sometimes give aquarists mild but not dangerous shocks.

May I conclude in a more aquatic vein by raising the question of water used for topping the tanks. Frequently the mains

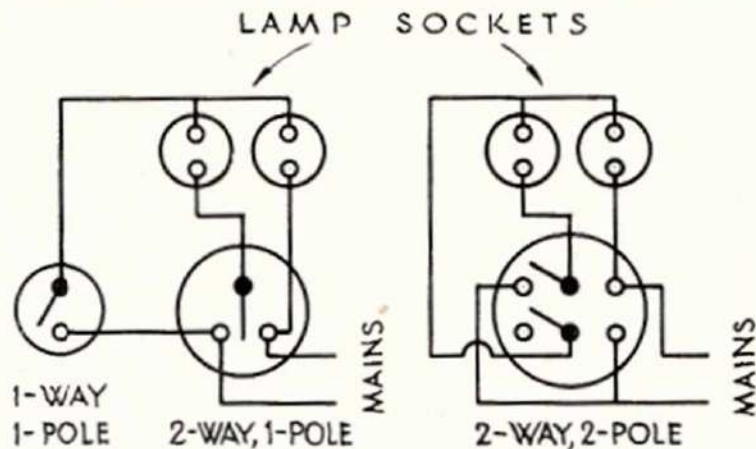


Fig. 1 (left) shows the original photoflood circuit, whilst Fig. 2 (right) is Mr. Thomas' suggested modification with a two-way, two-pole switch for ease in operating.

Readers' Views

(Continued from previous page.)

water employed for this purpose is hard and I have tried using water passed through a mains base-exchange water softener for some time now, but I often read in books and other literature that this is not recommended. Nevertheless I have found a general improvement in fish and plant life, freedom from trouble, etc., by using this softened water, and thus preventing the usual accumulation of hard-water salts in the tank water.

Perhaps WATER LIFE Analyst, or readers with similar experience of softened mains water, could give their views and comments.

S. C. FUDGE

WATER LIFE Analyst replies: "It may be remembered that an article appeared in the October 1955 issue, in which I discussed the various ways of softening water.

"The 'base exchange' method converts all the soluble calcium and magnesium salts present in

hard water to corresponding sodium salts, which, unlike those of calcium and magnesium, do not precipitate when the water is used for domestic purposes. However, the total content of soluble mineral salts in water so treated remains the same, for the calcium and magnesium salts have merely been exchanged for the corresponding sodium salts. Water thus treated can hardly be considered as an ideal medium for supporting plant life as the salts of magnesium, and much more those of calcium, have a far greater biological significance than those of sodium.

"Complete demineralization of water is possible by the use of synthetic mixed resins. Except on a fairly large scale, this method is expensive and, as has been stated, small quantities of demineralized water produced by proprietary 'plastic squeeze bottles' are as expensive as distilled water. Incidentally the water produced by these bottles has a very low (acidic) pH value. Such water by itself (as would be distilled water) could not support either plant or fish life but, on the other hand, it could be used by admixture to lessen the hardness of natural waters and also for topping up purposes to make good the loss of water caused by evaporation."

Current Research

Breeding the Shanny in Aquariums

By Alastair N. Worden, M.A., B.Sc., F.R.I.C., M.I.Biol.

THE commonest blenny of the British coast, a Mediterranean-boreal shore fish, the Shanny (*Bleinnius pholis*), breeds readily in aquaria. A detailed account of its breeding behaviour has not, however, previously been given, and indeed direct observations on the spawning habits of marine teleosts have been few.

At the Marine Biology Station attached to the University College of North Wales, Bangor, S. Z. Qasim has recorded a great deal of information not only on spawning but also on embryonic development and this is published in the current issue of the *Proceedings of the Zoological Society of London*, Vol. 127, pp. 79-93.

Ripe but previously unspawned fishes were collected in March from rocky shores, by turning over stones at about the level of low water neap tide. The sexes could be distinguished by body pigmentation, the shape and position of the genital papilla and aperture, and the shape of the head. This last was the best distinguishing character. Adult males have a prominent bulging forehead, the head of the female being much flatter. Dissections revealed a mass of fat under the skin of the bulge, and this may, perhaps, act as a reservoir of food during the period of incubation by the males, when little feeding occurs.

Conditions Provided

Single pairs were maintained in tanks measuring 45 x 30 x 30 cm. in which a slow circulation of water was maintained. Moderately-sized stones, selected so that spaces were left beneath them, were put together in one corner of the tank. After spawning, each pair of fishes was transferred to another tank of the same size with similar surroundings. The eggs deposited on the stones and glass walls were photographed, counted and allowed to develop. The fish were fed regularly on the meat of *Mytilus edulis*.

It was found that soon after a pair of fishes is left in a tank, the male hides under a stone, in a position where spawning subsequently occurs. Its colour rapidly changes from dark brown with black patches to sooty black. The white fold of

skin around the jaws thus becomes more prominent. This rapid colour transformation was noticed with every male in the aquarium.

Many males of similar colour were seen under stones in the natural haunts just before the spawning season began. Males found guarding eggs were always of this colour. Evidently the darkening in colour coincides with the selection of spawning sites by the males, and is retained throughout the incubation period.

Studies of the seasonal changes in condition of the gonads showed that males mature earlier than females. Having found a suitable nest they remain in it for most of the time but occasionally show excitement by swimming around the tank. These swimming excursions may be invitations to the female to spawn.

During the course of spawning, both male and female rest side by side, if there is enough room for two fishes to nest. If there is insufficient room, the female occupies the nest and the male moves restlessly about the outside, occasionally trying to gain access. The female turns on to her side or sometimes on to her back, so that her ventral surface is applied closely to the surface of a stone or the wall of the aquarium. The tail quivers, the pectoral fins move slowly and the mouth remains slightly open whilst she deposits each egg, with individual care, on the sides of the stones or on the adjoining glass surface.

During oviposition, the genital aperture keeps touching the surface and the fish keeps sliding forwards, backwards and sideways to ensure even distribution of the eggs, which are packed closely together in a single layer. Smooth surfaces are generally preferred for egg laying.

All spawnings in aquaria took place during the day. The process goes on slowly and lasts 7-8 hours. The eggs are deposited in patches occupying several sq. cm. in area. Periodically the male seems to become excited. "His whole body shakes violently, he assumes a position with his lower surface facing the newly-laid eggs, whilst emitting streams of

"milt". After spawning is over, the female comes out of the nest and goes into the far corner of the tank. The male continually changes his position for a short time, but eventually adopts what appears to be a comfortable position under the stones and, therefore, keeps guard over the eggs.

During guarding, the male rests with his head at the entrance to the nest. Whenever the female approaches, she is vigorously attacked and driven away and she is never welcomed again until the next spawning. Other animals introduced into the tank, such as crabs, are attacked in the same way. If one attempts to catch the male, he bites one's fingers hard. It appears to be the nest rather than the eggs which the male guards, for not only does he sometimes eat the eggs but also he will, if transferred into another tank immediately after spawning, show the same apparent devotion in guarding the bare stones! If offered food, the male would come to take it and then return to the nest.

During the incubation period the male moves his tail for long periods, setting up a current of water through the nest. He also brushes the eggs frequently with his smooth body, by changing his position. Experiments on eggs not under parental care showed that these soon develop a fungal infection.

Period of Incubation

The incubation period was found to last from 40-60 days, according to the temperature. The hatching of a single mass of young fish spawned in the laboratory was found to last over 3 days, while masses collected from natural haunts continued hatching over a much longer period. Among the factors that precipitate hatching is light—there being a day and night periodicity—whilst mechanical shock (due, for example, to the keeping of large stones on which there were eggs) produced sudden hatching as soon as the eggs were subsequently immersed in water.

The paper contains a detailed, illustrated account of embryonic development and will be found of great interest to advanced students.

Pocket Edition

MODEST in size but brimful of practical information on the culture of Goldfish is the Goldfish Society's third publication titled "Breeding and Raising Goldfish". The experiences of Miss D. Morris and Messrs. R. J. Affleck, M.Sc., L. C. Betts, C. F. C. Cole, R. H. I. Read, C. J. Saunders, B.Sc., J. Shaw, B. J. Upchurch and C. F. Whitehead (all accepted figures in the Goldfish Fancy) have been collated to make this one of the most unpretentious and handiest booklets we have seen for some time. It is priced at a reasonable 1/6.

Buzzing Around

NEW ZEALAND fishkeepers find wasps a menace during the Summer season. Pond fish gulp at the occasional one that comes near the surface and most times the result is singularly unfortunate for the fish, which eventually die. Gisborne Aquarium Society gives warning of the danger in the *New Zealand Aquatic World* and advises against putting screens of net over the pond unless they are especially well fitted; otherwise a wasp will wriggle under, find itself trapped, and cause untold damage. A better idea is to keep a wasp trap near at hand.



14-year-old Ulf Hannertz with the cheque he won in a Swedish television programme.

Piscatorial Prize

AFTER five appearances on Swedish television Ulf Hannertz, the 14-year-old son of a Stockholm doctor, won Sw.Kr.10,000 (about £700) in a quiz programme by answering questions on aquatic matters. Ulf started keeping fish six years ago and now has some 250 in 60 different varieties. He visited Britain in 1955 and 1956 when he saw the London Zoo and South Bank Aquariums and is well acquainted with *WATER LIFE* ("One of the best journals of its kind in the world").

He intends spending his prize money on trips to foreign Aquariums and, to begin with, he made a week's visit to Germany in February. During the Summer he will be in Chicago. Nothing final has yet been decided, but there is some talk of Ulf trying for the 64,000 dollar question in the States.

Fluorescent Lighting

THE use of fluorescent lighting for aquarium illumination has been on a controversial level for some years. Many aquarists have found they get poor plant growth after installing fluorescent units.

J. Hemerick presents some useful data in a Plant Irradiation booklet published by Messrs. Philips Electrical Ltd. Among the advantages he gives for the use of fluorescent units over aquaria are that the spectral distribution of the light is more

In and Around the Aquaria World

By L. W. Ashdown

favourable for plant growth, the tubular lamp ensures more uniform illumination, heat generation is less (which is important in coldwater tanks), and a reduced wattage is needed—approximately 1/3rd of comparable tungsten lighting.

Warm white de luxe is the recommended fluorescent lamp; this ensures faithful colour values and a generous output of light from the red end of the spectrum. Twelve to sixteen hours of fluorescent lighting have been shown to give satisfactory plant growth. This is rather more than we use for tungsten lighting.

Now comes the particularly interesting point. J. Hemerick says special attention should be given to the change-over from tungsten to fluorescent lamps. He admits that growth of plants is frequently affected. One cause is that tungsten lighting heats up surface layers of the water to an appreciable degree whereas the warming effect of a fluorescent unit is considerably less. The result is that the biological balance of the tank is disturbed and the aquarium needs time (maybe some months) to adjust itself to the changed conditions.

Lightening the Load

A TEMPORARILY cricked back is a sure sign you let yourself in for giving a talk on setting up an aquarium. Maybe you forgot to tell the club secretary you would like to have a tank, some rocks and gravel available. Trundling along the road, armed with all the paraphernalia on meeting night, you have plenty of time to regret your omission.

Some folk have got over the difficulty very neatly by making up a wood-framed, unglazed tank and paper or cardboard plants. One society that has done it in an effective fashion is Forest Hill A.S. and the results of their efforts are shown in the Jim Vosper photograph on this page. The kit consists of a base, four uprights and a top which can be fitted together on the spot. The two narrow sides and the back

retain the gravel. In this particular picture the rocks are water-worn flints and the artificial plants simulate *Cryptocorynes*.

WATER LIFE Diplomas

SHOW committees are now getting down to firm plans for their 1957 public exhibitions. *WATER LIFE* offers handsome additions to your specials list in the form of the Diploma shown here. Normally a maximum of two such Diplomas are awarded to an open event



and one where entries are confined to members. Early applications, giving details of the type of show you plan, will be helpful. We also like to have your show dates as soon as possible so that they can appear in our show dates panel during the season.

Secretaries are reminded that we welcome reports of their public exhibitions but, unless the event is a really large one, we cannot print all the prizewinners, just those who took the first prize in each class and the trophy winners. What we do like to receive are brief judges' comments on the leading exhibits.

Mental Health

RAPID strides are being made to improve the surroundings of patients in British mental hospitals and in one of the oldest, St. George's, Stafford, built in 1818, apart from occupying the patients during customary working hours, attention is being paid to their leisure time. Wards are being decorated in modern style and lounges are tastefully furnished. The first ward to have its renovations completed has a tropical aquarium installed which has given great pleasure to the patients.

International Study

OVER here on a year's research fellowship Dr. W. H. Hildemann was not slow to make contact with our leading aquarists when he arrived in Britain last September. In his native State of California he is a



LIGHTWEIGHT DEMONSTRATION AQUARIUM

The wooden-framed, unglazed aquarium made by Forest Hill A.S. for use when experimenting with aquarium furnishing. It is convenient for setting up suggested exhibition designs without the tedium of using real plants and filling with water.

In the Aquaria World (Continued from previous page.)

close friend of world-famed Gene Wolfshiemer and a charter member of Los Angeles Aquarium Society. I had a belated meeting with Bill Hildemann in early March when he entertained me to lunch at University College, London, where he is working.

Among other things, Dr. Hildemann is studying blood groups and scale transplantation reactions in Goldfish. It has been shown that a scale can be removed from a fish, even frozen for a period, and then grafted back successfully anywhere on the same specimen. To try to graft scales from one fish on to another has proved impossible, signifying that, although scientists have been unable to detect any biochemical difference at all among scales of a given species, any fish can and reacts against a foreign scale. The subject involves complicated immunogenetic mechanisms and maybe a vast number of scale groups (much the same as blood groups) will be found.

Ageing in Fishes

WHILST at the College I was introduced to Dr. Alex Comfort, scientific author and broadcaster, who, among other researches, is investigating ageing and longevity in fishes. The life span of the fishes (Guppies mainly) he has under investigation is lengthening his period of experiment beyond expectations. He has no difficulty in keeping the fishes alive and well for four years. Dr. Comfort would like to hear from any hobbyists who have kept strict records of ageing and life span in their fishes.

A finding that he has made is that Guppies kept in cramped quarters so that they do not complete their development will restart growth and development up to the age of 14 months if transferred to a more favourable environment. Above 14 months the fish seem to pass over the bridge and cannot make up the early growth.

Such is a sample of the work done in the zoological precincts of University College but, outside, Bill Hildemann likes nothing better than to spend his time with British hobbyists. He has spoken at a National Aquarists' Society meeting and is a regular figure at Hendon club's weekly meetings. "Your hobby is more highly organised over here", he told me and expressed amazement that Hendon were able to produce such interesting weekly meetings.

From his experience in the States he knows how easy and unfortunate it is when a club becomes purely a social body and fails to foster serious fishkeeping. Whilst Bill Hildemann will be sorry to leave us this Autumn, when he returns to California, he could not disguise his pleasure that then he will be able to build his own fishhouse and get down to serious fish studies, mainly with Guppies.

A New Copeina

A FISH new to aquarium keepers in the United States and, so far as I know, unseen yet in Britain is a rather lovely *Copeina* under the scientific title of *C. eigenmanni*. The Gene Wolfshiemer photograph here shows the distinct black band that runs along the entire length of its body. Above this stripe is a thin edging of red, topped by silvery-gold whilst the back of

the fish is brown-olive. The underparts are silvery. Fins are yellowish with an indistinct black mark in the dorsal. The fish has already been spawned in America.

Let's Specialize

WANDERING around fish exhibitions during 1956 one could not help regretting that there was not more of the specialist approach in the fish world. The Goldfish undoubtedly has its pockets of enthusiast in Bristol, Birmingham and Nottingham, plus the various G.S.G.B. groups, and the nation-wide influence of the Guppy Federation tells its own story of enthusiasm for *Lebistes* effectively harnessed.

Why, oh why, then are we not having more specialist bodies formed—one for Labyrinth breeders, another for Characins, a third for Platies and Swordtails—the scope cannot be estimated? Although I may be sticking my neck out I am willing to conjecture that, but for the Guppy Federation (and its forerunner, the Guppy Breeders' Society), the less spectacular Guppy varieties might have almost ceased to exist.

There can be few situations more disheartening for an enthusiast than to have no fellow Robson variety breeder, for instance, in his area and have to rely on the occasional entry he sees in the show of another area from which he can judge his stock. But let that same person be in a fraternity where other folk—no matter that they live many miles from his home—share his interests in the Robson and the story is very different. That is just what the F.G.B.S. has done—and a breeder of any variety knows that through F.G.B.S. shows, assemblies or issues of the bulletin he can share his interests, discuss his problems with others.

See-saws in Popularity

WATCH the Platies and Swordtails against the Guppies and what do we see?—the most dramatic fluctuations in

What mad-keen Characin breeder would not join a Characin Breeders' Association? Instead of working through the various species in his breeding programme and then transferring his interest to another group of fishes he'd be eager to hold the Rosaceus Trophy for three years and prove to the other enthusiasts that he was capable of keeping a strain in top condition over several generations.

With such specialist groups in existence the hobby could ride over times when popular interest in fishkeeping was low. They would form the foundation on which fishkeeping could keep its pulse beating strongly, come what may. That there is the need for specialist groups is illustrated by the number of "study circles" now being formed. Not specialist in character, they nevertheless show that the experienced fancier is anxious to meet his fellows for serious consideration of fishy problems and interests.

It is doubtful whether any other livestock hobby has so few specialist groups in relation to its size. The young fish fancy is growing up, it must take its responsibilities seriously if it is not to feel the draught every time the lay public gets a new invention to excite its attention.

Need for Something More

FOR television has largely exploded the idea that the furnished aquarium is the panacea for all the hobby's problems. It was no idle coincidence that as television set owners increased a few years ago the number of "one-tank" owners diminished considerably. For the person wanting nothing more than a colourful moving picture in his home and having no real interest in livestock the switching on of a television set is infinitely easier than supplying even the modest needs of aquarium fishes.

Which is not a condemnation of the furnished aquarium publicity for our hobby. Rather, it is a re-orientation of



Copeina eigenmanni, a species which has recently become available to American fishkeepers.

quality among individual varieties. Wagtail Platies, absolute favourites several years ago, are seen less and less on the show bench and almost appear to have joined Moon Platies in a state of quiescence. Red and Variatus Platies are around in much better numbers and their colour is being improved but the tropical fish hobby at present is too liable to the fluctuations arising from whims and fancies.

The position needs to be consolidated and one effective way to do it would be through the formation of specialist groups.

our ideas. For the man or woman who likes livestock, the first attraction to fishkeeping is through the furnished tank and the more attractive we can make these exhibits at our shows the greater will be the number of converts. The standard of furnishing in home tanks is still much below what it should be.

But after a while most newcomers decide to breed fishes. It is here that the specialist society can come into its own, offering to the keen beginner a welcoming and helping hand in whichever branch of the hobby he or she chooses.

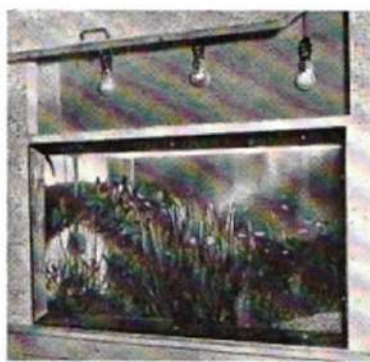


An Aquarium in the Modern Home

ONE of the most effective ways of displaying a decorative aquarium is in a room recess with a hardboard or plywood fascia around it. Mr. E. B. Lee of Ealing, London, W.13 (whose tank is shown in the accompanying photographs) has made one significant improvement when installing a 4 ft. x 2 ft. x 2 ft. aquarium in his lounge. Instead of merely bringing the hardboard to the edge of the chimney breast he has carried it right over the chimney area, thus increasing the illusion that the aquarium is actually set in a solid wall.

The recess on the other side of the fireplace has been treated similarly but here red-lined book shelves replace the aquarium. The hardboard along the entire wall has been papered in a modern light grey design, whilst beneath the tank is a convenient cupboard and, above, a hinged door (see lower photograph) for easy maintenance. The angle-iron front of the tank is hidden by a polished medium oak frame fixed with chromium screws.

Mr. Lee effected the conversion in his spare time and believes a similar adaptation is within the range of any amateur handyman.



PROBLEMS ANSWERED

Queries are answered free of charge by experts. They should be sent to "Water Life," Dorset House, Stamford Street, London, S.E.1, with a stamped, addressed envelope for the reply. All queries are answered direct but a selection is published below.

Reducing Temperature

Would it be possible to reduce the temperature of an aquarium containing 14 Angel Fish, one Kuhlii Loach, a Corydoras and a Plecostomus Catfish and two Bumble Bee Fish to 55 deg.F. over a period?—(P.W.W., Sheffield, 7.)

It would not be possible to reduce your community tank to a coldwater temperature. The lowest temperature at which this group of fishes could be expected to live and be maintained in a healthy condition would be 68-70 deg.F.

Algae Invasion

Although I have three Planorbis snails in my coldwater aquarium Green algae forms in it. Is there any way of stopping the algae developing?—(D.S., Redcar, N. Yorks.)

The development of algae to the point

of its being a nuisance is caused by two factors: lighting which is too bright and too heavy feeding. You should therefore experiment by shading the top light and making sure the food is not too fine to be uneaten by the fishes. A filter helps considerably. Snails are not very much use in keeping down algae and their excreta can, in fact, encourage its development. Overloading the tank with fish will also encourage green water.

Slow-worms

Can you tell me how to sex Slow-worms?—(J.M.G., Aberdeen.)

It is not always possible to sex these lizards, even when they are mature, but there are certain general characters to look for. (1) Males are more or less uniform in colour on the upper side; females usually have a vertebral stripe or stripes.

(2) The male tends to have a slight neck region behind the head. In the female the head merges into the body. The male's head is larger.

(3) If the tail is complete, then the male has a longer one in proportion to its body. (4) The rare 'blue-spotted' Slow-worm (it has scattered blue spots over the body) is usually a male.

Wasting Disease

In the past fortnight I have had trouble with my Platies; their fins close, their tails collapse and they develop slightly hollow underparts and curved backs. In the last 14 days I have had two Sunset Platies and two Wagtails die. I now notice my male Red Swordtail is developing the same symptoms.—(V. H., Wytherton, Boston.)

Your Platies have died due to a wasting disease which tends to attack fish of the Platy and Swordtail species, and does appear in tanks from time to time. There are many causes of this but, in your aquarium, we feel it would be reasonable to presume a bacterial infection which may have been caused through very slight over-feeding of dried food, coupled with a slight lack of maintenance of the tank. With this type of fish it is best to remove the sediment from the bottom of the tank at least once a week and top up with fresh water.

Coal for Decoration

When I was at the Olympia show in January I was amazed to see real coal in tropical fish tanks. Would it be harmful to my Goldfish if I put some in a coldwater aquarium?—(Miss M.C., Hampton Hill, Middx.)

Coal is an inert carbon so that when it is placed in a fish aquarium as a decoration it should not have any adverse effect on the water; whether it is good for the water and fishes remains to be proved. If you want to use it, the hard Welsh type of coal is best.

Flies in Worm Cultures

Could you give me the reason for small flies appearing in my White Worm cultures? How could I eliminate them?—(C.G.P., Halifax, Yorks.)

These flies, which appear in White Worm cultures, are similar to the common housefly, but about a quarter the size. They come during Winter and remain for the cold weather. Only occasionally are they seen in Summer.

CAUSES: (1) Uncovered or partially covered cultures. (2) Overfeeding and feeding with too much moisture-laden food. (3) Compost packed too tightly and insufficiently aerated. The last two result in sourness of the soil.

REMEDIES: Cover with a piece of glass fitting very close up to sides of box and touching the compost. Lay another piece on the edges of the box and make sure the edges are level so that there are no cracks between the box and the glass. Do not feed more than will be eaten in two or three days.

Control the moisture content of the culture by the feeding of either wetter or drier food, as required. For a time, bury the food completely to discourage the flies. Turn the compost and worms out once a week. Thoroughly air and then replace, taking care not to pack too tightly. Keep temperature down to 50 deg.F. to 55 deg.F.

News from the North-West

Rare Aquatic Plants in Cheshire?

SOME day, the North-west may have in Cheshire a good botanical garden with a collection of rare aquatics. This is the Liverpool University Botanic Garden (within easy public reach by the Chester-Moels bus or the Liverpool-Burton bus) now gradually taking shape by the roadside at Ness, in the former gardens of the late A. K. Bailey, a noted plant-collector. So far, with only three pools, the scope is limited, as these still have to be cleared and planted.

In the newly erected metal and glass houses two interesting aquatics are growing in glass tanks. One, accompanied by Goldfish, is *Salvinia natans*, a floating, water-surface plant with rather hairy, bright green leaves in pairs. It has no roots, like our native Duckweed; what seem to be roots suspended into the water are modified leaves. The other plant is the Water Hyacinth (*Eichhornia speciosa*), a Mexican subject which chokes waterways and is used to feed farmstock. When grown like this in water, the plant produces large, green, flask-like bladders at the base of the leaves to float them at the surface; but when grown on soil no bladders are produced.

Field Studies Centre

The new field studies centre, to be opened by the Council for the Promotion of Field Studies at Preston Montford, near Shrewsbury, this Spring, should have plenty of opportunity for including aquatic studies in its curricula for teachers and other visitors. The annual migration of salmon may be seen on the Severn which flows nearby. A few fresh Spring fish usually reach Shrewsbury below the weir by the middle or end of January.

The river holds Chub, Pike, Perch, Roach, Gudgeon, Dace and some Grayling. In the north of Shropshire lie the famous meres beside the Shrewsbury road at Ellesmere, several acres of water rich in large fish like Bream and Pike, and in aquatic plants, including the rare lesser Yellow Water-lily, *Najas pumila*, at Blakeney, beside the Shropshire Union Canal, its only English haunt. It grows also in Merionethshire and some lakes in North Scotland, where it hybridises with the common yellow Water-lily.

Cheshire schoolchildren have a long tradition of a quiet nature study, thanks to the encouragement of their teachers, and at Oldershaw Girls' High School, in Wallasey, Miss M. Thornton continues this good work with a school aquarium of fishes, warm water and cold. Mr. W. Thornley, who has been a stalwart of aquaria interest in the Liverpool schools in recent years, has now moved from Salisbury Street to Clint Road School and is busy establishing new vivaria and aquaria there—a particularly crowded district where children have few other contacts with Nature.

Councillor F. Hill, Mayor of Crosby (Lancashire), accompanied by the Mayoress, opened the annual general meeting of the Merseyside Naturalists' Association in the Alexandra Hall at Crosby in February and welcomed a large attendance of members from a wide area. It was pointed out in the annual report that subscribing members now range from Windermere to Aberdovey. Mr. R. H. Allen, a Runcorn businessman, was re-elected President for

South-west Viewpoint

Petrol Rationing Hits Societies

THERE is little doubt that petrol rationing has caused many headaches to club committees when trying to formulate their plans for the future: its impact is more heavily felt in a scattered area such as the south-west. Partly on this account, and partly for financial reasons, Bath A.S. have decided against running a show this year. I understand that at Bristol the situation is still under review and that the outcome may well be an alteration in venue and timing.

The Bristol & Bath section of the F.G.B.S.

1956-7, and Mr. P. G. Garlick, a Birkenhead businessman and tropical fishkeeper, as chairman.

A large series of natural colour slides of fauna and flora and their haunts in the North-west, which had been taken by Messrs. E. L. Jones, W. Blore and others, were projected on the screen. These included several haunts of water life in Lancashire, Cheshire and North Wales as well as the north Shropshire meres, visited during the past year.

Although the annual subscription was retained at the low figure of 5s., the balance sheet presented by the treasurer showed a balance of £227 in hand at the end of last year.

It is rather confusing to have two societies with similar titles in the same town and, by an oversight, I referred to the Southport Aquarist Society's annual dinner (in the previous issue) of which Mr. J. Taylor of Church Street is chairman, as the "Aquarium" society. Incidentally, similar confusion of name was made by some of the local Press reports. Although it is purely a matter for the organisations themselves to decide, it would, indeed, prevent confusion if adjoining societies avoided closely similar titles. The onus seems to be on newer clubs to avoid duplication when starting off on their own.

In the Potteries recently, I had a chat with Mr. Ken Burose, of Tunstall, who recently completed four years as chairman of the North Staffordshire Aquarists' Society and was succeeded by Mr. Adams. Still meeting regularly at the Bell & Bear, at Skelton, with a steady membership of some 40 people, his society was busy planning its snow of 150-160 tanks to be held at the end of May in the Charles Street Schools, at Hanley. I hope it will open a closer link with the local education authorities, for the society receives little help outside its own membership.

Ken himself is encouraging a steadily increasing interest in coldwater fish among his membership. He himself has Trout, Rudd and Minnows; others find Moors and Vels more to their liking. He has two big tanks in a lean-to fish-house, and was, at the time, looking round for some glazing help with a new 180-gallon tropical tank he is putting up in his house.

Among the society's leading fishkeepers are Mr. A. Brooks of Hanley ("he can't go wrong"), said Mr. Burose who has bred almost everything from Neons and Glowlights to several of the Barbs in some dozen tanks in his fishhouse.

Range of Membership

Membership ranges from Stone to Kidsgrove, including three or four women fishkeepers, apart from wives who come along with their husbands. The youngest, a teenager, has Cichlids as her favourites. With a subscription of 10s., and funds augmented by monthly competitions, their activities range from lectures by local members to Summer excursions to Belle Vue, Chester Zoo and some of the shows; but the cost of travelling limits these trips. They hope some day to combine a trip to Blackpool Aquarium with a tour of the illuminations.

Over the Cheshire border, in Crewe, things are not so well in the aquarium world. There is not the same concentration of population as

in the Potteries and, from lack of support, the Crewe Aquarists' Society has gone into cold storage, as it were. Mr. G. F. Newall, of 44 Bedford Gardens, still nominally continues as secretary, with a club fund of £8 awaiting. Mrs. Newall, who shared his interest in the society when it met at the Masonic Arms, put down the reason to the falling off of interest by the members. Only about eight people—virtually the committee—were attending the meetings at the end, and they found it most discouraging. Despite whist drives, and efforts to run a dance, they could not muster the interest, nor even sufficient people to fill a coach for a Summer excursion. They had very few lectures and maybe meeting on licensed premises kept some people away. The subscription was only 7/6.

Not that Crewe is without its fishkeepers today. Mr. Perry, who still looks after the tank the society set up in the children's ward of Crewe Memorial Hospital, has several tanks of tropicals in West Street. Mr. Harry Howard keeps a tank

New Club Secretaries

Bedford A.S.—Mr. W. Donnelly, 11 Sidney Road, Bedford.

Deal A.S.—Mr. J. Cowell, 44 Douglas Road, Mill Hill, Deal, Kent.

Isle of Ely A.S.—Mr. S. Canham, 10 Kingswood Road, March, Cambs.

F.G.B.S.—Liverpool Section.—Mr. F. G. Hilliard, 68 Folly Lane, Wallasey, Cheshire.

Gravesend A.S.—Mr. F. G. Efford, 136 High Street, Chatham, Kent.

Huntingdon A.S.—Mrs. E. J. Masters, 73 Ermine Street, Huntingdon.

Nuneaton A.S.—Mr. N. E. Townsend, Melbrey, 197 Hinckley Road, Nuneaton, Warwick.

Portsmouth A.S.—Mr. C. J. D. Smith, 18 Brompton Road, Mile End, Portsmouth, Hants.

Reading A.S.—Mr. A. C. Masters, 12 Patrick Road, Reading, Berks.

Rotherham A.S.—Mr. A. Ibbotson, 34 Henley Street, Masbro, Rotherham, Yorks.

City of Salford A.S.—Mr. B. Reuben, 15 Maud Street, Manchester 8.

Southport Aquarist Society.—Mr. O. Plant, 177 Liverpool Road, Southport, Lancs.

Southport & District Aquarium Society.—Mrs. J. E. Cahill, 38 Marina Road, Little Altcar, Near Liverpool.

Blackburn A.S.—Mr. J. Haworth, 38 Avondale Road, Darwen, Lancs.

of tropicals in Catherine Street. After some three years overseas in Australia, Mr. R. Gow returned, bringing some of his fish by air, and restarted his collection at his Horsey Hall flat at Eccleshall, in Staffordshire. Among lady enthusiasts, Mrs. Gosling, a jeweller by profession in the High Street, still keeps her fish tanks, and Mr. Thorley is in business in Cobden Street.

A healthy society wants a membership of about 50, and a bunch of at least six keen workers, plus rooms cheap enough for frequent meetings on a reasonably low subscription. Many clubs just cannot afford to pay lecturers even travelling expenses from a distance, or to hire films and projectors, and that is why their meetings depend upon competitive shows and "bring and buy" sales. They cannot afford to pay for advertising, and depend much upon the help of the shops that sell fish, in bringing the attention of customers to the society.

When a secretary has been running round for years entertaining a constantly changing group of members with socials, sales, talks and shows, often at his wits' end to find speakers, make the tea or organise a trip to Belle Vue or Blackpool, and he finds he is not getting anywhere, it is only natural for him to become discouraged. I am afraid a lot of the success and failure of local clubs depends also upon the size of the local population. The proportion of people likely to become interested is fairly average. There are fewer competitive interests in a small town, but transport is often poorer than in a city. The people who could encourage these enterprises are the subsidised museums.

are going forward with a plan to hold a show in Bristol about mid-summer.—H. C. B. Thomas.

ANOTHER IMPORTATION.—As this issue went to press we viewed two new fish at the premises of Mr. J. Marks (Exotictrade). One was the Opaline Gourami, already well known in America, and the other was a fish which has been called the "Chocolate Goby". Its markings rather resemble those of the Chocolate Gourami but it is of Goby shape.

African Fish Importation

IN the last issue we mentioned that too few aquarium fishes from Africa were seen in this country. A consignment arrived just a few weeks later that serves to show just what we are missing. This particular importation was made by Mr. Owen Reid (Pet Shop & Haven Aquarium). It included unusual Catfish, some Anabantids and several Characins.

High spot, to our mind, was a Characin under the name of *Diatrichodus affinis*. It is fairly deep bodied but with a pointed snout and rather resembles an *Abramites* in shape. The body is a leaden grey with an almost black area under the dorsal fin in some specimens. This function, it is thought, serves to highlight the brilliant red in its fins. There is a brilliant red splash behind a black mark in the fore-part of the dorsal, and the anal and pelvic are well served with red. The caudal is of a reddish shade near its roots. This is a fish we hope to see regularly.

Several Anabantids in the *Ctenopoma* Genus were also included in the batch: one, named *C. acutirostris* has dark spotting on a fawn background. Another (*C. kingsleyae*) is greyish with an eye spot at the tail base. The extreme back edge of the dorsal, anal and caudal fins are clear. A third species was *C. anorgii* with lateral body stripes extending backwards into the caudal and anal fins.

Among the Catfishes was a miniature imported under the name of *Microsynodontis christi*. It did not exceed 1 in. in length although it may not have been fully grown. Mr. Reid, having whetted our appetite, is now hoping to have further African imports.

From Abroad

A CONVENTION, arranged by the International Federation of Aquarium Societies, will be held in New York City on April 12-14. Eight hundred tanks will be on display. Famous American and Canadian fishkeepers will speak and a title from Hungary, "The Aquarium", is included in the film programme. The Federation now consists of 65 societies. . . . P. J. Merckens, for five years editor of "Het Aquarium", has taken over direction of the re-styled World Federation of Aquarists journal titled "The World Aquarist". It will be in English and German. . . . The first issue of the "Bulletin of Aquatic Biology" has appeared. This scientific publication will be published when circumstances permit and will consist of 4, 8 or 12 pages. The subscription of 16s. covers one volume of 100-150 pages. Further details can be had from the Administration of the Bulletin (Zool. Museum, Plantage Middenlaan, Amsterdam, Holland).

Albino Eel?

MAORIS at Mercer, in the Waikato district of the North Island, New Zealand, fished when one of them, Mr. Pat Mackie, caught a bright yellow eel in the Mangatawhiri stream. Nearly 4 ft. long and with a 9-in. girth, the eel was being kept alive until the Maoris discovered whether the Auckland Zoo or the museum wanted it.

The assistant-director of the museum, Mr.

A. W. B. Powell, said that from the description of the eel he judged it to be an albino, as was Harvey, the famous two-toned trout at Rotorua, which died earlier this year. Mr. Powell said the museum would be interested in seeing the eel, provided it could be sent to Auckland alive. When it died, it would probably change colour.

Adult Education

OVER 500 courses are being arranged for the Summer programme of the National Institute of Adult Education. They include the Biology of Ponds and Dykes (May 1-8), Freshwater Biology (June 7-9 and July 31-August 7), Marine Worms (July 10-17), Advanced Freshwater Ecology (July 10-17), Rushes and Sedges (July 12-14) and Algae (July 17-24).

A copy of the calendar giving details of the programme can be had from the National Institute of Adult Education, 35 Queen Anne Street, London, W.1, price 1/2d., including postage.

First Large Show of the 1957 Season

HENDON A.S. has a full classification for its large-scale open show to be staged on May 23, 24 and 25. Schedules and entry forms can be had from Mr. A. Ballock, 239 Squires Lane, London, N.3. The closing date for entries is May 1.

Venue of the event is the Brotherhood Hall, Edgware Road, W. Hendon, N.W.9, which can be reached by 183 bus from Hendon Central Underground Station. Admission times are 2.30 to 10 p.m. on the Thursday, 10 a.m. to 10 p.m. on the Friday and 10 a.m. to 8 p.m. on the Saturday. The price of admission is 1/- for adults and 6d. for children.

Mrs. Betty Robertshaw spoke on "Breeding the Easter Lizards" at one of the society's recent meetings attended by 63 members. Aquarists are invited to call at any of Hendon's meetings held every Thursday in the Brotherhood Hall.

Breeding Amphibians

BREEDING records of the Green Tree Frog (*Hyla arborea*) and the Painted Frog (*Discoglossus pictus*) are given in the February issue of the British Journal of Herpetology, official organ of the British Herpetological Society. Also included are observations on the lymphatic systems of *Xenopus laevis* and an account of the reptiles and amphibians in the highlands of Ecuador.

F.B.A.S. Presentation

MR. AND MRS. ROY SKIPPER were presented with an F.B.A.S. Diploma at the March 16 Assembly of the Federation of British Aquatic Societies. It was for their entry of Pompadour Fish at the 1957 WATER LIFE exhibition and was only the second to be awarded.

The next assembly takes place on June 15 and the remaining two for 1957 on September 21 and December 21. The F.B.A.S. Trophy will this year go to Corby A.S. third Annual Show in August.



F.B.A.S. PRESENTATION

Mr. and Mrs. Roy Skipper receive an F.B.A.S. Diploma at the Federation of British Aquatic Societies Assembly on March 16. Mr. S. W. Atkins (chairman) makes the presentation. The Diploma was given for Mr. and Mrs. Skipper's exhibit of home-bred Pompadour Fish at WATER LIFE's January show. Photograph taken by A. Wainwright.

Scottish Society's 29th Exhibition

THE SCOTTISH AQUARIUM SOCIETY reports that its exhibition held at the end of last year proved one of the most popular events it has staged and also the most successful financially. Plans are already well advanced for the 1957 show which is to be held in October.

The Robin Kerr Trophy for the best exhibit in the coldwater section at the 1956 event went to Mr. K. A. M. Robertson with a Moor Goldfish. This fish also took the Belrees Shield for



The new Strachan Kerr Trophy.

best in show. The best individual tropical fish was an *Apistogramma agassizi* which won the Peter M'Nish Trophy for Mr. A. Watt.

Greenock A.S. were successful in the club tropical furnished aquaria class and took the interclub trophy, whilst Glowlights, shown by Mr. D. Muir, won the Breeders' Trophy. Best schools' furnished aquarium, and winner of the Sawers Cup, was Bellahouston Senior Secondary School, Glasgow.

The Strachan Kerr Trophy, awarded for the first time and subscribed to by friends of the late Mr. Strachan Kerr, secretary of the Scottish A.S. for almost 20 years, was won by Master A. Young who showed the best junior coldwater tank.

Master Young also took the WATER LIFE Cup for the premier junior furnished aquarium exhibit. The President's Cup went to Mr. A. Christie who showed the best novice exhibit. The Society prize was won by Miss Philp.

Inter-Area Contest

THE N.W. London Group of Aquarists Societies has completed its first year of inter-club competitions. The result was a win for Hendon A.S. with Willesden A.C. as runner-up and Arnold Aquarists third. A points shield will be presented to Hendon A.S. in April in recognition of their achievement. N. London A.S. will be unable to participate in the 1957 competition but Harrow A.C. is expected to join.

A contest between the N.W. London Group and S.W. Middlesex Aquarist Association took place on February 22 when S.W. Middlesex were the winners by 110 points to 100.

East Midlands Group

THE annual general meeting of the East Midlands Affiliated Aquarist Societies was held in mid-March when Mr. H. Walding of Kettering was re-elected chairman and Mr. D. Atkins, 363 Willow Brook Road, Corby, Northants, was appointed secretary. Societies at present belonging to this organisation are Bedford, Corby, Kettering, Peterborough, and Northampton, but other local clubs would be welcome.

Aquarists' Internationale

Further Items from Correspondence
Received by Mr. R. W. Andrews

MME N. DU BREUIL (Hong Kong) writes: "We have a new member of the family—a little sea-horse brought in by the children and now doing nicely in his private one-gallon sweet-jar, with a sea-fan on which to anchor and moderate aeration. He was only mildly interested in newly hatched Brine Shrimp, but took most enthusiastically to nice fat *Daphnia*. Of course one has to feed the *Daphnia* little and often, as they do not live long in salt water, but he is most diligent in picking them up. An occasional mosquito larva is also much appreciated, and I do not think it is my imagination that he is acquiring quite a rounded figure. He is small—just over two inches.

"I got tempted by a pair of small *Cichlasoma festivum*, paid 2/6d. for them, and so far they seem happy. Another new acquisition is a pair of what the dealers call here Knife Fish, and George Bing says they come from India. They are blue grey black, with no markings. Their eyes seem large and shining, and they go regularly to the surface for a gulp of air. No barbels are noticeable, but a rippling anal fin merges into tail. A small dorsal is rather far back.

"Yesterday I had to go to Kowloon, across the harbour, and I always stop at George Bing's place. He told me, and showed a photograph, of tanks swarming with baby Pompadour fish. He managed to bring up a spawning of over 100 to inch-diameter size, and then sold them to Australia or New Zealand. In the next spawning the eggs were all fungused!

C BASIL JORDAN (Carrizo Springs, Texas) writes: "I have a strange little fish that I captured on the Pecos while on a trip with Herman Blass. I cannot identify it. I have tried all my books, old and new, but have found nothing like it so far. It is small, with matched anal and dorsal fins, which are white or yellow trimmed with black. The fish is olivaceous, becoming yellowish from the caudal peduncle through the caudal fin. It eats livefood and darts from its position among plants to capture food with the speed of a bullet. The males are shorter than the females and usually try to take a position under the female even though she rests on the gravel. The scales are edged in black. There are (estimated) 16 rays in the dorsal and probably 13 in the anal. It looks like the *Goodeidae* of Mexico except that I cannot see that the first ray of the anal fin is used as a gonopodium. Perhaps it would show up under some magnification. This fish is my pride and joy."

IN a recent letter, Mrs. Morten Grindal (Stockholm, Sweden) relates how she had kept twenty White Cloud Mountain Minnows (*Tanichthys albonubes*) in an outdoor tank for several months. The fish received a minimum of attention—their food being chiefly Enchytraeids of which there was always an unlimited supply to hand in an old rubbish heap, which the years had matured into a rich leafy loam. The tank temperature was never high, averaging around 60 deg. F. for most of the time. The temperature, however, had gradually fallen to 45 deg. F. by the time the tank plus fish was taken indoors, at which time the water was perfectly green with algae, but this soon cleared, leaving crystal clear water with an inch thick carpet of filamentous algae over the gravel bottom. Mrs. Morten Grindal holds the firm opinion that White Clouds are at their best and most brilliant coloration when kept in the lower temperature range, i.e., not over 70 deg. F. That the fish do not suffer any harm has been proved to her satisfaction by long experience.

Glasgow's Junior Competition

AT the Schoolboys' and Girls' Exhibition in Kelvin Hall, Glasgow, from March 12-23 "The Aquarists' Rendezvous", Glasgow, S.I. put on a tropical furnished aquarium competition open to schools in mid-Scotland. First prizewinners were Allan Glen's School and runners-up were Bellahouston Senior Secondary School.



Photograph

(W. J. Howes)

The effective water garden of George Whitelegg at the 1957 Ideal Home Exhibition.

Ideal Home Gardens

TO stage landscape gardens under the roof of the Grand Hall annexe, Olympia, London, is no easy task. The finished products can easily look vaguely synthetic or may be overstocked with flowers to give the appearance of a floral display rather than a permanent garden.

This year, in the Gardens of Music Section of the Ideal Home Exhibition, the organisers and the exhibitors sought to create restful set-ups in Tudor fashion and were successful in producing an atmosphere of tranquillity. Two of the water gardens, one from George Whitelegg and the other by Granville Ellis, were informal in character and beautifully arranged.

In the "That's a Good Idea" section Messrs. Henca Products Ltd. showed a novel plastic fish container in which the fishes could swim around the "handle" which was filled with water.

Trade Topics

MR. ROBERT JACKSON, Holly Bark Nurseries, Grove Lane, Hale, Altrincham, Cheshire, has taken over the Swanage Aquarium, Dorset, and will be responsible for its presentation during 1957.

THE escape of a 6 ft. boa constrictor in the Eltham shop of Mr. R. A. Fairbairn received wide publicity both here and abroad. Mr. Fairbairn appeared on Radio Newsreel, and also I.T.V. News to reassure people that the snake was not dangerous to humans, as earlier published reports had suggested. The Boa was located and recaptured after five days.

MR. S. STRELLEY reports what he believes to be a new fish, probably one of the Barb species. It is shaped rather like a Cherry Barb and has a red lateral stripe with a greenish sheen. Mr. A. Harding in Mr. Strelley's area (Chelsea) has bred the fish and has a small number of young thriving.

Veterinary Surgeons Form New Organization

WITH the approval of the British Veterinary Association (counterpart in veterinary circles to the medical profession's B.M.A.) the British Small Animals Veterinary Association was inaugurated early in March at a meeting held at the Royal College of Veterinary Surgeons.

Its committee is to discuss how its policy may be made most effective. It is possible that bulletins will be issued to those veterinary surgeons and practitioners throughout the country who become members, setting out the results of treatment of the smaller kinds of animals. Generally speaking, the scope of the new organisation covers all creatures outside the

range of farm animals and will, of course, include fishes.

According to an official, the founder members are fully aware of the growth in the number of fishkeepers, particularly among people who, having to live in flats, are debarred from keeping larger animals. At the same time they realise that only a minority in their profession have had experience of treating cultivated fish.

One of the early aims will be to increase their knowledge in this field, to pool experiences and to build up a service so that members of the public can have their sick fish and similar pets attended to quickly and efficiently.

Guppy Federation Changes

THE Federation of Guppy Breeders' Societies A.G.M. resulted in some changes in the officials. Mr. H. Esterbrook (East Midlands Section) became President, Mr. W. Howe the vice-president and Mr. R. Alley, the overseas secretary.

On the exhibition side Mr. P. Redsell is the new show organiser, and Mr. L. Stevens, show secretary. The provincial members' representative is Mr. P. Pavitt.

Twelve Fathoms Down

FIVE Auckland aqualung divers recently visited the wreck of the steamer "Wairarapa", off Miner's Head, Great Barrier Island, New Zealand. Led by Mr. L. W. Subritzky, the party carried out its job of metals recovery. At the same time they reported that some twelve fathoms down they found small highly-coloured fish swimming through the mouldering hulk, which was studded with octopus nests and kelp. The "Wairarapa" was wrecked when it crashed into the base of a cliff on October 29, 1894.

A.S.L.A.S. Report

MR. E. T. FARRANCE resigned from the position of treasurer at the A.G.M. of the Association of South London Aquarist Societies after serving in that capacity for several years. He will continue on the Association's executive.

Nomination of a successor was deferred until the next meeting. Other officials elected for 1957 were:—Mr. G. O'Neill, chairman; Mr. S. Davies, secretary and Mr. H. J. Vosper, publicity secretary.

Pollution Research

THE impact of modern industrial processes on river pollution and its effect on aquatic life were shown at a State Water Board hearing when oyster growers along Virginia's James River (U.S.A.) urged that a local company should not be allowed to dispose of 11 lbs. per day of zinc carbonate wastes into the river until studies had been made to show whether the chemical was harmless to oysters. The zinc carbonate waste would come from the company's prospective fibre plant.

Club Notes and News

The Editor invites clubs to send brief reports of meetings and announcements of forthcoming events. News items for the next issue should reach this office no later than Friday, May 17.

THE Midland A. & P.S. show this year will be held from August 28-31 in a new and larger venue—the Princes Hall, Broad Street, Birmingham. The show committee, which now has Mr. R. W. Smith as secretary, Mr. J. C. Froggatt as chairman and Mrs. T. W. Pegg as treasurer, informs us that the new premises offer admirable facilities. At the society's A.G.M., Mr. S. E. Thorp was elected chairman, Mrs. T. W. Pegg, treasurer and Mr. T. L. Dodge, secretary.

EIGHTH annual show of Bethnal Green A.S. will be staged at the Men's Institute, 229 Bethnal Green Road, London, E.2, on September 6-7.

A FULL programme has been arranged by Bexhill A.S. for 1957. Officers for the current year are chairman, Mrs. W. Chiswell; vice-chairman, Mr. J. Holder; secretary, Mr. D. R. Miller and treasurer, Mr. P. Norris.

THE finnage of Scaled Goldfish varieties was discussed at the February and March meetings of Bristol Coldwater Fish Breeders' Group. The secretary reports that some members have made great strides in producing the Red Scaled Veiltail.

"MICROSCOPY" was the title of an instructive talk given by Mr. Lemmon at the March 5 meeting of Cambridge & District A.S. The club planned to hold a show on April 6 at which Mr. C. W. G. Creed was due to judge.

THE Catford A.S. meets every Monday in Holbeach Road School, Catford, and during recent months members have heard interesting short lectures given on a variety of subjects. An unusual evening was spent when a member brought along a mixed collection of fish which were judged by those present, using the F.B.A.S. points system. The fish were given to the members supplying the nearest-to-correct solutions.

MAKING artificial rockwork was demonstrated by Mr. T. Pearson at the February meeting of Sunderland A.C. of which he is the secretary. Mr. H. Callett won the table show. Mr. Otley gave an illustrated talk on "Nature Study and Photography" at the March fixture.

COLOUR slides of fishes and aquatic plants were shown at the February meeting of Dunstable A.S. The April table show will be for Danios and Catfish and that scheduled for May will cater for Swordtails and Platies. Officers elected at the club's A.G.M. were: President Mr. F. Moore; chairman, Mr. B. Flatman; vice-chairman, Mr. P. Brown; treasurer, Mrs. E. Franklin; secretary, Mr. J. Long and show secretary, Mr. D. Edwards.

OFFICERS re-elected at the A.G.M. of Grimsby & Cleethorpes A.S. were: Mr. J. Cullum, President; Mr. R. Mackley, chairman and Mr. A. E. Parker, 19 Lichfield Road, Grimsby, secretary. The club's ninth annual dinner was held at the beginning of the year. This society has an aquarium on the promenade at Cleethorpes which is open to the public during the Summer months. They would welcome visits from other organisations and would be pleased to hear from societies planning a visit.

ALL officers were re-elected at the A.G.M. of Herne Bay A.S. when a satisfactory year was reported. Monthly table shows are being held during 1957 and the society's challenge cup will go to the member gaining the most points.

MR. D. SILVER received a chiming clock from the Yeovil A.S. in appreciation of the services he has rendered to the club during his three years as secretary. The presentation was made by the President at the February meeting.

TROPHIES were presented at the second annual dinner of Pontefract A.S. Mrs. L. Rhodes received the Morton Cup (highest points at 1956 table shows), and the Livebearer Shield, Mr. F. Poundford, the Stewart Cup and Mr. R. Bramley, the Fighter Shield.

SOME highly successful meetings are reported by Poole A.A. since its formation in May of last year. Prospective new members would be welcome at the meetings that are held on the last Tuesday of each month at St. Mary's Catholic Hall, Market Street, Poole, Dorset.

FOLLOWING the A.G.M. of Portsmouth A.S. Mr. T. Bennett is President; Mr. C. Smith, secretary; Mr. F. Lush, chairman and Mr. B. Nunn, treasurer. Meetings are held on the first and third Wednesdays of each month at the Senior Boys' School, Doyle Avenue, Hilsa, Portsmouth.

MR. H. N. ALLIES, who is to become curator of the Paignton Zoo Aquarium, has resigned from the position of President of

MAKING A STUDY

Members of the comparatively new Bristol Coldwater Fish Breeders' Group examine a Calico Goldfish at one of their recent meetings.



HARROW A.C. His successor is Mr. W. A. Bone. At the club's 21st A.G.M., held on February 19, it was reported that the new headquarters at the Y.M.C.A., Gordon Road, Wealdstone, had proved popular. The Harrow A.C. film has been in demand and sent as far afield as Nairobi and Mombasa. Officers elected at the A.G.M. were: chairman, Mr. W. L. Wilson; secretary, Mr. S. N. Spencer; treasurer, Mr. G. L. Spickett and show secretary, Mr. E. H. Mann.

THE annual dinner and dance of Redhill A.S. was held on March 22.

PRESENT chairman of City of Salford A.S. is Mr. Ashmore; the vice-chairman is Mr. McDowell; the secretary, Mr. B. Reuben and the treasurer, Mr. Young, following the A.G.M. held earlier this year.

MR. F. S. GEORGE, curator of Chessington Zoo Aquarium, will judge tropical plants in a table show at the April 10 meeting of Guildford A.C. There will also be a class for coldwater fishes judged by Mr. R. Moring. Officers elected at the society's A.G.M. were: chairman, Mr. Davey; vice-chairman, Mr. Ryder; secretary, Mrs. Patrick; treasurer, Mr. Baxwell and show secretary, Mr. Coveney.

RESULTS of the Hampstead A.S. election of officers are as follows: chairman, Mr. L. Coatsman; vice-chairman, Mr. P. B. Utton; secretary, Mr. K. J. A. Pye; treasurer, Mr. W. T. Adams and show secretary, Mr. C. K. Walker. Mr. F. Stone continues as delegate to the F.B.A.S.

DIFFICULTY in obtaining the services of lecturers due to petrol rationing has made Coventry P. & A.S. decide to utilise as many speakers as possible from within its society.

THE Deal A.S. is to provide a display at the local Rotary club's Citizens-at-Leisure exhibition of April 25 to 27.

HOW philately and fishkeeping can be combined with added interest to both pastimes was explained by Mr. C. Hill at the February meeting of Derwent A.C. meeting held in the club's new headquarters, the R.O.A.B. Club, Derby.

MEMBERS of Corby A.S. enjoyed a film show at their February meeting. Mr. J. H. Gloyn visited the society on March 20.

RECENT activities of Nottingham A.S. have included a lecture on "Aquatic Plants", a film show and the annual general meeting.

THE Peterborough A.S. has decided to cease publication of its Bulletin entitled "The Peterborough Aquarist" for a period at least. Officers elected at the A.G.M. were: Mr. R. W. Westcombe, President; Mr. R. Whitehead, chairman and Mr. R. Lickerish, vice-chairman.

"UNDER THE RED SEA" was shown at the February film show arranged by Nuneaton A.S.

WINNERS of the 1956-57 Perth A.C. trophies were Mr. R. MacFarlane (Livebearers), Mr. J. Brown (Livebearers), Mr. J. Cook (Labyrinths and Home Aquaria), Mr. J. W. Mitchell (Characins, Carps and Furnished Aquaria) and Mr. G. K. Stewart (Open Show).

Officers elected at the February 21 A.G.M. were President, Mr. J. G. C. Barr and secretary and treasurer, Mrs. Hogg.

THE Pisces A.C. (Dulwich) had eight new members following the announcement in our last issue. The society now has a meeting room at 507 Lordship Lane, London, S.E.22, at which it is possible to set up permanent tanks. Meetings are held at 8 p.m. every Wednesday.

NEARLY 80 members and guests attended the annual dinner of Plymouth A. & P.S. Trophies were presented at the function. Dr. D. P. Wilson, of the Plymouth Marine Biological Association's Laboratory, gave an illustrated lecture on his tour of the United States at a recent meeting.

NEW officers elected at the A.G.M. of Chester A.S. were chairman, Mr. F. Oldbury and treasurer, Mr. G. White. The club's annual show will be held on September 7 and 8 in conjunction with Chester Cacti Society at St. Peter's Parish Hall, Hamilton Place, Chester.

A NEW society has been formed at Clacton-on-Sea, Essex, under the title of Clacton & District Tropical Fish Society. Its secretary is Mr. H. T. Lewis, 29 Warwick Road, Clacton.

MEMBERS of Bristol A.S. told of their unusual experiences with fish at the March meeting. The society's annual dinner will be held in the Ship Inn, Redcliffe, Bristol, on April 27. The Keynsham and District branch of the Bristol A.S. discussed plants at its March meeting.

THE A.G.M. of Aylesbury A.A. was held at the beginning of this year. Mr. Allan Shaw was unanimously re-elected President and other main officials for 1957 are: chairman, Mr. C. A.

Club Notes and News (Continued)

Bartlett; vice-chairman, Mr. E. Weightman; treasurer, Mr. H. R. East and secretary, Mr. C. L. Stephens. Mr. F. Stanley will give a talk on "Cacti" at the April 10 meeting and there will be a tropical table show on May 8.

BEST fish shown at the 1956 table shows of Basingstoke A.S. was Mr. R. Forest-Jones' Veiltail Goldfish. Mr. W. H. Lock-Bowers gained most points during 1956 and received the Stanley Cup. At the club's A.G.M., Mr. R. Forest-Jones, B.Sc., was re-elected chairman and Mr. D. L. Edmonds, secretary.

MR. L. E. CHALLENGER spoke on the Guppy and judged a table show for fish of this species at the February meeting of Bath A.S. Mr. J. Wheeler's Veiltail was the first prizewinner. Coldwater fish and plants were exhibited at the

March meeting and were judged by Mr. H. C. B. Thomas.

ANOTHER society to hold an A.G.M. recently was Bedford A.S. when Alderman J. A. Canvin was elected President; Mr. L. Georgeson, chairman; Mr. R. J. Skirton, vice-chairman; Mr. G. Booth, treasurer and Mr. J. Bell, show secretary. At a subsequent meeting Mr. W. Donnelly was elected secretary in place of Mr. N. P. Turtle who is leaving the town. Mr. P. B. Utton spoke on "Water" at the February gathering.

MR. H. AINSWORTH was elected chairman at the A.G.M. of Riverside A.S. (Hammer-smith) when Mr. A. Huxley was appointed vice-chairman; Mr. N. W. Webb, secretary; Mr. E. Daynes, show secretary and Mr. T. Thewless, treasurer. A table show for Platies and Sword-tails was won by Mr. Flintham with a Red-eyed Red Swordtail. Trophies were presented at the March 2 dinner and dance.

ALL visitors will be welcome at a film show to be given by Hornsey A.S. at the Priory Social Centre, Priory Road, London, N.8, on April 16. Starting time is 8 p.m.

MOOR GOLDFISH and Shubunkins were brought along by Mr. Jenkins to illustrate a talk he gave to Llantwit Major A.S. during March. Meetings are held on the second Wednesday of each month at the Youth Club and visitors are welcomed.

ON February 11 Mansfield & District A.S. held its first film-strip evening. Mr. C. Schutt demonstrated tank glazing on February 25 and Mr. A. Atkins spoke on "Fish Diseases and their Treatment" on April 1.

MR. V. OWEN, who stewarded at the WATER LIFE show in January and until lately lived at 10 Cliff Street, London, E.16, is asked to contact the Editor as soon as possible.

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