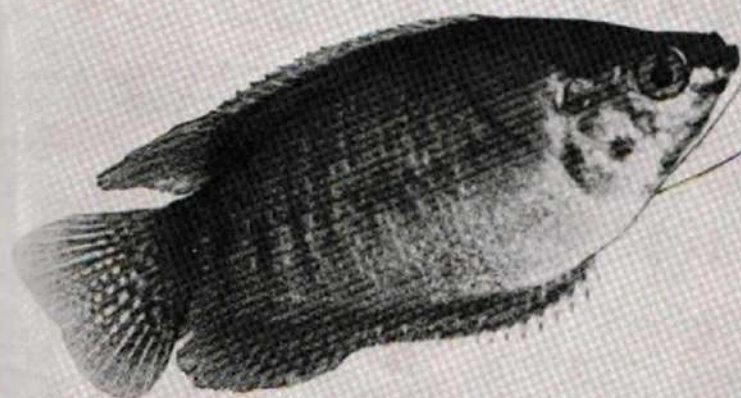


Royce

Water Life

AND AQUARIA WORLD



TWO CHILLING & CURENCE

Water Life

AND AQUARIA WORLD

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FRONT COVER: BUBBLE-NESTERS.
Among the bubble-nest builders in the *Anabantidae*
Family is *Colisa labiosa*, popularly known as the
Thick-lipped Gourami. A pair of these fish is shown
above, the male being the upper fish. A sequence
of pictures on pages 134-135 provides an unique
insight of the breeding procedure adopted by this species.

(Photograph)

[Gene Wolfshelmer]

VOL. 9, No. 3 (New Issue)

JUNE, 1954

EDITORIAL

Standards or Guides?

MUCH as it may be desirable to keep up interest in our shows and, consequently, essential as it is that there should be some incentive to encourage more aquarists to become exhibitors, what must not be overlooked is the fact that the majority of fish owners are not competition-minded.

For them, the care and time taken to produce new standards mean little; the claims of different authorities that their ideals are the best to aim at go unheeded; the feelings that run high when awards seem contrary to what the exhibitors expected are unknown. They are no more concerned with finer points of the respective show qualities of the Shubunkin favoured in Bristol or the Nacreous *Monoleptus* of the specialist breeder of *Carassius auratus* than with the prescribed colour, shape and minimum body length of the Common Goldfish, which standard the Federation of British Aquatic Societies introduced in place of the one first published round about 1935. They are not worried whether the *Lebistes* they keep are strictly within the Guppy pundits' range of types nor are they upset if their Fighters' fins fail to touch, or protrude beyond, the circumference of the circle which has its centre in the base of the Federation *Betta's* caudal peduncle.

Nevertheless, they are intensely interested in the fish they keep and wish to know if their specimens are of good quality or not. They want to be clear as to what constitutes an acceptable specimen and, when they start to breed, to be sure that they are not wasting time in producing broods unlikely to develop into useful stock.

Catering for All Fishkeepers

It seems that the many who are content to be breeders of fish for the love of it but who are not anxious to become exhibitors deserve more consideration than they have hitherto had from those who lay down what constitutes the ideal fish. What they want is not so much a hard-and-fast standard from which there can be no deviation, except after much debate and detailed deliberation, but a more generally worded guide to tell them the colour required, the size, the special characteristics of the species and, by means of outline drawings, to show the body markings, the body shape and the position of the finnage.

Such guides need not be confined to man-made varieties but should be drawn up for all fishes likely to be bred from in aquaria. They would be appreciated by some of the more experienced folk in the hobby as well as beginners. Better still, they could be the basis on which judges would assess exhibits for which no accepted standards have been drawn up.

Once a breakaway is made from the policy which results in the necessarily infrequent appearance of new standards, temporary guides for all kinds of fishes known to aquarists could be issued relatively quickly. There is no end to the possibilities.

Starting with Coldwater Fish

Advice on Setting Up a Tank and Feeding the Fish

By A. H. Charles

FUNDAMENTALLY the principles of fishkeeping are similar to those for the keeping of any other livestock. It is necessary to provide the creatures with environment and food reasonably similar to those they would find in Nature.

In this article I propose to give some detailed advice on the setting up of coldwater aquaria and also to suggest some foods suitable for coldwater varieties of fish. When keeping such fish in aquaria, the tank should be at least as wide as it is deep, to allow for the oxygen replacement at the water surface. Plants are needed in suitable numbers and variety. It is possible to obtain a fairly wide range from aquatic suppliers and advice can be obtained with regard to the method of planting. Practically all plants now used in aquaria and ornamental ponds are specially propagated by specialists and specimens collected from the wild are rarely suitable and should be avoided by the inexperienced.

We will assume that Goldfish have been decided upon, and one or more of the varieties chosen. As these have been bred and kept as pets by the Chinese since the Sung Dynasty (A.D. 960-1279), they are well suited to aquaria conditions provided certain points are borne in mind.

Number of Fish

The number of fish that can be accommodated in any tank must, of course, be related to the size of the aquarium. Let us assume that the container chosen is one commercially available, i.e., 24 x 12 x 12 in., although the larger 36 x 15 x 15 in. is by far the better. However, we will start with the smaller size which holds approximately 10 gallons of water, allowing for the sand, rocks, etc. and has a surface area of 288 square inches.

When deciding how many fish can be accommodated in a tank, a method of computation is one inch of fish to each gallon of water. This method, however, has been superseded by a more modern standard which is 24 sq. in. of water surface to each inch of fish. Working to either of these standards, the 24 x 12 x 12 in. tank will accommodate only 10-12 in. of fish, i.e., five-six 2 in. fish, three-four 3 in. or two-three 4 in. ones. It will be obvious that any fish

larger than 4 in. will be cramped in such a tank, especially as it will grow larger and longer in time. Always remember when calculating the size of fish, to measure body length only—do not include tail.

Now we come to the setting up of the aquarium and first we must see that the tank is thoroughly clean inside as well as out. In order to make quite sure that it is free of disease and predators make up a solution of permanganate of potash (a deep pink colour) and pour this into the tank, which should have been completely filled previously with cold water, and leave for twelve hours. Then drain the tank and wash it out with fresh water. To clean it thoroughly use a soft brush—an old nail brush will do—and scrub all the glass, refill and then empty. The tank should then be free of anything of a harmful nature to the fish or plants.

Obtain 21 lb. of aquarium gravel from a local pet store, place this in the tank, banking it up at the back and sloping it to about 1/2 in. depth at the front so that it does not show over the top edge of the bottom, front angle-iron frame.

If desired, a few pieces of rock (which may be purchased at the store) can be placed in position. The centre of the tank is not the best place for these and more to the sides and back is preferable so that there is a clear swim area for the fish at the centre front.

Now pour in about 6 in. of water. To do this without disturbing the gravel, place a sheet of newspaper completely over it and stand a small basin in the centre. The water can then be gently poured into the basin and it will overflow. When the six inches of water are in the tank, the basin and paper can be removed.

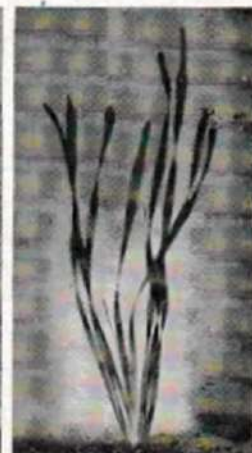
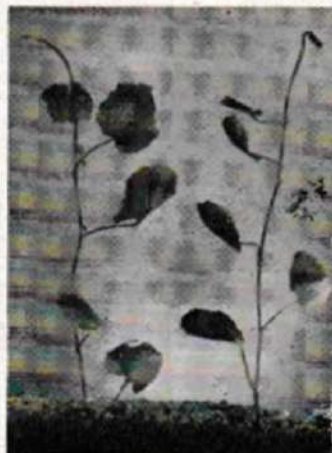
The plants come next, and these should be placed to look as natural as possible. It should be kept in mind that the

aim is to copy Nature. Arrange a number of plants along the back and aim to have these fairly thick with a clump at each side. A very good specimen plant bedded by one of the pieces of rock towards the side of the tank will look well. If it is placed in the middle it will stand out from the rest of the layout and detract from the overall appearance of the natural set-up. Furthermore, it will not give the fish free space to swim.

There is a wide variety of plants from which to choose, each of which can be obtained at aquatic stores. The species include the grassy types, *Vallisneria* (straight or twisted) or *Sagittaria*—either one or the other, but it is as well to remember that *Sagittaria* and *Vallisneria* in one tank will



The author, a well-known West London aquarist.



Photographs

Left, *Elodea canadensis*; centre, *Cardamine lyrata*; right, *Vallisneria spiralis* var. *torta*.

[G. J. M. Timmerman]

not thrive as they seem to have antipathy to each other.

Then there are *Eleocharis* (Hairgrass), *Acorus* (Dwarf Rush) and *Potamogeton*. All these have definite root systems, and can be planted in the same manner as ordinary garden plants. The *Vallisneria* or *Sagittaria* are best situated at the back and sides with clumps of *Potamogeton* in the back corners. The crowns of the *Vallisneria* or *Sagittaria* must be above the gravel surface. Hairgrass can be placed at the sides of the tanks and at the front corners, again allowing the crowns to appear above the surface of the compost. The Dwarf Rush will look well if placed just at the mid-distance between the rocks and front glass. Here again, the crowns should show above the gravel.

The bushy types, such as *Lagarosiphon major* (*Elodea crispata*), *Egeria densa*, *Elodea canadensis*, *Myriophyllum*, *Ceratophyllum demersum* (Hornwort), *Ludwigia Muleritii*, *Limnobia Nammularia* (Creeping Jenny) *Cardamine*, and *Marsilea quadrifolia* (Four-leafed Clover), are sold as cuttings and need to be weighted with a small piece of lead and this inserted into the gravel. In time these plants will anchor themselves.

The special plant for the front off-centre area can be a *Najas* ("Spatterdock"), or a *Stratiotes aloides* (Water Soldier). Both these have definite roots and should have the gravel well over the top of the roots as, being large subjects, they tend to lift out of the compost due to their own buoyancy. All the other types mentioned can be arranged along the back or in clumps with the stems well set in the compost.

Fossiliaria antipyretica and *gracilis* (Willow Moss) look very attractive. This is especially true if one can obtain a branch attached to a stone or short piece of root of a tree, as this, when placed between two pieces of rock or set at the end of a row of plants, will help to give a natural appearance to the set-up.

There are some floating plants which can be used, as they will act as cover for the young fry should the fish spawn. It is as well to include some specimens of one or more of

these:— *Azolla* (Fairy Moss), *Riccia* (Crystalwort), *Hydrocharis* (Frogbit) and *Lemma* (Duckweed). This last-named will probably be included when your fish need a little extra in their diet.

When you have completed the planting to your satisfaction, place a piece of newspaper and the basin over the plants, rocks and gravel and carefully fill the tank. A clean watering-can is handy for this job. The water should reach just up to, or a fraction above, the bottom edge of the top angle iron, then there will be no water line visible. Leave the tank for a few days—as long as a week if possible—before introducing the fish, as this will allow everything to settle down and give the plants an opportunity to adjust themselves.

Achieving a Natural Effect

The main idea when setting up your tank is to make it appear as near to the natural habitat of the fish as possible and, if you follow out these instructions, the whole attempt will pass muster. It should form a picture for all who see it besides being an added attraction in the room in which it is set up.

Feeding the fish should not present any difficulty as most fish kept in aquaria are omnivorous. Goldfish and most other members of the Carp Family will take small quantities of brown bread, porridge, white fish (raw and cooked), sardines (these, from tins, should be given without tomato juice or oil), shrimps, insects of all kinds, flies, grubs and gentles (fly maggots), gnat larvae, caterpillars, small Earthworms (or large ones cut in pieces), crushed freshwater snails, small woodlice, baby slugs, etc. When giving dried foods always remember to soak them in water first, as they are apt to swell inside the fish after a meal. This does not apply to finely ground dried foods. There are many good proprietary brands of dried food available and advertised in these columns. I would mention here that, when ants eggs are given, these should preferably be taken freshly from a nest as they then have a high food value.

— Know Your Fishes —

No. 33. Pygmy Sunfish

(*Elassoma evergladei*)



Photograph]

[G. J. M. Timmerman

Few members of the North American Sunfish Family, *Centrarchidae*, need be given tropical conditions but fish of the Genus *Elassoma* are generally regarded as exceptions. *Elassoma evergladei* rarely exceeds one inch in length, hence its popular name of Pygmy Sunfish, although the female is the slightly larger fish.

The male in breeding trim is most attractive with a rich black overall colouring and spangled flecks of green and yellow on his body. At other times the body is a dark olive-green, with dark barring often discernible, and the dorsal and anal fins are black-edged, whilst all fins tend to be dusky.

The female is less colourful, her body being an olive-brown with a few dark spots, and her fins clear. She has less developed fins and this is particularly true of

the dorsal which in the male is of quite handsome proportions.

These fish are generally inoffensive although lively, but their small size does not make them ideal as community inmates; neither does their preference for water slightly on the acid side and having a temperature of 70-73 deg. F. Over 78 deg. they may show signs of distress and over 80 deg. may prove fatal.

Pygmy Sunfish should only be offered livefood. Prepared food—even if taken, which is doubtful—will not keep them in good condition. *Daphnia*, chopped Tubifex, White Worms and Brine Shrimps are all excellent.

Breeding procedure is interesting as the 30-60 yellowish eggs are deposited in a simple nest of pieces of plants on the aquarium bottom. The male is particularly active at this time, displaying his fins and taking on his full depth of colouring. Spawning can be a somewhat protracted affair lasting over several days. Although the male guards the nest until the eggs hatch in about 48-72 hours, he may eat the fry under aquarium conditions and, for safety, the parents can be removed after the spawning. The smallest crustaceans (finely sifted *Daphnia*) will be taken as a first food and growth of the fry is quite rapid.

There is another less often seen species, *E. zonatum*, which is extremely similar in external appearance to *E. evergladei*.

The Pygmy Sunfish has a range from North Carolina to Florida. It is found in slow-moving waters or swamps and actually gets its specific name from the Everglades swamps of Florida.

Class: *Pisces*. Order: *Percomorphi*. Family: *Centrarchidae*. Genus: *Elassoma*. Species: *E. evergladei*.

Unusual Losses Among Goldfish

Toad Tadpoles and Water Shrews Suspect?

By E. E. Dennis

AMONG the many obscure reasons for the distribution of fish in Nature I am not aware that the presence of toad tadpoles has ever been mentioned. It may perhaps be inferred that, where they are present in large numbers, they may have an hitherto unsuspected bearing upon the well-being of fish in the waters that contain them.

In a small pond about 8 ft. x 3 ft. x 2 ft. deep, which contained three 8 in. Goldfish and a good number of tadpoles of the Common Toad (*Bufo bufo*), several of the tadpoles were seen apparently attached to the fish. When the fish were approached and disturbed they swam away and, on this movement being made, the tadpoles became detached and at that time no more was thought of the matter.

Later on, however, the Goldfish were found to be in distress, resting near the surface of the water and remaining motionless and apathetic when approached or otherwise disturbed. On dipping them out with a hand net, it was found that their bodies were stripped of mucus over an area on each side which extended along the lateral line for about four inches and above and below it for about two inches. At the roots of the fins the skin was also removed and the raw flesh exposed, while the whole skin of the dorsal fin was stripped off, only the bony rays remaining.

The stripped patches felt rough and the scales so loose that they came away almost at a touch. Fungus had begun to grow on the affected parts. The fish were given a salt bath daily and the Fungus disappeared but, at the end of about a week, was replaced by a bright green growth resembling a filamentous algae. This growth could be easily scraped off but did not seem to be affected by the salt. The fish, appearing to have recovered, were transferred to a clean pond where they behaved normally, swimming



Photograph

(E. E. Dennis)

Eight-inch Goldfish apparently killed by Common Toad tadpoles.

away when disturbed, but after three weeks two were found on the surface lying on their sides. These died two days afterwards. The third fish, which was the one least affected by the tadpoles, recovered completely.

Some time afterwards another unexpected attack on six-inch Goldfish took place in a rather larger natural pond which was covered with one-inch mesh wire netting well pegged down

to exclude herons, etc. Two fish were seen to be damaged and, upon netting them, it was discovered that one had both eyes eaten out, leaving large ragged white sockets, and that the top of its head was badly torn about. The other fish had lost one eye and had severe head injuries. Both were killed immediately after examination.

Nothing could be found in the pond to account for the injuries, and there were no tracks or traces of rats or other enemies. A search was made of the grass surround of the pond without result but, upon lifting a wheeling plank lying a few feet away, out ran two water shrews. Could these pretty little velvety black creatures have been the culprits?

I had occasionally seen them about the place, but had had no previous cause to suspect them and the occurrence remained a mystery. However, I have just been reading the book "King Solomon's Ring," by K. Z. Lorenz, and in the chapter on water shrews the author writes: "It has been reported by A. E. Brehm that water shrews have killed fish more than sixty times heavier than themselves by biting out their eyes and brain. This happened only when the fish were confined in containers with no room for escape. The same story has been told to me by fishermen on Lake Neusiedel, who could not possibly have heard of Brehm's report." The above book should not be confused with "King Solomon's Mines"—a very different story altogether.

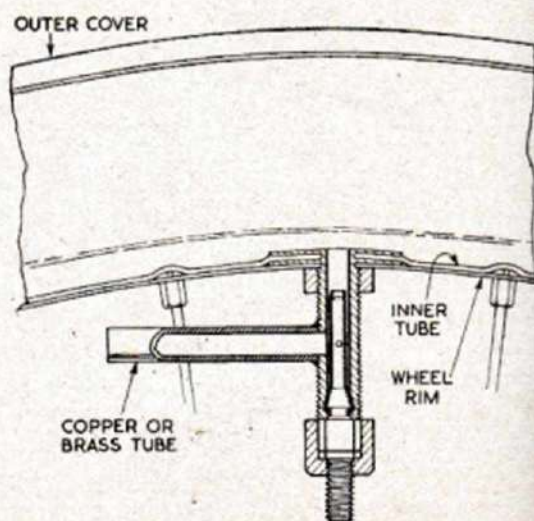
Readers' Hints and Tips

Useful Temporary Aerator

A USEFUL temporary aerator can be made by utilizing a bicycle wheel complete with inner tube and outer cover. The only other fitting required is a piece of brass or copper tube, 1½-2 in. long and ¼ in. in diameter. To make the necessary adaptation first drill a hole through the side of the valve casing. This hole should be of the same, or a slightly smaller diameter, to that of the copper or brass tube. File the threads away from around the edge of the hole to give a flat surface. The copper or brass tube is then soldered on the filed area so that the end covers the hole. Rubber tubing, diffuser stone and a clamp, to restrict the flow of air, are fitted up to the metal tube in a similar way to when a more orthodox aerator is used.

The aerator is now ready for use and the tube is pumped up hard when it will perform satisfactorily in aerating aquaria for from 12-24 hours without repumping proving necessary.—(H. Buck, Ferest Hill, London, S.E.23).

(10s. 6d. is paid for all published hints and tips.)



Innovations in a Cellar Fishroom (2)

Novel Tank Lighting Arrangement

By J. E. Edwards

In the first part of this contribution which appeared in the last issue, I referred to the system of aquaria lighting which I had put into operation. This, in my opinion, is most efficient and very economical.

First of all, let us consider the disadvantages of utilising normal lamps as used for domestic lighting. After many years of fishkeeping I can quite honestly say that using domestic lamps has proved expensive and not too efficient. In spite of all possible safeguards, such as cover glasses, specially designed aquaria shades, trying to use the lamps in the suspended position for which they are designed, and even using a higher voltage type of lamps and under-running them, the results were most disappointing when, bearing in mind the large number of tanks, and thus lamps, in use, I have changed as many as eleven 230-volt, 60-watt lamps in one week, and even four in one day once. My local electrical dealer views me with a somewhat jaundiced eye when I trot round to his shop with an armful of lamps which have not gone anywhere near the life guaranteed by the manufacturer. He has always changed them, but I begin to dread the almost weekly visit and in the end turned the job over to my wife who has more courage than I have!

Unfortunately lamps over an aquarium are inclined to be subject to condensation. At around 230 volts this can produce quite a large electrical arc across the lampholder contacts. Another fault is that the large size of a domestic lamp means close proximity to the water. Should fish splash some water on to a hot lamp it explodes, leaving the tank in darkness, blows the fuse and you usually have the job of digging around the compost afterwards for small pieces of very sharp glass. If you try and over come this hazard by the use of a cover glass as I do, then, owing to the fact that the lamp must be very close to it, the glass eventually cracks under the heat.

On top of these drawbacks one has to consider the running costs. Take, for instance, a 24 x 15 x 12 in. tank. To obtain really first-class illumination and no shadow means using two 40- or 60-watt clear lamps. As I have forty tanks in use, many quite large, it means a considerable electricity bill each quarter. For example, take ten tanks using only one 60-watt lamp each; this adds up to 600 watts per hour. I rate tank illumination to be around six hours each day, giving a consumption of 3,600 watts per day. Working at 1000 watts per unit one would be burning 3½ units per day, without heating.

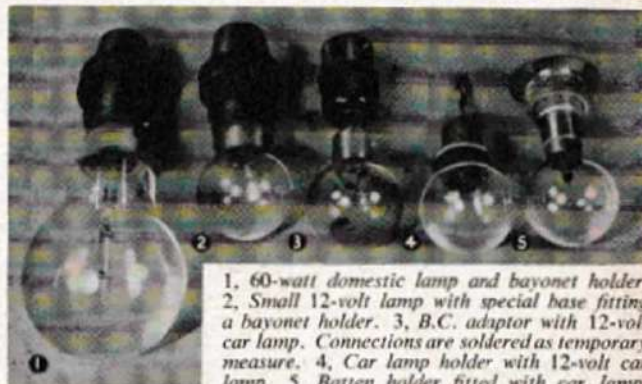
As stated in the last issue, I put meters on lighting and heating circuits and found that when everything was on I was using almost three thousand watts. Fortunately everything was not always on because of the thermostats, but even so it could not continue if fishkeeping was to remain just a hobby. By the way, one can pick up second-hand meters in markets and junk shops. Any price up to 50/- is reasonable.

Obviously, when I took over my cellars, lighting was to be even more of a problem because, whilst I had quite an amount of daylight, it could not be as much as I would get in an upstairs room or outside fishhouse. Also, as I now had a large number of furnished aquaria they would not show well if not lighted up when the rooms were in use. I had made experiments with every known lamp both

normal and industrial and even spent considerable time and money on fluorescent lighting, mixing reds with whites, daylight with peach, warm white with daylight and red, but the only one which was at all successful with me was the warm white. Even so for thirty or more tanks it was likely to prove costly, and replacements expensive.

I considered putting in a small generator to run low-voltage lamps. I went round obtaining information and eventually met an old aquarist friend who suggested trying car bulbs via a transformer. I looked into this for a time and eventually hit on a system which is really a great success.

The average house voltage is between 230 volts and 240 volts A.C., so why not run car bulbs in series? I borrowed a transformer which would give me 12 volts off the house supply and experimented with 12-watt, 24-watt and 36-watt



1, 60-watt domestic lamp and bayonet holder. 2, Small 12-volt lamp with special base fitting a bayonet holder. 3, B.C. adaptor with 12-volt car lamp. Connections are soldered as temporary measure. 4, Car lamp holder with 12-volt car lamp. 5, Batten holder fitted with car lamp.

car bulbs. I found that a 36-watt car bulb over a 24 x 15 x 12 in. tank and a 24-watt over a 24 x 12 x 12 in. gave a brilliant white light which was better than a fluorescent tube and showed the natural colour and beauty of the fish. The lamps, being made for cars, are very robust and, if put into the normal shades, are sufficiently far from the water or cover glass to give adequate air space. Thus lamp failure is uncommon unless the bulb is given a strong enough knock to break the glass. If you do not wish to purchase car lamp holders it is possible to get the lamps standard B.C. capped by the manufacturers, at a cost of about 3d. extra. In this way normal lamp holders can be utilised but be sure to have a few spares as if one lamp fails when connected in series, the whole chain goes out until the faulty lamp is replaced.

Lamps in Series

What do I mean by in series? It is quite simple, but if you are not electrically-minded get some help on this job. The mains supply is, say 240 volts A.C. You are going to use 12-volt lamps. Twelve into 240 goes 20 times, thus 20 lamps in series does the trick without the use of step-down transformers or resistances. Series means that the lamps are connected up like a Christmas tree set. If you do not want to have the use of so many lamps, 10 24-volt ones will do the same job. If you are in need of more, well, 40 6-volt lamps will be suitable. One word of warning: the wattage in each chain must be the same, all 24 or

36-watt. If you mix them the lower wattage lamps will burn out.

One of the advantages of a 12-volt series electrical circuit is the safety factor. I have had many unpleasant shocks off a tank and, on checking up, found it was the electrical wiring which was the cause. If one is in a fishhouse with a concrete floor, stockings feet, sleeves rolled up and bare arm immersed up to the elbow in water and forehead supporting a metal lamp shade or cover, well, it can be somewhat disturbing for a few minutes!

Using a 12-volt system must minimise this hazard to a great extent. Should any part of the circuit be touched with wet hands a shock rather like that of a sparking plug on a motor car would be received and it would not be lethal. What other advantages are there? First of all I believe it provides the finest lighting for a fish tank I have seen. I realise this might be a controversial statement, but I have now had this system for several months and, not only have many of my friends copied it, but some of the leading lights in the hobby have come along to see it and gone away wondering and trying to work out the cheapest method of changing over their own installation. Besides this, I have had a number of club visits from those within easy travel distance.

I have also demonstrated it to a number of societies when I have been giving them a talk. For this I usually arrange with the secretary to have a small coldwater tank set up with a few fish and plants and I take along a small transformer and a lamp. A 12-volt, 24-watt lamp is quite sufficient to prove my point.

Another fact about this lighting is that, instead of the yellow illumination given by the normal domestic lighting, it gives a brilliant white light which not only shows up the colour of fishes to perfection, but even the plants seem to thrive on it. I now grow plants I have never been able to grow before, and in a cellar half below ground with the lighting off from morning to evening. There is no trace of algae, or all the other unwanted troubles that so often accompany lighting or daylight.

Finally, let us examine a hypothetical case to work out the saving in wattage per hour. Let us take 20 tanks using 36-watt lamps over each, a total of 720 watts. Before I adopted the new system I had to use at least a 60-watt clear lamp over each tank. Therefore I would have used about 1200 watts. I am therefore saving at least 480 watts per hour. In fact I save more because I use only 24-watt lamps on 10 tanks, a saving of a further 120 watts.

Smaller Lamps More Handy

Frankly, apart from the lighting given and the safety angle, I like this form of lighting because of the small lamps used. They do not get in the way when one is manipulating a net. I also find that reflectors do not make very much difference to the light given. After all, they are car headlamp bulbs and are only required to cover a very small area at very close proximity to the water. I no longer get those cracked glass covers. In fact I can lay one of these lamps on the glass, leave it switched on for hours and I have not as yet known a single glass break.

If a standard B.C. holder is used, spares can be obtained from most garages. They average 2/7d each, plus tax. This is not more than a few pence above the cost of a 100-watt domestic lamp and they are far more robust for aquarium work.

Of course there must be drawbacks and we must be fair about it. One of the most obvious is that if you use a number

of lamps in series, and one lamp stops working, the circuit is broken and all go out. I do not find much difficulty in finding which one has failed quite quickly and, in any case, I have had very few go. So far I have only lost ones that I have dropped or given a severe knock.

The other warning is an important one. If there is a chain of lamps in series, when all lamps are in circuit it resembles one large wattage 230/240-volt lamp. Now, should there happen to be a short-circuit along any part of the wire to earth, say through a metal tank which has been earthed, or water or gas pipe, or something of this nature, the chain will have short-circuited and all the lamps from that point back to the mains will blow. This could be anything from one to twenty lamps and quite an expensive proposition.

Binding with Rubber

However, this is a warning and the danger can be easily overcome by binding any pipes or other earthed objects with rubber. Should you be one of those all-too-rare aquarists who have earthed their tanks, cover the lip of the aquariums with some rubber matting and stick it on with Bostik. In any case this should prolong the life of the tanks and quite a number of experienced aquarists are adopting the idea these days. If you would like to have a few fuses in the series chain you can easily do this by fitting in, say, a fuse at every fifth lamp, using 5-amp fuse wire.

For testing various points of the circuit I have made up a tester out of a piece of copper wire bent like a hairpin. The top part is bound with insulation tape. All I have to do is to place the two ends of the wire across a fuse or lampholder and that is where the trouble is, on come the lamps. If you want to do things really properly and are prepared to spend some extra money you can place a small neon lamp across each lampholder and, when a lamp blows, the neon above the offending lamp will glow brightly.

Do not forget that there is nothing new in this system of lighting and many garages and factories use it for bench and inspection lamps to keep down costs.

Finally let us consider the fish and plants in my fishroom. I have disciplined myself over these. For years I have had dozens of different species in each tank and chopped and changed the whole time. Now I have gone back to my original love for two years study. I refer to livebearers. They have been one of the most neglected groups for several years. I am now breeding real Red Platies, Red and Yellow Wagtail Platies, Red Swordtails, Tuxedo Platies and, of course, Guppies, although the latter have fallen by the wayside more through over-specialisation than neglect. How often does one see a red Red Platy or Wagtail these days? By giving myself a two-year plan and getting rid of all fish I am not going to try to breed from, every tank must earn its keep. I have one variety of fish per tank and they make a better picture, too!

Specialising with Plants

Regarding plants, so far I have been very successful with the new lighting and base heating, but again I am specialising. If a particular species will not grow easily for me under the conditions provided, it is eliminated. Generally speaking, I try to have one species of plant per tank. For decoration I am experimenting with slate and, to a certain extent, with red tile, not brick. My friends compliment me on the result and the unusual pictures presented. That is good enough for me because many of these aquarists know far more about these matters than I do.

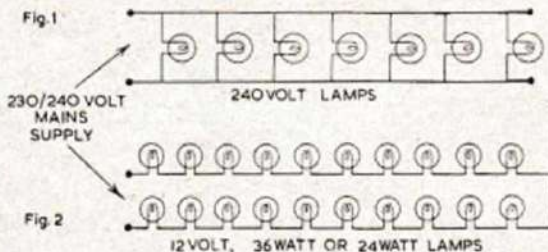


Fig. 1, parallel wiring circuit using domestic lamps. Fig. 2, series circuit utilising 20 12-volt lamps of consistent wattage.

More Views on Separate Classes for Champion and Novice Exhibitors

Should the Scheme Be Limited to Club Shows Only?

AMONG the views not so far published in this debate are a number against the proposal just as there are those equally strongly in favour of it. In this issue we include some constructive criticisms from opponents to the scheme as well as contributions from its supporters. Space permitting, the letters still in hand will be published in our next number, after which a summary will be given, prior to sending the Federation of British Aquatic Societies to give their considered opinion of the suggestion that we need two categories of exhibitors at shows.

Mr. D. G. Baker (secretary of Bradford A.S.), says that in the view of his members the scheme as originally projected is sound and if adopted generally would create more interest in the rearing of fish. Bradford A.S. has run table shows on various lines in the past with separate classes for novices and seniors.

Mr. R. S. White (East Ham), President of the Federation of Guppy Breeders' Societies, has strong views based on experience gained at shows for Guppies. His conclusions are: "The idea of champion and novice classes is most commendable and one of which I am wholeheartedly in favour. I can, however, see some snags in the suggestion as set forward. The title of champion might suggest a superior type of fishkeeper when, in actual fact, all of the important three awards gained may have been won by a single fish brought from a fellow aquarist. This may lead to a complete over-valuation of the owner's stock with subsequent harmful results to the hobby. Buyers of that person's stock may pay high prices in good faith for completely worthless stock. It is surprising how many aquarists will pay more than a fish is worth in the mistaken belief that merely by mating the bought fish with one of their own, they will be the proved owners of similar or better fish. There are in all branches of the hobby, so-called aquarists who are only with us for what they can take out of the hobby and



Mr. R. S. White.

will do what they can put into it. Some charge fantastically high prices for their stock just because they happen to be in the market. We must not encourage these individuals. If the two categories were accepted there would be a tremendous amount of work involved to maintain accurate records of winners. This could only be done by a central committee constantly publishing up-to-date lists with the co-operation of all show secretaries. The cost of the one would be too high and, I fear, the co-operation of the other lacking in some instances. The former Guppy Breeders' Society recognised the value of, and was able to work, such a novice class with the ruling, 'That every member be considered a novice until he or she had attained 20 points in novice competition'. With the formation of the Federation of Guppy Breeders' Societies we found some difficulty in maintaining accurate records between sections and the ruling now reads 'That a member be considered a novice in his first year of membership'. With the benefit of this experience and bearing in mind that the original idea of champion classes was to encourage the beginner, I would suggest that the ruling

THE suggestion that there should be a higher status for experienced exhibitors was first mooted in the October 1953 issue of WATER LIFE, since when a large number of letters has been received for and against the suggestion. The original scheme visualised when the Editorial was written may well prove to be workable, but the opinions expressed in letters published and those still in hand suggest that it might be improved in one or two ways. When a summary of the views put forward is published it will be opportune for the Federation of British Aquatic Societies to weigh up the disadvantages and advantages and then to put forward any plan which they recommend should be adopted by all show promoting organizations. That something should be done to encourage more to become and remain exhibitors is obvious and the introduction of two categories instead of one could be the answer.

should read: 'That a novice be considered an aquarist who is serving his first two years of membership in any one or more societies'. The other class instead of being called 'champion' should be known as the 'advanced or senior' class. Entry forms and schedules could easily be adapted to cover these rulings. The protest clause and integrity of fellow exhibitors would be the only safeguards needed."

Mr. D. McCann Pullon (F.B.A.S. judge and lecturer and Breeders' Section secretary to Nottingham A.S.), has contributed a detailed criticism of the suggestion. His very sound arguments merit their appearance in full. He writes: "I consider that the problem is a double one. Primarily, there is the object of encouraging novices to compete, and secondly, there is the problem of maintaining enthusiasm in the face of continued success, in a particular competitive class, on the part of an individual. The two, to my mind, are distinct, and I believe the second to be of less importance than the first. At present, the hobby has two distinct grades of competitions, open shows and club shows. If novice classes are to be encouraged they should be at club level. Some societies have followed this policy for a number of years. Many societies, however, have insufficient members or competitors to operate a novice/senior scheme, or prefer not to introduce one for other reasons, e.g., the tendency to split the club into senior and novice cliques, or because of the extra clerical work involved. The latter would probably be extensive for, if a novice/senior scheme is to be equitable and effective, it would need to be on a class basis, i.e., a senior competitor by virtue of qualifying wins in, say, Swordtail classes would presumably be a novice in all other classes—tropical, cold, breeders, or furnished, pending qualification in each class. The second part of the problem was encountered by Nottingham A.S. shortly after its re-formation at the end of the war, and was met by placing a ban on the entry in any of the club's shows of a fish which had already won a similar class. This scheme operated with reasonable success until it became evident that it was no longer necessary. A review of the show results within this society indicates that in general the exhibitors with any lengthy record of successes are those who breed the fishes they enter.

Aims of the Keen Breeder

One might, of course, logically expect this to be the case, for the keen breeder naturally endeavours to select the best

of a brood for his future breeding and competitive stock. When his selection is at fault he may find himself beaten by fish of his own breeding but this is not usual except where the breeder disposes of his surplus as soon as they reach a saleable size instead of growing them to the point where the slight qualitative differences are sufficiently developed to enable an accurate final selection to be made. This premature disposal of broods is in my opinion a basic reason for lack of success in competitive classes.

"There is a skilled technique in preparing and benching an exhibit and in my experience both as a judge and a competitor at all types of shows, only a small proportion of exhibitors either know of it, or are prepared to take the trouble involved in using it. Naturally, those who do are more consistently successful than those who do not. This technique should be acquired at club level, however, and not at the open events. Combining the above two reasons with those which have already had ample publicity, the main reasons for lack of success in competitions may perhaps be summarised as follows:— 1. Failure to realise that purchased fish are generally at a disadvantage when competing against fish that have been bred by the exhibitor. 2. Failure to obtain adequate stock to commence a line aimed at producing fish of show quality. 3. Too early disposal of the surplus in the brood. 4. Inadequate facilities for, or care taken in, rearing the fish. 5. Insufficient specialisation, or, in other words, attempting to reach the top in more classes than one's facilities will allow. 6. Lack of knowledge of the requirements of show standards resulting in faulty selection of breeders and of entries from the specimens available. 7. Incomplete understanding of, or failure to use, the techniques of preparation and benching (which vary considerably between species). 8. Faulty judging, from a variety of causes including lack of time, poor display conditions, or in mixed classes, personal bias.

Extension of Star Scheme

"There are of course other reasons, relatively minor ones in my opinion, but does the introduction of novice/senior classes at open shows answer even one of the above points? I think not. Indeed, one aquarist with whom I discussed this problem rang me a few days later and said that it seemed to him to be closely akin to the booby prize at a whist drive, except that the number of times one could win it was limited! Open shows attract aquarists from all over the country to see top quality fish, but even now some are disappointed. Lower grade classes are not going to help maintain their support. The F.B.A.S. star system is now becoming generally known. Is not this an encouragement for those in the cards but not taking first place? Perhaps it could be extended beyond the first four or six where the quality of entries calls for it. I know of more than one instance where a newcomer to the hobby has really set out to win a given class, in spite of views of others that 'Mr. X always wins', and has succeeded in ousting the 'champ'. This was one reason why the ban on previous winners became redundant in Nottingham. Others I have spoken to have been affronted by the proposal and have taken the attitude 'I want to win a real class or not at all. Does competing against second-rate stuff tell me how good or how bad are my fish?'"

"I can almost hear some readers saying, 'Right, you've put up an argument against the scheme; what alternatives can you suggest?' Briefly, my suggestion comes under two headings.

"For Open Shows I submit that (a) If additional classes are possible, split up the mixed ones, e.g., striped Barbs, *Hyphessobrycon* species, etc. (not of course the A.O.V. classes which cater for everything not covered elsewhere), so that a species does not have to compete against its more glamorous relatives. (b) Give judges more time per class to avoid the mistakes arising from rushed work. (c) Arrange for all complaints, other than trivial ones, regarding the judging to be passed immediately to the F.B.A.S. Show Standards and Judges' Committee for investigation.

"For Club Shows I think that (d) the appropriate F.B.A.S.

committee might investigate ways of meeting the two problems at club level, including a review of any schemes operated by affiliated clubs, and might issue, perhaps as an addendum to the Show Standards Handbook, a summary of their findings for the guidance of individual clubs. (e) as (a) above. Nottingham has done this for some time, i.e. in any grouped class in the show schedule, if the entries include six or more of one species, those entries automatically become a separate class providing the remainder is sufficient to continue the original class."

Mr. C. R. Looker (London, E.15), well-known amongst aquarists in the South, is well qualified to participate in the discussion. Recognised as a judge by the F.B.A.S. and the F.G.B.S. and an active member of East London A. & P.A., he is also an honorary member of the Eastern Counties Section of the F.G.B.S., Bethnal Green, A.S., Stoke Newington A.S., Forest Gate A.S. and Chingford A.A.S. He writes:—"I well remember the controversy over the question of whether or not a judge should withhold a first award and I realise that it was out of this discussion first started by WATER LIFE that the present F.B.A.S. Star Scheme was introduced. The debate went on for several months but I did not contribute as my views had already been voiced by fellow judges. Now WATER LIFE has done it again! I am not sure whether it has thrown the cat amongst the Goldfish or declared open warfare on the pothunters. I very much



Mr. C. R. Looker.

like the idea of introducing novice and championship classes for aquarists and would also like to see more junior classes for exhibitors under 16. I have seen the introduction of a scheme for novices, based on the first year of membership, by the F.G.B.S. The entries can gain award cards and the Novices' Cup is competed for every six months. Several clubs I know hold table shows for junior cups, competed for monthly, thus giving encouragement to the aquarists of the future. If we decide to have classes for champions, I propose that at first they be limited to three national events, for example, in the Summer in London (the N.A.S. Exhibition), in the Autumn in the Midlands or North (such as Birmingham, Nottingham or Manchester) and in the Winter in London (WATER LIFE Show). Certain conditions should control the entries such as:— 1. The exhibit should have been owned by the exhibitor for six months. 2. It must have won a first prize with 90 points or over, i.e., by the winner of a gold star under the F.B.A.S. scheme. These conditions could be made to apply to fish, plants and furnished aquaria classes. By this means, it would be possible for one entry to win the championship of all three shows and I submit that such an achievement would make the exhibit the champion of all champions for the year in its section."

Mr. J. E. Taylor (chairman of Bethnal Green A.S.) states that his society devoted one whole session on the question of introducing champion and novice categories of exhibitors in open shows. It was agreed that novices should be catered for, as it is hoped that they will become champions of the future. After much heated discussion lasting two hours, the society considered that novice classes should be confined to table shows of clubs to which the member belongs. Mr. Taylor adds:—"By expert coaching and genuine advice from members of the champion category, the true novice will then soon be able to leave the 'nursery' and compete against his more knowledgeable fellow aquarists. The society has in the past adopted a points system for an annual shield for champions and this year are doing likewise for novices. Regarding open shows every aquarist will agree that we go to see and admire champion exhibits."

Getting the Colour into Metallic Veiltails

Selection of Suitable Stock
and Need for Heat and Light

By N. E. Perkins

I HAVE been prompted to write this article by a letter from a WATER LIFE reader in which he expresses his hope of obtaining a quick colouring strain of Metallic Veiltails from British stock. Since, in the past, I have been approached many times on this subject it would appear that there is a general desire to see more of this beautiful type of Goldfish. What I have to say, however, is purely my own personal opinion backed, to a certain degree, by experiments and observations both of my own and of others.

There is an old saying that you cannot have your cake and eat it and it seems to me that this is precisely what we aquarists have been trying to do for a long time. Although coloured Metallic Veiltails are seen from time to time, no one, to my knowledge, breeds them specifically with any degree of success with regard to the percentage which will colour at a reasonable age.

Tendency to Retain Darker Specimens

Now it is just this problem which has concerned me for some time and I think that at last I am on the road to success. When breeding the non-metallic types (Nacreous or Matt) the tendency is to preserve specimens which exhibit the darkest colours, both as show specimens and for breeding stock. Now I contend that by this method the tendency has developed to inhibit or retard the loss of black pigment so necessary for the correct development of coloured Metallics. Coupled with this is the fact that in England we do not experience the required sunshine and warmth which are vital factors in the change.

The result is that most people lost heart long ago in their efforts to produce Metallic Veils, since even those



Female bronze Veiltail with luxuriant, sturdy finnage.

which did colour took anything from two to seven years or more to achieve it. Occasionally, foreign stock arrives in this country, fully coloured at one year or maybe less, but these fish are of such poor shape that few fanciers have been interested in their culture.

It is a noticeable fact that amongst a spawning of Nacreous Veiltails many of the best-shaped fish are found to be bronze Metallic (such a spawning producing 25 per cent Matt, 50 per cent Nacreous and 25 per cent Metallic fish). If these are retained they will produce sturdy finnage which excels anything produced by their Nacreous brothers.

This, of course, leads to a desire to see such handsome specimens blossom into full colour and, in my own case, led me to make a few experiments, some of which suggest that the possibility of overcoming this difficulty of colour in Metallics may soon be realised. Early attempts to induce colouring merely by the use of extra light and heat having failed, I was forced to examine the problem more critically with the result that I arrived at the conclusions regarding the constant preservation of highly coloured non-metallics mentioned earlier.

At this time I had certain Nacreous fish which had exhibited the tendency to lose all black pigment at about one year and since four Metallics of the same spawning were still in my possession, I decided to subject them to intensive light. After four months of this treatment one had completely turned gold and the others were in the process of doing so. Older bronze Metallics were then tried under the same conditions but these were related to more highly coloured stock born before I had observed any tendency toward loss of black pigment. These resisted all efforts to change colour for a period of six months.

Careful Choice of Parent Fish

From this it would appear that careful selection of Nacreous parents showing a marked tendency to lose black pigment, could be used to produce a nucleus of coloured Metallics. Nevertheless it would be necessary to concentrate on the 25 per cent Metallics so produced, subjecting all such fish to light and heat. All, probably, would not respond to this treatment so that a selection of the earliest to colour, and their segregation from Nacreous fish from then on, would be required if this method were to have a chance of success.

(Continued next page.)



Brother of the bronze female fish shown at the top of this page. In contrast, this specimen has straggling and weaker finnage. Photographs for this article taken by L. E. Perkins.

Current Research

Physiology of Migration

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

THE problems of migration may seem very far removed from those of maintaining the majority of aquarium species. Apart from the interest of the phenomenon, however, recent studies on it have thrown much light on fish physiology in general, as is evident from the contribution by Dr. William S. Hoar, of the University of British Columbia, to *Biological Reviews* (1953, Vol. 28, pp. 437-452). Dr. Hoar's own studies on fish migration are well-known, and his review covers not only these but, also a wide field of research, including the important physiological studies of Dr. Maurice Fontaine of the Natural History Museum in Paris.

Most studies on fish migration have been concerned with limited aspects of the movements of those species that travel annually from salt to fresh water (anadromous) and of those that exhibit the reverse phenomenon (catadromous). The mechanisms governing migration over long distances prior to, or following, the fresh water to sea water transition, as well as the migration of strictly marine and freshwater fish, have scarcely been considered by physiologists. Hoar considers that migration should be considered as one aspect of the animal's general behaviour, since it is "appetitive behaviour" in the modern sense of that term. This concept will seem reasonable to those who have read the fascinating research on Sticklebacks briefly noted in *WATER LIFE* issues of June-July and August-September last.

Fish Moving Downstream

The downstream movement of juvenile and spent fish is recognized as a part of the migratory behaviour of a great many fish. That of the juvenile salmon is a precisely timed and intricately controlled phenomenon undertaken by lively and vigorous animals. These fish are not weak animals transported by the current, but their behaviour is such that, during the night, downstream displacement is inevitable. Some species (e.g. the Pacific salmon known as the Chum, *Oncorhynchus keta*; the Pink, *O. gorbuscha* and the Sockeye, *O. nerka*) exhibit schooling behaviour as soon as the yolk-sac is absorbed and they are able to swim freely. Chum fry swim vigorously into currents and maintain their position during the day, even in quite rapid water. These lively little fish prefer relatively bright light, and move into strong currents by day. As the light intensity falls, their responses to the current (rheotaxis) fail and they pass downstream in shoals. These rheotactic responses are dependent to a large degree upon vision and since the night movements occur during somewhat precise periods it is believed that they are connected with the dark adaptation of the eye. For a limited time the fry appear to exhibit night blindness. Their downstream movements are not necessarily made at the same rate as those of floating objects, for they remain active and, as they dart to and fro, will move most easily and farthest with the current, passing downstream rapidly until they can again see to maintain position with respect to fixed objects.

Pink fry are believed to behave in much the same way as Chum, but those of the Sockeye remain near the bottom during the day. As the light intensity falls they emerge and rise to be displaced downstream, swimming vigorously during the process.

Experimental work has tended to confirm that not only responses to light, but also reactions to small changes in temperature and variations in the activity of the thyroid and gonads or sex-glands, play a part in migration. Small but sudden elevations of temperature will cause Chum fry

and also Sockeye yearlings to swim vigorously and rapidly with the currents. Temperature may thus be added to the other external factors, such as lowered light intensity and loss of contact with the bottom, that initiate or hasten migration. Vigorous swimming downstream is sometimes observed, even during bright sunlight, in places where the water is deep and the fish have not any visual contacts.

Experiments involving thyroid and sex hormones have been carried out in troughs in which small artificial waterfalls have to be negotiated. The immersion of Sockeye yearlings for varying periods in dilute solutions (1 part in 2,500,000) of synthetic hormones (thyroxine sodium, methyl testosterone or stilboestrol, representing the thyroid, male and female internal secretions) has been shown to "improve" their performance by comparison with that of untreated controls. The reaction time of the fish that have been exposed to the hormone solutions is consistently shorter than that of the control fish, and it seems likely that increased hormone production on the part of the endocrine glands in question may be at least partially responsible for the heightened activity during migration.

Getting the Colour into Metallic Veiltails

(Continued from previous page.)

I am aware that this theory conflicts with a current idea that better coloured Nacreous specimens may be produced by crossing a Matt fish with a coloured Metallic, both from good coloured stock, but it is just this last qualification with which I disagree and I would say that the Shubunkin, which has been bred almost entirely with colour in view, substantiates my view since bronze offspring of such fish rarely colour no matter what the treatment.

In conclusion it might help if we examine the position



Year-old Metallic Veiltail coloured by use of heat and light.

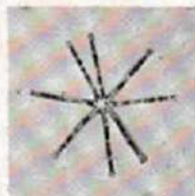
regarding Fantails. The Metallic type has gained popularity to the near exclusion of Calico or Nacreous specimens and it may be just this lack of interest to produce highly-coloured Calico Fantails, coupled with intensive efforts with the Metallics, which has led to the present existence of good, early-colouring fish. It would be interesting to know of progress made in this direction by any of the older fanciers of Fantails although I rather suspect that the problem has never arisen, foreign early-colouring specimens having been persevered with from the start.

so great nor so violent as on land. These are matters of importance to small creatures entirely dependent on their surroundings for bodily heat.

Strange as it may seem they are, too, safer from freezing in water than on land. This is due to these characteristics of water and also because of the phenomenon whereby water, on cooling, contracts in volume until it reaches a few degrees above freezing point (4 deg.C. or 39.2 deg.F.). If cooled further, it begins to expand again and becomes lighter.

The effect of this is that on the approach of freezing conditions the colder water from the surface sinks at first and warmer water from below rises to take its place. This continues until all the water reaches 4 deg.C., when further cooling results in the coldest water remaining at the surface, where it freezes. The water below remains at the same temperature of 4 deg.C. while the layer of ice now on top acts as a blanket and slows down further cooling. All pond-hunters and pondkeepers must have noticed that even in the severest weather there is usually an unfrozen stretch of water in which the creatures can live.

Finally, the amount and kind of inorganic substances in the pond must obviously have a great effect on the plants and consequently on the animals living there. This chemical



Asterionella, a freshwater diatom (enlarged photograph).

factor is dependent on the source from which the water reaches the pond and also on the nature of the bottom or "substratum" of the pond. In carrying out a thorough survey of a stretch of water such factors must be borne in mind and, although it is beyond the capacity of most of us to carry out a water analysis, there are simple tests which can be made. At least one manufacturer now produces a series of reagents for the rapid determination of quantities of nitrates, carbonates, oxygen etc. to be made on the spot.

The estimation of pH, or the hydrogen-ion concentration, is a familiar technique to many aquarists and it produces useful information on ponds also. Many creatures can exist only within fairly restricted ranges of pH, for instance *Paramecium* will die when the pH reaches 8.4. Estimation of the pH of any pond which is being surveyed, and at the time it is being surveyed (for pH of a natural pond can fluctuate widely throughout the day and year), will give useful data for understanding the absence or presence of certain creatures or plants.

It is hoped that this series of articles will at least have shown the importance of considering a pond, any pond, as an entity, i.e., as a self-contained community of plants and animals. I believe that once this fundamental aspect is grasped, our pond study, whether it be in the classroom or for our own amusement and interest, will take on a new fascination and tempt us to explore even outside the subject of biology into the realms of chemistry, physics, hydrostatics and meteorology, if only in an elementary way. This broadening of our outlook cannot fail to be beneficial to us.

Aquatic Plants

IF well-grown specimens of one plant species gain more consistent attention at shows than any other, then that honour must certainly go to Fanwort, *Cabomba caroliniana*. It is not a difficult plant to grow but it is certainly not easy to grow well. Give it water or lighting not to its liking and it will turn a sickly yellowish-brown but under conditions which favour development few plants can excel its beauty—one luxuriant terrace upon another of brilliant green leaves giving a sturdy bushiness which so many aquarium plants lack. The diameter from the tip of one leaf to the extremity of its opposite number on the other side of the stem can be as great as two inches. The ideal is that the paired leaves should appear at regular and short intervals on the stems.

The underwater leaves of *Cabomba caroliniana* are coarsely segmented and approximately the shape of an open fan. They are borne in pairs but form an incomplete whorl around the stem. This is the main point of differentiation between *Cabomba* and *Limnophila* (*Ambulia*), which are sometimes confused, as in *Limnophila* the leaves are borne in complete whorls.

Method of Propagation

C. caroliniana is propagated by means of cuttings, a small bunch of these generally being planted in the aquarium gravel, when they become established quite quickly. Ample light is essential, for, under poor illumination, growth lacks luxuriance and becomes puny. Many aquarists find difficulty in producing good quality specimens due to insufficient light encouraging leggy growth. Some go so far as to set the *Cabomba* cuttings in plant pans and suspend these just below the water surface, gradually lowering the pans as growth develops. Whilst this method would doubtless encourage the desirable close packing of the leaves there is no reason why the same effect could not be

Fanwort

(*Cabomba caroliniana*)

achieved by increasing the top light and planting direct in the gravel on the aquarium bottom. Water with a low lime content is preferred.

C. caroliniana is a most desirable representative in the furnished aquarium and is also used as a spawning plant for egg-laying fish. If necessary, it will live for several weeks when free floating. It is more usually used in tropical tanks but will thrive in coldwater aquariums although the leaves form a tasty morsel for Goldfish and this no doubt explains why it is not more frequently planted in such aquaria.

Flowers, white with a touch of yellow at the base of the petals, are borne just above the water surface.

There is a beautiful red variety known as *C. caroliniana* var. *rosæfolia*, the stems and leaves of which are rosy-red. It is not quite so easy to cultivate as the species and the red colouring is only at its best in a good light. The temperature of the tropical aquarium is more suited to this variety.

Cabomba caroliniana comes from southern areas of the United States. Under Federation of British Aquatic Societies' ruling for competitive furnished aquaria at shows it is classified for use in tropical tanks only.



Supplying the Needs of Vivaria Inmates

3. "Treetops" Vivarium as a Home for the Climbing Reptiles and Amphibians

By Alfred Leutscher, B.Sc.



Vivarium for climbing creatures.

Much vivariums are designed to allow as much floor space as possible in order to give the inmates plenty of freedom of movement. In this article I propose to deal with a different kind of vivarium, in which floor space is sacrificed for height. This is what I like to call a "Treetops" vivarium, which gives a clue to the habits of the occupants. A certain number of reptiles and amphibians, such as Tree-frogs, Geckos, Chameleons and certain climbing lizards, spend a good deal of their lives well above ground level, such as in bushes and trees, and on walls and rocks. This is the needs of these tree-top dwellers which we will now consider.

Tree-frogs are too well known to require description. By means of sucker-like fingers and toes they can cling to leaves and branches, even bark and vertical glass. Those frequently kept by hobbyists are the members of the Family Hylidae (which are actually toads), and usually come over from N. America or Australia, which are two of their strongholds. The best-known vivarium Tree-frog, however, is the European Green Tree-frog (*Hyla arborea*), which is generally on sale by late Spring. Most specimens seem to come from France and Italy.

Dimensions of the Glass Cage

A suitable-sized home for a small colony of these attractive coloured amphibians is a glass cage, about 18 in. square, by 2½-3 ft. high. The base consists of a wooden tray which is about the same depth as an average-sized flower pot. The reason for this will become clear later. On this tray is erected the main glass cage, made of a frame of strong wood (about 1 in. x 1 in.) which is slotted to take panes of glass. This glass should fill in three sides. Directions for making such a frame and fitting the glass were given in the first article of this series (see WATER LIFE, February-March, 1954, issue). The fourth side of the frame is fitted with a separate square of glass in its own frame, which is hinged into position to act as a door. The general result will appear similar to the sketch above.

The top of the cage is covered with perforated zinc to allow for ventilation. From it is suspended an electric light bulb, about 40- or 60-watt strength, which will provide the lighting and heating if and when required. The wood-work of the vivarium can be stained on the outside to match

the furniture of the room in which it is to stand. The inside is best left untreated, to avoid any risk of harming the inmates.

Some plants may be introduced and these can grow in their own pots. The base of the vivarium (i.e. the tray) is filled with large stones, and the flower pots sunk among these up to their rims. The stones will serve a double use. They hide the pots and at the same time provide hiding places for the inmates, should they wish to leave the branches and leaves. If desired the stones may be covered with a layer of loose moss, to retain moisture. It might also be a good idea to first line the tray with metal sheeting, to keep it water-tight.

There are plenty of plants from which to choose. They should be the sturdy indoor kind, preferably broad-leaved and evergreen, so that there is ample surface for the Tree-frogs to grip. Many florists now cater for the indoor plant hobby, and can provide just the right kind. Some examples are the various *Hedera*s (Ivy), *Tradescantia*, and small specimens of Fig, Castor Oil and *Aspidistra*. A climber called *Phyllocladon* is ideal. All these plants will require sticks for support as they grow taller. The actual climbers can be supported with loops of twine tied to eye hooks which are screwed into the framework at convenient places. Virginia creeper and the variegated *Coleus* add a pleasing splash of colour to the "Treetops" vivarium.

The purpose of the light is merely for inspection. European Tree-frogs live fairly well in our climate, and do not require much extra heat. The bulb which I use is coloured green and is intended for decorative effect. When switched on it produces a beautiful, diffused greenish glow throughout the cage, enhancing the natural green colouring of the frogs and plants.

Elsewhere I have stressed the importance of keeping amphibians in humid surroundings. Tree-frogs are rather the exception and can stand a good deal of dryness. All that is necessary in hot weather, is to spray the plants and frogs with fresh water every morning. Both will keep happy



Photograph]

[L. E. Day

European Tree-frogs do well in the vivarium described in this article and can tolerate a reasonably dry atmosphere.



Photographs]

[L. E. Day and Sport & General

Left, a Common Gecko (*Tarentola mauritanica*) and, right, a Jackson Chameleon (*Chameleo jacksoni*).

for the rest of the day. Occasional watering of the pots will also be needed.

Tree-frogs should be fed on a variety of insects. Flies are the main stand-by, and these are quickly caught by the creatures, even by leaping into the air. A steady supply can be ensured by placing some fly pupae into a small pot with a perforated lid and standing this in the cage. As the flies hatch they leave the pot and escape into the cage.

A similar home to the above will serve for Geckos, but a modification is necessary. These active little lizards are usually nocturnal, and spend the day in hiding. If one side of the glass case is lined with a sheet of plywood, then some strips of bark can be fixed to it. The Geckos will hide in the cracks and behind the bark. I have such a piece of bark-covered plywood which can be placed in position inside the cage, against one side of glass. By removing it later, the Gecko cage of one year can then be converted into a Tree-frog cage for the following. In other words, the same vivarium is in use for different inmates. With the Geckos a light is helpful, to provide the adequate temperature. This may be controlled by fixing a sliding shutter on to the roof above the perforated zinc.

Chameleons can also live in such a "Treetops" house. One specimen is best, as they are rather quarrelsome creatures. For climbing purposes it is advisable to include some stiff branches. Some of the perches should be placed so that the Chameleons can hide itself among the foliage. Personally, I am not too keen on keeping Chameleons in my collection. Feeding is one difficulty, and on top of this the normal expectation of life seems to be very short.

Apart from a cork background, we can try to erect a wall of brickwork or rock, making a setting for such lizards as the Wall species. Because of limited space this will require some care. By breaking up house bricks and shaping them, one can build up a miniature wall at the back of the vivarium on which it is even possible to grow rock plants. Succulents, such as the stonecrops and other drought-resisting plants, are the best. Such an arrangement as this makes a really beautiful background for a small colony of active lizards which like to climb, such as Wall Lizards and small Green and Eyed specimens. As they dart about and finally settle on top of the wall (to get nearer the light bulb) one gets a far better view of them than if they remained on the ground level. As the brickwork warms under the bulb, they will lie out in a flattened "sunning" position, remaining like this for long periods.

The above are just a few ideas on how to build and design a novel type of vivarium, and the main purpose of this "Treetops" villa is to give the inhabitants plenty of scope to exercise their climbing abilities. Finally, a useful tip. It is sometimes possible to obtain a ready-made tall-shaped "vivarium" at an auction sale or a shop. What I have in mind is a display or show-case, used for advertising purposes in many shop windows and on counters.

Water — the Basis of Fishkeeping

First Article in an Important New
Series by the WATER LIFE Analyst

IN Nature water occurs as a condensate in the upper atmosphere in the form of rain droplets and, as such, is probably the purest form of water occurring naturally. However, purity is merely a relative term, for even at the moment of condensation water dissolves atmospheric gases and small amounts of mineral matter. As the rain droplets descend earthwards, greater amounts of these impurities may be gathered, depending upon the nature of the area over which rain falls. Thus, in the Highlands of Scotland where the atmosphere is reasonably free from impurities, rain water will reach ground level in almost its pristine purity, whereas rain falling over industrial areas will meet with dense atmospheric pollution in the form of solid and gaseous products of combustion, and considerable contamination will result. However the final character of these surface waters is dependent almost entirely on the nature of the ground upon which they collect.

Water collecting upon the hard and impervious rocks of the Highlands retains the characteristic softness of the original rain, whilst water seeping through the comparatively soft chalk comprising the Downs of southern England dissolves some of the mineral constituents and in so doing becomes extremely hard in character.

These differences of the mineral content in water are revealed by chemical analysis and, to allow comparison, the table on page 129 exemplifies the difference of mineral content for water taken from lakes fed by inflowing streams of surface water from almost barren rock, and water taken from chalky areas. The Ennerdale and Katrine Lake waters are classified as extremely soft, whilst the chalk waters are extremely hard in character, the causative agents of hardness being the content of calcium and magnesium salts held in solution. Waters containing less than a total combined amount of 50 parts per million of calcium and magnesium salts may be classified as soft in character. A water containing 100 to 150 parts per million of hardness is slightly hard, over 200 and under 300 parts per million, hard; and over 300 parts per million, extremely hard.

Hardness of water is referable to the degree of soap destroying power of water containing calcium and magnesium

Chemically, domestic soaps are water-soluble products containing sodium and/or potassium salts of the organic acids, glycerols, oils and fats. These soluble sodium/potassium soaps, upon contact with hard water, are precipitated as insoluble calcium and/or magnesium soaps in equivalent amounts to the hardness present in the water. It is these insoluble soaps which appear as a scum on hard waters.

Besides calcium and magnesium salts the salinity of water may be increased by the presence of non-hardness salts of sodium and potassium, usually present as chlorides, nitrates and phosphates. Phosphates, together with silica, are of great biological significance for they are intimately related to the presence and growth of phytoplankton. Other substances present in minute traces in water are referred to as trace elements and these are also of importance biologically.

General Content of Moorland Waters

Of different character are surface waters from moorlands. These waters have a high organic content due to humic acid being washed from peat and may contain other organic acids and their salts washed from mosses and the rootlets of heathers growing upon the summit heaths and bogs of the fountains, the Lake District and North-east Yorkshire. A summary of the different characteristics of the surface waters already described may now be made:—

1. Surface waters draining off hard impervious rocks are of a different character and contain less than 50 parts per million of a combined total of magnesium and calcium salts. These waters, by reason of their content of dissolved free carbon dioxide, are slightly acidic and have an average pH value of 5.5. Finally they are of a high degree of purity being comparatively free from both mineral and organic matter.

2. Surface waters draining through soft chalk become of a different character owing to calcium carbonate (chalk) being held in solution by carbonic acid. These waters usually contain small amounts of magnesium salts which add still further to their characteristic characteristics. By reason of the calcium carbonate content these waters are termed "calcareous" and have an average pH value of 7.0.

3. Surface waters seeping through peat retain their softness and at the same time become decidedly acidic, some attaining a pH value as low as 4.5. These waters are yellowish in colour and have a heavy organic content of vegetable origin.

Attention has been given earlier in the way in which naturally formed waters may possess certain characteristics. Consideration may now be given to the occurrence of some forms of aquatic life and the extent to which they may owe their existence, maintenance and productivity to the presence of the environment in which their growth of dissolved mineral salts and atmospheric gases.

Firstly plant life must be considered because this is the only form of life, with the exception of a few bacteria, capable of synthesising organic materials needed for growth direct from inorganic salts in solution. Plant material must, therefore, be the first link in the biological food chain forming the basis of all life.

Healthy growth of all plant life is dependent upon the following ten essential elements being available in assimilable forms:— hydrogen, carbon, nitrogen, oxygen, magnesium, phosphorus, sulphur, potassium, calcium and iron. Lack of any one of these elements causes characteristic deficiency syndromes to appear.

One other element, namely silicon, is essential for some forms of aquatic plant life, thus silification is characteristic of certain minute unicellular algae known as Diatoms. The star-shaped colonies of *Asterionella formosa* are an important species of diatoms occurring in Lake Windermere. These diatoms multiply rapidly during the early Spring months of the year and remove soluble silicates with such rapidity that replacement of the element carried into the Lake by inflowing streams and rivers is insufficient to meet the demand. The rate of growth of *Asterionella* then begins to diminish rapidly.

The role played by the other essential elements already mentioned, and which are necessary in the nutrition of plants, should now be considered. The element sulphur, needed in small amounts for the formation of protoplasm and protein matter, is obtained from the sulphates of calcium and magnesium. Calcium salts also provide the element calcium needed for neutralising acids formed in the plant and, in addition, play an important role during biological formation of nitrate from decaying vegetable and animal matter.

Magnesium salts provide the element magnesium which, together with iron, is essential for the formation of chlorophyll, the green pigment of plants. This pigment, which in reality is a combination of two green pigments (chlorophyll a and chlorophyll b) and two yellow pigments (carotin and xanthophyll), is a complex compound of carbon, hydrogen, oxygen, nitrogen and magnesium. Chlorophyll absorbs light and consequently furnishes energy for the formation of glucose from carbon dioxide and water, this very complex build-up of a sugar being properly called photosynthesis.

Nitrogen is absorbed from nitrates in solution and, like sulphur, enters into the composition of protoplasm and proteins in the plant. Foliage growth is also encouraged. Carbon is derived from the carbon dioxide (dissolved in water in the case of aquatic plants) by the process of photosynthesis and is present in carbohydrates and protoplasm.

Hydrogen and oxygen are absorbed as water. Water forms a large proportion of

| Mineral Substance | Lake Ennerdale Water, Cumberland | Loch Katrine Water, Perthshire | Chalk Water, Windsor, Berks. | Chalk Water, Watford, Herts. |
|----------------------------------|----------------------------------|--------------------------------|------------------------------|------------------------------|
| Calcium Carbonate (Chalk) | 2.5 | 2.8 | 230.0 | 268.0 |
| Calcium Sulphate (Gypsum) | 0.8 | 2.5 | 55.0 | 15.9 |
| Magnesium Sulphate (Epsom Salts) | Trace | 7.0 | — | 33.0 |
| Magnesium Chloride | — | — | 20.0 | — |
| Sodium Chloride (Salt) | 9.0 | 7.8 | 12.6 | 55.0 |
| Sodium Sulphate (Glauber Salts) | — | — | — | 11.5 |
| Sodium Nitrate | — | — | 25.5 | 40.0 |
| Silica | 0.8 | Trace | 12.0 | 11.0 |

Comparative results of chemical analyses of water from Northern Lakes and chalk areas. Content of commoner dissolved mineral substances is given here in parts per million.

the carbohydrates, protoplasm and other substances found in plants and, indeed, constitutes about 95 per cent of the total substance of aquatic plants. Phosphorus is absorbed as phosphates of calcium and potassium in solution, and is present in proteins. Potassium is absorbed as nitrate, chloride and sulphate and its presence is necessary for the effect it has on enzyme action during carbon fixation and protein formation.

Besides the importance of the element oxygen in nutrition, where it is used with hydrogen in the form of water, it is also required in its free state for respiration, and its availability for this purpose is more limited for truly aquatic plants than for terrestrial subjects. Therefore the intake of oxygen for respiration common to plants and animals is attended with some difficulty so far as aquatics are concerned for, whereas one cubic foot of air contains just over $\frac{1}{3}$ rd ounce of oxygen, the same volume of water completely saturated with this gas would contain only $\frac{1}{100}$ th ounce. This respiration problem in aquatic plants is partially solved by the development of a large absorptive surface and extremely thin structure of the foliage. Also the stems of the plants have abundant intercellular spaces filled with oxygen gas, a fact which accounts for the buoyancy and erect position in the water of anchored aquatics.

The essential object of respiration is to supply oxygen to the plant in order that slow combustion of the complex organic carbohydrates (i.e. starch, sugars etc.) synthesised from inorganic mineral salts in solution may take place

with the liberation of the harmless end-products, carbon dioxide and water. Thus two factors are necessary for normal respiration, a supply of free oxygen and a supply of oxidisable (combustible) material.

Abnormal respiration may, however, take place in plants when oxygen is absent, the end-products in such cases being composed of harmful alcohol and organic acids which eventually poison the plant.

In this article it has been stated that certain elements are essential for plant nutrition. That naturally formed water may, under certain circumstances, acquire these by dissolving atmospheric gases and mineral salts containing these elements in combination is obvious from the fact that plant life may, in fact, be abundant and truly aquatic.

It has been explained why some waters retain their original "softness", meaning that very little mineral matter has passed into solution, in particular the mineral salts of calcium and magnesium. This in turn would mean that "soft" waters, generally, would only support a very sparse and limited range of vegetation. As plant life is the first link in the biological food chain, it could be expected that aquatic fauna would be most diverse, and prolific, in those waters capable of sustaining an abundance of aquatic flora, whilst in those waters that could not, the reverse would be true.

This is a correct supposition and it will be demonstrated in later articles when consideration will also be given to the modifications that may be expected to occur for these factors under aquaria conditions.

Armoured Catfish (*Callichthys callichthys*)

Conditions Provided for a Prolific Pair
Producing Eggs at Frequent Intervals

By F. Bates, B.Sc.

CALLICHTHYS CALLICHTHYS shares, with various members of the Genus *Corydoras*, the common name of Armoured Catfish. The name is bestowed upon these species because of the bony plates with which the greater part of their bodies is covered. *C. callichthys* was first described by Linnæus and has been available to aquarists, though always in restricted numbers, since well before 1939.

It hails from the streams and rivers of the tropical forest areas of South America east of the Andes, its range probably extending from British Guiana in the North to the southern tributaries of the Amazon in the South.

Despite the name *Callichthys*, which means beautiful fish, it cannot, by any stretch of imagination, make any claim to beauty. Nevertheless, it has a distinctive attractiveness of its own, though this may not be apparent on first acquaintance. The body is moderately elongated and rather cylindrical with the greatest body depth just forward of the dorsal, which gives it a certain club-shaped form. The body is protected by two rows of overlapping plates along each side, while the skin of the ventral surface is strong and thick.

The head is wide and flat on its upper surface, and the snout is much more pointed than in the *Corydoras* species. There are four long barbels, the pair on the upper lip pointing downwards while those on the lower lip point upwards. As with other fish of the group, an adipose fin is present while the pectorals are moderately large but much smaller than those of fish in the Genera *Acanthodoras* and *Asterodoras*.

When adult there is a marked colour difference in the sexes, for while the slightly larger female is a slate grey, the male tends towards a chocolate brown. In breeding condition the sexes may also be distinguished by the heavier body of the female. In the wild, fish may attain a length of 7 in. but young fish raised in an aquarium rarely if ever exceed 5 in. They breed when about 3½ in. long and even sooner.

C. callichthys is quite hardy, fairly resistant to low temperatures and thrives under normal conditions. In addition

it is quite a useful scavenger. It is comparatively peaceful and appears harmless to other fish much smaller than itself but is nocturnal to a very great extent and therefore tends to hide away during the hours of daylight. It will take almost any food from the aquarium bottom and will thrive and breed on a diet consisting almost solely of *Tubifex*.

In February, 1952, I received a pair of these fish. At that time no sex distinctions were detectable although it was estimated that the fish were about two years old. I was not particularly interested in Catfish then so they were placed in a community tank where, apart from the matter of feeding, they were forgotten until some three months later when I decided to thoroughly clean and replant this tank. The *Callichthys* were caught and placed in a glass jar where, on seeing them, my wife remarked that one was "a fat, ugly brute". The fact that only one of the pair was so maligned aroused my interest and a closer examination revealed that the larger and more lightly coloured fish was definitely heavier in the body; indeed it definitely gave the impression of being a female ready to spawn.

Spawning Attempt

It was decided, therefore, to try and spawn them and they were accordingly placed in a tank, 24 x 12 x 12 in., which was filled with distilled water to which some sea-salt had been added (20 parts per 100,000). The pH value was raised to 7.2 by the addition of the requisite quantity of lime water. The tank was planted with *Cryptocoryne cordata* and two plants of *Aponogeton ulvaceus*, each of the latter carrying a number of floating leaves.

The fish were then given copious supplies of *Tubifex* but, apart from the fact that at one time the female was seen to have torn caudal and dorsal fins, nothing of particular interest was noted. After four weeks it was decided to try the effect of reducing the salt content of the water and consequently one half of the water in the tank was replaced

by fresh distilled water. It was while this water was being run into the aquarium that a number of tiny black specks were observed to be moving about either on or above the sand. These resembled small tadpoles about $\frac{1}{8}$ in. long but a closer inspection confirmed the hope that they were young *Callichthys*.

Effect of Water Addition

The fresh water appeared to excite the parents who became very active but no sign of spawning was seen although next morning the male was noticed to be guarding a bubble-nest under one of the *Aponogeton* leaves. The female was removed and five days later the male was also taken out. The fry were fed on mashed *Tubifex* and *Corethra* larvae together with some dried food. Growth was slow at first but became more rapid after four weeks. By the time they were four months old the largest specimens had attained a length of about 2 in. and it was possible to make some attempt to pick out the males by their browner coloration.

After these two initial spawnings numerous others took place and the following remarks are based upon the observations of these. No courtship was ever noticed and, as all spawnings took place at night, the actual mode of spawning was not seen. On one occasion, however, the fish were observed to rise in turn, the female first, and to go in an inverted position under one of the floating leaves. Due to the lack of light in this part of the aquarium it was impossible to determine whether eggs were deposited, but eggs were certainly laid on the leaf during the night, for the male was guarding a nest there the next morning.

When protecting eggs the male is very aggressive and attacks one's finger or any other object breaking the water surface in the vicinity of the eggs, while the female is driven away should she approach too closely. During this period the male remains almost directly below the eggs, either near the sand or among the plants, 3-5 in. below the eggs.

The actual eggs are quite large, about $\frac{1}{8}$ in. in diameter and strongly adhesive. On one occasion—but only once, for in the numerous spawnings they always chose, with this one exception, the underside of a floating leaf of *Aponogeton ulvaceus* as the spawning site—they attempted to spawn on the underside of a plant of *Linnobium stoloniflorum* but this proved too small for the purpose and eggs were seen adhering to the leaves of plants well below the surface. Whether these eggs hatched I cannot say as this spawning took place only two days before I went on holiday; true, when I left there was no sign of Fungus growth upon them, but, on the other hand, no young were visible on my return.

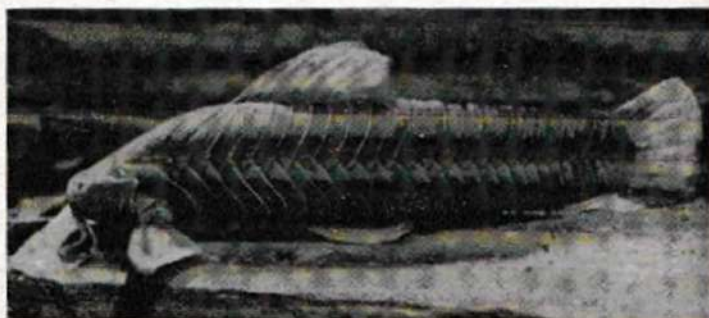
C. callichthys has been described as a bubble-nesting fish but, to me, it seems doubtful if this description is fully justified as no bubbles are blown before the eggs are laid. Indeed such a procedure would render the attaching of the eggs to the underside of a leaf more difficult.

On two occasions I have found what appeared to be a full complement of eggs, that is somewhere in the region of one to two hundred. These were on a leaf without any bubbles present but the latter were blown during the following night. The bubbles are much larger than those produced by Labyrinth fish, being about $\frac{1}{8}$ in. in diameter. The effect of placing these bubbles under a floating leaf is to raise it, and consequently the eggs, slightly above the surface of the water. Whether this is an essential factor in the development of the eggs, or whether the main function of the bubbles is that of concealment, I would not care to say. It may be of some significance, however, to note that when I removed

the leaf with the eggs attached to a small incubator tank, I obtained the best results if I was able to float the leaf with the bubbles still *in situ*.

At a temperature of 82-84 deg.F. the eggs hatched in about 96 hours. At this time the movements of the male had produced, whether deliberately or not I do not know, a shallow pit in the sand beneath the eggs. On hatching, the young sank into it and appeared to be guarded by the male for the next 24 hours. After this, they began to move about the bottom of the tank in rather short jerky movements or to move up the side of the aquarium in short stages, attaching themselves to the glass while they rested. They were quite dark in colour and it was interesting to note that, even at this early age, their barbels were well developed. It was not until they were about $\frac{1}{2}$ to $\frac{3}{4}$ in. long that they were seen to go to the surface of the water and take air.

Water conditions do not appear to be very important in the breeding of this species as it seems tolerant of a reasonable range of pH values (provided this does not fall below 7) and of calcium and total salt content. Spawnings were obtained in waters of which the pH reading varied from 7.0 to 7.4, hardness ranged from .5 deg. to 3 deg. of calcium



Photograph

J. J. Hoedeman

Callichthys callichthys. Lateral rows of overlapping plates are clearly visible.

(i.e., where the calcium content reckoned in terms of calcium carbonate varied from .5 to 3 parts per 100,000 parts of water) and total salt content varied from 5 to 30 parts per 100,000.

Temperature is important as no spawnings were obtained at a temperature less than 80 deg.F. Indeed, on two occasions, when the temperature was allowed to fall to 76 deg. the male lost all interest in the eggs and ceased to guard them so that they were eaten by the snails present in the tank.

The young were fed on *Tubifex* which was ground with a pestle and mortar but there may be more satisfactory methods of feeding as the maximum number of young I raised from a single spawning was 60, despite the fact that on one occasion there must have been over 200 eggs. The average spawning was about 100 to 150.

When to Remove Parent Fish

Two methods of procedure are open to the aquarist after spawning has taken place; the first, and the one I should recommend, is to remove the female immediately after the spawning and take out the male as soon as the young are free-swimming. I doubt if the parents molest the young but they show no parental care at this stage and thus there is no advantage in running any risks. The second method is to sever the stalk of the leaf on which the eggs are deposited and to float it, with the attendant bubbles, in a small tank for incubation.

I have known no species which spawned so frequently as *C. callichthys* for, when the eggs were removed from the breeding tank, the parents spawned every two to three days and this for a period extending over 10 weeks. No species that I have met can attempt to rival that!

Pondkeeper's Year

High Summer at the Poolside

By J. Stott

JUNE marks the beginning of a period when the serious pondkeeper is given the opportunity to analyse the result of his planning and labours earlier in the year because the next few weeks will produce the peak of the general mid-summer display. This may create a feeling of pride and achievement but, on the other hand, I have known it produce disappointment.

In the healthy, established pond, where the water plants have developed strong growth, their heavy feeding at this time of the year will in all probability exercise a considerable measure of control over the development of algae. This applies to the free-floating kind which, when in excess, is responsible for the unsightly condition described as green water.

Although to some extent the control also extends to the filamentous type, a Summer season seldom passes without the appearance of this thread-like algae in some part of the pond. There may only be small quantities in the established pool but the important thing is to keep it down to a minimum by regular removal once or twice a week during the late Spring and through the Summer months. This is a task which should never be neglected if there is a tendency for filamentous algae to develop. Once it is allowed to get firmly established it will eventually choke the plants and extreme measures have to be taken to eliminate it.

As the activity of the desirable pond life increases it is only natural to expect the undesirables to become equally active and, given the opportunity, they will establish themselves in one form or another. The thread-like algae, already mentioned, is a weed in the cultivated garden pond just as the self-introduced wildlings are weeds in the bog and rock garden surround. Weeding is just as important in water gardening as in any other form of gardening if the best results are wanted and a good display desired. Of course there are pests and so-called pests with which to contend. What is meat to one is poison to another and I was reminded of this when on a visit to north Suffolk some years ago. I came across a farmer looking on with his hands dug deep in his pockets whilst his man was busily engaged clearing out a short dyke. "Hard work this, you know," the farmer said to me. "Blamed nuisance they be, nothin' but pests they are." In this instance the pests were some of the finest Water Soldiers (*Stratotes aloides*) I had seen for a long time!

Although many of the insect larvae which will be present in the matured and healthy pond make good food for the fish the pondkeeper should always be on the look-out for those types which may be harmful, such as the larvae of the Dragonflies. The larvae of the *Dytiscus* and the beetle itself constitute danger to fry and young fish. Water Boatmen

are also a menace. When seen they should be netted as they come to the surface.

Larvae of the China Marks Moths (*Pyraustida*) are capable of spoiling the leaves of the Water-lilies and other species of aquatic plants. The caterpillars bite through the leaves in order to cut out pieces for the making of a case. When small sections of the Water-lily leaves are seen to be missing these larvae should be suspected and, if possible, the underside of the leaves inspected, where the cases will be found adhering with the caterpillars inside. They should be removed and destroyed. Small pieces of vegetable matter floating apparently harmlessly on the surface of the pond should also be suspect and the surface skimmed clean. The Potamogetons are also used as a food plant by this caterpillar. The larvae of one of the smaller species, *Campylota lemna*, uses Duckweed as food and material for case building. The adult moths are to be seen flying among the pondside foliage from June to early August.

Ants can be a serious pest to the pondkeeper who has a rock garden as part of the pond surround. Some careful observation of their movements will reveal the position of the nest and this, along with the occupants, may be destroyed by saturating it with paraffin. Paraffin should not be used, however, if there is the possibility of its finding a way into the pond water. If, owing to the position of the nest, there is the danger of this happening, boiling water should be used instead. Slugs are also very destructive in the rockery and may be effectively dealt with by using one of the anti-slug

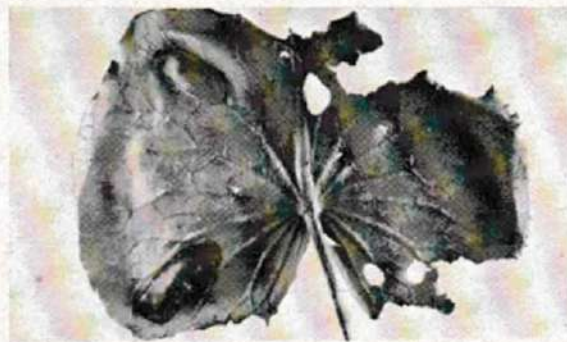
powders obtainable from most horticultural stores.

From now until late Autumn wholesome feeding of fish fry is essential to promote growth if it is intended to winter the young stock in the pond. Plenty of swimming space is also important for development. When space is limited and hatching was carried out in a tank or some other suitable container, it is wiser to pick out a few youngsters which have the appearance of making good fish when they are large enough for selection. Concentrate on rearing these successfully rather than attempt to rear a considerable number when probably

through lack of space, the entire spawning will be lost. As soon as the young fish are about 1-1 in. long they may be liberated into the pond but, before doing this, make sure that the temperature of the pond water does not differ from that of the container in which they have been kept. A chill at this stage of development may cause trouble later. Allow the temperatures to become equal by putting the fish into a large jar containing water from the tank and floating this in the pond for half-an-hour before releasing them into the pool.

Although the fish will obtain a certain amount of naturally-occurring livefood in the pond it is hazardous to rely on this source entirely for the fry. In the average-sized garden pond it is advisable to give supplementary foods, particularly if adult fish are present. These can take the form of chopped Earthworms, White Worms and *Daphnia*. Dried foods should be given a little at a time; excessive quantities, even in a pond, can cause trouble.

In July the midsummer display will be at its best. A spell of dry weather occurring towards the end of June will bring the pond and its surround into prominence because it is under such conditions that the foliage at the pondside retains a fresh, lush appearance so often lacking in other parts of the garden. Most hardy Water-lilies will be in bloom by July, providing colour over the surface on the pond.



[Photograph]

Cases of the China Marks Moth on the underside of a Water-lily leaf. Pieces from the edge of the leaf are used for these cases.

[J. Clegg

At this time of the year the pond and surround tell in their own way the thought and skill used in the planting and designing earlier in the year. It is also a testing time for the new pond because the first season can be a trying time for the newcomer to pondkeeping. A prolonged spell of green water can be very discouraging until conditions right themselves.

It is by careful arrangement in the mixing of various species, varieties and forms of plants in the water garden that colour is made to dominate the tendency for excessive greenness in the actual pond and pondside. I have seen ponds where this attempt has failed because of poor selection of subjects. Conversely I know of others where the variety of colour is a joy to see. It is surprising how often those species which bloom profusely, and are suitable for marsh or bog planting, are neglected or forgotten. Some of these plants are capable of offering bright colour and large, attractive flowers.

One particular pond comes to mind which, at this time of the year, will be a blaze of colour. Informal in shape, set in a rock garden surround, it represents a delightful combination of rock pool, marsh and alpine garden, although the last named is not large for it is intended only to divide the pond from the rest of the garden. The clever use of several dwarf Conifers gives an impression of depth to the scene.

Formal Marsh Area

The small area of marsh will contribute a variety of colours from its complement of Irises (*Iris Kaempferi*, *sibirica*, *Wieseneri* and *Pseudacorus*), in front of which, nearest the pool, Monkey Musk (*Mimulus guttatus*) and the Water-lily (*Gelium rivale*) will play their part. Over the surface of the pond will be the white, crimson and pink flowers of the Water Hawthorn, *Nymphaea Fræbeli* and *N. formosa*. *Sagittaria latifolia* and *Pontederia ornata* will provide white and pale blue blooms. This combination of colours will be seen against a rock garden setting which forms the surround to three sides of the pond and where *Arabis*, *Iberis*, *Symphytum* and other alpines in luxuriant growth make a colourful contribution to the scene.

There are three varieties of Irises suitable for bog planting which, to my mind, always look well together. Usually they come into flower about the same time and provide a delightful blending of delicate colour. They are *I. levigata* (blue), *I. levigata* (white) and *I. ochroleuca* (yellow and white) all of which approximate about two to three inches in water. Place in front of them, where the marsh is well covered with water, the Fringed Golden Buck-bean (*Lamnanthemum peltatum*) and the effect is complete.

When obtaining Irises it is as well



Photograph] [W. S. Pitt
When Water-lily leaves are packed together it is a sign that the roots may need dividing.

are not all suited to a bog marginal position. Some even require the drier and well drained conditions of the rock garden. Japanese Irises are marsh lovers and like a position where they can obtain full sun. The Flags and *I. sibirica* varieties also appreciate moist positions. All these species have rhizomes and are non-bulbous.

Some of the lilies can be of great use to the pondkeeper as providers of colour. One in particular should be mentioned as it offers its rich scarlet bloom in July. It is *Lilium chalcidonicum*, which should do well in the moist ground at the pond edge and in a position where there is full sun. Another lily flowering in July is *L. Martagon* which is also suitable for a similar position.

There is a gentian which is worth a trial at the higher reaches of the marsh in a partially moist position. In such a situation the lovely dark blue flowers of *Gentiana Pneumonanthe* will be a welcome addition. It should be planted in late March and

may need a little care until established.

The leaves of the Water-lilies should be watched at this time of the year. Profuse leaf growth is a sign that the roots may require thinning by division; a job to be remembered the following Spring. When leaves push up out of the water with stems clear of the surface this suggests that planting in deeper water is required. Poor leaf growth is generally indicative of an under nourished condition and fresh compost is needed for next year.

A prolonged hot spell of weather will considerably reduce the oxygen content in the water and the fish will appreciate the refreshing effects of a supply of freshwater run into the pond through a fine spray. Gasping at the surface is a symptom of this trouble and is most likely to occur in the smaller type of pond where the capacity and surface area is limited.



Photograph] [J. Stott
Formal pond on a terrace. The opening in the terrace wall at the far end of the pool is where water drops into a stream flowing into a second pond on another terrace



THE pair of Thick-lipped Gouramies (*Colisa labiosa*) shown in the picture sequence on these pages was conditioned with livefood prior to the breeding attempt. The fish were kept separated for a couple of weeks and then placed in a standard 24 x 12 x 12 in. aquarium, although I have spawned them in smaller sized tanks on other occasions. Water depth for this spawning was 8 in. and the tank was completely bare with the exception of a few floating Water Fern plants. The aquarium was entirely covered by glass as this lessens bubble breakage. The water was at 80 deg. F., which was about 4 deg. warmer than the conditioning temperatures.

Full Breeding Dress

Within only a day or so, in the presence of the female, the male assumed beautiful breeding colours. His body and fins turned a deep chocolate brown. The body stripes increased their greenish sheen while the fins became edged with stripes of green and orange. The female's usual green-striped silvery body became only slightly more colourful. This pair was obtained as young immature stock and brought up to adult 3½ in. size by me.

PRINT 1. This picture shows the male beginning to prepare his nest beneath the floating plant. The presence of only a few bubbles indicates that he has just started this operation.

PRINT 2. At this stage I find the manufacture of the bubbles and the nest most interesting. Comparisons can be made between Thick-lipped Gouramies and other bubble-nest builders, for example, their near-relative, *Colisa lalia*, the Dwarf Gourami. This latter species blows a nest in a similar manner to the Thick-lips, except that pieces of water plants are woven into it and the fish even go to the bottom mulm to put some of that material into the nest. Often, when viewed from above, the nest of Dwarf Gouramies is black, rather than the whitish colour of the bubbles. Theoretically, all this decaying organic matter is probably supposed to help the newly-hatched and free-swimming fry to find the necessary microscopic livefood.

Plants Not Incorporated

Thick-lips, on the other hand, do not put all this matter into their nests nor do they weave pieces of plants to help maintain construction but instead build it in a similar fashion to the Blue Gourami *Trichogaster trichopterus sumatranus* or the Mosaic Gourami, *T. leeri*.

Record of a Thick-lipped Gourami

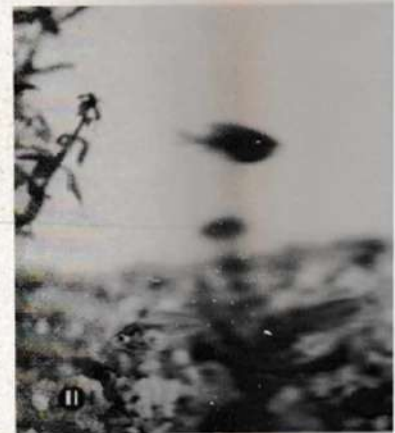
Pictorial Account by *Ken Williams*
the Procedure Adopted by the Editor

The actual bubble-building is shown in this picture and the next. The fish goes to the surface. Its mouth seems to open and close and out comes one continuous string of bubbles which float together on the surface, but not in the nest.

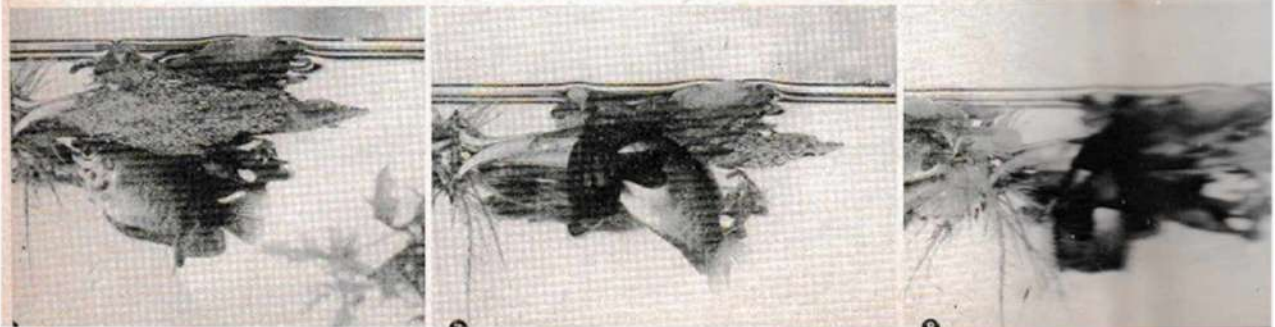
Mass of Bubbles

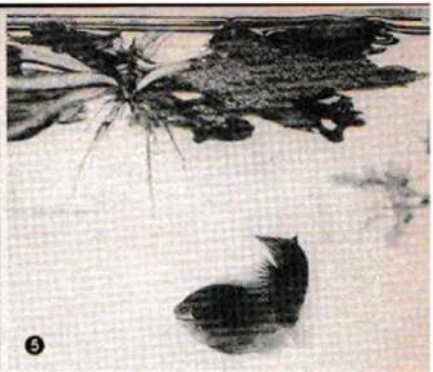
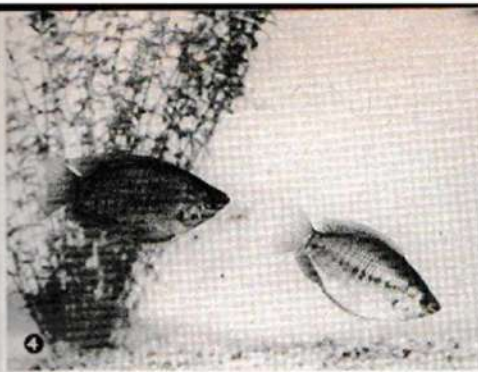
PRINT 3. This photograph shows how the continuous manufacture of bubbles often results in the formation of quite a mass at the surface. When the male is satisfied that he has enough bubbles for a good mouthful, he pulls them all back into his mouth in one inhalation, then dives beneath the floating plant and releases the mouthful of bubbles. They cascade up into the nest to enlarge it. Often the male releases bubbles from beneath his gill-covers which, of course, float up into the nest as well. It makes quite an impressive sight. All this is so different from the method adopted by *Betta* who laboriously manufactures individual bubbles and goes back and forth from surface to nest with each bubble.

Few people give much thought to individual types of nest manufacture; a bubble-nest is a bubble-nest and that is that for most of them. They would be surprised how different each species can be in its nest building. *Trichopterus pumilus*, the Dwarf Croaking Gourami, builds a nest of bubbles beneath aquatic leaves which are often 2 in. below the surface of the water. The babies hatch out and become



Three fry from the spawning operation. This picture was taken the day after the male had begun to develop his nest.





Black-lined Gourami Spawning

By Gene Williams (U.S.A.) Showing
Colisa labiosa Species



free-swimming without ever getting near the surface.

PRINT 4. The male feels the nest is sufficiently formed so he starts chasing and attracting the female in an attempt to get her under the nest. She has been somewhat curious during the nest building process and has occasionally made hurried inspection trips but has quickly dived away when the male started forcing his attentions on her.

Persuasive Male

PRINT 5. As can be seen in this picture, the male, through dint of much fin-spreading, tail-waving and chasing, has finally got the female in the immediate vicinity of the nest. The female is on the left eyeing the spread fins of the male whose tail is in the right foreground.

PRINT 6. Eventually the two fish are directly beneath the nest. The male is in lateral view here while the female is preparing for coital embrace. It is interesting to note

that this is rarely started, or, if started, never completed, when the two fish are not directly beneath the nest. This is probably because the eggs are lighter than water and, upon the release of the eggs by the female, they float up into the nest. Breeders who expect the same type of spawning as in *Betta splendens*, when the male catches up heavier-than-water eggs as they drop, will be disappointed. It needs careful observation to see the eggs as they rise up into the

nest. People who attempt to spawn this fish often think they have failed because they did not observe the eggs. The whole spawning takes only a short time and, if the breeder is absent for half an hour, he might miss the spawning act, as well as not seeing the eggs.

PRINT 7. After the female puts her body at right-angles to the male, with her nose about midway between his head and tail, the male (whose darker tail can be seen against the lighter body of the female in this picture) starts to curve around the female's body.

Expulsion of the Eggs

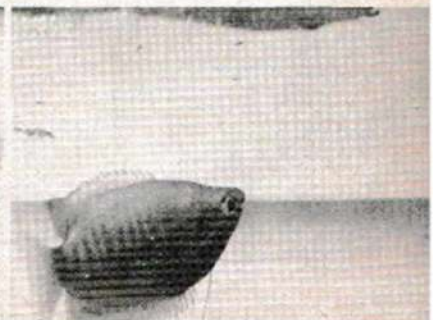
PRINT 8. The male fish bends in a complete semi-circle with the female becoming vertical in position. It is now that the eggs are expelled by the female at will, not squeezed out by the male, and then fertilized by the male as they go up into the nest. The vents of the two fish are very close together. These spawning embraces are continued until the female is devoid of eggs. The male might chase her from the nest although she usually leaves and hides of her own accord. I usually remove the female at this time although I have raised the fry when both parents are in the breeding aquarium with them.

PRINT 9. This is a top view of the nest showing the bubbles amidst the leaves of the Water Fern. Actually this picture was taken with developing eggs amongst the bubbles, but they do not show.

PRINT 10. In about 36 hours the fry hatch out and stay in the bubble-nest. Another 36 hours can go by and they then become free-swimming and wander around for food. Although somewhat indistinct, the young, free-swimming fry can be seen in this picture with proud father just beneath them and playing guard duty. Actually, he is not guarding with a hostile attitude such as that adopted by Cichlids, but just watches with a suggestion of infinite curiosity which makes you feel that he is probably just as amazed as we are at this wonderful natural creation.

Rearing the Fry

PRINT 11. With good feeding of microscopic livefoods, such as Infusorians and then Rotifers, and newly-hatched Brine Shrimps, the fry grow quickly and at four weeks, when this picture was taken, they already begin to assume the shape of their parents. Given good conditions and enough livefood for proper growth, they will be large enough to breed from before they are one year old.



German Breeding Methods

Achieving Success with Three Tropical Species

Apistogramma ramirezi. This little fish is easily the most beautiful of the Dwarf Cichlids and deserves far more popularity than it has at present. It certainly receives special attention in the German booklets ZÜCHTERKNIFFE where a long chapter is devoted to it. *A. ramirezi* is a native of Venezuela. It is difficult to describe the beautiful colours and markings precisely. A quite unusual feature is the fact that the female, when in spawning condition, shows even more colour than the male and has a purple spot between ventral and anal fins.

Its natural habitat is in the creeks of the savannahs of the Amazon where the water is clear, though slightly brownish and almost permanently exposed to direct sunlight. This explains why *Apistogramma ramirezi* requires high temperatures, namely 75 to 80 deg. F., and also an efficient inside filter. pH value and water hardness are of only secondary importance, pH variations from 6 to 7.5 and hardness up to 15 degrees are acceptable. The most suitable foods are mosquito larva and large *Daphnia*.

Breeding should be attempted between January and May as this is the main spawning period of the fish. The breeding tank should be approximately 24 x 10 x 10 in. Fine aquarium gravel and a few large pebbles can form the base and the tank should be well planted. It should be filled with clear well-matured tank water to a depth of 5 in. A small addition of fresh rain water is beneficial and encourages spawning. Temperature should be between 83 and 92 deg. F.

Spawning Preparations

The breeding pair is introduced at this stage and should start work immediately. The female will select one of the smooth pebbles provided and will polish it thoroughly whilst the male starts digging in the gravel in best Cichlid fashion. Spawning always takes place in the evening between 8 and 9.30 p.m. The female develops a rather prominent ovipositor (breeding tube) and deposits up to 400 eggs on the carefully cleaned pebble. These are immediately fertilised by the male.

Both parents fan the eggs and take their duties in turns. During this period they should be fed sparingly on *Daphnia*. Though the parent fish will take great care of the eggs, adequate aeration is essential for really successful results. At a temperature of 90 deg. F., the eggs hatch in 48 hours, when the parents transfer them to the pits dug by the father fish. After six more days the fry become free swimming, and are guarded by the male. As at this stage fights between the parent fishes may occur, often with fatal results to the fry, the female should therefore be removed from the tank. From the moment the fry become free-swimming a good supply of pond Infusoria and nauplii must be provided, when the young fish will grow rapidly. With this "natural" breeding method 150 to 200 fishes must be considered a good average.

To secure greater success another breeding method is suggested, and when adopting it the tank should be partitioned, preferably with frosted glass, into two halves. After the fish have spawned on

a pebble it is carefully transferred, under-water, to a large clean glass jar or small tank. The jar is removed to the other half of the partitioned tank and put on the gravel bottom. The water level in the jar should be equal to that in the tank and the rim of the jar should be about 1 1/2 in. above the water level. An inside filter is now switched on, filtering water in the jar, with an overflow tube taking the excess water back into the tank. The eggs are thus subjected to a change of water all the time. The success is said to be quite amazing and a hatching of 400 fry is not exceptional.

On the fifth day, when the fry start to swim, the overflow tube will have to be raised and the open V end of this tube inside the jar protected with some fine gauze in order to prevent the fry being carried into the big tank. Only on the sixth day, when the fry have become fully free-swimming, should the transfer be made. Great care must be exercised and the transfer must be done under water. Feeding should start at this time. The pebbles can now be returned to the spawn-



Photograph [G. J. M. Timmerman] *Apistogramma ramirezi*, a beautiful Dwarf Cichlid species. A pair is shown, with the male to the right.

ing half of the tank where the parents will most probably be ready for another spawning.

Aplocheilichthys macrophthalmus. This delightful little fish, popularly called Lamp-eyes, is not often bred. According to ZÜCHTERKNIFFE, breeding should not present too much difficulty if sufficient care is exercised. The species does not exceed 1 1/2 in. in length and is a native of Lagos in Nigeria. Its main feature is the luminous green spot in the upper part of the eye, which makes a shoal of these fish particularly striking.

For breeding purposes they are best kept separated for some time prior to the actual attempt. A breeding tank about 40 x 10 x 10 in. is prepared and divided into two halves by a glass partition. Water should be old and soft, i.e., up to 12 deg. of hardness with cooking salt added at a rate of one teaspoonful to every two gallons of water. The tank should be furnished and contain *Riccia* or Bladderwort in one half. When the tank is set up the parent fish can be introduced to the section with the floating plants—several pairs are best. Unfortunately the fish are

not at all prolific and the females will only lay two or three eggs each day. The eggs should not be exposed to direct sunlight.

At a temperature of 74 to 77 deg. F. the fry hatch in 14 to 18 days, when they should be removed with a spoon and carefully transferred to the other half of the tank. It is now that the real problems have to be faced. For some time the fry must have Infusoria of the smallest type which they will only accept when swimming close under the water surface. Infusoria cultures started on dried banana skin are particularly suitable. Such cultures take about eight days to develop and can be kept for some time provided the small pieces of banana skin are removed and replaced with a new supply every four or five days. As a substitute, a sprinkling of powdered yeast is suggested. After eight days larger Infusoria and Rotifers will be taken by the young fish. For the next two to three months only finest sifted *Cyclops* is suitable. The young Lamp-eyes should not be bred from until they are one year old.

Betta splendens. Ideas on breeding Siamese Fighting Fish, which vary in certain respects from the methods generally employed by aquarists in Gt. Britain, are also contained in ZÜCHTERKNIFFE. Here, in brief, are the essential points as they are set out in this publication:—Size of tank: 24 in. or larger. Depth of water: 4 in., but in any case no more than 6 in. Type of water: "old", no specification of pH or degree of hardness is given. Temperature: high, anything up to 86 deg. F.

Tanks should be well planted to offer hiding places for the female. After spawning she should not be removed as her presence is said to stimulate the male to take greater care of the newly-hatched fry. Only when fry become free-swimming should both parent fishes be taken out.

Best food for the fry is Infusoria cultured on crushed raw rice and rain water. These cultures take five to seven days to develop and are best started when the parent fish are put into the breeding tank, a new culture being set up each successive day to ensure a week's supply. After this time the fry will be able to take larger food such as nauplii, sifted *Daphnia*, etc. Aeration is regarded as essential.

Early Sexing of Young Fish

As soon as the young fish can be sexed—and the author claims this to be possible when they are only about 1/2 in. long—selection for show purposes should start and the best males have to be separated into individual all-glass tanks. Contrary to the usual practice, feeding of the show fishes should now be carried out sparingly on a diet of large *Daphnia*. This method of feeding is said to encourage the development of enormous and flowing finnage combined with elegant and slim bodies.

It is interesting to note that these show fish do not as a rule make good parents and have to be brought to breeding condition by transferring them for some considerable time to a community tank.

PROBLEMS ANSWERED

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

Illness of Pond Fish

A number of fish in my pond seem to be affected by Tail and Fin Rot and at least two specimens have lost their tails completely. Can you suggest a treatment?—(W. H. Price, Wellingford.)

Trim the frayed edges of the fins with a pair of Dentsol, keeping the disinfectant away from the eyes, mouth and body of the fish, especially the gills. Give the pond a good flush out with the hose, allowing the water to run all night if possible. Leave the fish in whilst this is being done.

Rearing Earthworms

Is it possible to propagate Earthworms in a similar way to that adopted for White Worms?—(A. B., Glasgow.)

It is really not practicable to breed earthworms in confined containers. They can, however, be attracted to one spot in the garden by the following means. Dig a hole in the dampest corner of the garden, approximately 3 ft. x 3 ft. x 1 1/2 ft. and into it put grass cuttings. Place a sack over the cuttings and keep it damp, particularly during the warm weather, as the sack begins to get soggy, you will find the worms adhering to it. Disturb the grass as little as possible.

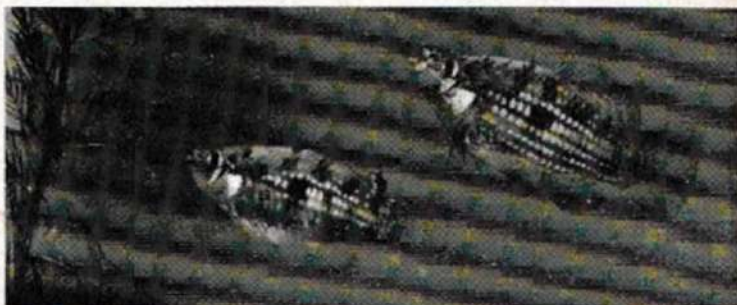
Terrapine Requirements

I have recently purchased a pair of Common Terrapins (*Pseudemys scripta*) and literature suggests they are somewhat troublesome to rear. I am keeping them in a small aquarium with an airstone at the back which is above the water level. Water at the front is 24-3 in. deep. A 25-watt bulb supplies heat but temperature varies between 70-75 deg.F. during the day and 60-70 deg. at night. How can I ensure that they do not lack calcium and vitamins in their diet?—(H. L. Wilson, Garden City, Herts.)

The difficulty in rearing the baby North American terrapins seen in this country is mostly due to environment (colder weather and less sunlight) and the lack of certain essential minerals and vitamins contained

in their normal diet. Specimens appear to originate from the Southern States. Permanent heating provided by a light bulb is a good substitute (but we would suggest you use a stronger bulb—40- or 60-watts) so as to maintain a temperature more in the region of 70-80 deg.F. If it falls to the sixties at night this should not cause trouble. They should receive as much direct sunlight as possible. On warm, sunny days the specimens (in shallow water with a small island in an open dish) can be put out in the garden, bringing them in at night.

Calcium for shell growth is provided by



Photograph

Pair of Flag Fish (*Jordanella floridae*), the more colourful male is to the right.

[G. J. M. Timmerman

feeding on tiny water molluscs (since the shells are eaten), and creatures such as woodlice and water lice. Vitamins come from the sunlight, and occasional meals of raw fish, especially herring. Access to a sunray lamp is a great help—give a 1 hr. treatment, say, once a week. The diet can be varied, e.g., fish, meat, Earthworms, various insects and larvæ, some specimens taking one thing more than another. Those that will eat water plants or young lettuce should be encouraged to do so. Baby terrapins can develop quite hearty appetites. At a tender age it would be wisest to keep them warm all the year round. Water must always be clean and fresh, as Fungus complaints may otherwise appear.

In the latest work on the North American terrapins ("Handbook of Turtles", by Professor Archie Carr) the author gives five different races or sub-species for *Pseudemys scripta*. These Terrapins (or, to use the American term—turtles) are *Pseudemys scripta scripta*, the Yellow-bellied Turtle; *Pseudemys scripta troostii*, the Cumberland Turtle; *Pseudemys scripta elegans*, the Red-eared Turtle; *Pseudemys scripta gaigea*, the Rio Grande Turtle and *Pseudemys scripta nebulosa*, the Baja Californian Turtle.

Of all these it is the Red-eared (or "Elegant") form (*P. s. elegans*) which possesses a red patch between the eye and neck, and is mostly seen in pet shops in this country.

Base for a Large Tank

What thickness of slate would be required for the bottom of a 48 x 12 x 14 in. tank? How can I make up a glazing compound?—(D. W., Porthcawl, Glam.)

You will find the cheapest bottom for

your aquarium will be 1/2 in. plate glass as cut slate is very expensive. Four feet is long for one piece so be quite sure to mount the aquarium very securely along its length, otherwise it will whip and crack the bottom. A satisfactory glazing compound is ordinary linseed oil putty into which has been thoroughly worked red lead at the rate of one teaspoonful to each pound of putty. It will no doubt be necessary to add a drop of linseed oil to keep the putty "tacky". Paint the frame and edges of the glass with gold size before glazing.

Flag Fish

Some information on the Flag Fish (*Jordanella floridae*) would be helpful as I have recently purchased a pair.—(R. G. N., Wantage, Berks.)

Jordanella floridae is one of the Egg-laying Tooth-carps from Florida. Contrary to some

people's view this fish is not strictly carnivorous but likes to eat algae which seems to be essential for its well-being. It is a vigorous fish and inclined to be pugnacious. The aquarium should therefore be well planted and have a fair amount of floating plants such as *Riccia*. It does well in alkaline water at a temperature of about 75 deg.F. Spawning lasts several days, about 20 eggs being laid each day in depressions in the sand. The male parent fans the eggs (which hatch in about a week) and protects the babies, usually proving an excellent parent. The eggs should not be in strong light as, if they are, it is most unlikely that they will hatch.

Stocking with Plants

I find stocking my 3 ft. tropical tank with aquatic plants rather expensive. Are there any garden or pond plants which could be used?—(R. K. J., Peterborough.)

There are few native water plants that will thrive in tropical tanks. Many have been tried without much success and in any case the acclimatizing of such plants is best left to the experienced fishkeeper since they can quickly cause trouble for the beginner. Species of *Myriophyllum* and the Canadian or Common Pondweed could be tried with some hope of success. Creeping Jenny (*Lysimachia*) and Baby's Tears (*Helxine*) will exist for a time in a tropical tank but they cannot be said to thrive. If you concentrate on growing plants in your tank it should not be long before you have plenty. Once planted, leave them alone and do not keep taking them out to wash them, also see that some mulm is present and that they have sufficient light.



[W. S. Pitt
Common Terrapine (*Pseudemys s. elegans*).

Aquatic Press Topics

Life Span of Aquarium-kept Fishes

WHAT sort of life do we give our pensioners? A pertinent question when the lot of many elderly folk is hard. But that is a topic not relevant to these columns and the pensioners I have in mind for discussion here are old stagers among the tropical fishes in our aquaria. Sparking off the subject were Messrs. J. Carnell and G. J. Bellew who, last Autumn, gave a list of life-spans based on their own observations which was published in the National Aquarist Society's Bulletin. Selecting from it, here are some of their longevity records:—Black Widows, 5-6 years; Neons, 3-4 years; *Hypessobrycon serpa*, 4-5 years; Pencil Fish, 4-5 years; Flame Fish, 3-4 years; *Hypessobrycon rosaceus*, 5 years; Beacons, 4 years; Bloodlins, 4-5 years; *Epiplatys chaperi*, 4 years; Mouthbreeders, 4 years; Guppies, 2½ years; Zebra Fish, 3 years; Platies, 2-2½ years; and Angel Fish, 9-10 years.

A short while afterwards Wm. T. Innes, L.H.D., devoted a feature in THE AQUARIUM magazine (U.S.) to this topic. Following on the N.A.S. Bulletin's list he gave some more details gleaned from reports he had received over the years and also from his own experience. Included here were:—any *Asyanax*, 6-8 years; *Mankhausia*, 8 years; Hatchet Fish, 3-4 years; *Leporinus*, 15-17 years; *Copeina*, 3 years; *Chilodus*, 4 years; *Brachydanius*, 3 years; Rasboras 3-6 years; Barbs, 5-7 years; White Clouds, 3 years; Mollies 3-5 years; Paradise Fish, 4 years; Fighters, 2½ years and Gouramies, 3-4 years. It will be seen that in most cases Innes flings his net wider and gives figures under Generic headings rather than individual species.

What I believe would be of interest to many fishkeepers would be a collated record of maximum life spans of the more commonly kept fish species. Have you a sprightly old 'un swimming around your aquarium and can you be quite certain that his/her age exceeds those shown in the lists I have quoted. If you can I should like to hear about it. To start the flow I would mention two fish in my possession. They are a male Flame Fish and female Nigger Barb, both are in fine fettle although almost 4½ years old. I had a female White Cloud which was very nearly, if not absolutely, four years old when it joined the mulm last December. These fish I purchased when they were three months old.

POSING queries for which there are, at present, only speculative answers, Mr. A. Leutscher, B.Sc., asks all interested in field work to investigate a number of odd features in the habits of our native reptiles and amphibians. Writing in the Spring number of COUNTRY-SIDE (the official organ of B.E.N.A.) he asks why is it that two neighbouring colonies of Common Frogs, in situations which appear similar, sometimes spawn at different times? Water analyses, plant life, water depth, sunshine and temperature records, might give interesting comparisons. Another unsolved mystery is why some newts stay in ponds all the year round whilst the majority leave the water by midsummer.

Biggest problem concerns the reason why Common Toads make an annual migration to one particular pond. Other ponds are ignored, and, even if their path crosses a

road and many of the participants are killed, the others still continue on the journey. Some enthusiasts have already followed these migratory trails by night and mapped the routes, but more information is needed.

How does a Grass Snake hunt and catch its prey under water? Also, what is the incubation period for these creatures? If hayricks and manure piles are watched in July the eggs may be found. When the young hatch in September on what do they feed if, indeed, they feed at all before hibernating in October?

There seems more than enough work here for any animal lover not to go unoccupied to the countryside during many Summers to come.

REFERRING back to the Guppy discussion in this column last issue, I am happy to hear from Mr. W. G. Phillips that he subscribes to an idea which occurred to me when first reading the South African scientists' report. It concerns that part where they said there had been sex-reversion among Guppies after Fungus had appeared in an overcrowded tank. Three days following the

infection 70 per cent of the fish were dead, leaving 86 females and seven males, both described as sexually mature. Within 20 days it was reported that 41 females were changing to males, the gonopodia and male colouring having almost fully developed. It occurred to me that this so-called sex reversion might be nothing more than a case of the fish completing their development when the gross overcrowding had been alleviated by the death of many of their fellow inmates.

Mr. Phillips agrees with this view, or at least believes that many of the fish described as females were, in fact, males late in developing. He thinks that the first significant pointer is that there were 86 females and seven males after the infection. Mr. Phillips goes on—"Actually some of those 86 so-called females were late maturing males which can only be detected, if I may say so, by experience. My conclusions are also borne out by the fact that a 'revert' Guppy (female to male) only shows the change by the presence of a gonopodium and it never shows any of the colours associated with the male Guppy". Mr. Phillips is so certain that the fish were, in fact, late maturing males and not fish undergoing a sex change due to the Fungus infection, that he is prepared to supply female Guppies to responsible people who think that reverts can be produced by infecting the fish with *Saprolegnia* (Fungus).

From Continental Journals

Miniature Tropicals

IN the April issue of DIE AQUARIEN-UND TERRARIEN ZEITSCHRIFT (DATZ) there are descriptions of two fish which seem attractive and interesting enough to deserve our attention.

Mr. F. Schneider describes his experiences with *Neolebias ansorgii*, a pair of which species he received with a number of other fish from Holland. *N. ansorgii*, which is native to West Africa, is among the smallest members of the Characin Family and does not exceed 1½ in. From Mr. Schneider we get a very detailed report of its requirements and characteristics. In condition the fish is of reddish brown colour with metallic green on its sides. Starting at a green spot on the shoulder and running to a green band at the tail, is a wide brown band with light coloured edges. Pelvic, anal and caudal fins are vivid red, as are the underparts of the male fish, the female being somewhat paler throughout. The species is peaceful and suitable for communities of fish about its own size.

It requires a well-planted tank, preferably with fine-leaved plants, old water to a depth not exceeding 8 in., only slight aeration and temperatures between 74 and 79 deg. F. The fish thrives on all types of livefood with special preference for *Tubifex* and mosquito larvae. It will not accept any dried food.

Mr. Schneider succeeded in breeding the fish though they do not seem very prolific. He used a small tank containing two parts old acid tank water and one part fresh rain water to a depth of 5½ in. The aquarium was planted with some *Myriophyllum* and *Fontinalis* and provided with an egg-trap made of glass bars. Temperature was increased to 83 deg. F. when spawning took place, after a day of chasing. The eggs numbered not more than 40 to 50. The parents were then removed, the

young hatched after two days and were free-swimming after another five. They accepted Rotifers as a first food, Mikroworms after eight days and finely-sifted Cyclops and Dwarf White Worms when three weeks old. With this method Mr. Schneider succeeded in rearing 34 young *Neolebias ansorgii* at his first attempt.

Another unusual and very pretty little fish is described in an article by Mr. L. Schikirsch. It is *Rasbora maculata*, which has a total length of only 1 in. A small tank, 18 in. or even less, is suitable. Soft old water at a temperature of 73-75 deg. F. and furnished with fine-leaved plants suits them well. A dark background and a dark bottom layer help to show these lovely little fish off to the maximum advantage. The colour of the male is a vivid dark red and of the female a more pink shade, both with dark blue spots, oscillating lines and a small circle on the tail. They are very lively fish which are always on the move, especially when provided with some small livefood.

Mr. Schikirsch has bred them successfully several times. He uses an all-glass tank filled with two parts filtered rain water to one part old acid water at a depth of 5½ in. Spawning plants are *Myriophyllum* and *Nitella*. Glass marbles or similar egg-traps are necessary as *Rasbora maculata* is an egg eater. At a temperature of 79 to 83 deg. F. spawning takes place with a short embrace by the male. The spawning period is from two to three hours, after which the parents should be removed. Care must be taken that they are placed in water of similar pH value to prevent any bad effect. The fry hatch after 24 to 36 hours. Feeding should start on the third or fourth day with smallest types of pond Infusoria. The young fish grow rapidly and can be offered small Cyclops after the first week. When properly fed they are of sufficient size to be sexed in eight to nine weeks.

By H. O. Munro

In and Around the Aquaria World

— By W. J. Page —

AN interesting visitor to the editorial office some time back was Mr. M. Manal, secretary of The Aquarist Society of India and editor of the lively printed bulletin "The Indian Aquarist". Now comes the news that Mr. Manal is undertaking a world business tour. In his spare time he hopes to meet leading aquarists in the places he visits, including Bangkok, Singapore, Hong Kong, Jakarta, Manila and Tokyo, and cities in Canada, U.S.A., Brazil, Argentina, Cuba, the West Indies, Germany, France, Italy, Egypt, not forgetting Great Britain. It would be an interesting event if British aquarists could arrange an open meeting at which he would be invited to give a talk. The suggestion has been put to the F.B.A.S.

WHEN looking at supplies of aquarium fish in retailers' shops, we, or at least I, often try to conjure up in our mind's eye the sort of people who handle the freshly-caught specimens in far-off places and who, in turn, pass them on to bulk purchasers for transshipment to this country and elsewhere.

A well-known figure in Hong Kong is George Bing of the Kowloon Aquarium who wholesales marine and freshwater

fishes to all parts of the world. He is noted locally for his kindness and generosity to his best of friends. According to Henry A. Nichols of California, who sent me the photograph which I reproduce, George has an interesting background. Apparently, for years he ran a wholesale seafood market, collecting for his Oriental clientele shark fins, beche-de-mer, scallops and Pappaside, etc., using his own big junk which sailed between the Philippines and the islands of the South China seas.

He had always kept a large well-aerated tank of fishes in his shop window but more recently, as my correspondent puts it, he "got the aquarium-bug bad". From a modest beginning in the field he has built up a big connection. Quite possibly some of the fish in your tank, collected in the Far East and sent to Hong-Kong, were handled by Bing before being sent first to Singapore, thence to London.

THE number of film shows included in clubs' programmes continues to grow and in response to numerous enquiries I have, from time to time, recommended secretaries to obtain a copy of Part 3 of the Catalogue of Educational Foundation for Visual Aids. The cost is 2/9d. post paid and it can be ordered from 33 Queen Anne Street, London, W.1. It lists the subjects (films in colour and black and white, silent or talking and filmstrips issued by a number of firms). More recently we have received a catalogue from John King (Films) Ltd., of Film House, East Street, Brighton, Sussex, who hire

out a range of 16 mm. films. One or two are suitable for hire by aquarist clubs, including "Strange Cargo" and "Demons of the Deep". A French film, "Par 18 Metres de Fond" tells of deep-sea diving by Capt. J. Cousteau.

MR. GENE WOLFSHEIMER, whose photographs and notes on Thick-lipped Gouramies appear in this issue, is one of America's top-flight fishkeepers. He lives at Sherman Oaks, California. The initials "F.A.I." which he puts after his name indicate that he is a Fellow of the Aquarists' Internationale, the correspondence circle with members in a number of countries who regularly exchange useful letters on their experiences. In Great Britain two of its members are Mr. R. W. Andrews of Harringay and Mr. D. G. Armstrong of Crofton Park, London, S.E.4. The sequence of pictures taken by Mr. Wolfsheimer shows the nest-building habits of *Colisa labiosa* remarkably clearly.

AS New Zealand was much in the news recently, during the visit of H.M. The Queen and H.R.H. The Duke of Edinburgh, Mr. L. C. Driver of Stratford in the North Island was prompted to send the letter, published on page 136, and the two photographs, one showing the pool built high up on Mt. Egmont.

Mt. Egmont is at one end of a rain belt which accounts for Mr. Driver's mention of the heavy rainfall. New Plymouth and Stratford are at the foot of the mountain and aquarists in the two centres have formed a very live society with headquarters at the former place, the seaport capital of Taranaki province. An annual feature of the society's programme is a weekend visit to other societies, sometimes as far as 160 miles away. The hospitality shown is reciprocated.

Last Winter (Summertime in Great Britain) the society staged a successful display at the Coronation Show of the local Agricultural and Pastoral Association. The New Plymouth society is affiliated to the New Zealand Federation of Aquatic Societies.

FROM Wellington, N.Z. comes an interesting letter sent by Mr. R. Perrett, a successful Goldfish breeder "down under." During the last breeding season, earlier in the year, he settled down to a busy time and had hopes of raising anything up to 900 Telescopes and Moors. One of his recent activities has been to construct a new basement fishroom measuring approximately 20 feet long by

6 feet wide. The cementing took up much of his spare time but now that it is finished the extra accommodation is coming in most useful. Mr. Perrett already has twenty tanks for his fish, some tropicals as well as Goldfish, and his outside ponds cover about 140 square feet.

POPULAR amongst a wide circle of aquarist friends in the South is Mr. Harold Pearson, secretary of the South London Section of the Federation of Guppy Breeders Societies. As an official of the F.G.B.S. (he is on both its management and judges' and standards committees) he participates very conscientiously in debates. He is also a grade A judge on the Guppy Federation's panel. Not only does he stand up for his own section's interests but he tackles F.G.B.S. problems with a wider outlook. His experience permits him to bring out and develop sound arguments for and against the several motions that crop up at the meetings he attends. An active Guppy breeder, Mr. Pearson exhibits with success and has won prizes in Round-tail Male and Grey and Coloured Female classes. The South London section competes for a Mrs. Pearson cup which has been given to encourage the exhibition of breeders' teams of four fish. The photograph, by Mr. R. G. Gardner, was taken at the 1954 WATER LIFE show where Mr. Pearson was a steward in the Guppy section.



Mr. H. Pearson.

IRREPRESSIBLE is, perhaps, the best description of that rotund little character, Alec. H. Charles, who has proved an energetic and helpful worker at a number of WATER LIFE shows. He has been in and out of office in a number of clubs and is now back in harness as press officer of West Middlesex A.S. liaison officer of N.W. London Group and S.W. Middlesex Association and press officer of the West London Group of the F.G.B.S. If he has not been so active as usual during the past two years or so it is because he has had the misfortune to lose his wife, who died from a cerebral tumour. Mrs. Charles was not often seen but she took great interest in Alec's collection of fishes. Very few knew that she was a former matron of a military



Mr. George Bing.



GOLDFISH BREEDING IN NEW ZEALAND

Left: Mr. R. Perrett in his new fishroom. Right: outdoor pools used for hardening off young stock. Mr. Perrett finds the ponds of great value in getting his new stock to develop in colour and size at a satisfactory rate.

hospital; in fact, it was when A.H.C. "caught a packie" in the 1914-18 war and she nursed him back to health that romance crept in. Mr. Charles, who felt her loss deeply, has since her death been up against a number of misfortunes through indifferent health and lack of employment but he still remains optimistic. If he has any failing it is his non-stop talking; he is an experienced fishkeeper as his article in this issue reveals.

TWO well-known figures in the aquaria world had to curtail their engagements for some time through the illness of their wives. Mrs. Betts, wife of Capt. L. C. Betts, chairman of the Goldfish Society of Great Britain and of the Aquatic Traders' Association, is recovering from an operation and Mrs. Campkin, wife of Mr. P. S. Campkin, chairman of the Judges' and Standards Committee of the Federation of British Aquatic Societies and past F.B.A.S. chairman, was also in hospital for a period. Both are making good progress. Whilst his wife was in one hospital Mr. Campkin's mother was admitted to another. Later she returned home but died soon afterwards. Our condolences go to Mr. and Mrs. Campkin.

APPROXIMATELY half-way between London and Brighton, to the south of the North Downs, lies Redhill, one of those old-world Surrey towns to which new houses are slowly but surely bringing a change of character. With Mr. W. Williams as an energetic chairman and Mr. J. O. Edwards as an equally active secretary, the local society, Redhill A.S., is meeting adequately the needs of fishkeepers in the district.

As a guest at the society's annual dinner held at a hostelry out of the town on the way towards Salfords, I had the dual pleasure of responding to the toast of "The Visitors" and presenting the A. Wilkins Cup for most points gained at table shows to Mr. B. Robinson, who will hold it for six months. It will next go to Mr. D. Fathers who (tied for the honour). I also handed out WATER LIFE diplomas won by Messrs. W. Leach (Redhill's show secretary) who staged a very shapely London Shubunkin and Price (Crawley)



Left, Mr. P. Hewitt and right, Mr. W. Williams, chairman, with the Editor of WATER LIFE, on the occasion of Redhill A.S. annual dinner.

who exhibited what the judge described as an outstanding Green Swordtail for the best coldwater and best tropical fish, respectively, at the society's recent show.

Joining in the social evening which followed an enjoyable meal were members of the Horley and Crawley societies, Mr. and Mrs. J. E. Edwards and their daughter from Surbiton, Mr. P. Hewitt of Wallington and Mr. and Mrs. A. Lambert of Hook.

Grace which was said by the chairman at the beginning of the meal took an ancient form, the wording of which was familiar, I noticed, to more than one of the menfolk present. Some of their reserve, if not the caution they had been taught, was thrown

to the wind when it came to joining in the party games.

I was told that the three societies mentioned and others not so very far away may be invited to form an interclub association, a move I encouraged in my remarks. Here is another instance of an area organisation being first considered locally and without the aid of the F.B.A.S. Sooner or later, the Federation, which could have encouraged complete coverage of the country by affiliated area representation, may find that a number have come into being on an independent footing. Whether that trend is a good thing for the hobby I do not know but it could undermine the strength of the F.B.A.S.

Ronald Martin, Joan Coslett and Billy Jackson, Junior members of Plymouth A. & P.S., who took part in a B.B.C. Children's Hour programme.



THE preparation of the revised recommendations for furnished aquaria classes at shows, published on page 145, is an outward sign of the degree of understanding reached between our two Federations. I would be ungenerous to our northern friends to say that one federation should be adequate to look after the club side of our hobby or to infer that, were the area scheme to come into full operation, the Federation of Northern Aquarium Societies could become a subsidiary of the Federation of British Aquatic Societies and function as the larger federated organisation's northern area. Certainly, the policy of the F.N.A.S. is ideally suited to serve a relatively limited area, with a main place of assembly (Manchester in this instance) and a strong bias towards encouraging social activities.

In my opinion, there are well defined areas with strong local clubs which would be the natural focal points for such districts. With Glasgow as the centre of Scottish activities; Manchester covering the North; Bristol the South-west and Wales (here we already have the South-

promotion, conferences and the like could be more easily arranged on a national basis and local (area) committees could look after the domestic needs of the clubs under their jurisdiction. At present, the growth of area associations independent of the F.B.A.S. is inclined to weaken rather than strengthen its status, a position that could be reversed if a strong lead came from the F.B.A.S. Council.

THREE junior members of Plymouth A. & P.S., Joan Coslett and Billy Jackson, both 16, and Ronald Martin, 12, took part in a Children's Hour programme ("Take Your Choice") when they discussed the merits of fishkeeping in an interview

with Keith Hamilton Price. The accompanying photograph shows the trio looking happy and confident outside the British Broadcasting Corporation studios at Plymouth. Joan, who is the daughter of Mrs. V. Coslett, the society's secretary, writes on their experience on page 150.

MISS D. MORRIS has proved one of the keenest supporters of the Goldfish Society of Great Britain, readily passing on information based on her experiences in breeding her fish, treating diseases and exhibiting. Her wide knowledge was recognised when she was appointed assistant to the technical director, Miss Morris, who has frequently travelled to London from Brighton, where she lived, to attend G.S.G.B. meetings and shows, now tells me that she has moved to Horley, Surrey. Luckily, her fishkeeping interests will not suffer since there is a pond in the garden and a shed which is being converted to a fishhouse. Still on the main London-Brighton line, her move should not interfere with her visits to aquarists' gatherings in town.

AT a meeting held recently, the Aquaria Section Committee of the National Exhibition of Cage Birds and Aquaria discussed the 1954 event and made proposals for the next WATER LIFE show, to be held on January 6, 7 and 8, 1955. Due consideration was given to suggestions put forward by three correspondents and the section committee's recommendations have been passed to the main show committee. Once again, the venue will be the capacious National Hall at Olympia where, by making fuller use of the big gallery to the Hall, the whole Exhibition may be laid out better, with advantage to the aquaria display. I hope to have more details for the next issue.

In the meantime, I can say that the enthusiasm shown by the committee, including representatives of the F.B.A.S., F.G.B.S., G.S.G.B. and the B.H.S., promises well for the event. A number of new features are contemplated and it is considered likely that the classes will be increased. Preliminary notices will be sent to all clubs and past exhibitors shortly.

(Continued next page.)

western Aquarists Societies' Association); Nottingham, the North Midlands; Birmingham, the South Midlands (it is the home of the Midland Association of Aquarists Societies) and London in the South (the Association of South London Aquarist Societies could have its scope extended), we are half-way towards getting the necessary machinery to put an overdue plan into being.

The F.B.A.S. as such could concentrate on national aspects and much of the detailed discussion at its regular gatherings of delegates could be reduced by having had the subjects thrashed out thoroughly by clubs in their respective areas beforehand. Standards, judges' panels, show

Arresting the Fall in Society Membership

WHY did you become an aquarist? An unnecessary question, you remark? Yet is it? People seem to keep fish for all sorts of reasons. Fortunately, most individuals have come into the hobby for the simple reason that they are interested in these creatures. There is a small minority, however, which is lured on only by the thought of making money "on the side"; my only word to them is beware, for, unless the profit motive is secondary in importance to a genuine interest in fishkeeping, the effort will probably end in frustration.

What of our enthusiasts, how did they become attracted to the hobby? Many friends admit that their interest in fish was first aroused by seeing furnished aquaria at one of the local club shows, or in an aquarist's home. Others say that they were always keen on living creatures, right from their schooldays when they caught small fish from the brook at the bottom of the lane.

For whatever reason, and however our interest was aroused, we needed assistance and guidance through the pitfalls encountered in aquarium management. To get this help, many of us joined aquarists' societies that have been appearing almost everywhere up and down the country in these post-war years. Doubtless, at the time, some of us thought only of what we

By W. B. Johnson
Chairman of Hornchurch and District
Aquarium Society

would gain from such an association; we may have seen the society as a gateway to knowledge and as a means of obtaining cheap equipment and foods.

This phase soon passed and in our maturity we saw the society as a body of people, some more knowledgeable and enthusiastic than others, yet all kindred spirits, pursuing fishkeepers' interests everywhere and making some contribution to the community in general at the same time.

From time to time, we hear clubs report falling memberships. Because of this lack of support, they decide not to organize their annual show. It should be obvious now that shows are the largest potential source of increased membership that any society can have; dispense with them and you have cut off your life-blood, vitality will drain away. Even if membership is cut down to a dozen stalwarts, a joint show can often be staged with another club in the same position, or perhaps the local horticultural society can be persuaded to let you have a corner for a display at its next show. Such an arrangement need cost little and benefits both organizations.

Having established a sure method of building up the membership, it remains for the society to minimise wastage of members. This is particularly important in the small club where a fluctuating membership and restricted facilities tend to take their toll. In those cases where it is noticed that members are losing interest, perhaps because they can draw nothing further in the way of aquarium knowledge from the club, it pays to find them a job to hold them, even if it means creating one!

Points Worth Considering

When considering member wastage, I suggest the following ideas be considered:—

1. Cater for both coldwater and tropical enthusiasts.

2. Every meeting should be of interest to both novices and the more experienced aquarists. If the society is large enough, a separate beginners' night can be the solution.

3. Have an energetic and keen executive committee to arrange the year's programme and plan social evenings, outings, etc. Maintain a balanced programme throughout the year covering lectures, demonstrations, table shows, quizzes and the use of visual aids. It should be possible to dispense with all club business within 15-20 minutes on general meeting nights.

4. Encourage members to take part in the club programme as much as possible. It is surprising how many experts there are on such a diversity of subjects. If the speaker is limited to a 10-15 minute period no one will become bored and many will be interested, including the individual putting it over. This idea will give you an opportunity to persuade your experts to disclose their fishbreeding secrets. It is appreciated that there are two schools of thought on this topic but, from experience, the writer believes that restricting the circulation of this information has an adverse effect on membership. Surely only

professionals need to keep their findings to themselves?

5. Encourage team research under which the more experienced aquarists are set a task or problem and at some future meeting report their findings.

6. During the year some field work should be carried out, even if it is restricted to a *Daphnia* hunt round the local ponds by coach!

7. Arrange home aquaria competitions with visiting judges.

8. Arrange visits to public aquaria and commercial breeders' establishments. Occasional social evenings or outings to a show in town are appreciated.

9. Stage an annual club show.

Earlier, reference was made to the contribution that the aquarist—through his society—could make to the community. Many societies have already presented aquaria to hospitals and institutions in their localities, and assisted invalids and disabled persons to furnish their own home aquaria. This is good work but our task is not done—it will never be done whilst there are people who are lonely and suffer in mind or body.

Thus we revert to our original question. Why did we become aquarists? The only answer, surely, is because there are, and must always be, fish at which to look and interest us.

WATER ANALYSIS

Samples should be sent in a clean pint bottle, well packed, to Water Life Analyst, 12, Featherbed Lane, Addington, Surrey, together with a fee of 5s. per sample. The name and address of the sender and details of prevailing conditions should accompany each sample which is submitted.

Sample received from J.L., Southampton. It was taken from a 16 x 8 x 8 in. tropical tank. Average temperature had been 75 deg. F., and water had come straight from the mains; one third of the bottom area was planted and there was some floating Riccia. Illumination was supplied by two, 25-watt bulbs. In the first attempt four Platies and two Zebra Fish were introduced but died within 24 hours. The tank was cleaned and restocked with fresh gravel, plants and water. A female Guppy and two Zebra Fish were put in but the Guppy died within 24 hours. The water was replaced and the Zebra Fish seemed to revive temporarily but 24 hours later they were dead.

Test for impurities:—Appearance: clear and bright. Odour: none. Total mineral content: 0.0200 per cent., satisfactory. Organic matter: 0.0011 per cent., satisfactory. Nitrogen compounds: 0.000020 per cent., satisfactory. Ammonium compounds: 0.000028 per cent., satisfactory. Poisonous metals: none detected. pH: 7.7, satisfactory. Chlorine, as salt: 0.004 per cent., satisfactory.

Suggested corrections:—The results obtained from the chemical analysis of this sample of tank water reveal that it is fairly pure. However, the sample gave a distinct positive reaction for the presence of free chlorine. Whilst traces of this gas may normally be found in treated drinking water, such water may be very injurious to fish life. The remedy is very simple, for one or two crystals of "hypo" (sodium thiosulphate) dropped into the tank will rid the water of any excess of free chlorine. Sodium thiosulphate is itself quite harmless.

In and Around the Aquaria World—contd.

NOT to be outdone by the Canadian aquarist, Mr. W. H. Hewitt of Toronto, who, as reported in the April 1953 issue of WATER LIFE, presented Sir Winston Churchill with some blue-red *Platypleurion variatus*, another gift by air has been sent by *The Aquarium*, published in Philadelphia, Pennsylvania.

The fish are described as telescopic-eyed black Goldfish. The popular press seized on the story that they were unusual and rare. Some of our experienced judges might agree since they complain that many of the Moors they are called on to judge are of fair shape and show too much bronze instead of the desired velvety black. Nevertheless, without attempting to belittle the value of the gesture of *The Aquarium*, I must say that Veiltail Moors of good quality have been seen in Great Britain. In fact, I believe the fish are young stock, not yet fully coloured. I must get some details.

I know that when Mr. Churchill visited the 1952 N.A.S. Show and became an honorary member, he was presented with two red Siamese Fighting Fish but it's about time someone here in the coldwater line did something, otherwise the lay public may think we have no quality Goldfish in this country. Perhaps the Goldfish Society could pass on some specimens of the black, metallic Spherophthalmic form of *Carassius auratus* that would pass their type test; alternatively, the Federation of British Aquatic Societies might persuade a coldwater fan to give the Prime Minister a trio of gold-star standard Veiltail Moors; or, again, West Country enthusiasts who belong to Bristol A.S. would possibly be willing to offer three or four "black beauties" that conform to their own standards for this variety.

F.B.A.S. Judges' Conference

Complacency the Keynote of This Year's Debates

ABOUT thirty-five accredited judges, drawn from affiliated societies from over a wide area, were welcomed to the 1954 Conference, which had the air about it of a semi-official, semi-social event, by Mr. T. E. Butt, chairman of the Federation of British Aquatic Societies. The social side was immediately evident, greetings being exchanged between judges from Cheltenham, Nottingham, Northampton, Wolverhampton and the more closely-knit Home Counties. The business intentions of the occasion were emphasised by Mr. Butt, who pointed out that the gathering had not been called together to "hear things from us" (the F.B.A.S., in particular its Judges and Standards Committee), but to discuss matters. It was, he said, an opportunity for judges to make suggestions, to criticise, to give their opinions for the guidance of the Judges and Standards Committee, and to assist Mr. Butt in his recommendations to the F.B.A.S. Chairman, Mr. G. H. Gloyne, and Mr. Chapman of the Federation of Northern Aquarist Societies, expressing the appreciation of the F.B.A.S. of the token of closer co-operation between the two Federations.

Year's Work Reviewed

The chair was then taken by Mr. P. S. Campkin, chairman of the Judges' and Standards Committee, who called on the secretary of that Committee, Mr. J. H. Gloyne, to deal with the only matters "from us to you". These were reports on the 1953 Conference and on committee work during 1953-4. To give the judges ample time for their deliberations, Mr. Gloyne condensed his account of the 1953 Conference, and mentioned his comments on committee work in matters of minor importance, including the operations of the Star School, the recent issue of standards for Koi-ryu, Red, Albino and Red Tuxedo Swordtails, F.B.A.S. Diplomas, the up-standings of judges, a re-statement of the plans and the commencement of an area Judges' Panel in the Portsmouth area, concluding with thanks to the Federation of Guppy Breeders' Societies for their collaboration in respect of standards for varieties of Guppies. Assuming that an alert, critical faculty is an essential attribute of a judge, the complacency of the gathering was rather remarkable. Comments on the secretary's reports came slowly. A suggestion from Mr. H. S. Waite, that specialist societies should be excluded from the awards of the F.B.A.S. Diploma (for exhibits gaining more than 90 marks), probably based on the assumption that such exhibits are more likely to be found in the entries at specialist shows, was cheerfully countered by Mr. R. O. B. List, general secretary of the F.B.A.S., and the award is still open to all. Mr. C. R. Looker asked for a quicker release of essential information, especially regarding new standards, but this could not be interpreted as a criticism of the Committee's secretary, who already gives all of his not too plentiful spare time to his work for the F.B.A.S.

Local Training Course

Mention of the judges' course inaugurated in the Portsmouth area was the signal for some appropriate observations on the future operation of the Judges' Panel. It was pointed out that several societies made their own arrangements for the judging of table shows and society shows because of the fees payable for accredited judges. Mr. S. T. Jelly pointed out that the fees for judges had been fixed and approved by member societies, and when he was approached to provide capacity when standards were discussed, from willingness to make their services available free.

first broached, right through to the standards of today. So far as the Bristol Society was approached, the necessary data were readily available, and the details of the outline drawing, with the added decision without prior consultation with the Society, and although the standard was entirely approved, it was accepted. The Society has now issued another and different standard without consultation with any organisation. The placid reception of Webley's contribution highlighted the proportion of cold water representation on F.B.A.S. Panel, a representation further depleted by the unavoidable absence of those two protagonists, Mr. A. Beckett and Capt. L. C. Betts.

Mention was made by Mr. Gloyne of consultations between the G.S.G.B. and F.B.A.S., regarding these very standards, but the presence of any representative from Bristol was not mentioned, and in view of Nottingham's worthwhile activity in the all standards for Fancy Goldfishes, that some of its standards would appear to be the common meeting ground for the several international authorities. If prejudices are subordinate to genuine desire for mutually satisfactory standards, the issue of one acceptable set of Standards for Cultivated Goldfishes will not be long delayed. The source of publication is of minor importance.

Breeders' Teams

The decision of the Committee, that in breeders' classes should consist of six fish, and that where sex was indicated, three would have preference over a "one-sex" indiscriminately mixed entries, met with approval, the Guppy fancy inclining to "all male" entries. The Committee's decision to establish a scale of marks to cover "Breeding" has resulted in a list of the generally known Tropicals, graded in order of breeding difficulty. Obviously this is necessary if competitors' efforts with difficult species are to be recognised and rewarded. The Committee of such a list requires knowledge and experience, and the Committee is to be congratulated in finding these qualities in its midst. It is hoped that their reward will be a careful consideration of the proposed scale, with amendments submitted, where necessary. Criticism measure so full of pitfalls, anomalies and difficulties should be kept to a minimum.

The point was raised that some areas are difficult with fishes that are common and easy to breed in other areas and vice versa. This does not affect the issue very much as it is expected that broods in a given area appear in competition against each other, should fishes with a high rating, such as become easily bred in one area, come from that area might have a slight edge over another area, but their journey to the show and their entries, encouraging entries for such varieties. Points were raised about the quality of breeding good Guppies, and the various "varieties" of *Millettia*, and also the problem of observation was about the difficulty of being an even six of *Heterostichus* forms which has its broods in two; but most of this was cleared up when the suggestion was amended the wording to "Difficulty or Ease of Reproduction", thereby indicating that mention only was involved in the scale of points, all other qualities being judged on their merits.

Age Limits Proposed

A matter on which a more lively discussion might have been anticipated arose from the Committee's suggestion that a "minimum" of these competitive broods is desirable, leaving the equally important "maximum" to the discretion of the competitor, and well fully adult fishes appearing in these competitive classes with greater frequency, the question as to the desirability of this was not raised by any

accredited judges have often expressed regret at the lack of opportunity to increase their experience. It soon became apparent that the question of fees was incidental, the crux of the matter being whether aquarists of sufficient competence to become judges should be accredited. Every society appears to have members capable of judging, and who are anxious to become judges, whether there is anything to judge or not. The F.B.A.S. has a large panel of accredited judges, some of whom are only occasionally employed, and two pertinent questions which should be faced squarely are—"Is it desirable that judges should be appointed as a mark of competence?" or "Should the appointment of judges be dependent on the necessity for them?"

The recommendations of the F.N.A.S. for the adjustment of pointings for Furnished Aquaria have resulted in a better method of assessing the completed exhibits. They had pointed out that high marks given for individual features in furnished aquaria could result in a premier award going to an entry which was not satisfactory in that it did not present an harmonious whole. They also stressed the importance of descriptive details being available to competitors and judges, in addition to the points and uniform system of judging, and obtain, with less dependence on a conference.

This valuable collaboration from the North was emphasised by Mr. Gloyne in his later remarks when he said that it was most satisfying to find the F.B.A.S. and the F.N.A.S. "running in double harness". Does this indicate the acceptance, in spirit, of the principle of Regional Associations

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with the possible formation of more, and the co-operation of all, of them?

Unilateral activity was apparent in an item on the agenda, sponsored by Nottingham A.S., and expressed by Mr. W. C. Webley. He first made the intriguing observations that the recognition of interest in the Tropical Fancy was being offset by a quickening of interest in the Coldwater Fancy—and Nottingham A.S. being alert to changing trends, had formed a study group. They were examining the existing standards for Fancy Goldfishes, from all sources, variety by variety, and ultimately they hoped to arrive at a basic standard for each variety. He has written to add that it was not a further standard, but the study group is to accept only this basic standard. It is rather difficult to see how a basic standard can be arrived at or accepted unless it is expressed in detail, which, surely means "issued". (The letter from Mr. Webley, on page 137 explains what the study group hopes to do—Ed.)

The necessity for this work was stressed by Mr. Webley pointing out that the details of the Shubunkin in the F.B.A.S. standard handbook, were not only ambiguous, but were endorsed as being "Recommended by the Bristol Aquarist Society", whereas that Society has since issued another standard for the Bristol Shubunkin, with more ambiguity, and differing from their own previous standard. Mr. Webley concluded with the observation that the Nottingham Society was impressed by the precision of description used by the Goldfish Society of Gt. Britain in their standards.

Replying to these comments, Mr. A. Fraser-Brummer said that he had acted in an advisory capacity when standards were discussed, from the days of the old B.A.S., when the matter was

ment. Surely, the dissociation of quality from difficulty of reproduction would be accentuated if an upper age limit were fixed, for, by-and-large, Breeders' Classes in the tropical fancy should be assessed by the ability to induce certain fishes to spawn or bear, and the ability to raise the resulting young into healthy fishes of comparable even size. Matching up six adult fishes would appear to have little bearing on these two difficulties.

All that has ever been discussed at any meeting of judges appeared in the matter sponsored by Mr. W. G. Phillips, which first of all sounded like a plea for more varieties in the Guppy fancy, then switched into an earnest advocacy for the inclusion of the Pearl-scaled or Hammer-scaled and Bubble-eyed fishes in the standards for Fancy Goldfishes, and concluded with an expres-

sion of the competitive disadvantages suffered by Minnows, Rudd, and Perch, in A.O.V. classes where these fishes are judged by "basic points" with other standard varieties being judged by "standard pointings".

Some support came, with the assumption that the point at issue was the encouragement of "sports" in A.O.V. classes, with the possibility that these "sports" might be developed into new varieties, but the sponsor was very definite that "sports" were not in his mind, only long established (sic) varieties, such as the Flag-tailed Guppy, and the Pearl-scales or Hammer-scales, and Bubble-eyed Goldfishes. He traced the origins of these varieties to emphasise that they were not "new", but may have confused the issue a little, when Perch, Rudd and Minnows appeared in his arguments.

The Chairman congratulated Mr. Phillips on "moving in and out of order" with such facility, and clarified the matter by pointing out that the question to be decided by vote (the only matter on which a vote was taken) was, "whether the basic scale of pointing was adequate to judge fishes where no standards exist". The meeting decided by a majority vote that the basic standard points were adequate, and there the matter rests at present. The solidarity of the Guppy fanciers' votes appeared to indicate that they had sufficient varieties for the time being. Some Goldfish fanciers held the same opinion, but whether the "basic scale" will enable a judge to assess a fish which he has never seen before, and of which he has no knowledge, we may never know. One thing was obvious—the unanimous desire that the Conference shall be repeated next year.

Revised Points Scale for Judging Furnished Tanks

F.N.A.S. Joins F.B.A.S. in Amending Their Recommendations

MR. J. H. GLOYN, secretary of the Judges' and Standards Committee of the Federation of British Aquatic Societies, has forwarded a copy of the revised F.B.A.S. instructions to judges for furnished aquaria classes and, in his covering letter, states that he is authorised by Mr. G. W. Cooke, secretary of the Judging and Standards Committee of the Federation of Northern Aquatic Societies to write on behalf of that Federation which approves the changes.

The notes sent us embody the new material which, it is understood, is partly based on the recommendations of the F.N.A.S. representatives. And, as Mr. Gloyn points out, the recommendations printed in the F.B.A.S. booklet "Show Standards for Cultivated Fishes" remain as published but with slightly amended pointing. The revised scale of points has been tried out at a number of competitive exhibitions including the 1954 WATER LIFE Show and Mr. Gloyn reports that it has been found to be satisfactory. He adds that it is the result of negotiations between the two Federations during the past eighteen months and comments "We think we may say that it can be regarded as acceptable over the whole country."

The chief departure is the combination of the two main headings "Design" and "Technique" and a slight alteration to the detailed pointing under those headings. The new notes are not intended to restrict the efforts of exhibitors and the two committees hope that competitors will find that the field for endeavour, design and effect is as open as hitherto. The main function of the notes is to show under which sub-head certain aspects of the entry are to be considered and thereby indicate the maximum number of points that can be won or lost for a good or bad item in the set-up.

The new notes are primarily intended for the guidance of judges and their use should help bring about a uniformity of approach by judges throughout the country. Their publication should help exhibitors to know for what judges are encouraged to look when assessing the merits of exhibits in furnished aquaria classes.

To help readers interested in the furnished aquaria classes at shows we give the complete, revised recommendations, printing in italics summaries of the additional material. Italics, where used, also indicate the changes made in the pointing:—

THE FURNISHED AQUARIUM

General Guidance to Exhibitors

"It is of prime importance that there should be a defined predetermined plan of furnishing the aquarium with fish, plants, and accessories. The design should be feasible, realistic, and decorative, the various parts so balanced as to give a convincing impression of permanency.

"The basic idea may be pure design of form and colour, or may represent as closely as possible a cross-section of a natural pool or stream, in this case the various elements being correctly geographically related. Attention should be drawn to the need for restrained use of rockwork, which should be appropriate in form and disposition.

"No furnishings should be allowed external to the aquarium. Auxiliary apparatus should be as concealed as possible. A thermometer, if necessary, should be visible but unobtrusive.

"The 24x12x12 in. aquarium is generally

in colour, condition, shape, fins and department are penalised.

PLANTS 25.

Selection 10. Considerations: Appropriate relationship in variety, colour and texture to each other, to the fish and the rockwork; overstocking, the indiscriminate mixture of too many varieties and the inclusion of out-sized or disapproved varieties are penalised.

Quality 15. Considerations: Degree of perfection in colour, texture and quality. Damaged or unhealthy plants are penalised.

DESIGN AND TECHNIQUE 50. (Note: Formerly two separate headings with 25 points each).

Design and General Effect 15. (Note: Formerly Design and Harmony, 15).

Considerations: Merits of the layout and general appearance and the grouping of plants; whether exploitation of materials is to the best advantage in forming a realistic and harmonious picture; faults in general technique which detract from the finished picture; whether or not the fish are visible. Originality 5. Considerations: Any measure which brings about a practical and effective departure from the commonplace; whether by use of particular rockwork, planting or the use of any kind of legitimate but unusual materials.

Permanency 5. Considerations: Whether measures

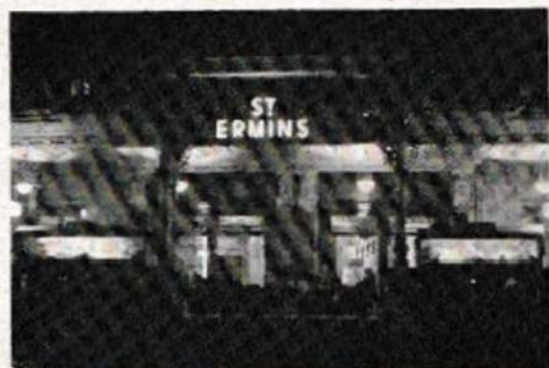
used for this class and because of its availability is likely to remain so. The advantage of an aquarium of greater depth for the display of fish and plants is obvious. Taking into account the difficulties of transport, handling, etc., it is suggested that aquariums 30 in. long, 18 in. deep and 15 in. wide for the coldwater furnished aquarium and 24 in. long, 15 in. deep and 12 in. wide for the tropical furnished aquarium, would make for a much finer display and it is hoped that as opportunity arises these larger sizes will be adopted."

Judging

Note: In the booklet the following appears "In judging this class the points should be divided equally under the following headings:—

1. Design and Character
2. Fish (quality and condition)
3. Plants (quality and condition)
4. Technique

Under special circumstances, and when the design warrants it, accent having been placed on the fishes rather than the plants or vice versa,



This night photograph is of two 9 ft. tropical tanks outside St. Ermin's Hotel, Westminster, London, S.W.1, set up by Queensborough Fisheries. Of constant interest to the residents, the fish in the tanks also attract the attention of passers-by. Other traders might well consider the possibility of persuading hoteliers to follow this example by having aquaria installed at the entrance to, or near the reception office of, their own premises.

Photograph]

[L. E. Perkins

points should be transferred between headings 2 and 3."

On the judges' cards the maximum points were hitherto allocated as follows:— FISH 25 (Selection 5, Size 8, Quality 12). PLANTS 25 (Selection 10, Quality 15). DESIGN 25 (Permanency 5, Originality 5, Design and Harmony 15). TECHNIQUE 25 (Clarity 7, Planting 10, Suitability of Compost (credit will be given for the absence of rock where design demands it) 8). It is this scale which has been altered and the following substituted:—

FISH 25.

Selection 5. Considerations: Whether the selection is appropriate to the general layout; whether the fish of a species are matched in size and natural characteristics and the selection is conducive to a harmonious community. Gross overcrowding is penalised.

Size 8. Consideration: Stage of growth in relation to the variety.

Quality 12. Degree of perfection assessed. Faults

have been taken to ensure that a mature, well established appearance has been achieved, whether the plants have been treated in such a manner that they are likely to flourish and the pleasing qualities of the tank will last.

Clarity 5. (Note: Formerly 7 points). Considerations: Only tanks containing water of crystal clarity receive full marks.

Compost, Rockwork and/or other Accessory Features 10. (Note: Formerly Suitability of Compost, 8 points). Considerations: The tone and texture of the compost in relation to the plants and rockwork. The composition, natural qualities, texture, colour, character, general suitability and amount of any rockwork or other accessory feature, credit being given for the absence of rockwork if warranted by the layout.

Planting 10. Considerations: The natural posture of the plants, the lie of the stems, the position of crown, stem and leaves in relation to the compost and the concealment of any lead weights, roots, etc., account being taken of any plant where it is natural for part of the root system to show.

News from the North-west

Difficulties in Carlisle and Workington

NO-ONE in the Carlisle area who keeps fish need go short of natural livefood, at least in Summer. That was the opinion given to me by Mr. Wm. ("Bill") Dawes, one of the pioneers of the hobby in North Cumberland, when I visited him at his home in Norfolk Road recently. The reason is that *Daphnia* are so prolific in the ponds at Aughton, in the old Blea Tarn site at Crosby Eden and in most farm-pits around the border town that you lift large quantities of it out with your dip-net. Furthermore there are unlimited quantities of *Tubifex* on the Solway marshes near Burgh ("Bruff"), where the drainage trenches from the farms run down to the estuary.

Here, in the northernmost corner of the North-west of Britain, the aquaria hobby arose out of a romantic link with the Y.M.C.A. in which Mr. Dawes played a large part. When I visited the Y.M.C.A. headquarters in Fisher Street, I saw a furnished aquarium in the wall of the buffet-room. "Ah," I thought, "somebody here is interested in fish." Then Mr. Pickering, the secretary, showed me three more tanks of tropicals and Goldfish in the building. The story of the Carlisle Aquarists' Society gradually unfolded.

When I lived in Carlisle for a short time several years ago, there was no organised branch of the hobby as there was in Manchester, the aquaria Mecca of the North. In 1946, Mr. Dawes, a very keen protagonist of livefood feeding, set up an aquarium in the Y.M.C.A. It became immensely popular, just as the present tank in the buffet intrigues visitors for morning coffee. The interest grew so much that an aquarists' group was formed and met regularly.

Club Eventually Launched

Finally, in 1950, one of Mr. Dawes' keenest disciples, Mr. S. Crosby, launched the Carlisle society which was the Y.M.C.A. aquarists' group "grown up" into a fully-fledged group. It started with about 50 members, but, alas, many soon fell away. The first secretary was Mr. J. H. Routledge, of Warwick Road, a coldwater enthusiast who keeps about ten tanks and is noted for his line-bred Shubunkins. Mr. Crosby, who is the present secretary, is noted for the fishhouse he has established at his home in Borland Avenue, Botcherby, a nearby village. Here he has about a score of tanks containing tropicals and coldwater fish, and another dozen seawater collections obtained from the local coast at Silloth and Skimburness. As an ex-salmon-angler, Mr. Crosby knows well enough how to catch wild stock.

But to return to Mr. Dawes, as he has "fathered" so much of the interest in the hobby at Carlisle. Once noted for his tropicals, he recently had to give them all up—temporarily we hope—because of an unfortunate bereavement, but he has maintained his famous worm-culture, where he breeds with great success masses of red brandlings in a big worm-pit, 3 ft. by 3 ft. by 3 ft. deep. The pit is brick-lined and in it he puts all the potato-peelings and other kitchen vegetable waste for them—a glorified compost heap with

Nottingham's Initiative

Programme of Fancy Goldfish Section

SINCE January last, this new Study Group has had five useful meetings. Future arrangements are: June 15—The Veiltail, a study of the standard. July 20—Demonstration of culling young stock. Aug. 17—Moors, a study of the standard; further culling demonstration. Sept. 21—Orandas and Lionheads, a study of the standards. Oct. 19—Celestials and New Introductions, a study of these varieties. Nov. 16—Prevalent Diseases, diagnosis, prevention and cure. Dec. 14—Display of young stock bred during the current year. During the year established breeders in the section have agreed to make available free-swimming fry to those members without adult stock, these fry to be reared and submitted for examination and criticism at the December meeting.

the top covered over. In private life a boiler-inspector, he links the hobby with a trade which has several kinsmen in the society.

The Carlisle society is only about 30 strong, although I came across some fishkeepers, including an ex-mayor of the town and former President, who are not linked up with the body. The society no longer meets at the Y.M.C.A., but at the King's Head Hotel on the first Thursday of the month. It organises frequent table shows. Once the members linked up for an exhibition with the annual flower show held in the covered market of the town, and it attracted great attention. They have also held outings to places like the Armathwaite trout hatchery and a coach trip has been organised to Belle Vue.

Another of the stalwarts of the aquarium world in Carlisle is Mr. W. Wilkinson of Sewell Road, who helped Mr. Dawes set up some of the tanks at the Y.M.C.A. Another man recently forced to suspend his activities *pro tem*, owing to business pressure is Mr. ("Tom") W. T. C. Nott, formerly the area representative of the Goldfish Society of Great Britain, who found his business of selling television sets took up all his spare time too, forcing him to give up the aquarist shop he also ran. Now he has no tanks at all, after a life interest in the hobby. He formerly bred and exhibited Shubunkins and other Goldfish. The only link he has kept up is his garden pond, 6 ft. by 7 ft., which has been largely left to look after itself. Here his Shubunkins and Green Tench recently bred.

Other well-known aquarists who have made names in the Carlisle hobby include Mr. Edwin Hardesty of Carlton Road, Mr. Bobby Harris of Bower Street and Mr. F. Stevenson of Borrowgate, Appleby, whose large-sized and well-coloured Black Mollies are famous. The Y.M.C.A. still maintains an active interest in the hobby it fathered and its chief influence is equipping tanks for local hospitals, schools and other places. It is, indeed, the disciple of the hobby in this corner of Cumberland. The members have set up about 20 tanks for other people, in certain cases charging for the material and giving the workmanship as a labour of love. One of their tanks is in the Cumberland Infirmary; another recently went to the Stanwix Infant School, whose headmaster, Mr. Tom Armstrong, is a keen member of the Y.M.C.A. group. In their four tanks at their H.Q. the "Y.M." finds the plants grow so luxuriantly that they have to thin them frequently, and thus they can sell the surplus plants to newcomers to the hobby and gain funds to buy more fish for their gift tanks. Mr. Stevenson, of Appleby, is of course another plant-expert with his ponds, although also noted for his chrysanthemums.

In addition to the Y.M.C.A. scheme in Carlisle several other Border institutes have had tanks fitted up privately. Harrowby Infants' School has a tropical tank containing a few Swordtails, Neons, etc., Longtown School has a tropical tank and Mr. Sproston, the headmaster of Wigton Secondary Modern School, has fitted up a tank at his school. The matron of the Carlisle City General Hospital has a little tank with a few Neons, Angels, Mollies, Glowlights etc. in her room and another tank has been set up in the children's ward there.

The hobby is still young in Carlisle and it is doubtful if it is really growing at any pace, apart from transient interests that come and go. For every new tank started, the local trade finds two or three offered back to them by folk giving up. All told there are only some forty aquarium keepers of tropical and coldwater fish in Carlisle, only a couple in Silloth down the coast, but over fifty, according to the trade, at Workington. I found more fishkeepers than serious fishbreeders. But the real difficulty is probably that Carlisle is an isolated town of some 70,000 people set in the northern wilds, too far from other large populations to become a county centre like Manchester. There are not any fish shows large enough to make it worth while for people to take up exhibiting "around the county" seriously. In addition there is only a handful of people with a lasting, life-long interest and a background of scientific knowledge of fish and fish-breeding. One city alderman—an ex-mayor and former

By "Aquaticus"

President of the aquarists—with two well-furnished and costly tropical tanks in his office, told me that he only kept his fish for a hobby, not a study (is not that true of many club-members also?). In Carlisle there are not enough adult members to hold big meetings and shows.

Leaving Carlisle I went down to the industrial west coast of Cumberland, to Workington and Whitehaven. Here the problems of the Workington and District Aquarists' Society is just the same— isolation and the difficulty of obtaining enough visiting lecturers for their meetings. Four years ago a small group of pioneers started the Workington society. They were Messrs. G. Parks (a chemist), B. Smith (a hairdresser), C. Johnstone (a Whitehaven policeman), J. Egan (a newsagent) and R. Ormsby (a builder). They soon had about 50 members. They made about £21 profit on their shows, at 3d. and 6d. admission—and then came a bad patch. The trouble was shift work. Workington is very different from Carlisle—smaller, with a 28,000 population and heavily industrialised with mining areas. It was difficult to find time when all the members were free from shift work. This year they are not able to stage a show but things are picking up again. New members are coming in to take the membership from thirty towards forty, and it is hoped to have a show again next year.

Membership covers the industrial west coast of Cumberland—Workington, Maryport, Whitehaven and Cockermouth (where Councillor Long is another enthusiast). With Mr. Martin Watt of 18, Milburn Street as the secretary and aquarists visiting Workington on the third Wednesday each month will be very welcome at the New Crown Inn, where meetings are held.

Tanks in a Shop

Despite their ups and downs, the Workington aquarists have much to their credit. When I visited Mr. Smith's barber's shop in Harrington Road, there were two fine tanks of Angels and other tropicals to interest his customers. At his home he has bred Black and Speckled Mollies, several Barb species and Swords, etc. He has been largely responsible for several tanks in local institutions, such as: Workington Infirmary, a tank at the Victoria Girl's Modern Secondary School (where his daughter is science mistress) and another at St. Joseph's Secondary Modern School.

I think, after travelling around Cumberland, that the difficulties at Carlisle and Workington, the two centres of the hobby, are really the same. Here we have two comparatively young societies faced with isolation. Access to many good lecturers and trips and a steady membership is not readily available. Workington aquarists have long trips—to Belle Vue and to Chester—but I think there are also suitable places nearer home—the Freshwater Biological Association's laboratories opposite Windermere, some marine work and collecting from the Whitehaven fishing boats, the salmon-spawning beds on the Derwent and the Eden, etc. Workington is keen on obtaining the loan of more fish although already they have had some. There is every reason why both societies should establish themselves and grow.

Society for São Paulo

BRAZIL now has a society in São Paulo catering for aquarists. Formed in 1953, it is the Núcleo de Aquaristas, Sociedade Geográfica Brasileira with headquarters at Rua Formosa, 367-19 and Edifício C.B.I., São Paulo. The President is Dr. Agenor Couto de Magalhães, director, Mr. Werner C.A. Bokermann and secretary, Mr. V. Bicudo. Mr. D. G. Armstrong who supplies this information tells us that the society held the first aquarium exhibition ever seen in the city last November. The membership is now well over 30 and there are plans to publish a club magazine shortly.

Norwegian Fish Fair

FOR two weeks, from June 13, the Norwegian fishing industry is holding a trade fair at Alesund, the fishing port. Primarily, of course, this fair is for commercial fishing interests, but among the attractions will be an aquarium, which is to contain the various kinds of fish caught off the Norwegian coast.

Club Notes and News

The Editor invites clubs to send brief reports of meetings and announcements of forthcoming events for publication. Items for the August-September issue should reach this office by July 12.

FOURTH annual open show of **Blackpool & Fylde A.S.** will be held in the Victoria Street Congregational Schoolrooms from July 31-August 7. Messrs. W. Dann and J. Shaw have been recent lecturers and their subjects were "Breeding Livebearers" and "Shows and Showing." Mr. G. N. Hadley has been appointed equipment secretary and societies who require loan of certain apparatus which the Blackpool club holds should contact him at 41 Westby Avenue, Blackpool.

MRS. W. M. MEADOWS has been a recent speaker at a **Dunstable A.S.** meeting. The subject she chose was "Barbs" and a table show for fish of the same Genus was held during the evening. Mr. W. J. Hindstock won first and second prizes. Second annual members' show will be held on June 28 in conjunction with a local Old People's Fete.

AT a March meeting of **Newcastle-upon-Tyne A.S.** Mr. C. Graham spoke on "Guppies."

IN the schedule for **Walthamstow A.S.** annual show on September 3-4 four open classes are included. One is for club tropical furnished aquaria, another for club coldwater furnished aquaria and the remaining two are for livebearer pairs (excluding Guppies) and egg-laying pairs. Show secretary is Mr. J. Brownning, 28 Sperling Road, Tottenham, London, N.17. Venue for the event is Hawthorne Road Hall, Hawthorne Road, E.17.

A NEW society has been formed in the **Wembley** district under the title of **Arnold Aquarists**. It meets on the first Monday of each month (excluding August when the meeting night will be the 9th) at Preston Road Lawn Tennis Club, Wembley. Members have heard a talk by Mr. Allies on "Furnishing Aquaria" and a table show has been held in which the winners were Mrs. Bernard and Messrs. Green, Williams and Chalkley. Secretary is Mrs. T. V. Trant, 20 Thimere Gardens, Wembley, Middlesex.

CHANGE of secretary is reported by the **Friends A.S. (Dulwich)**. Present holder of the position is Mr. B. J. Widding, 101 South Croxted Road, West Dulwich, London, S.E.21.

AT the **West Middlesex A.S.** annual meeting Mr. W. G. Farr was elected President; Messrs. A. H. Charles, R. A. Brown, R. A. Scarbrow and L. J. Pitchford, vice-presidents; Mr. A. J. Hayes, chairman; Mr. W. T. Harding, vice-chairman; Mr. G. T. Eastop, show secretary and Mrs. J. Shalford, 99 Syon Park Gardens, Isleworth, Middlesex, secretary. Trophies presented at this meeting went to Mr. A. H. Charles (Annual Challenge Cup), Mr. C. Blagrove (Chairman's Cup), Mr. M. Langridge (Home Coldwater Aquaria and Breeders' Competition), Mr. T. N. Wood (Home Tropical Aquaria and Tropical Livebearers) and Mr. J. G. Eastop (Tropical Egg-layers).

Bound Volumes of WATER LIFE

BOUND volumes of the 1953 issues of **WATER LIFE** are now available. The cover is of stout green linen boards with gilt lettering on the spine. An index is included making the volume a useful work of reference for your bookshelf. Supplies are limited, so obtain your copy now, price £1 11s. 6d., post paid, from the Publisher, **WATER LIFE**, Dorset House, Stamford Street, London, S.E.1.

AT the A.G.M. of **Derwent A.C.** Mr. A. D. Brakell was appointed chairman; Mr. F. Reader, treasurer; Mr. F. Holloway, show secretary and Mr. D. Jenney, 30 Addison Road, Derby, secretary. The retiring chairman, Mr. D. Oliver, presented the club with its first trophy. A programme of table shows, lectures and outings has been arranged.

THERE were 82 entries for the first show of **Cambridge F.C.** on March 27. Judges were Messrs. N. S. Mason Smith and A. Taylor. Sadler Cup for best fish in show was won by Mr. H. W. Maltby and Cambridge Daily News Cup for the most points went to Mr. C. J. Fuller. Other trophies were won by Mr. H. W. Maltby.

Widespread Entry for the National

THE 1954 National Aquarium Exhibition, organised by the National Aquarists' Society, has attracted a widespread entry from as far as Bristol in the west to Scunthorpe in the north. Some interesting fish have been entered and the class for Barbs is particularly well supported. Altogether 46 classes are being staged.

WATER LIFE stand will be amongst the trade displays at this event, which takes place on June 10, 11 and 12 in the Royal Horticultural Hall, Vincent Square, London, S.W.1. The show opens from 2 p.m. 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. Admission is 2.6d. (1/- for children under 14).

ON the first day, the official opening will be performed by Frankie Howard, the noted radio comedian.

A new trophy is the Suregrove Cup which the Council has decided to allocate to the livebearer classes (excluding Guppies). This year it will go to the best Mollie. The donors of the cup have undertaken to provide replicas.

A number of non-competitive displays have been planned. The London Aquarium, South Bank, will stage a marine exhibit. As we go to press we learn that the entry is nearly 1,000, with 46 entries in the class for club tropical furnished aquaria and 50 breeders' teams in the class for tropical egg-layers.

(Livebearer Cup and Yallop Shield), Dr. J. Sadler (Lambert Shield) and Mr. Fuller (Fuller Shield). Mr. Fuller, who lives at 8 Shelley Road, Cambridge, is the secretary.

A LARGE number of members heard Mr. S. Daniels speak on "Breeding Fancy Goldfish" at a recent meeting of **Plymouth A. & P.S.**

"GENETICS and Heredity" was the title of a talk given by Mr. H. S. White, President of the **Guppy Federation**, at a meeting of its **West London Section**. During the same evening there was a table show judged by Messrs. R. A. Foster, J. Little, A. P. Stanley and H. S. White.

TABLE show schedule for **Kirkcaldy A.S.** is:—June, Swordtails; July, Platies; August, breeders' livebearers and September, breeders' egg-layers. Officers elected at the A.G.M. were President, Mr. Smart; vice-president, Mr. Stoddart; treasurer, Mr. Nicol and secretary, Mr. J. Taylor, The Pharmacy, Methilhill, Leven, Fife.

AT the fifth annual open show of **Southampton A.S.** (July 1-3) the F.B.A.S. trophy will be up for Pantails.

RECENTLY - INAUGURATED **Ashford (Kent) A.S.** has Mr. G. J. Downe, 13 Church Road, Ashford, as its secretary.

THIRTY-SEVEN classes comprise the annual open show of **Northenden Community Association A.C.** It is a three-day event running from June 10-12 in the Church Rooms, Kenworthy Lane, Northenden, Manchester. Two **WATER LIFE** diplomas will be up for competition.

ON August 19-21 the **Portsmouth A.C.** open show will be held in the Royal Engineers' Drill Hall, Portsmouth. Entry forms can be obtained from Mr. G. Elverson, 24 Bertie Road, Southsea, Hants.

THE **Calder A.S.** has recently come into being and those interested in the new venture should contact Mr. J. Hellowell, 6 John Street West, Tuel Lane, Sowerby Bridge, Yorks.

A DISPLAY of four aquariums was put on by **Shirley & South Birmingham A.S.** at a local flower show. Lectures on "Reptiles," "Breeding Goldwater Fish," and "Freshwater Biology" have been heard recently.

THIS year the **Romford A.S.** annual open show will be a one-day event on August 21 in the Lambourne Hall, Western Road, Romford. It will consist entirely of tropical species. An innovation will be the inclusion of championship classes for the best Livebearer, the best Egg-layer and best fish in show. Interclub, junior and individual furnished aquaria classes will be included and schedules can be obtained from Mr. A. C. Speller, 21 Cedar Road, Romford, Essex.

PLAQUES were presented to Messrs. W. Blair and L. R. Scott at the April meeting of **Greenock A.S.** in recognition of these aquarists' success in last season's competitions.

THE **Peterborough A.S.** is planning its outing for some time in June when a visit will be made to the new South Bank Aquarium, London, and Kew Gardens.

AN interclub quiz recently took place between **West Surrey P. & A.C.** and the **Weybridge** club. Weybridge were the winners and on November 1 a return match will be held.

MR. W. T. SMITH was elected chairman and Mr. I. Digger, treasurer at the A.G.M. of **Stourbridge A.S.** The secretary was re-elected for a further year. Messrs. I. Digger and W. T. Smith have recently given talks.

ANNUAL dinner of **Bristol A.S.** was held on April 2. It was followed by a variety entertainment.

THE **East Midlands Section of the Guppy Federation** has decided to participate in the inter-section competition arranged by its Federation.

African Marine Fish

AN interesting consignment of African marine fish recently arrived at the premises of an inner London importer and exporter. The fish were in remarkably fine condition and many unusual types were included. A selection has gone to the London Zoo Aquarium. Among identifiable specimens were *Demoiselles*, apparently *Dascyllus trimaculatus*, *Puffers (Tetraodon)* and some *Gobies*. The same concern has also imported from Australia, for what is believed to be the first time on a commercial scale, *Pseudomugil signifer* (Blue-eyes), a type of *Mogurnda mogurnda* and *Carassius goli* (Fire-tailed Gudgeon). Another rare species recently arrived is the so-called Loretto Tetra (*Hypseabrycon meto*).

Wiltshire Fossil Shell Bed a Re-discovery Interest in Spanish Armada Shells Shown by Scientists in Africa

THE interest shown by readers in the Spanish Armada and fossilised Oyster Shells (referred to in our last issue) has drawn the following observations from Mr. Ernest A. Chapman:—"In view of queries raised about the four small Mother-of-Pearl Shells which I described in your August 1953 issue and the find of fossilised shells to which you referred in the October 1953 issue, I give the following further information. The geology of the Vale of Wardour was first described in 1836 by Dr. W. H. Fitton, and he published a section, *Transactions of the Geological Society of London*, ser. 2, vol. 4, p. 247, showing the succession of rock formations in the neighbourhood of the village of Ridge, mentioning the bed of Greensand full of the oyster *Ostrea vesiculosa*. On the northern side of the Vale the bed can be traced from west to east for a distance of several miles. The shells at Chapel Copse, Ridge Farm, Wiltshire, are massed together to a depth of about 18 inches in 20-60 or more feet of Greensand. The seam exposed along one edge runs for about a quarter-of-a-mile in length. It has not been possible to ascertain the width. I was partly responsible for re-discovering the seam with the farmer, Mr. Derek Branford. These specimens of *Ostrea vesiculosa* are fossils and their only connection with the Spanish Armada Pearl Shells is that they, too, are from the oyster Family; by reason of their smallness, mostly smaller than a shilling piece; and their great age. It is not known for this species to produce pearls.

"My four Mother-of-Pearl Shells differ from the *Ostrea vesiculosa* in that they are living specimens, identical in form and structure to the extinct Miocene species, *Pteria phalacroca*. They appear to be an unique set since no other specimens have been traced. The deep groove behind the anterior ear covers the whole of the anterior margin, back and front, having a wide, thick

scroll-like turn-up, overlapping hinge plate, with a deep umbonal cavity. They are of iridescent Mother-of-Pearl throughout and perfectly balanced. The gross weight of the four specimens is only 112.93 grains. I have been searching all over the world, without success, since 1924 for other living pearl shells like those I possess, known among scientists as the four Mystery Pearl Shells."

Mr. Chapman has received letters in response to his enquiries from scientists in many different countries. Among them, one comes from J. Desmond Clark, M.A., Ph.D., F.S.A., F.R.A.L., curator of the Rhodes-Livingstone Museum in Northern Rhodesia. Dr. Clark suggests that if the Mother-of-Pearl shells came from the Indian Ocean they may have found their way to Spain via Portugal. He points out that the Indian Ocean was in the Portuguese, not the Spanish, sphere of influence and adds "It seems not unlikely that the pearls found their way first to Portugal and thence to Spain." Dr. L. R. Cox, of the British Museum (Natural History), comments that "The oyster *Ostrea vesiculosa* is

confined to the Cretaceous system and became extinct many millions of years ago", and adds "I have never heard of any specimens containing pearls, although there is no reason why the inner shell layer should not have had blister-like swellings occasionally. In true oysters like this the inner shell layer was not nacreous, as in the so-called Pearl Oyster and other members of the Family *Pteridae*."

Dr. J. Millot, who is well-known as head of the team which is carrying out examination of the second *Colacanth* found off East Africa, has shown interest in the four Pearls. He is to have the species of *Pteria* found in the same waters studied to see if he can answer the questions raised by Mr. Chapman. Professor Millot is Director of the Institute of Scientific Research of Madagascar. Another Frenchman who has promised what help he can give is Commandant Jacques-Yves Cousteau, the underwater explorer, archaeologist and author. Commander Cousteau knows Professor Millot and hopes to contact him on the subject. He is at present on board his boat "Calypso" undertaking an oceanographic expedition in the Red Sea, the Persian Gulf and part of the Indian Ocean, through to the Seychelles and going eventually on to Madagascar and the Comoros.



Photograph]

Two fossilised oyster shells found at Chapel Copse (approx. one-third larger than life size).

Club Notes and News

— continued —

MR. R. T. BIRCH is the secretary of the newly-formed **Fleetwood A.S.** His address is 10 Melbourne Avenue, Fleetwood, Lancs.

FROM June 2-5 **Sheffield A.S.** is staging its annual show in the Montgomery Hall, Sheffield.

THE 1955 show of the **National Aquarists' Society**, which will be the eighth annual event, will take place on June 9, 10 and 11. The Royal Horticultural Hall, Westminster, has already been engaged. The scope of the show will depend largely on the support given to the 1954 event to which reference is made on page 147.

ON April 20 Mr. George Cansdale, vice-president of **Hampstead A.S.**, gave a lecture at which aquarists from five societies were guests of Hampstead. There was an interclub table show judged by Mr. Fraser-Brunner on May 4 and during the same evening he also gave a lecture. A breeders' show is scheduled for June 1, a plant show for June 15, and an interclub table show for June 29.

THE **Southern A.A. (Brighton)** records an increase in membership and its headquarters are now the Level Café, Rose Hill, Brighton. Recent programme has included a film show arranged by Mr. L. H. Ede, a talk on the local water supply by Mr. Warren and a ramble to Berwick, Sussex, and the Cuckmere Valley on Easter Monday. A visit will be paid to the N.A.S. show in June and Mr. D. McKinley is scheduled to speak on "Parasites of Tropical Fish" at the July 26 meeting.

OFFICERS elected at the A.G.M. of **Rochdale A.S.** were President, Mr. J. Dodsworth; vice-president, Mr. N. Gott; treasurer, Mr. R. Hadson and secretary, Mr. J. L. Anderton. 2 Alma Street, Rochdale, Lancs. Mr. McDowell delivered a lecture on April 5.

MORE than 100 members and their friends attended the annual dinner and dance of **Midland A. & P.S.** A quiz with members of the Midland Association judges' panel has been held recently. There will be 44 classes in the annual open show running from August 26 to 28. Entries close on August 9 and details can be had from Mr. C. D. Roe, Shirley Aquatics Ltd., Monkspath, Shirley, Nr. Birmingham.

THE first interclub show between **Bedford A.S.** and the Kettering society was held on April 14. Kettering were winners of the Cooper Challenge Shield. Mr. J. H. Gloyn was the judge.

CHAIRMAN and secretary of the **Hull** group within the **Federation of Guppy Breeders' Societies** have recently passed the "B" class judges' examination of the F.G.B.S. Members of this section have recently enjoyed a quiz.

AS the result of the A.G.M. of **Kettering A.S.**, Mr. L. Briggstock is vice-president and secretary; Mr. J. Sharp, chairman; Mr. J. Harris, treasurer and Mr. S. D. Simons, show secretary. An aquarium has been presented to the children's ward of Kettering General Hospital. The first of this season's table shows was held on May 11.

NEW address of Mr. W. Richardson, secretary of **Bethnal Green A.S.**, is 16 Whitman House, Roman Road, Bethnal Green, London, E.2. At the society's fifth annual show on September 10-11 there will be six open classes, two for interclub fur-

nished aquaria, one for the London area Fighter championship and three for breeders' entries. Silver cups will be awarded as first prizes. Schedules can be obtained from Mr. Richardson. Closing date is August 13.

MR. G. R. RHODES, 5 Market Avenue, Dukinfield, Cheshire, is the new secretary of **Ashton-under-Lyne A.S.**

A NEW society has been formed in East Anglia. It is the **Norwich Fishkeepers' Circle** and its secretary is Mrs. H. E. Roper, 2 Marl Pit Lane, Dereham Road, Norwich. Meetings are held on the first Wednesday of each month at the Crispin Hall, Pitt Street.

MR. W. L. MANDEVILLE visited **Bath A.S.** during April and gave its members a talk. Visitors to this city are welcome at the society's meetings which are held on the second Thursday of each month in the Y.M.C.A. Messrs. C. W. G. Creed and L. C. Betts are judging the second open show running from July 22-24 in the Pump Room, Bath. Schedules can be had from Miss A. Gurney, 41 Sydney Buildings, Bath.

WINNER of a **WATER LIFE** Diploma as the most successful exhibitor at the November, February and April table shows of **Newtownards A.S.** was Mr. J. P. Gaw.

MR. W. P. BRADLEY spoke on "Furnished Aquaria" at the March meeting of the **Eastern Counties Section of the Guppy Federation**. In April Mr. Fraser-Brunner gave a lecture on "The Structure of the Guppy." First prizewinners in table shows at these meetings were Messrs. Russell, Seingier, Jenkinson, Layzell, and Postgate. Members took part in an inter-section quiz with the South London group on May 13.

THE **Bury A.S.** staged a successful show from May 4 to 8. There were 483 entries received from a wide area.

Club Notes and News—contd.

ON the Fête Day arranged by Standard-Kolster (Sidcup, Kent) the aquarists' section of the social and athletic club will stage a show. It is hoped that entries can be accepted from other societies including members of the South-east London and North Kent Association.

A CHANGE of venue is reported by the Hastings & St. Leonards A.S. Meetings will be held in the Junior Library, Brasseys Institute, Hastings, on alternate Wednesdays, commencing June 22. Mrs. G. Breathen, 1 St. Peter's Road, St. Leonards-on-Sea, is the secretary. Highlights of recent meetings have been the showing of two colour films made by Mr. R. Young, and a talk by Mr. H. Pepper on his recent success in breeding Glowlight Tetras. Mr. Young's films showed the spawning of Siamese Fighters and Black Widows.

FILMS were borrowed from Harrow A.C. for the April meeting of Leicester A.S. Mr. W. L. Mandeville gave a talk in May. It is hoped that Mr. A. Wilson Smith will visit the club in June to speak on "Reptiles." A display is being put on in the Horticultural marquee at the Abbey Park Show on August 3-4. The society's annual show will be held in St. Mark's Schoolroom, Belgrave Road, from August 25-28.

THE Hertford A.S. has been inaugurated and its secretary is Mr. G. W. Brookfield, 42 West Street, Hertford.

MEETINGS of Pisces (E. London) Society are now held on the first and third Thursday of each month at the E.L.C.C.A.S. Broadway Society Halls, North Street, Plaistow, E.13. Table shows, including breeders' classes, are arranged for all meetings.

ALL retiring officers of Willesden A.C. were re-elected at the club's A.G.M. on April 28. The fifth annual dinner was held on May 22. Willesden Borough Show will be held on September 11-12.

ON July 16-17 Macclesfield A.S. will be staging its annual show in conjunction with the Macclesfield branch of the National Cactus and Succulent Society. Venue is Brocklehurst Memorial Hall, Macclesfield.

Striking Aquaria Display at Curacao Exhibition

UNDER the auspices of the "Curacaosche Petroleum Industrie Maatschappij" (Royal Dutch/Shell Group), which operates a refinery on the island of Curacao in the Netherlands Antilles, an exhibition is held every two years, called "Nimble Fingers". The purpose of this display is to demonstrate how the staff of the Company spend their leisure time by means of diverse hobbies. At the last of these exhibitions some members of the Aquarium Association "Anrilla", which is affiliated to "De Nederlandsche Bond Aqua-terra" demonstrated the pleasing effects that can be obtained in the arrangement of freshwater and seawater aquaria.

Range of Colours

The purpose of this exhibit was not only to show the population of Curacao the results that can be obtained with good arrangements of tanks, but much more to impress them with the astonishing colours of tropical fish, anemones and corals. The exhibit of the Aquarium Association was combined with a series of underwater photographs and prepared corals by Dr. R. Flachs, Assistant Manager of the Company, and was divided into freshwater and seawater sections.

In the freshwater section community tanks were built up with a background of Norwegian slate and other rock groupings in front. The whole set-up of the freshwater aquaria was

FIRST prizewinners in a recent three-class livebearer table show put on by Hounslow A.S. were Messrs. Vance, Stallard and Boulton. During the same meeting Mr. Dacombe spoke on "Coldwater Fishkeeping."

ACTIVITIES of Riverside A.S. (Hammer-smith) include table shows for Labyrinths and A.O.S.—also competitions for the Egg-layers' Shield and Male Fighter Shield. There are vacancies for new members. Particulars can be had from Mr. N. W. Webb, 384 Goldhawk Road, Stamford Brook, London, W.6.

THE Kingston A.S. hopes to stage its annual show on September 21-24 in the local Y.M.C.A.

OFFICIALS appointed at the A.G.M. of Lowestoft A.S. were chairman, Mr. A. E. Chapman; vice-chairman, Mr. G. W. Howard and secretary and treasurer, Mr. R. Smith. An exhibition of tropical fish and a showing of films was arranged in the Lowestoft Art Centre on April 27-28.

NEW secretary of North Bucks A.S. is Mr. K. W. Bird, 56 High Street, New Bradwell, Wolverton, Bucks.

APRIL programme of Tyneside A. & B.S. consisted of a show for Barbs, a lecture by Mr. Patrick and a quiz. On May 11 Mr. Gill spoke on "Setting Up Aquariums" and on May 25 Mr. L. Thompson took as his subject "General Fishkeeping." Shows are arranged for June 8 and July 6 and lectures for June 22 and July 20.

THE Dukeries A.S. staged a show of tropical and coldwater aquaria at Whitwell from April 17 to 20.

HOME aquaria competition of Nottingham A.S. was held on April 25 with Messrs. Oldham, Taylor, Ford, Steward and Duckering acting as judges. Winners of first prizes were Messrs. Taylor and Adcock. The pond competition is scheduled for June 27 but entries should be made by June 12. Judges will be Messrs. G. Clarke, W. Town and B. Inman. The annual outing to Chester Zoo took place on May 30.

IN WATER LIFE'S April-May issue the vice-president of Enterprise A.S. was incorrectly given as Mrs. R. H. Wood. Mr. A. E. Izzard holds this position and Mrs. R. H. Wood is the present vice-chairman.

Northern Federation's Autumn Show

CLASSIFICATION for the Federation of Northern Aquarium Societies' Autumn show has been announced. Entry is restricted to member-clubs of the Northern Federation and there will be no entries from individual exhibitors. One class will be for tropical and coldwater furnished aquaria and another for six pairs of either coldwater or tropical fish. The club staging the best exhibit in the first class will be awarded the W. R. Smith Challenge Trophy and the society staging the best team of exhibits in the second class will gain the F.N.A.S. Challenge Trophy. Exhibits in both classes will then be combined and they will be judged for the artistic skill of staging the exhibit as a complete display. Winner of this competition will gain an F.N.A.S. Trophy. Another F.N.A.S. trophy will be awarded for the best complete display, disregarding the fish.

The show will be held at Belle Vue, Manchester, in conjunction with the F.N.A.S. Autumn Assembly on October 3. It is reported that although, as we stated, there was a drop last year in individual membership of affiliated societies, the position is now improving and, in fact, the number of applications shows an increase.

S.W. Middlesex Association

THE South-west Middlesex Aquarist Association was formed in 1953 after the Federation of British Aquatic Societies had discussed the formation of area organisations. It came into being to encourage co-operation between societies in its area and it is affiliated to the F.B.A.S., to which body Mr. A. H. Charles is the delegate. The S.W. Middlesex Association is supported by the Feltham, Hounslow, Kodak, Riverside, Ruislip, Slough, Southall, Spelthorne, Uxbridge, West Middlesex societies and Wembley A.S. Any other clubs who would like details can obtain them from the secretary, Mr. A. J. W. Wilson, "Parkside", 180 Uxbridge Road, Feltham, Middlesex.

An inter-society competition is being run on a league basis, the winning club receiving a perpetual challenge trophy. Mr. S. Dryer has recently been appointed show secretary. Examination for members who act as judges at shows arranged by member societies was held on April 30.

New Canadian Society

MRS. L. E. PHILLIPS, publicity chairman, informs us that the Ottawa Valley Aquarium Society has been formed to cater for aquarists in the Ottawa, Ontario, district of Canada. The society is now busy preparing a full programme.

South-Western Association

AT the May 2 meeting of the South Western Aquarists Societies' Association, which took place at Bristol Zoo, Dr. G. Cunliffe (University of Bristol) spoke on "Inside Your Fish". After tea, an open forum was held when problems from the floor of the meeting were discussed.



[Photograph]

Seawater tanks, photographs and corals forming the marine section at Curacao

[Shell]

British Aquarist at the Californian Oceanarium

MR. DAVID BROWN, former marine section aquarist for the London Zoo Aquarium at Regent's Park, has been appointed chief aquarist at Marineland of the Pacific, planned to be the world's largest Oceanarium located at Portuguese Bend, California. The appointment of Mr. Brown to the new post was made by Mr. Kenneth Norris, curator of the 3,000,000-dollar Oceanarium now under construction on the coast of Southern California, South-west of Los Angeles.



Mr. David Brown, appointed in the U.S.

A native of Buckinghamshire, Mr. Brown attended High Wycombe Technical College before joining the Royal Navy in 1943. After a few years in the advertising business he joined the staff of the London Zoological Society and served as aquarist from 1949. Mr. Brown came to California in 1952 and has continued his work with marine life on the Pacific Coast.

The large Oceanarium will feature two four-story tanks, each with a capacity of 500,000 gallons of salt water, a smaller aquarium for tropical fish and a sealarium. One of the main tanks will be circular, 80 ft. in diameter and 26 ft. deep. It will have a 1,500-seat stadium around its rim so that spectators may watch the porpoises and other sea animals perform.

An oval tank, 100 x 50 x 26 ft. deep will house tropical marine species. Through large picture windows at various depths of the tank spectators may observe thousands of sea animals living together under natural conditions.

Plymouth Juniors at B.B.C. Plymouth Studio

Fishkeeping Discussed in West-Regional Programme

REFERENCE is made on p. 142 to the three junior members of Plymouth A. & P.S. who broadcast in a Children's Hour "Take Your Choice" programme. Joan Coslett, one of the trio, sends us the following account of their experiences.

"Swordtails, Guppies and Siamese Fighters were the main topics of interest to Billy Jackson, Ronald Martin and me, when we were interviewed on the West of England's programme of Children's Hour, as young members of the Plymouth and District Aquarists' and Pond-keepers' Society.

"We were introduced to Mr. Keith Hamilton Price who at once put us at our ease. I was asked the name of the Club, and the number of members, to which I was very proud to answer over 100 including 20 juniors. We were then asked what

fish were our favourites and why? Ronald described the Swordtail—its colours and interesting highlights, such as its ability to swim backwards. 'Guppies' was the reply given by Billy; he is a member of the Federation of Guppy Breeders' Societies and is very interested in the breeding of these smaller fishes. My favourite was the Siamese Fighter with its flowing fins, beautiful colours, and its brooding habits.

"Another point raised was the value of hospital tanks. The Society has presented six hospitals with tanks and one to a little paralytic girl at Whiteleigh. We mentioned the gentlemen who service these tanks, and how the children call them the 'Fish Doctors'.

"Mr. Price then went over to the City Hospital, where my father described the tank that we presented to the Children's Ward."

F.B.A.S. Public Relations

OFFICIALS, delegates from twenty-three societies and two associations, and representatives of the Aquatic Traders' Association, took part in the special Assembly of the Federation of British Aquatic Societies to consider the work of its new Public Relations Committee.

The Federation having felt that the hobby needed publicity, the committee has been formed and already useful work has been done. A questionnaire brought in replies from 53 societies. An analysis of the replies showed that much was being tried out to let the public know of the hobby but that with co-ordination more could be achieved.

Numerous schemes were outlined and, in effect, steps are being taken to show how individual societies can get publicity for the hobby in addition to the lines of approach that will be taken by the P.R. Committee on behalf of the Federation. The promised co-operation of the trade organisation should help considerably.

The P.R. Committee is not concerned with raising funds but both directly and through societies aims to use all possible kinds of media in improving the public's knowledge of the hobby's ramifications.

Continental Touch

FISH Tanks Ltd. seem to have built up an unrivalled technique for advertising displays in which are incorporated furnished aquaria. The very boldness catches the eye, with the fishes and plants contrasted by the vividly coloured pieces of quartz rock. A good example was seen at the London section of the British Industries Fair where, on the stand of F. & M. Jewellery Ltd., such a tank was used to establish the claims that their bracelets and other metallic jewellery accessories were unscratchable, even under water. When we saw it, some of the fish in the tank, Swordtails in particular, were inquisitive about the brightly coloured gilt and silver link bracelets which had been laid across the "rockwork". Fish Tanks Ltd., which firm, incidentally, has the contract for setting up and maintaining the aquarium in the Children's Zoo

at Battersea Park Festival Gardens, has a new line. Known as the Continental, it is a fascia now marketed for tanks of all sizes with colourful, striped top "awning" and a narrow bottom shelf on which small rock plants, in miniature and plastics flowerpots, set off the tank. The colour schemes vary and give the aquariums a gay look, yet one not too unconventional to rule out the use of such fascias for drawing-room tanks set up in houses with modern style furnishings. These fascias are of a patented design.

Guppy Federation's Show

SATURDAY, October 2, is a date which all Guppy enthusiasts should note, for in the Pavilion Cafeteria of the Zoological Gardens, Regent's Park, London, the Federation of Guppy Breeders' Societies is holding its annual show from 12 p.m. to 6 p.m. The Pengilly Memorial Trophy will this year be up for competition for the best fish in the open classes.

The series of lectures on genetics given by Mr. R. J. Affleck, M.Sc., following the Federation Assemblies, is being well received. The second of these talks was heard on May 15. At an earlier Assembly it was agreed to raise the subscription for all section members by 1/- Annual subscription of provincial members is 6/- A new section has been formed to serve the Liverpool area.

The Federation produces a most useful monthly bulletin and the February and March issues had attractive illustrated supplements.

N.W. London Group

AT a recent meeting of the North-west London Group of Aquarist Clubs the following topics came up for discussion:—the use of rocks and gravel in competitive aquaria, list of speakers and open show judges and standardised judging of fish for which there are no show standards.

Consideration is now being given to the possible reorganisation of the body as there is some overlap with the group of clubs in the South-west Middlesex area. It is hoped that the areas in which the two groups operate will be re-defined so that there is the minimum of inconvenience to each.

River Pollution

SPEAKING at a symposium on the biological aspects of river pollution organised by the Midland Branch of the Institute of Biology at Birmingham University recently, Mr. J. A. Alabaster of the Ministry of Agriculture and Fisheries told of experiments made by trapping and marking fish in rivers as a means of studying the effect of pollution on the fish.

Mr. F. T. K. Pentelow, another official of the Ministry, said that full information on what would happen when an effluent was discharged, was still not available but the time had come when such data should be formulated. Major J. S. Spicer, Chief Pollution Officer and Fisheries Officer of the Trent River Board, spoke of the functions of the Board in relation to pollution and said that the various users of surface water must be prepared to share equitably the burdens imposed by communal use.

Dr. R. W. Butcher, biologist to Burnham-on-Crouch, who was previously biologist to the Trent River Board, spoke of micro-organisms as indicators of river pollution and Dr. H. A. Hawkes, of the Tame and Rea Drainage Board, described how stream fauna were used as indicators of pollution. When the problem of radio-active wastes was raised, Major Spicer said that the Government was carefully controlling effluents from atomic undertakings.

Goldfish Society Notes

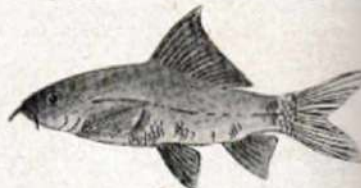
THE Goldfish Society of Great Britain is apparently experiencing stalemate at present in its negotiations with the F.B.A.S. regarding the production of show standards acceptable to both bodies. After working toward its own standard ideals for several years the Society states it is not in favour of agreeing to standards in which it has no confidence.

Regarding the advisory service to local societies the President of the G.S.G.B., Mr. R. J. Affleck, M.Sc., is now formulating a scheme of lecture material to assist members unused to public speaking who are called upon to give talks.

Colourful Labeo

AMONG recent supplies of tropical fish two London traders have received small quantities of a striking *Labeo* species. The fish is very much more colourful than the customary Black Shark (*Labeo chrysoptekadion*) and, from external appearance, it seems to be *Labeo bicolor*, first described by Hugh M. Smith in 1931.

Body colour is a rich velvety black and this colour also suffuses throughout the dorsal, anal and pelvic fins. Underparts of the body and head are slightly pinkish. The caudal fin and part of



Drawing of *Labeo bicolor* specimen.

the tail base are a conspicuous red and, in well-coloured specimens of the present importation, the red colour seems more intense on the tips of the caudal lobes and where it joins the black of the body. The pectoral fins are also an orange-red, more intense at their base.

Hugh Smith records that black spots on the body are scarcely visible in living specimens but, in those which we viewed, two dark spots were clearly seen on each side behind the operculum and another, on the side, behind the dorsal fin. It seems possible that the less colourful fish might be females. Length of specimens from the current importation is approximately 3½ in. but the average adult size is recorded as 6 in.

A somewhat similar fish is believed to be *Labeo erythraeus*, but here all fins except the pectorals are red although this red colouring is not bright and the overall effect is duller. *Labeo bicolor* has spawned in Australian aquarists' tanks but the eggs have not hatched.