Water Life

AND AQUARIA WORLD

JUNE—JULY, 1955

TWO SHILLINGS AND SIXPENCE

Water Life AND AQUARIA WORLD

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FRONT COVER: **AQUARIUM JOKERS. Gaily garbed in orange, with blue-black barring and red finned fins, Clown Loaches (*Botia macracantha*) are now once more available to British enthusiasts. Their subtle fun consists of resting on their sides which, in other fish, suggests impending death. Not so with Clown Loaches and, in a short while, they right themselves and swim cheerfully away.**

[Photograph] [*Gene Wolfsheimer*

EDITORIAL

Judges' Jamboree

RECOGNISED judges of our federations and area organisations are beginning to find that their annual conferences are serving a most useful purpose. Such gatherings help to clear the air where and when dissensions exist; they have a definite social value, and form the machinery through which recommendations are made to the hobby at large.

These annual events are now assuming more of the status of national conferences and invited delegates from other judge training and appointing groups are taking an active part in putting forward useful suggestions. These ideas will, we hope, filter through the proper channels, not too slowly, and so come to be discussed by rank and file aquarists.

Decisions reached by our show judges are worthy of careful consideration. Their opinions are voiced in a legitimate endeavour to make the task of judging easier and to see that it is carried out more efficiently. There is, however, one important qualification. Points of view held by show-promoting societies who, thereby, engage the judges, must not be overlooked. Similarly, the reactions of individual aquarists, without whom there would be no fish to judge, must be taken into account.

Proposals Deserving Support

We like the proposals emanating from the 1955 Conference, a report of which appears in this issue. It is hoped that it will not be long before they receive the approval of club representatives at their federations' meetings. We also hope that the discussions which took place will be given detailed publicity by those who participated, when they attend their own club meetings.

We are in sympathy with those judges who feel that the existing methods of judging furnished aquarium competitions tend to limit freedom of design. Too much emphasis may be laid on what shall be done and what must not be done. A little less rigidity here will encourage a revival of interest in what remains the most attractive section of our exhibitions.

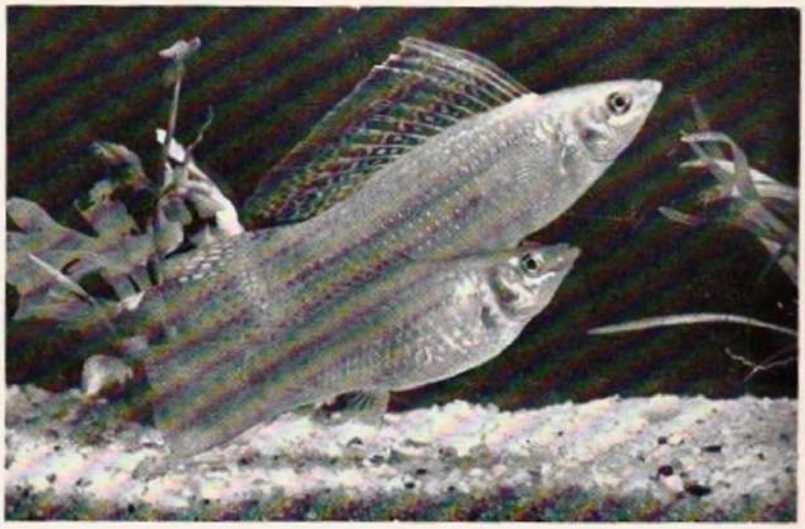
Another subject broached at the Conference was that of lower grade judges and a sound scheme was submitted to help give more encouragement than comes their way at present. We query, nevertheless, the extent to which the suggestion goes. Is it bold enough to improve the situation? Has not the time come to consider abolishing grading, acknowledging all who qualify to judge as being capable of tackling all kinds of shows? The criticism that the same judges are engaged over and over again, others rarely getting an invitation to officiate, is borne out in fact. That may be very largely due to the bar which precludes Grade B judges from being appointed for open events.

Open the field to everyone accepted as a judge and show promoters will have one headache less to contend with when making arrangements for their events. Unless we give all our judges opportunities to place the awards we shall never know their true capabilities.

Royal Mollies from Lake Petén

— By —

Dr. Myron Gordon



A beautifully developed pair of Lake Petén Mollies (Mollienesia petenensis). *The male is the upper fish and has a large sail-like dorsal fin. Although in the wild these Mollies grow to 5 in. long it is difficult to obtain such a size under average aquaria conditions. Photograph by courtesy of the New York Zoological Society.*

THE Lake Petén Mollie, a giant fish by tropical aquarium fish fanciers' standards, but one that would be rated only as a good-size Minnow by game fish enthusiasts, was found in Guatemala, brought back alive to the New York Zoological Society's Aquarium and displayed there for the first time during the Summer of 1954. Little was known about this beautiful, 5 in. long livebearing fish except that it was one of the largest of its kind. It had an enormous, cape-like top fin and its home territory was restricted to Lake Petén and vicinity in the north-central part of Guatemala.

When I went to Guatemala and adjoining British Honduras last year, I was not primarily concerned with Mollies. The purpose of the Aquarium's expedition was to obtain new and rare races of Platies, for our long-term experiments designed to understand better the influence of heredity in the development of black cancers. On the night preceding the date set for the first day's survey of the Lake Petén area, my guides, Señor Pinelo, the agent for the local airline at Flores, and my host, Señor Castellaños, suggested a fish hunt by flashlight in the shallow waters along the lake shore.

Fish Spotted During Nocturnal Search

When the spotlight was flashed in the water between the beached native dug-out canoes, I noticed a number of pale grey, ghost-like, fish-like objects. At first they were practically motionless; then gradually they began to stir in the glare of the persistent light and their shadows revealed their outlines. As they swam closer to the shore, I saw their high, sail-like fins which broke through the surface of the murky water. I realised at that instant that the fish were *Mollienesia petenensis*, a rare species only once before seen alive for a short time in the United States. I decided there and then I had to make every effort to get some of them back alive for the Society's Aquarium even though my equipment was not designed to carry fish of the Petén Mollies' generous proportions.

I would not have succeeded had it not been for the interest and help of Señors Pinelo and Castellaños in Flores, and three extraordinary persons in Guatemala City, Señor Penado, Dr. Scrimshaw and Señora Bower. With their enthusiastic co-operation, the Petén Mollies upon their arrival in Guatemala City, were instantly transferred to large aquaria made available especially for them and the Platies. The Mollies responded graciously by giving birth to a large brood of young. This unexpected good fortune facilitated my problem of how I could, in some measure, repay my friends for their kindnesses. Before returning home, I divided the lot of baby Mollies among them. The unusual fact about these babies is that ordinarily gravid Mollies, if disturbed, are not supposed to give birth to viable young. Although the Petén Mollies were carefully handled, they were nevertheless uprooted from their home and shut up in small glass jars for several days. Despite my best efforts they were jolted badly in their journey from their Lake Petén jungle home to what turned out to be their Guatemala City maternity ward. Two females and their handsome male reached New York City safely and continued their laudable family behaviour. In our aquaria, they produced many more young, some of which were donated to British aquarists; others were given to Dr. Caryl P. Haskins, who is studying their responses to related Mollies.

Mollies of one kind or another live in just about every sluggish stream and weed-entangled pool along the Atlantic coastal plain from Florida to Texas down to Mexico, the countries of Central America, Panama, Colombia and Venezuela. They are not of the same species. Neither are they radically different from one another. The aquarist can recognise the distinctive characters of a Mollie no matter where it comes from. So can the Mollies. When two Mollies from widely geographically isolated countries are brought together through the intervention of a fish fancier, the fishes respond favourably and usually interbreed. As a consequence, if the fancier takes no precautions to maintain the original natural population in separate quarters, the purity of each race is threatened. The Mollies' lack of discrimination and the fancier's carelessness led to the loss of the first lot of Giant Mollies from Petén. It happened in 1935.

At that time a few Mollies from Petén were brought back alive to the United States by Dr. Carl L. Hubbs on an expedition sponsored by the University of Michigan's Museum of Zoology. They required generous living quarters for breeding and the rearing of the young. They were liberated in a pond of a commercial tropical fish breeder in

Louisiana. The manager, unfortunately, failed to remove the native Louisiana Mollie, *M. latipinna*, from their pond. The two species interbred and the original *M. petenensis* was never recovered. That is, until the Society's own expedition to Lake Petén, early last year.

In our large aquaria, the spectacular Petén Mollie male was constantly displaying his enormous blue and green star-spangled top fin. He would rush out of a corner, stop short before his mate, twist his body and curve his net-like fin as if to trap her. There should have been a dozen females for him, for he was entirely too energetic for the two present. A glass barrier had to be placed between him and them. I could not help but think that he behaved like a pugnacious rooster in a hen yard.

The Lake Petén Mollies breed readily and produce many healthy young. The problem is to rear them to their full potential length in the United States. No ordinary, average-sized aquarium will do. I put several young in an uncrowded community tank of some fifty gallons with plenty of plants, including algæ. The males reached only three inches in eight months, at which time they were sexually mature. I expect they may reach three and a half inches eventually, but I doubt if they will get much larger than that in my aquarium. Like the other species of large Mollies, *M. petenensis* want plenty of room, preferably a pond in limestone country where the water is fairly hard. They love to browse on the tufts of algæ. But Mollies are by no means exclusively vegetarians, for they relish shrimp, liver, and any other meat or fish small enough for them to swallow or soft enough for them to tear apart with their little, delicate teeth. In tufts of algæ they find tiny organisms, like protozoans, Rotifers, cladocerans and other crustaceans, which add animal food to their vegetable diet.

Three Years Before Full-size Achieved

Mr. Albert Greenberg, of the Everglades Aquatic Nurseries, says it may take three years to rear a four- to five-inch Mollie. A fish raised commercially over so long a period must pay for its keep. That usually represents more money than the average aquarist is willing to exchange over the counter of the tropical fish shop. But for the connoisseur, *M. petenensis*, like its neighbouring *M. velifera*, the giant Mollie of Yucatan, is the ultimate choice. Once seen, the other Mollies seem puny and commonplace. When it comes right down to fundamentals, the kings of the Mollies require royal suites.

Diary of a Pondkeeper

Orfe Are Ideal for the Formal Pond — Alpine Subjects in a Moraine Area — White Water-lilies

By J. Stott

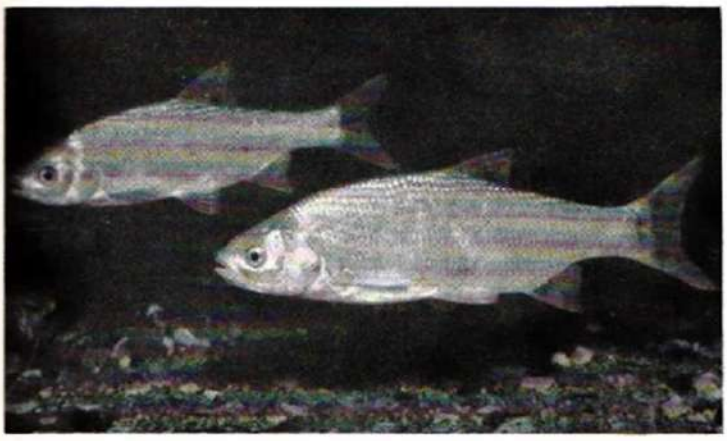
RECENTLY, I was looking at an ornamental pond of formal design, which was stocked with Golden Orfe. They were darting about close to the surface, as their owner threw in gentles, which they took with obvious relish. The more I see of this particular species the more I realise how well suited it is for such a pond, where the display of fish is so much a part of the general scheme. The Golden Orfe's light colouring shows up well against the dark depths of the pond and it is extremely active, frequently at the surface, where its quick but graceful movements may be fully appreciated. To obtain the best results with these fish it is essential that plenty of flesh or meaty foods should be available to them and overstocking should be avoided. Plenty of swim space, coupled with good feeding, is necessary to obtain the development and condition needed to see them at their best. Apart from the usual livefood such as Earthworms and the like, chopped raw beef, offal and shredded raw fish are excellent foods for them.

If it is any consolation at all, the heavy snowfall in February was ideal for the alpines at that particular time of the year. Under the thick, protective covering of snow they were in conditions favourable to their welfare and, provided they are in a properly constructed site, they should be putting on a good display this season if given reasonable weather conditions. Mine were covered in a snowdrift five feet in depth and, although quite a number of them had been subjected to transplanting late in the Autumn, they all established themselves extremely well, helped, no doubt, by the suitable weather conditions in February.

Frequently an overflow pipe is included when a pond is constructed, and this may be put to good use by directing the excess water, when it occurs after a heavy rainfall, through a moraine instead of running to waste. In a natural state, a moraine consists of an accumulation of stones, gravel, sand and a small amount of soil. Along the base of this accumulation during the Spring and Summer water flows, from which moisture rises to the roots of the plants.

There are several ways of providing these or similar conditions artificially, some of which are elaborate, but others are more simple, depending of course, on available space, position and the amount of money and time that may be put into the work. Whatever method or design is used, it should attempt to provide, either as a steady flow or periodically, a flow of water through the base.

If the overflow pipe is taken to the base of a moraine situated at the



Golden Orfe—ideal fish for the large formal pond. They are surface feeders and frequently visible but an active disposition makes them intolerant of overcrowding. Photograph by L. E. Perkins.

pondside, the periodical supply of water it will provide is usefully employed because a few of the choice alpines which refuse to thrive in other parts of the rock surround will probably do well in a moraine, when their beauty may be enjoyed.

In the Winter months, however, this supply is not needed. Under natural conditions the flow of water is stopped by deep freezing at higher levels of the mountainous terrain. In our artificial moraine we attempt to imitate the natural conditions by cutting off the supply. When the pond overflow is utilised for the supply, this is easily achieved by having a second overflow pipe to a normal drainage which is put out of action during the growing season by inserting a stopper and allowing the overflow to the moraine to function. In the Winter the stopper is changed over, cutting off the supply to the moraine and allowing the second pipe to deal with the excess water from the pond to the normal drainage.

Supplying Water in Dry Weather

By fitting a vertical extension (E in diagram), long enough to protrude just clear of the surface of the moraine, to the bend of the overflow pipe to the moraine, water may be supplied from the surface directly to the base when required, say during a prolonged run of dry weather. The opening of this pipe at the surface can be concealed by covering with a suitable stone or small rock which may be removed when there is need to use the pipe for watering.

With a well-planted pond there should be plenty of colour and interest during the month of June, because the mid-summer display will be reaching its peak. The sun-warmed waters will encourage full growth of the submerged aquatics, while the fish will be active and feeding well. There should be plenty of naturally-occurring livefood about in the pond

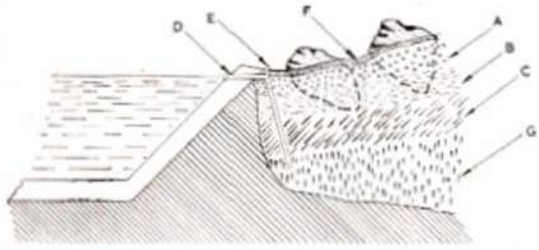


Diagram showing the overflow supply to a moraine area. A, *consists of a mixture of two parts loam, two parts sand and two parts stone chippings;* B, *mixture of one part peat and two parts coarse gravel;* C, *layer of small stones;* D, *overflow pipe from pond:* E, *surface pipe extension to overflow for direct water supply;* F, *top dressing of light soil and gravel chippings;* G, *layer consisting of flat stones, rubble and coarse sand.*

at this time of the year, but a little extra provided by the pondkeeper will not come amiss to the fish while the higher water temperatures are increasing their appetites and it will ensure that they are getting all they require for tip-top condition.

When a warm Summer evening is drawing to a close, and the sky is tinted by the softer colours of a fading sunset, the pondside is a pleasant place for relaxation, especially if a comfortable garden chair is available. This can be made even more enjoyable if the air is carrying the fragrant perfume of the Night-scented Stock. A fourpenny packet of seeds of this hardy annual will be sufficient for sowing in some convenient little corner of the pond surround to provide evening fragrance from the lilac-coloured flowers. If they were sown in March they should be in bloom from now to late August. A well-drained sandy soil is all they need.

July should find the Water-lilies providing their blooms. There is a wide variety of shades to be obtained these days, but I must confess an old-fashioned preference for the pure

Photograph] [*H. Bastin*

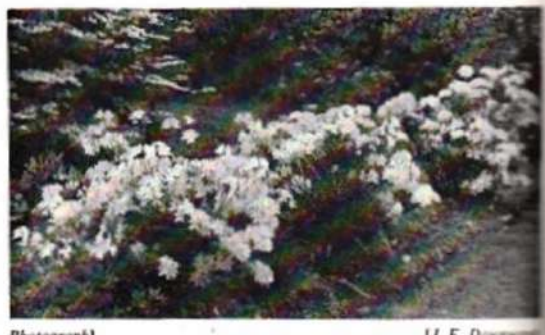
Nymphæa alba, *a native Water-lily of considerable charm. It is strong growing and requires a large pond to develop well.*

whites. Even our native white, *Nymphæa alba*, is capable of providing a lovely display for it possesses a delicate charm and, in my opinion, can hold its own among the more highly developed varieties. It is a beautiful sight to see the blooms in high Summer on Barton Broad in Norfolk.

One of the best whites, to my mind, for the average-sized garden pond is Albatross, because, while producing comparatively large flowers freely, the leaf spread is surprisingly small. Furthermore, it is an easy grower, requiring a minimum of attention to provide maximum results. Another white variety well worth consideration is *N. odorata*. The principal attraction here is that the flowers are perfumed and freely produced over a fairly lengthy period. The blooms are not quite as attractive in shape as those of Albatross.

Situations with a Northern Aspect

Quite often, when laying the surround, especially with the pond of informal design, when a built-up background is used to provide a rock setting, some small part will be compelled to face north and, therefore, affected by shadows cast across its surface. Such positions are frequently unavoidable and may present something of a problem to the beginner. If it is part of a rockery or rock setting, three of the best rock plants for taking care of the position are perennial Candytuft (*Iberis sempervirens*), *Arenaria balearica* and the *Primula Juliæ*. The position, however, may allow for somewhat taller growth, in which case one or two shade-loving shrubs could be tried, such as *Spiræa japonica* or, if the soil is inclined to be acid, *Azalea mollis*.



Photograph] [*J. E. Downward*

In the pond surround a few Azalea mollis *may be planted.*

Inheritance in Fish (3)

Tracing the Parentage of Guppy Stock — the Meaning of Albinism and the Breeding Potentialities of Such Fish

By R. J. Affleck, M.Sc.

I am pleased to report that the table in the last article of this series showing expectations from Grey, Golden, Blond and Cream Guppies has helped many aquarists to understand hitherto unexplained results. The information contained is sufficient for us to solve the problem mentioned in the first article (i.e.—why Goldlaced (Golden) Guppies appeared in the third generation of my original Grey × Gold (Blond) matings), so let us begin by making a diagram of what actually happened:—

Gold (Blond)

Grey × Grey —All Grey

Grey × Grey Gold —38 Grey: 12 Gold

Grey Goldlaced —41 Grey: 15 Goldlaced

We can solve the problem by working backwards but as we are only interested in the goldlaced character we ignore the genes for gold.

The genotype of the goldlaced in the F.3 must be gg and, of this pair of genes, one came from the father and the other from the mother. As the parents are both grey the genotype of each must be Gg. We also know that two fish each Gg should produce grey and goldlaced in the ratio of 3:1. In our case we have 38 and 12 respectively, which is a good approximation to the expected ratio.

Now what about these Grey fish of the F.2? As we have just decided that their genotypes are Gg we can now state that G was derived from one parent and g from the other one. The parent fish (F.1.) are grey so the genotype of each must contain at least one G. We also know that if each had carried the gene g, some Golden fish would have been produced in the F.2. As there are no golden fish in the F.2 we conclude that the genotypes of the F.1 fish are Gg and GG.

By the same reasoning as used in the preceding paragraph we conclude that, as the genotypes of the original parents are Gg and GG, the genotypes of the original parents are Gg and GG.

From the information available we have no means of telling whether the Grey fish was BBGG or BBGg or whether the Gold (Blond) one was bbGG or bbGg, but we have seen that it is possible for a recessive gene to be carried for several generations before its effect is finally made manifest.

Most of the so-called mutations reported by aquarists are cases similar to the one just described. This does not mean that mutations do not arise in stocks maintained by aquarists. Indeed every aquarist should be on the lookout for any new feature and I also think it is advisable to consult a geneticist when any new character does arise. I know of three or four mutations which have been lost through ignorance on matters of the correct mating.

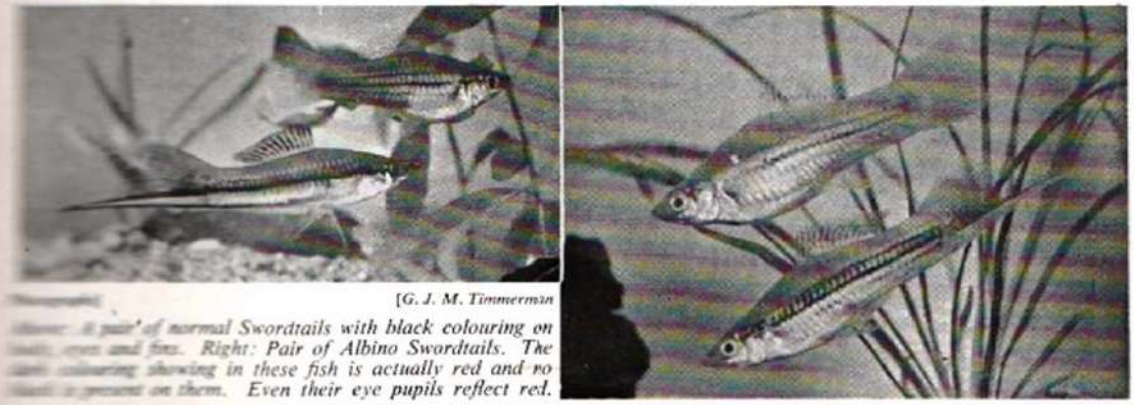
Albinos Among Fish

Albino fish, particularly Swordtails, have been very popular in the last few years and, although everybody recognises the pale, cream-coloured ones with pink eyes as Albinos, it is surprising how many aquarists do not realise that the "Red-eyed Red" is also an Albino.

What is the definition of an Albino fish? It is one lacking black pigment but not necessarily lacking red, orange, yellow, etc. A yellow Platy, for example, does not appear to have any black markings but the pupil of the eye appears black. In reality the pupil is a transparent region and the black appearance is due to black pigment in cells within the eye. A yellow Platy, therefore, is not an Albino. If, however, a cream-coloured Albino Swordtail is examined, no black pigment can be seen even in the eye, which appears pink. The pink is due to the fairly large amount of blood passing through the capillaries of the eye.

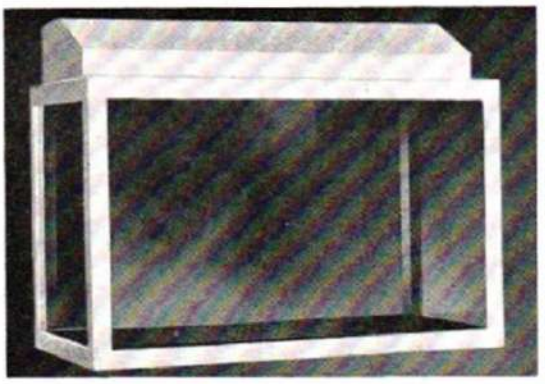
As an Albino fish is merely one lacking black pigment it follows that red, orange, yellow and other colour effects not produced by black pigment may be present. A Red-eyed Red Swordtail is one such example and the coloured Albino Guppies belonging to Mr. W. G. Phillips is another.

In all cases so far examined, albinism in fish is inherited as a simple recessive so that if A and a are substituted for B and b in Figs. 2 and 3 (WATER LIFE, February-March issue) it will be seen that a non-Albino/Albino cross produces all non-Albinos in the F.1, whilst in F.2 non-Albinos and Albinos occur theoretically in the ratio of 3:1.



[G. J. M. Timmermin

Above: A pair of normal Swordtails with black colouring on body, eyes and fins. Right: Pair of Albino Swordtails. The dark colouring showing in these fish is actually red and no black is present on them. Even their eye pupils reflect red.



Buying Your First Aquarium

Choose One of Reasonable Size with a Finish to Match Home Furnishings

Angle-iron, 24×15×12 in. aquarium with light shade.

FISH tanks of many shapes and sizes can be seen in any aquatic supplier's shop. Among them is, no doubt, just the one for your first venture into indoor fishkeeping. It is merely a question of knowing which would be the best for the fish you propose to keep and which would harmonise with the scheme of the room where it is to be set up.

Cost will usually be a controlling factor and, if this should be so, choose a tank of standard dimensions (18×12×10 in., 24×12×12 in., 24×15×12 in., 30×15×12 in., or 36×15×12 in.). If you are not unduly worried about the amount of the initial outlay, bow-fronted tanks and frames in special finishes, e.g., chromium, wrought iron, etc., can widen your choice considerably.

For a community of tropical fish try to start with an aquarium no smaller than 18 in. long, which, in the orthodox pattern, will be 12 in. deep and 10 in. wide. You can have a tank of less capacity but it will lack the permanence of one 18 in. or over. For the larger tropicals—those growing to over 2½ in.—regard a 24 in. long tank as a minimum.

Should you favour coldwater fish, then a 24 in. long tank must really be your minimum size if the fish are to develop to maturity. Coldwater fish are bulkier and require a larger swim space and water surface, so even 3 ft. long is not excessive for their home.

Comparative Depths

Tanks 18 in. or less in length rarely exceed 12 in. in depth, and those 24 in. to 36 in. long vary in depth between 12 and 18 in. Occasionally aquariums are made for special purposes in which the depth equals or exceeds the length. Whilst there is no reason why tanks so deep in relation to their other dimensions should not be used, there is one factor which must be borne in mind. It is that most of the air dissolved in the water and used by the fish for their respiration, enters through the water surface and consequently the greater depth will not enable the fish capacity to be increased. From the decorative viewpoint, a 12 in. depth is ideal for an 18 in. long aquarium, a 12 in. or, with coldwater fish particularly, a 15 in. depth for a 24 in. long tank and a 15-18 in. depth for any aquarium exceeding that length.

It is almost certain that the tank you buy will be metal-framed, although a few people do use wooden-framed aquariums of pleasing construction. An alternative is the all-glass aquarium, but here you run up against an undoubted risk. During cleaning out the tank may be accidentally knocked, and with an all-glass aquarium the loss is complete, whilst, with a framed tank, repairs will usually involve nothing more than the replacement of a single glass panel.

All-glass aquaria are not condemned out of hand, in small dimensions they are ideal for two or three Guppies, White Cloud Mountain Minnows or Zebra Fish.

Metal framed tanks are of two types, the most popular being those with an angle-iron frame. Somewhat cheaper are tanks made with pressed steel frames, generally spot-welded at the corners. These will give good service.

Aquariums of both types are available in a variety of finishes. Happily, the dark green paint of pre-war days is now taking a back-seat and into popularity are coming cream, chromium and various semi-metallic shades. It depends very largely on the style of room furnishing you have which colour you choose. Chromium generally looks better with modern furnishings, though it need not appear out of place with wood panelling. Cream is a versatile colour, but if you are at all uncertain, choose one of the quieter finishes.

The back panel of glass may be opaque or tinted. This is desirable as an impression of depth is given to the contents against such a background. Do not worry if the back panel is of clear glass, however; you can rectify this quite simply by fixing behind it a sheet of coloured paper, wood or plastics, or paint the outside of the glass the colour which appeals to you. Removable sheets are best in the first instance as they can be easily replaced if the effect is not to your liking. Black is the most popular background, but some people use green, blue or scenic effects.

Photograph] [Deste

A skilfully constructed wooden-framed aquarium, fitted with base heaters. Strip lights are used in the light canopy. The tube and diffuser stone within the tank are for aeration.

Briefly, then, choose an aquarium which is, within reasonable dimensions, as large as you can afford for the type of fish you hope to keep. There is nothing so infuriating as to find, a few weeks after purchase, that the tank which had seemed just right before you brought it home, is proving woefully inadequate for your fishkeeping interests.

Care of the Common Iguana

By Mary E. White

The author's Common Iguanas, "Iggy" and "Anna." In the upper photograph they pose for their picture and camera-conscious "Iggy" drops his dewlap. The right-hand photograph shows "Iggy" enjoying his daily spell under the infra-red lamp. Whilst in the author's possession these creatures have been quite tame, and have made no attempt to bite. Their spacious vivarium is in the dining room. Photograph by G. S. C. White.

THE Common Iguana (*Iguana iguana*) from tropical America is not for the novice herpetologist, but if one is more experienced, and has plenty of space and time to devote to these lizards, they are very attractive and interesting. It would be best to obtain the very young specimens that are sometimes available, as this Iguana can grow up to six feet in length. Obviously, in time, if all goes well, they will grow too large for the average herpetologist to cater for, but reared from babies one can provide for them for a considerable time.

The cost of maintaining them is somewhat high, especially in the Winter months when fruit and greenfood, which is their main diet, are scarce and expensive. However, the smaller they are the less they require. Heating is also a problem as they need a large vivarium, but no doubt there are various methods of heat saving to be tried. An infra-red light bulb I believe to be a necessity, but this need not be on all the time. Switched on for an hour or so daily it is very beneficial to these lizards. When using this light a strict watch must be kept on the temperature, as it rises very rapidly and they must be able to move away from the direct heat if they wish. At other times an ordinary light bulb can be used for illumination.

In the following paragraphs I have set down my own experience which may be useful to others interested.

In November, 1953, I purchased two young specimens measuring about six inches from nose to vent. Having previously seen only the large Iguanas in the London Zoo, these babies were rather disappointing on first acquaintance. Their colour was a brilliant green, but, not having the spiky adornments of their elders, they looked rather like puny chameleons.

I first housed them in a vivarium measuring 36 × 18 × 30 in. furnished with suitable branches for climbing, and (mistakenly) sprays of rhododendron leaves for decoration. The temperature was kept between 75-80 deg. F., and an infra-red light bulb was switched on for several hours daily. At first an ultra-violet lamp was also used twice a week. This I discontinued after a while, as there was no means of protecting their eyes from the powerful light. Being very inquisitive lizards they would stare at it and make their eyes sore.

Hoping they were a pair (being too young to sex) I named them "Iggy" and "Anna." "Iggy" was without much doubt a male. Nodding and bobbing his head, which is a characteristic of the males, he would drive "Anna" from his favourite branch. Most of this aggressiveness was only bluff. When she stood her ground he was at a loss to know what to do.

They fed well from the start, favouring such items as lettuce, watercress, and banana. Soon they began to grow. The dewlaps and leathery spines started developing, and their faces became bluish in colour. So fast were they growing that it soon became obvious that they needed a larger home.

Cause of Illness

It was during April, 1954, that "Iggy" became ill. He was dull in colour, eating nothing, and staying on the floor of the vivarium. The latter seems to be a bad sign in the arboreal lizards, and as his excreta was bloodstained I knew that there was something fundamentally wrong. On looking round I noticed that large bites had been taken from the rhododendron leaves, and a horrible suspicion crossed my mind that the leaves were poisonous. After searching through a veterinary encyclopædia, I found that that was indeed the case. In common with most other evergreens, the rhododendron is poisonous to herbivorous animals. The remedy given for this type of poisoning was purging with a vegetable oil. Putting on a pair of leather gloves (to avoid being clawed) I proceeded to catch the patient. Sick as he was, this was no easy task. Scratching and lashing wildly with his whip-like tail, he tried to elude capture. My husband was standing ready with the olive oil, anticipating trouble, but to our amazement "Iggy" took his medicine like a lamb—a desertspoonful of it!

The next day he nibbled a lettuce leaf and climbed groggily up to his favourite perch. Within three days he was back to his normal arrogant self. Needless to say, the offending

leaves were never again used for decorative purposes. For about a week after his treatment he would lash the air wildly with his tail whenever I opened the feeding door. However, he soon forgot the indignity of the medicine and calmed down again.

By the end of May their new house was ready. This was far more spacious, being 4 ft. × 2 ft. × 5 ft. in height, which gave them plenty of room for climbing.

We managed to transfer the Iguanas without much difficulty, but, as soon as they were in the new vivarium, an amazing scene took place. Both creatures inflated and arched their bodies, which became brilliant in colour and blotched with black. The dark tail bands were very pronounced, and the pupils of their eyes contracted to mere pin points. This gave them a vicious appearance as they advanced on one another to do battle. With lashing tails and open jaws they jostled for position, each trying to bite the other about the body. Pushing and leaning like two wrestlers, each was unable to get a grip on the hard inflated body of its opponent. This continued for almost half-an-hour, and was a most impressive sight. Finally, they parted, each selecting a branch to lie on. Gradually their appearance returned to normal, and from then on they were the best of friends.

Stroking Appreciated

Both Iguanas like to be stroked as long as the tail is not touched. "Anna" especially enjoys it, closing her eyes in obvious delight. "Iggy" is rather more condescending, holding himself erect in a slightly lofty manner. When sloughing they like the loose skin pulled off, as the ragged pieces seem to irritate them.

The vivarium they are in stands in my dining room, and they take a lively interest in everything that goes on. They are very clean in their habits, having a special corner for excretory purposes. I use leaf mould for the floor covering, as I find it hygienic and absorbent.

So far they have remained mostly herbivorous, eating clover, lettuce, watercress and fruit. Tender young dandelion leaves are also liked. They seem to prefer green leaves to fruit. Mealworms are relished, small pieces of raw meat and smooth caterpillars, but vegetation remains their favourite food. I have rarely seen them drink, although water is available. They appear to get sufficient moisture from the green leaves. The infra-red light, which is now fixed in the vivarium, is switched on for several hours daily. This seems necessary to their well-being, toning up the circulation and inducing them to feed well.

These lizards have never at any time attempted to bite, but I have great respect for their large claws and powerful tails. "Anna" is the more docile of the two, and as she never nods or swaggers she is almost certainly a female. Although they are extremely fast moving when so inclined, they spend most of the day lazily sprawled on a branch, with legs dangling in a ludicrous manner.

Eye Movement When Annoyed

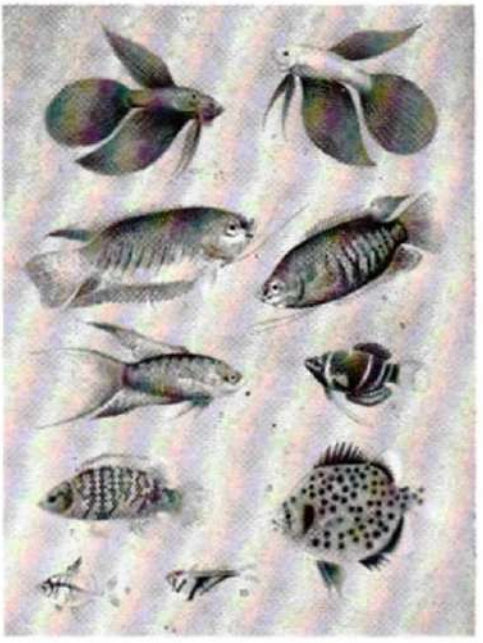
When annoyed the eyes contract and dilate like those of an angry parrot. The male extends his dewlap and inflates his throat as well. So far they have retained their bright green colouring on the body, but their heads are now blue grey. "Iggy" has a beautiful mottled appearance about the neck and throat.

They seem very intelligent creatures, recognising people, and showing alarm when strangers look at them. My own dog they take no notice of, but should any other dog come into the house they flatten their bodies and try to hide behind the branches. I have noticed this same habit in chameleons. At the time of writing they have been in my possession for a year, and are now over 30 in. in overall length. If they grow too large I shall, of course, have to dispose of them to a Zoo, but I should be very reluctant to part with them.

GUIDE TO TROPICAL FISHKEEPING

Photographs in Natural Colour

Six Identification Plates



THE above picture is a reduced black and white reproduction of one of the six 7 × 5¼ ins. identification plates in full colour appearing in the new comprehensive work of reference for aquarists, "Guide to Tropical Fishkeeping." These plates give at a glance nearly 70 species and varieties. The book also contains 24 photographs of fishes in natural colour. Black and white illustrations total 269 (fish 200, plants 30 and general subjects 39). There are line drawings and classification charts.

The book, in the preparation of which the author has had the full co-operation of WATER LIFE editorial staff and a panel of experts, deals with nearly 400 species and varieties of tropical fishes. No keen tropical fish breeder can afford to be without a copy of this new work, which contains descriptions of individual species and varieties with sections on feeding, breeding and identification. That devoted to classification will do much to avoid future confusion over nomenclature. The book is printed on high-class paper, has a stiff linen-bound board cover, with an attractive dust cover, and, as end-papers, maps showing the areas from which the fish come. The large number printed, which will be needed to meet the demand, has enabled the publishers to keep the price down to a very low figure and yet give a wealth of illustrations, the high standard of which, plus the reliability of the text, make it a book which should be in your possession.

"Guide to Tropical Fishkeeping," by J. H. P. Brymer. Price 35/- (36/- by post from the Publishers, WATER LIFE, Dorset House, Stamford Street, London, S.E.1.).

Nannostomus anomalus — a Peaceful Small Characin

By Dr. F. N. Ghadially

MANY of the fish belonging to the Characin Family are notoriously difficult to breed, hence it is a pleasant surprise to find one as beautiful as *N. anomalus* that is not only a ready spawner, but possesses all the desirable qualities that go to make an ideal aquarium fish. Fully grown specimens measure about 1¼-1⅜ in. and have a very sleek, streamlined appearance, as can be seen from the photograph.

A broad bluish-black line runs along the entire length of the fish; parallel to it and just above it runs an iridescent gold stripe. The fins, particularly in male specimens from a good strain, show a brilliant red coloration. Bluish-white markings on the ventral and anal fins further enhance the appearance of the male fish. On occasions they show dark vertical bands and a red line or red markings on the body; these, however, are transient features. Though capable of very quick darting movements they usually move slowly or remain hovering in one spot with quivering fins, giving a most pleasing effect.

Effective in a Community

Not only do these fish lend grace and beauty to a community collection, but they also create an unusually beautiful display when a number are given a tank to themselves. Though a well-behaved, peaceful fish, it is by no means nervous or shy, and is almost as much at home in a bare tank as in one that is well-planted, though, of course, it shows off much better under the latter conditions. In spite of rather frail and delicate appearance it is extremely hardy and will tolerate a lot of maltreatment.

Feeding the fish requires some care; they have rather small mouths and when feeding either live, fresh or dried food, this should be borne in mind. Further, as a rule, they are reluctant to pick food off the bottom of the tank though in time they may be trained to do so occasionally. Small *Daphnia*, Small Bloodworms, *Tubifex* and White Worms are accepted with relish. It is quite common to find after a meal of such worms that one of the fish has swallowed a worm the wrong way and it lies protruding through the gill slit! This need cause no alarm as almost always the fish shows no distress and eventually the worm is extruded. Should the reverse be the case, the worm can, as a rule, be quite easily extracted by means of a pair of tweezers.

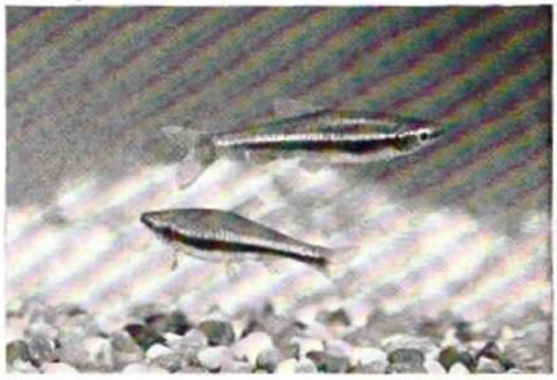
Newly-hatched Brine Shrimps are rightly considered too small to feed most adult fish, but an exception should be made in this case; large numbers are accepted with great relish in preference to almost anything else. The soft pulp from a maggot husk is another great favourite. Dried food is accepted, but rather reluctantly, and once it falls to the bottom is usually ignored completely.

Acid Water Appreciated

It is believed that these fish like soft, slightly acid water, and will breed readily only under such conditions. This appears to be correct as many aquarists in Sheffield area, where the water from the tap usually gives a hardness reading of about 30 parts per million, and a *p*H of 6.8 to 7, have bred this fish with great success (as the water is so soft rather large variations of *p*H are sometimes encountered).

Those living in places where the water supply is hard and alkaline can rectify this by diluting the tap water with distilled or rain water and acidifying it by suspending a nylon bag (made from an old stocking) filled with peat in the water. The amount of distilled water needed will, of course, depend on the degree of hardness of the local tap water, but in most places a ratio of about 2 to 3 parts of distilled or rain water to one of tap will be found adequate.

If any gravel is used it is best to make certain that this does not contain any limestone or it will, in time, tend to turn the water hard and alkaline. Whether a given batch of gravel is suitable for use can be easily determined by adding a little acid such as hydrochloric acid to a quantity (an eggcupful) of fresh gravel placed in a drinking glass. If there is a strong effervescence it shows that the gravel is unsuitable for use. However, a quantity of this gravel can be made usable by placing it in an all-glass container and adding enough water to just cover it, followed by the addition of small quantities (½ a cupful) of hydrochloric acid at a time until fresh addition of acid causes no further effervescence. The whole process should be carried out gradually, spread out over the period of a day or two. During the course of the treatment, the gravel should be occasionally stirred with a wooden stick. Finally it should be washed thoroughly with dozens of changes of fresh water, some of the final changes being allowed to stand with the gravel for a day or two to make sure that *all* the acid is removed. As a further precaution *p*H readings should be taken of the water before and after it has been standing on the gravel. A shift of the *p*H to the acid side would indicate that further washings and stirrings are required. It must be emphasised that concentrated hydrochloric acid is a corrosive fluid which should be used with the greatest care, only a little at a time being added to the gravel and the whole process carried out away from the reach of children and animals.



Photograph] [*Dr. F. N. Ghadially*

Pair of Nannostomus anomalus. *Lower fish is the female. Ventral and anal fins of the male show typical white extremities.*

N. anomalus can be kept in quite small tanks, one about 18 × 10 × 10 in., set up with gravel and water of the type described above and planted with plants that thrive in soft water such as Cryptocorynes and *Cabomba*, is ideal for bringing up half-a-dozen youngsters to breeding size and condition. In such a set-up the fish show off their colours brilliantly and the whole effect can be very beautiful indeed. As these fish are great jumpers, it is important to keep the tank well covered at all times to prevent losses. A temperature of about 75 deg. F. suits them best. Snails do not thrive in such an environment and, if introduced, rapidly die and

the calcium from their shells will tend to make the water hard.

Sexing is quite a simple matter with fish over ¾ in. long. The female is very noticeably plumper than the male. As in most other fishes, the male is more brilliantly coloured than the female; as a matter of fact, there is very little red coloration to be seen in the fins of the female. It is possible to breed with these fish when they are about nine months old and of about 1 in. in size, but success is more likely with larger, more mature, specimens. They are a rather long-lived fish, I have seen some fine specimens approximately five years old.

N. anomalus spawn over a prolonged period. That is to say, they do not, like most other aquarium fish, deposit a large number of eggs in a few hours, but lay a few eggs every day for a number of days. Most of these adhere to the leaves of plants or other spawning medium used, but quite a few fall to the bottom. As only a few eggs are laid, it is a rare sight to see them, especially as they are quite small, transparent and colourless. When well fed, parents do not, as a rule, devour eggs or fry. In view of this, breeding becomes quite a simple matter. A pair or trio (two females and a male) are placed in a tank about 18 × 10 × 10 in., containing soft acid water with no gravel at the bottom. Willow root forms the ideal spawning medium, and a couple of handfuls of this should be placed in the tank. In a previous article (February-March, 1953) I have described in detail the technique of using this root. Failing this, fine-leafed plants may be employed, but care must be taken to see that no snails, planarians or *Hydra* are introduced.

Regular Feeding

The temperature should be maintained at about 80 deg. F. and the fish fed regularly on their favourite foods. When any young are sighted, and this usually occurs in 6 to 15 days, the adults should be transferred to another tank set up in a similar manner, where they will most probably carry on breeding. On most occasions eggs will be missed and the first sign of success will be a fry or two swimming at the surface of the water. In a few days many more fry will be noticed. The average number of young that can be expected by this method is about 40, though occasionally as many as 70 or as few as 2 or 3 may be obtained.

Although, as a general rule, it is best not to trust any fish too much with eggs or fry, I have on occasion left *N. anomalus* with their youngsters and have had quite good results. This, as a matter of fact, constitutes one of the simplest ways of breeding these fish. If a trio is placed in a well-planted tank such as described earlier, and fed adequately, one will, in time, find a dozen or two young fish of varying sizes growing quite well in happy company with the parents. In any given brood considerable variation in size of youngsters is to be expected. The smaller ones are not necessarily runts, they are just young that have hatched out of eggs laid at the end of the prolonged spawning period.

Feeding the fry is, again, quite simple. As the number in a brood is usually small, there are often enough natural Infusoria in the breeding tank to meet their requirements and none, or very little, cultured Infusoria need be added. The next food to wean them on is newly-hatched Brine Shrimps. Mikro-worms should be used very sparingly, as those not eaten will fall to the bottom where they will die and pollute the water. These fish can be reared to adult size almost exclusively on newly-hatched Brine Shrimps, but as the young increase in size, it is best to introduce *Daphnia*, *Cyclops*, White Worms, etc., to their diet.

The young present some peculiarities of appearance and postures which may cause needless anxiety to the novice. At one stage of their development at a cursory glance they appear to swim upside down, but a closer examination reveals that this is just an illusion created by the markings, shape and posture of the fish. Similarly, the aquarist may suspect Fin Rot as the fins appear to have a ragged margin but closer inspection will reveal that this effect is produced by the dark irregular colour markings on fins with clear transparent margins. For many minutes on end some young assume a posture with such a sharp angulation of the body as to make the aquarist wonder if the fish has broken its spine. Ultimately, however, the fish straightens itself, much to the relief of the aquarist.

The colour markings on the young are very different from those of the adult, at one stage they show numerous fine whitish spots which may make the aquarist suspect that the young are infected with Velvet or White Spot. But these are just natural colour markings that vanish as the fish grow older.

Water—the Basis of Fishkeeping

Action of Toxic Metals—Need for Care When Adding Chemicals

By WATER LIFE Analyst

IT will be remembered that it was stated in the previous article of this series that raw water utilised for public supplies was, in some instances, made bacteriologically safe for drinking purposes by treatment with chlorine gas. Whilst any slight residuum left in the water would be quite harmless to human beings it might, on the other hand, be inimicable to fish life, but no difficulty would be presented in ridding the water of this undesirable element.

However, there may be traces of other inorganic chemicals present in a water supply which are not easily eradicated and might prove toxic to fish life in aquaria supplied with such water. In this connection, the growing tendency to use copper piping for domestic plumbing constitutes such a hazard, in that a copper content may be imparted to the water in a concentration quite fatal to fish life.

Recently, "mysterious" deaths of fish were occurring in an aquarium set up by a Glasgow school where all the plumbing had been executed in copper piping. An analysis of the water from the aquarium revealed a concentration of copper present to the extent of just over one part per million, which would be quite fatal to most freshwater fish. A prolonged draw off through the system may have prevented a toxic concentration of copper accumulating but, as the Glasgow supply is passed through copper grids before being distributed, it may well be that a relatively high concentration of copper is already present in the water before it reaches the consumers' taps.

Effect of Metals

The presence of such concentrations of copper, and/or certain other metals likely to be found in public drinking water supplies, are of course quite harmless to human beings although such metals may be extremely toxic to fish life. Consequently the chemical tests that have been devised, and are used, in standard analytical methods for the detection and also for the quantitative determination of extremely small concentrations of metallic salts that may be present in water are of great value.

The lethal action on fish by highly toxic metals such as copper, zinc, lead, silver and chromium (only the first two mentioned metals are sometimes to be found in traces in satisfactory drinking water) is entirely external. The soluble salts of the metals mentioned are powerful precipitants of the protective slime or mucus surrounding the bodies of

fish; their gills become so clogged with the precipitated and toughened mucus that the fish finally die of asphyxia.

Some years ago the writer participated in a series of experiments in order to find out the effects of copper poisoning on Carp. The results of these experiments showed that, once a critical stage had been reached in the precipitation of the mucus on the bodies of the test fish, there was no recovery and they died quickly, even if transferred to clean water saturated with oxygen. These experiments were carried out using 3 in. mature Carp as test animals placed in a tank containing two parts of Metropolitan Water Board tap water and one part of raw Thames water, taken above Laleham.

Experimental Conditions

The water was maintained in constant circulation and at a mean Summer temperature of 17 deg.C.; two gallons per 1 in. of fish were allowed, and three fish were used during each test. It was found, on average, that asphyxia syndromes, shown firstly by frantic dashes to break the surface of the water and a quickened rate of respiration, occurred within 18 hours, in water containing copper sulphate equivalent to concentration of 0.4 parts per million as copper. Post-mortem examinations carried out upon fish known to have died by the action of metallic poisons confirm that asphyxia was the cause of death.

Post-mortem examinations cannot, under any circumstances, reveal that fishes have been killed by exposure to the action of metallic poisons, for no traces of these will be found in the body tissues. Of course asphyxia may be caused by other agencies having no connection with the toxic action of metals.

Thus chemical analysis of the water is the only method by which it may be ascertained whether or not metals are present in sufficient concentration to cause death. Where deaths occur in aquaria, and they are of a high order with no symptoms of recognisable diseases occurring, it would seem as well, under these circumstances, to consider the probability of metallic contamination of the water. Where this is found likely to happen it would, of course, be far safer to use suitably collected rain water for filling the tanks.

Often it is found that aquarists unknowingly, but nevertheless quite deliberately, poison the water in which they keep their fish. Thus sea salt (an impure form of sodium chloride) is often added constantly to the water in a tank. Worse still, these frequent additions may be made to a tank containing species of freshwater fish which, in the wild, are only exposed to a negligible concentration of sodium chloride. The gradual build-up of a high salt concentration in such a tank results in the fish slowly being denuded of their protective mucous body covering whence, not only are they subject to bacterial attack, but, worse still, tend to lose their body fluids which is quite fatal.

Treatment of diseased fish with recommended chemicals must, without exception, be carried out in a separate tank. Exposure time to the treatment should always be cut to the minimum, for even the most widely advocated harmless "cure-all" may, after all, prove to be a deadly "kill-all"!

Disposing of a Fallacy

Permanganate Will Not Render a New Pond Safe, But There Are Effective Alternatives

POTASSIUM permanganate will not make a new concrete pond safe for fishes. We repeat this statement because the belief that permanganate will do the trick is still widely held and has again received publicity elsewhere. This chemical is quite incapable of neutralising the harmful alkalis which escape from new concrete and our Analyst relates what actually occurs when it is added to the water of a newly-constructed pond.

"By adding permanganates to a strongly alkaline water (as may be present in a newly-constructed pond) oxidation of any extraneous organic matter present in the water proceeds at a fast rate. During this vigorous chemical oxidising reaction of the organic matter, the permanganate loses some of its available oxygen and is itself reduced to a brown manganic oxide, which, unlike the permanganate, is insoluble in water. This brown manganic oxide is precipitated all over the surface of the new concrete and gives a pseudo-appearance of matureness. However, during this process not a fraction of the original concentration of alkali in the water is lost or neutralised.

"There is one important point that may be overlooked when ponds are treated with potassium permanganate. Salts of manganese are well known to be very toxic to fish life. Precipitated manganic oxide under certain conditions of *p*H might well have a very adverse effect upon fish life."

So it will be seen that far from the permanganate having any advantageous effect, it can, in fact, prove harmful to the fish if any large amounts of precipitate remain, which would be the case if the pond were not thoroughly washed round after the chemical had been used.

Proven methods of rendering a concrete pond safe for fish are three in number. The first is lengthy but absolutely safe. It consists of filling the pond with water at regular intervals. After each filling has been allowed to stand for a week the inner concrete surfaces are scrubbed and the pond emptied and refilled. A two-month period of these weekly labours will ensure complete safety.

If the pond is constructed in the Autumn then obviously stocking with plants and fish will not be done until the Spring but the pond can be filled in the Autumn and with, perhaps, two changes of water prior to setting up, it should be entirely safe.

Using Phosphoric Acid

The second, more speedy, method for ponds constructed in the Spring is to fill with water and then to stir in well some commercial concentrated phosphoric acid—just sufficient for the water to give an acid reaction (litmus changing from blue to red). Twenty-four hours later the alkalis from the concrete will have made the water alkaline once more and phosphoric acid should again be added until an acid reaction is achieved. Repeat these daily inspections and additions for up to a week, by which time the water should remain acidic for a 24-hour period. To be quite certain that no more alkali is likely to escape leave for a further 24 hours with no more acid added, test again and if the litmus still turns red, all should be well and after a *thorough scrubbing out* the pond will be safe for filling and setting up.

A third way of overcoming the problem is to coat the concrete with one of the proprietary sealing compounds made for this purpose after a preliminary wash round. Although, over the years, small areas may be chipped off, exposing the concrete, these places are likely to be so small that the amount of alkali then able to escape will not be sufficiently large to cause trouble.

Bleak Hall Aquaria

Model Accommodation for Fish Forms an Integral and Elegant Part of an Enterprise in Bedfordshire

(*WATER LIFE Photographs*)

Sturdily constructed outdoor fishroom.

WHEN the managing director of a flourishing concern takes up fishkeeping as a hobby, joins a society, meets, as a fellow member, a master electrical engineer who is a successful aquarist, and then asks the latter if he will help in creating a luxurious fish breeding establishment, the developments that follow can easily be imagined. The establishment has come into being and since no expense has been spared, the story behind it is worth the telling.

Mr. Dudley S. Redman who fills the first rôle, occupies Bleak Hall, a 25-roomed Jacobean house situated four miles south of Biggleswade in Bedfordshire. The well laid out grounds, which cover fifty acres, surround the imposing residence that has been skilfully modernised by its owner without losing any of its old-world charm. Oak beams, weathered red brickwork, old-fashioned roofing tiles, latticed and leaded windows and, inside, low ceilings, stone passageways, thick walls, inglenooks and wide brick fireplaces, create an atmosphere that fits the personality of its unassuming, quietly efficient, owner.

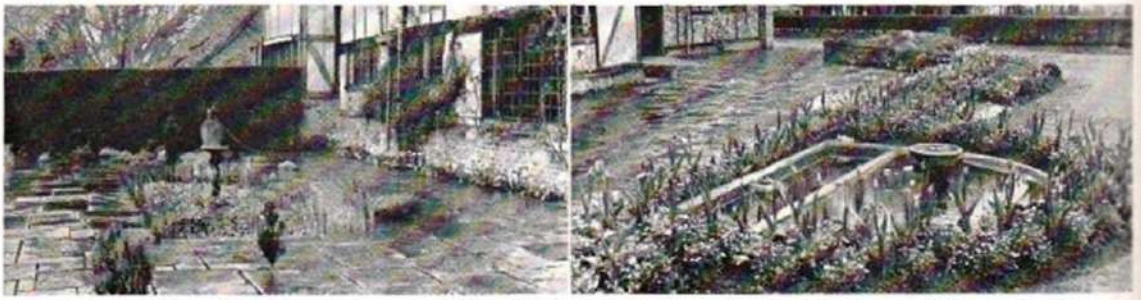
A Justice of the Peace, chairman of the local Council, chairman of at least three companies, and on the board of directors of other firms, Mr. Redman has much to do, yet is able to devote a considerable amount of time to the plans which he and his colleague, Mr. H. Driver, have evolved to breed tropical fish. When it is explained that he has a staff that maintains, under ideal conditions, a model herd of Jersey cattle, a herd of prize pigs, chickens producing good quality eggs, both under the battery system and in field arks, a number of geese and, as a new departure, a range of aviaries for bird-breeding, one can get some idea of the amount of work being carried on. Above all this there are extensive cultivated gardens with a range of greenhouses. Bleak Hall is noted for its flowers, fruit, and vegetables. It can be appreciated that, quite apart from the fish-breeding activities, here is a place which, with its well kept lawns and wealth of trees and shrubs, preserves a homely appearance whilst it is being put to good use. Much high-class foodstuff and livestock are produced for consumption. The marketing of these items all help to reduce the heavy running costs and to employ a staff of experienced men, thereby preserving a compact country estate.

Three well established ponds containing Goldfish, Golden Orfe and Shubunkins have been in existence for a number of years. Edging the lawn is the oldest, semi-circular in shape, with a shallow strip divided from the main area. Nearby, in the centre of a paved area which runs between the drive and the house, is a rectangular pool well stocked with plants and, especially, a fine growth of hardy Water Hawthorn. In another part of the garden, where the design is less formal, is a kidney-shaped pool scheduled to accommodate coldwater fish as they are bred. There is, too, a sizeable pool for *Daphnia* cultivation. A quota of the geese are kept separate from the rest solely to help in the process.

Modest Start

Inside the house, in the study, are two large community tanks on a sturdy wooden stand. It is interesting to record that it was with a small aquarium first bought from a West End firm, Mr. Redman started tropical fishkeeping and, although the majority of the tanks now used come from other sources, those in the most prominent places set up for display purposes come from the same source. It was the review in WATER LIFE of the neat outdoor fishhouse designed and built by Mr. H. Morriss of Letchworth that gave birth to the idea of having one built in the grounds near Mr. Redman's house. Next, membership of the North Herts. A.S. brought Mr. Redman into contact with a circle of keen aquarists, among them Mr. Driver. The latter, who has long been associated with the hobby, formerly lived at Biggin Hill in Kent but when his home was blitzed during the Battle of Britain he moved north to Biggleswade. During the war he served in the R.A.F. with tours of duty abroad, including North Africa. His experience as an electrician and builder has helped him to introduce a number of novel features into the design of the fishhouse.

Bleak Hall Aquaria consists of the fishroom proper and a breeding room. To avoid clashing with the mellow appearance of the main house, the bricks and other material used



Water Hawthorn fills the rectangular pond (left) whilst the semi-circular pool (right) contains a collection of Goldfish.

for the external structure were carefully selected so as to blend with the surroundings. The room reserved for breeding was a substantially built shed that had been strengthened inside to conserve warmth and to provide the strong flooring necessary to accommodate a closely fitted complement of breeding and stock tanks. The outside of the shed still has wavy-lined elm weatherboarding, in keeping with other wooden buildings in the vicinity.

With Mr. Redman meeting the cost and pooling his own ideas with those of Mr. Driver and of Mr. R. Porter, a professional architect, there has been constructed a fishroom which many would like to have but which may on such a scale be considered beyond the reach of their pocket. As the following notes will show, however, the ideas employed can to a very large extent be modified for the man working to a considerably smaller budget. Everything on paper pointed to achieving an ideal at the outset; in practice Messrs. Redman and Driver have come very near to it, but only after making certain changes based on day-to-day experience. Had they felt fully satisfied with the buildings and their contents as soon as they were first set up they would no doubt have missed much of the pleasure that is derived from effecting improvements after surmounting little setbacks cropping up here and there. Instead they have faced up to the problems as they arose and are beginning to feel that they are getting near the standard of perfection they want to attain.

Challenge Accepted

The breeding room is yet to be brought fully into commission and here new ideas are still being incorporated. The general design of the main fishroom is based on the combination of a number of ideas given to Mr. Driver when he inspected large and small fishbreeding establishments on the Continent, particularly in France. The ultimate aim is to have somewhere where it is possible successfully to breed tropical fish under strictly controlled conditions and, in particular, to get rare species to breed freely. They accept as a challenge all reports of difficult-to-breed types and believe that by combining past experience with the results of future experiments they will be able to ascertain the conditions such as fish require.

The fishroom measures 25×15 ft. It receives adequate natural light from the sloping glass panel windows. These rise on either side from relatively low solid side walls to the tiled A-shaped roof which has been built at a more acute angle. These half-roof lights could admit an excess of light in extremely bright weather but this is controlled by the exterior roller blinds.

Draught-free ventilation has been effected by installing extractor fans. Despite the big expanse of glass, retention of heat is efficient, largely due to the fact that the brick walls and tiled roof have an inner lining of cork blocks. The floor, measuring a little under 25 feet long by 12 feet wide, is tiled. The mains coldwater supply is supplemented by a hot water tank of 25 gallons capacity.

Porchway Entrance

The interior design, which permits plenty of room to move about in, allows for ten concrete floor tanks each 4 ft. long× 2 ft. 6 in. wide×9 in. deep. At one end is a large window with beneath it a sink with sloping draining boards on either side. On either side of and under the sink, cupboards are provided to hold food supplies. At the far end the entrance is through a door in the centre leading into a porch built with its door at right angles, thus preventing any direct inrush of cooler air when the doors are opened.

Metal supports come out of the walls at an angle above the concrete tanks to support two rows of aquariums. The shape is planned to give easy access to the floor tanks. The supports and framework are made of 1½ in. angle iron, the supports being constructed from double angles. The tanks

(*Continued next page.*)

Two views taken inside the fishroom. Top: Looking towards the entrance. Below: The far end with its window, sink and three large store cupboards. Note the ample floor space, the excellent layout and good top light. The installation is designed to reduce labour to a minimum and to allow plenty of working space.

The two energetic partners. Above: Mr. Driver looks at a new arrival. Mr. Dudley Redman checks temperatures of the water. Breeding on a large scale is the ultimate aim.

consist of six 48 × 15 × 15 in., six 48 × 15 × 12 in. and twenty-six 24 × 15 × 15 in.

The aquariums are electrically heated, the temperatures in them being controlled by one heavy duty thermostat to each bank. Warning lights, visible from Mr. Redman's house, come on when there is a fault so that if the fishroom is temporarily unattended, an occasional glance from the house is all that is necessary to tell if there is need for emergency action.

Two Styles of Lighting

Artificial lighting consists of combined units, each composed of a fluorescent tube with, at one end, an infra-red lamp. The effect is to give a pleasing amount of light. Experience has shown that the infra-red lamps supply the rays that are outside the range of those radiating from the fluorescent tubes without in any way affecting the degree of brilliance. The fish and plants in considerable variety are kept and both seem to flourish under the lighting method employed.

The accompanying photographs give a good idea of the general appearance of the buildings that constitute Bleak Hall Aquaria and the notes published may give a fair assessment of the scope of fishkeeping and fishbreeding which are carried out by Messrs. Redman and Driver. To get a complete picture an inspection of this capacious private aquarium is called for and such visits from individual aquarists and clubs are welcomed by arrangement. It will be seen by all who go there that already much progress has been made and that not only are the premises kept scrupulously clean but the fish and plants, most of which were propagated at Bleak Hall, are in remarkably good condition. The two partners who, between them, have been able to contribute both the necessary finance and knowledge do not claim to know anything like all there is to know about keeping fishes in aquaria. They are anxious to exchange views with other aquarists and invite those who inspect the Aquarium to offer constructive criticisms. Their ultimate aim is to record their breeding room successes and failures and to employ methods calculated to bring them consistently good results over long periods. In due course, they hope to publish their own findings and views.

Filling in the Gaps

The appearance of such notes in print would do much to help those trying to breed specimens of the same kind of fish. With luck the data kept at Bleak Hall may well help to fill some of the gaps in our knowledge.

Aquatic Plants

Water Hyacinth

(*Eichhornia crassipes*)

WHEN an aquatic plant has, on the one hand, the complimentary title of Water Hyacinth but when, in other quarters, it is called the Florida Devil, it would suggest that we have in *Eichhornia crassipes* a subject which is beautifully evil. Fortunately its evil intent is not manifested in this country for it is not hardy but in many of its native haunts, which include America—around the Gulf of Mexico especially—Africa and Australia, it develops and divides at such an astonishing rate that navigation of the waterways becomes impossible. Small wonder that in some areas cultivation of this species has been banned.

For British fishkeepers, however, the Water Hyacinth is an unusual and delightful floating subject not easy to cultivate because it must have a special set of conditions. In the average room aquarium it is unlikely to thrive but in the glass-topped fishhouse with high temperature and humidity throughout the year it can do well.

During a favourable Summer it can grace the garden pond from May to September but in Winter it will require the warmth of a heated fishhouse or greenhouse. Goldfish and Labyrinth fish breeders find this plant of value because its long feathery roots, violet in colour, hang down into the water and form an ideal spawning medium for their fish.

Nevertheless, this is a species which can be assessed on its beauty alone without having to resort to a treatise on its utilitarian merits. The leaf petioles are tremendously enlarged and the leaves above them are light green and smooth. Imagine such a plant sitting on the water surface with its lengthy, coloured roots trailing into the water beneath, and then it may be forgiven that the lovely flowers last but a few hours. It is from the flower form that the name of Hyacinth is derived. The blooms are borne on spikes and the individual flowers are light mauve with a yellow and bluish eye marking in the upper petals.

A really pleasing way of growing the plant is in a wooden tub, kept in the greenhouse or fishhouse except during the warmest months of the Summer. Under such conditions—and also in aquaria and ponds when conditions suit it runners will be thrown out and the plantlets so formed can be severed when they have reached a reasonable size. The photograph in the first column shows young plants developing.

Where fishhouse accommodation cannot be offered, a method of overwintering has been suggested which is well worth trying. In the early Autumn the Water Hyacinth is planted in a flowerpot, using sifted loam and charcoal for this purpose. The soil is kept moist and the pot placed in a shaded position under cover where frost cannot penetrate. In May the Hyacinth can be refloated.

When free-floating, it does not seem to matter unduly whether the roots actually touch a planting medium or whether they are above it but, except in a large volume of water as would be present in a pond, a periodic change of water seems to be appreciated. The Federation of British Aquatic Societies allows the Water Hyacinth to be used in tropical furnished aquaria judged to its recommendations.

There are two varieties of *E. crassipes* likely to occur. One, *major*, is large and bears mauve-pink flowers and the other, *aurea*, has yellow blooms.

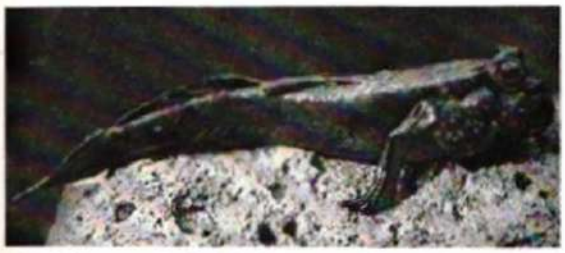
Tropicals in their Native Haunts

Many Aquarium Fish Endure Spartan Conditions in their Natural Waters

By R. N. Campbell, B.Sc.

I THINK most aquarists who keep tropical fish, and who may not have had the opportunity to observe these species in their native environment, are apt to regard them only as the source of an interesting hobby or perhaps as beautiful, animated ornaments, and their reproduction in captivity as a challenge to man's ingenuity.

Like other "tropical fans" from temperate lands who have had cause to visit some tropical countries, I was impressed by the importance of these little fish in the cycle of life in their natural surroundings. There are two reasons



Mud Skipper (Periophthalmus), *a fish which is able to manœuvre out of water with comparative ease. It can hop and crawl and for these reasons it is not easy to catch.*

for this, the first being the tremendous numbers in which they stock their native rivers. The second reason, which arises directly from the first, is the great number and variety of their predators—fish and fowl—which they support, and consequently their importance in maintaining a considerable item in the diet of the human population.

It was with an air of anticipation that I landed at Bombay and made my way through the large bazaar to the animal market, where I was offered practically everything from a cobra to a small deer (I bought a Nepalese parakeet for five shillings!). Nevertheless, I was very disappointed when, apart from some small Goldfish, all I was offered in the fish line were a few Angel Fish in a jam-jar. I should explain that my visit was made several years ago.

However, my tropical fish-hunting days were near at hand, and soon after, on the banks of the great Narbada River in Central India, I had my first opportunity to observe the country cousins of my old tropical-aquarium friends.

Danios in Large Numbers

This river teems with many kinds of fish, large and small, but the only familiar ones I saw were some of the Danios, which swim in silver shoals and cause the water surface to "boil" when a few crumbs are sprinkled on it. There were many other little silvery fish of the Carp Family and the natives net them in great quantities for food. A glance into the wooden boxes which the fishermen carry slung over their shoulders reveals a heap of little fish.

The dry-season was at its height during my visit and the tributaries of the Narbada, which raged down from the hills and flooded the rice-fields during the monsoons, were reduced to dry water-courses winding through the withered and dusty jungle, with small shallow muddy pools at irregular intervals. When a few crumbs (dry biscuits are part of a pond-hunter's equipment out there) were sprinkled on the surface of one of these pools tight shoals of little fish appeared from nowhere, snatching desperately for the crumbs. Some of their more adventurous members actually wriggled an inch or so out of the water in the mud for some of the crumbs which had dropped there. They also enjoyed nibbling at my hands and feet as I pursued them with a net!

Tameness of Small Fish

The tameness of these little fish was typical of all the other kinds I came across with the exception of the wily Mud Skipper. Even the huge Mahseer, numerous in the precincts of most of the local riverside towns, could be made to "boil" the water like its tiny relations, for a handful of grain.

In Eastern India, the pond-hunting was much more exciting, though the climate is not conducive to long expeditions. There is little need for strenuous searching as in and around Calcutta all the "tanks" and little ponds, which are numerous, carry a fish population of all sizes and kinds, quite out of proportion to their size and depth.

Well-camouflaged Species

The prettiest inhabitants I saw here were the dainty *Aplocheilus panchax*, whose bright coloration blended perfectly with the marginal water plants. Three-spot Gouramies were common, too, feeling their deliberate way through the water-plants with no other apparent object than to observe the pond-hunter at closer range.

It was along the Arakan coast of Burma where the blue sea, white sands and green jungle exist in a hard contrast of colour, that I first saw the incredible Mud Skipper. This species is not often seen in Great Britain, but most aquarists will recollect that it is just as happy out of water as in it, and my first attempts at securing a specimen were futile—the fish just hopped away like grasshoppers out of

(*Continued next page.*)

Current News from Germany

Photograph] [*Paul Popper*

In the Spring of this year a number of electric eels arrived at Aquarium Hamburg from South America. Here one demonstrates its electric power by lighting up a special bulb.

BOUND VOLUMES OF WATER LIFE

VOLUME 9 of WATER LIFE covering the six issues published in 1954 is now available bound in stiff board covers with attractive green linen cloth binding. This volume is obtainable at a cost of £1 11s. 6d. by post. As supplies are limited, orders with remittance should be sent in as soon as possible to the publisher, WATER LIFE, Dorset House, Stamford Street, London, S.E.1.

the shallow water into the tangled mass of tree roots which line the small estuaries.

The natives use Mud Skippers as bait for the active silvery Catfish which seem to abound everywhere. It was just after pursuing the Mud Skippers that I caught a glimpse of a shoal of some tiny marine fish darting across a shallow pool in the sands towards the deeper water. They looked rather like Clown Fish, and their brilliantly defined vertical bands of colour defied description. The sight of this shoal of little gems made an indelible impression on me and now, whenever I have time to consider the possibilities open to the aquarist, I try and visualise the breathtaking spectacle of a tropical marine aquarium stocked with a shoal of these colourful fish.

Frogs in Large Numbers

Further south, in the Rangoon area, the drainage system of the paddy-fields in the monsoons provides endless amusement for the pond-hunter. As well as many kinds of small fish there are frogs of all sizes and with strong voices, not to mention land crabs. Striped and other small Gouramies were common and, here again, the natives catch them in quantity usually by means of pushing a net, like a shrimping-net, along the ditches which are filled with water of a lentil-soup consistency. The muddiness of water is universal in the monsoon areas, and a glassful of water from any river during this season, if left to stand, produces an inch or so of sand and silt. The fact that fish can live at all in the water is a source of wonder to the newcomer, especially if he is an aquarist who siphons off the residue from his aquarium once a week !

Guppies are commonly introduced into wells, tanks and waters in India to carry out their role as destroyers of mosquito larvæ. They seem to thrive in the worst possible conditions (from the aquarist's point of view, anyway), and I saw some in a well a few miles from the snow-capped foot-hills of the Himalayas, where the night temperatures must have been uncomfortably low for them.

Variation in Conditions

In fact, all the fish I saw in their natural state seemed to be thriving, in spite of the very rigorous conditions prevailing in most cases. I think it may provide food for constructive thought if the aquarist considers just what conditions his tropical specimens would have to endure in their natural state. Firstly, there is the considerable fluctuations of day and night and seasonal temperatures. Though this would not apply to those fish from equatorial regions, India lies wholly north of the Equator, and, in Winter, it is decidedly chilly in the early morning. Also the seasonal monsoon lasting three or four months causes the water level to rise everywhere and the small fish live in the thick muddy flood waters which lie over the surrounding countryside, no doubt well supplied with suitable food. The dry season brings the conditions that I have already described. It should be realised, too, that if undisturbed, most of these small fish live in very shallow water, just a matter of a few inches.

As the science of the culture of tropical fish species progresses, I think more attention will be paid to the conditions experienced by the fish in Nature. Natural conditions are hard to simulate artificially, but I am sure this would be easier than trying to modify the instincts of the fish in question to suit the average aquarium conditions.

— Know Your Fishes —

No. 39. Dwarf Pike

(*Belonesox belizanus*)

Photograph] [*Dr. G. Aurell*

Because *Belonesox belizanus* prefers its livefood large the average aquarist is likely to look upon it as something of a brute. Two-inch long fish are eaten with relish, *Daphnia* are beneath the dignity of a mature specimen, and dried food is disdained by all ages. *B. belizanus* matches its carnivorous tastes with a belligerent appearance. Its mouth is large and offensively toothed and its eyes are prominent and unpleasantly alert. The fish's contour is very similar to that of a Pike, hence the popular names of Dwarf Pike, Viviparous Pike and Pike Minnow.

Colour is an uninteresting olive with a metallic lustre. The body is studded with small black dots, roughly arranged in lateral lines. The caudal fin base is graced with a large black spot.

B. belizanus is happiest in old water which has been made slightly saline. Its diet can consist of the larger aquatic insects and frog tadpoles, but live fish, of which it can consume a surprising number, must be the staple item if specimens are to be kept in top condition. Individual fish may be induced to take Earthworms.

Dwarf Pike, although members of the livebearing *Pœciliidæ* Family, are not so profilic as most other members we keep in tanks. The parent fish must be well-conditioned with ample livefood and the aquarium should be thickly planted to give the new-born fish a reasonable chance of survival. They are ¼ in. long at birth and will take *Daphnia* and White Worms as first foods. Well before a brood is produced the parent male fish should be taken from the breeding tank.

The females measure 6-8 in. when adult and the males, 4 in. Sexes can be identified in the typical livebearer fashion, by the males approaching maturity having their anal fin modified to form a gonopodium. A temperature range of 72-85 deg.F. suits them. Naturally, *B. belizanus* is quite unsuitable for community collections. Native countries of the species are British Honduras, Guatemala and Mexico.

From the aquarist's viewpoint, this fish represents the supreme so far as unusual livebearers are concerned, but no attempt should be made to keep it if ample, regular supplies of live fish for food are not assured. Without such creatures as the main bulk of its diet *B. belizanus* will soon present an emaciated appearance.

Class: *Pisces*. Order: *Microcyprini*. Family: *Pœciliidæ*. Genus: *Belonesox*. Species: *B. belizanus*.

Easily-bred Aquarium Jewels

Black Rubies or Nigger Barbs Suitable as Fish for Beginners

By S. J. Dadiburjor (India)

NIGGER Barbs (*Barbus nigrofasciatus*), or Black Rubies as they are sometimes called, are members of a very popular Family of tropical fish. All species belonging to the Genus *Barbus* are more or less docile fish and make satisfactory members of community tanks. They give gaiety and grace to an aquarium and are never sluggish in their movements.

Barbs are mostly careless and indifferent breeders, scattering their adhesive ova among water plants. In some species the spawning is a rather gentle and slow affair but in others it is conducted at a very brisk chase.

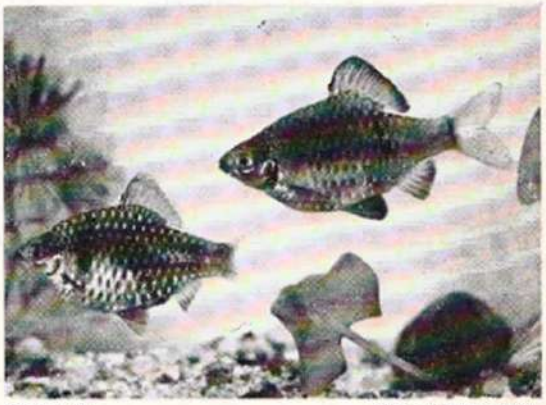
Barb fish enjoy livefoods but take prepared foods readily. They can withstand low temperatures, but for breeding and keeping them in best condition I think the temperature of the water should remain between 78-85 deg. F.

The Nigger Barb comes from Ceylon, where it is abundant. It is an ideal aquarium fish, being active, peaceful and easily bred. The mature males are extremely beautiful, especially when they move about the tank courting their mates. They then adopt the colour of a deep red strawberry. Their beauty is further enhanced by dense black in the fins. There is also a black suffusion over the fish and this combination along with the deep red colour, more intense in the forepart of the body, makes the Nigger Barb a real attraction and it can then be ranked among the most beautiful aquarium fish. This colour phase is only temporary, however, and the fish gives up its gay apparel when not in good condition.

Success on Each Occasion

I have been successful in spawning Nigger Barbs each time I have tried. For a spawning attempt I choose fish between 12-18 months of age. On several occasions I have found that aged males are of very little use as, when they breed, most of the eggs turn out to be infertile. I have observed that in old males the colours tend to become more fixed.

I condition my breeding pairs on livefood and oatmeal porridge to which has been added dried plankton and Bemax. When the females are loaded with spawn I set up a tank of about 30 gallons capacity, layer the bottom with well washed sand, and plant the centre of the tank with bunches of *Elodea*. The tank is always thickly planted but I leave a clear border of about two inches all round the perimeter, giving ample room for the fish to chase each other. The tank is filled with fresh water and, when it has settled down (which takes about two days), I introduce the breeding pair in the evening and the next morning the fish begin to spawn.



Photograph] [*G. J. M. Timmerman*

Male (upper fish) and female Nigger Barbs (B. nigrofasciatus).

The spawning is a very slow affair. The male chases the female and then he very gently coaxes her to enter the thicket of plants. At first she shams but then enters the plant growth with the male close behind her. She moves about searchingly amongst the plants and occasionally the underparts of the two fish contact and on each occasion 4-6 eggs are dropped. Being adhesive, they remain on the plants.

The spawning goes on for about four hours, during which period 200 or more eggs are distributed among the plants. After the spawning is completed the pair are removed to another tank. The young hatch in about 24 hours at an average water temperature of 80 deg.F. They are very small and are of a light amber hue. On the second day after hatching they are seen hanging from the plants and from the sides of the aquarium. Three days after hatching the young are free-swimming but remain on the bottom of the tank; a slight jerk given to the aquarium will reveal their presence.

Three Hundred Fish Result

From my latest spawning I have reared 300 Nigger Barbs in an aquarium of 30 gallons capacity. In this spawning I fed the young Nigger Barbs on cultivated Infusoria for the first few days. As the aquarium was thickly planted with *Elodea* some of the decomposing plants in the aquarium had set up an Infusoria culture for the young Barbs to feast upon.

When they were a week old I started feeding them on Mikro-worms. The young consumed large quantities of these and there was no irregularity in their growth. When the fish were about three weeks I fed them on large numbers of newly-hatched Brine Shrimps, the eggs of which I get from England, and on this food the young progressed quite satisfactorily.

At this stage I had to remove them to a larger tank as they were extremely overcrowded (though the water was aerated). Only then did I realise that in so small an aquarium I had succeeded in rearing about 300 Nigger Barbs from a single spawning. At the time of writing the young are about three months old and can tackle *Tubifex* worms.

Readers' Hints and Tips

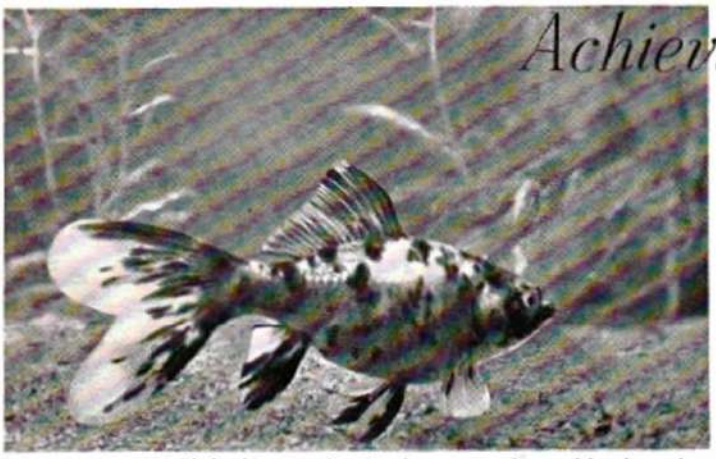
Preparing Food for Fish Fry

WHEN young tropical fish have reached a size at which Mikro-worms seem too small, catch any insects, beetles, flies, etc., and break them up well on a piece of glass. Care should be taken that no insects are used which have been subjected to insecticide spray such as D.D.T. Scrape off the chopped food with a razor blade and put it into a fine wire strainer held in the water of the aquarium. Stir it and small pieces will float out into the water. I use this method for all my young fish, but probably young Danios give the finest display when fed in this way.—(C. E. Cade, Nairobi, Kenya.)

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

Achieving Success when

Founding a Strain on Good
— Feeding Programme For



A Shubunkin reared under the system advocated by the author.

THE Shubunkin is, in my opinion, a very beautiful fish. Its graceful lines, active disposition in both aquarium and pond, and vivid coloration give great pleasure. Unfortunately, many fanciers who are anxious to breed this fish find difficulty in obtaining a presentable pair from which to produce stock. So many purchases prove to be expensive disappointments or the founders of indifferent strains. My experience shows that the answer lies in making personal contact—and this should not be impossible—with a reliable breeder who may be willing to part with good, but naturally not his best, fish.

After six or seven years of consistently breeding the Shubunkin, I am, at last, able to say that a good proportion of my yearly spawnings will consist of reasonable quality specimens. During this time my assets and equipment have consisted mainly of three small outdoor ponds, each having surface dimensions of roughly 7 ft. × 10 ft., and tanks ranging from 36 × 15 × 15 in. to show tank size, housed in a small conservatory facing south. In addition, I have several hatching containers, which were originally the domed glass covers for artificial wreaths; these are now inverted on rubber rings or beach quoits.

Activity During Winter Months

In North Devon, where I live, temperatures seldom remain below freezing point for long periods during normal winters, and ice is a rare occurrence on the ponds, consequently the fish remain active for most of the time, readily taking any food which may be offered to them, but feeding is not attempted when a trial morsel is declined.

Unless the weather is unusually severe, my fish breeding season commences in mid-January, with a slight increase of food for the adult Shubunkins in the ponds. My practice is to give sufficient to be eaten immediately, with no scraps left over to pollute the water. As much food as possible is given and the fish rapidly show signs of breeding condition.

I usually plan with April or May in mind as the spawning date, but spawnings could be obtained at least one month earlier. Sometimes it is not possible to have sufficient supplies of spawning plants available at this time. Willow roots are an excellent substitute, indeed the ideal medium, since they will last for several seasons and can be sterilised in near-boiling water with no signs of deterioration. My present collection of willow roots has been used for four successful, consecutive seasons, but I find them rather difficult to obtain and this year they will certainly need renewing.

As the time for selecting the parent fish approaches, the smallest of the three ponds is cleaned out and filled with new water, willow roots are floated on the surface and the chosen team of three is introduced a few days later. The breeding team usually consists of two male and one female Shubunkins selected for their slim bodies (particularly in the female) and bright coloration. These fish will supply the only brood of fry to be reared in that particular year.

Some breeders claim that they are able to forecast the time of a particular spawning a few days before the event, but I have never been able to do it reliably. My usual procedure is to watch the fish closely until driving occurs and then I expect to find a nearly completed spawning at breakfast time next morning. I make no special arrangements to be on the spot during spawning. By the time I arrive on the scene, the males are still much too preoccupied to have begun devouring spawn. As the fish begin to tire, the spawn-covered willow roots are removed to the hatching containers already filled with clean pond water, which is gradually brought to a temperature of 65-70 deg. F. The fry hatch in about six days, and the willow roots are removed when the fish are all free-swimming.

WINNING WAYS

Another fish bred and raised by Mr. Burns. The efficacy of his breeding programme is demonstrated by successes at shows. Apart from wins at many large coldwater competitions, including Bristol, the author also took first prize in the Breeders' Singletail Goldfish class at the 1955 WATER LIFE *event with a team of Shubunkins which gained 78 points out of* 100.

First Food for the Offspring

Feeding with old pond water and yolk of hard-boiled egg begins immediately. A piece of yolk the size of a match head is crushed between the finger and thumb beneath the surface of the water, whilst the hand is moved gently to and fro, distributing a fine cloud of egg particles over the whole volume of water in the bowl.

The hatching containers are cleaned every day and I find

Breeding Shubunkins

ack — One Spawning a Year Sufficient

Young Fish — Culling the Offspring

By W. J. Burns

a decorator's four-inch varnish brush invaluable, the bottom of the bowl being swept clean by gentle strokes down one side, continuing up the other side to above the surface of the water. Approximately a gallon of water is also siphoned off, to be replaced by pond water which has been examined for pests, the strainer of an old coffee percolator being fixed to the suction end of the hose to protect the fry.

Simultaneously with the fry becoming free-swimming, Brine Shrimp eggs are prepared for hatching in one pound jam jars, one third full of brine. Three of these jars are floated in each fry container to provide a supply of shrimps to supplement the egg yolk diet, four to five days after the free-swimming stage. The shrimps are removed from the jars by straining the brine through nylon stocking material, and fed to the fry by dipping the material into the bowls. Even partly hatched eggs seem to be eaten by the fry, and the residual egg husks which gather round the edge of the surface can be removed later with the varnish brush.

Progression to Mikro-worm Stage

Three or four days of Brine Shrimp and egg diet bring the young fish to the Mikro-worm stage, the shrimps being no longer required when it is apparent that all fry are taking Mikro-worms. Egg is still on the menu. Another three or four days elapse and *Daphnia*, sifted through a fine coffee sieve, are fed. Mikro-worms are discontinued as soon as possible and are replaced by Bemax sifted through the same fine sieve. During all these stages of feeding my rule is to feed the fry little and often, at least three times a day if the calls on one's time allow.

They will now be growing so rapidly that more room is required. It then becomes necessary to distribute them into the tanks, which are filled with slightly green pond water. Food includes White Worms at this stage. When definite coloration can be seen in the fish they are thoroughly culled, all the bronze, pink and deformed ones being removed and none but the best specimens being retained. Size is not a reliable standard to use when sorting, as often the best fish in form and colour are slightly retarded in growth.

Sojourn in Ponds for Summer

As the outdoor temperatures become steady, the fish are settled into the ponds, where they will remain until Autumn. Intensive feeding continues right through the Summer, using *Daphnia*, chopped ragworms, White Worms, Bemax and porridge. A crust of brown bread is always floating on the pond surface and the fish feed from it continually. Growth during the Summer is always astonishing, and appetites even more so. I find myself wishing for snake-sized worms!

With the approach of colder weather the young fish are brought indoors to spend their first Winter, but no heat is used. Some will have grown to twice the size of others, making it necessary to sort for size as well as quality, the best being retained, whilst the fish of lower, although reasonable quality, find their way into the hands of genuine local enthusiasts.

The following Spring sees the young Shubunkins returned permanently to the ponds, where they continue to grow rapidly, often reaching breeding condition by midsummer, when spawnings may take place unchecked. No attempt is made to save the eggs, as fish of two years or more have already been selected and mated in the Spring.

Feeding is of great importance, and one final word on this subject may not be out of place. The necessity for livefoods cannot be over-stressed, as it is these which keep the fish in perfect condition and produce slim, well-shaped specimens. Earthworms are used only for the older fish and are not too easy to find. Ragworms are taken from the mud banks of the River Torridge and when chopped are ideal for small fish because of their soft and tender meat. Prawns, boiled and chopped, together with raw, lean beef, help to vary the diet. Mikro-worms are bred on porridge over which has been sprinkled baker's yeast—the latter greatly improves the culture. The worms are taken from the porridge on inch-wide strips of wet brown paper, which have previously been laid on its surface. White Worms are bred in grocer's large biscuit tins, half full of wet earth, using dog biscuits as food.

Dangers of *Daphnia*

It seems inevitable that, when live *Daphnia* are used, gill worms will be introduced into the tanks. If the situation is accepted, and Dettol baths are given to the fish, with care being taken not to overdo them, their health will not be affected. The only other medicine used on the fish is sea salt for slight fin congestion, their condition being generally so good that catastrophes are usually avoidable ones, such as those resulting from the inadvertent use of chlorinated tap water.

I use no scientific methods in breeding, but rely solely on good feeding, and good matching; there is nothing up my sleeve.

The Shubunkin has brought me into personal and postal contact with many grand and enthusiastic fishkeepers in different parts of the country. It is a fish worthy of all the perseverance and time one can give to it and that, as I have found quite recently, brings its own reward.

Photograph] [L. E. Perkins

As soon as outdoor temperatures stabilise, Mr. Burns puts his young fish into ponds, continuing to supply them with ample food throughout the Summer. Prior to cold weather setting in they are brought into indoor tanks for their first Winter. The following Spring they are returned to a pool and kept there permanently unless selected for breeding in subsequent years.

More Observations on Barbels

They Could Prove Good Pond Fish Says Mr. W. J. Howes

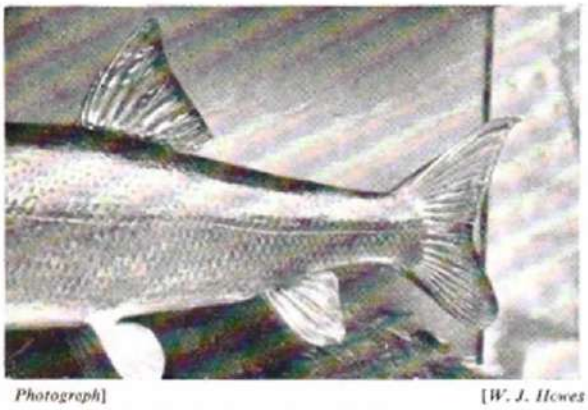
THERE can be no doubt that the recent article on the Barbel by Mr. N. E. Perkins (p. 28, February-March, 1955, issue) was extremely interesting to those who study water life and our native fish in particular. Attention has now been drawn to a peculiarity in the Barbel which has not, apparently, been previously mentioned. The first move to be made after reading this contribution was to my book-shelves, where I searched thoroughly and came to the conclusion that Mr. Perkins was correct in his assumption that this peculiar feature had been completely overlooked by the eminent ichthyologists of the past.

Nevertheless, it is possible that certain specimens examined by the ichthyologists possessed caudal fins which were slightly tattered, causing the unequal shape to be attributed to the constant movement of the tail fin on the gravel bed of a river.

However, since learning of this uneven design of the Barbel's tail fin, I have inspected a number of excellent specimens and all have shown the same extension of the upper lobe. Fish from the rivers Thames, Kennet and Avon were subjected to close observation. Now it would be interesting to see if specimens from any other notable Barbel rivers are similarly shaped.

The rounded lower part of the Barbel's powerful tail is in keeping with the fish's scoop-like lower fins which, when in action, give it a terrific driving force, for the species is one of the fastest of our freshwater swimmers.

It does appear quite reasonable that when the enlarged upper lobe to the caudal fin is in use it would tend to force the fish's head down to the bottom. Being an angler as well as an aquarist, and with a great respect for the Barbel's sporting qualities, I had always believed that its ability to

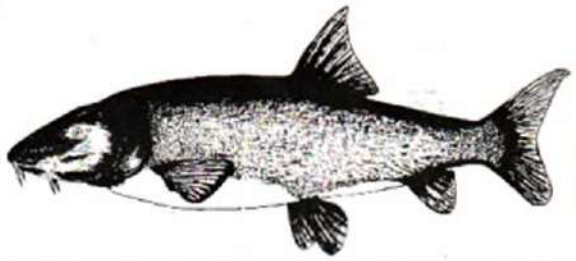


Photograph] [*W. J. Howes*

Barbel (Barbus barbus) *caught in the River Kennet. It shows uneven development of the tail fin and thickened margin to the dorsal fin first referred to on p.* 28 *of the February issue.*

stay close to the river bed was due to the slope of the head. The Barbel's long snout makes the head more or less pointed, creating a steep curve from its dorsal fin to the end of its nose, which forms an ideal shape for the fish to cleave a way through very fast-running water.

The Barbel prefers that part of a river which flows strongly and the water of a weir stream is one of its favourite haunts. The curve to its head also enables the Barbel to remain on



the bottom for, when hooked and on the bottom, the flow of water holds it there and it is extremely difficult for the angler to lift it. Another feature of the species is its high dorsal fin, the leading ray of which has a sharp saw-like edge.

Its boldness and powerful fighting capacity make the Barbel a worthy quarry for the angler, but owing to the nature of a typical Barbel haunt and also its moody feeding habits, it is a difficult fish to catch. The love of well aerated water makes the Barbel an unreliable inmate for aquaria; in fact, well-known public aquariums have tried on several occasions without much success, nevertheless, there is a wide field for experiment here by pondkeepers.

Obtaining Suitable Fish

A request to an angling friend may result in two or three small Barbels for the garden pool, and, if suitable specimens are introduced, they will appear to settle down fairly well. The garden pool fitted with an aerating apparatus should suit *Barbus barbus* perfectly.

While Barbels weighing 3 to 6 lb. are about average, 10-pounders are not rarities, and although the record rod-caught fish weighed 14 lb. 6 oz., larger specimens have been known, including one of 16 lb. 4 oz. hooked and returned to the River Avon (Christchurch) during the close season in 1931. It has, in fact, been mooted that a twenty-pounder is a possibility !

It is doubtful if they will breed in captivity, the main drawback being the large size of adult fish. Then there is the problem of sexing, although it would be comparatively easy to distinguish the sexes in the breeding season. During the Winter they are, in their native element, semi-hibernators, so the chance of catching a few with the hope of obtaining a pair approaching breeding condition seems fairly slim. But, as the weather improves, shoals of Barbels start moving to the gravel shallows where spawning takes place about May. It is then the "closed season" and catching them in that period is a punishable offence !

Large Pools Required

However, if given a reasonably large pool, and the fish introduced are small, there is every possibility that the Barbels will adapt themselves to pond conditions, and live and thrive for a long time. They make interesting pond fish and are of splendid colouring. Fish from bright gravel swims are a beautiful golden brown on the back, shading down to gold on the sides and to a white abdomen, while the fins on the lower part of the body are tinged with red.

Almost all fish will, of course, eat other fish, and even Barbels are not averse to small fish, so care should be taken to remove any specimens tiny enough to be swallowed.

Barbel are like immense Gudgeon, and will normally feed on the same kind of food, although a much larger quantity will be required as they have enormous appetites. They are bottom-feeders, indicated by the ventral position of the mouth, from the corners of which hang four barbels or feelers and, whilst they are fond of water-snails, worms, maggots, freshwater shrimps and various other aquatic insects, they are even more fond of Earthworms. These latter may either be fed whole or broken up.

Diversion for Hospital Patients

Northenden Society Follows the Pattern of Many Others in Maintaining an Aquarium at a Local Hospital

By John Wakefield

DURING a recent holiday in Denmark, I was shown round the Sindssygehospitalet in Aarhus, the oldest of Denmark's mental hospitals. In the airy and colourful outpatients' waiting room, I noticed a large aquarium, lavishly planted and stocked with Swordtails, Platies, Mollies and Guppies.

In it was no fish rare or difficult to keep. As the friend who was showing me round, a psychiatrist on the staff of the Sindssygehospitalet, pointed out, the tank had been designed and installed with ease of upkeep foremost in mind. He was not prepared to make any sweeping claims for the therapeutic value of such tanks, but was convinced of their usefulness as a welcome and pleasant diversion to occupy the minds of patients awaiting examination.

This tank in a Danish hospital reminded me of another in England—at the Christie Hospital and Holt Radium Institute in Manchester, where I work. Acquired in 1951, this 36 in. × 15 in × 12 in. tank suffered from the beginning from more than its fair share of teething troubles. The thermostat went wrong soon after it was set up and next the heater failed, followed, soon after, by the pump. To cap everything, a mysterious bacterial infestation turned the water into a filthy, slime-covered, yellow-brown mess that obscured everything, killed off plants as fast as they were put in but, curiously enough, seemed to harm the fish not at all.

Help in Refitting

A local dealer in aquaria and tropical fish, Mr. V. Hollinghurst, of Denton, kindly loaned a smaller tank, gave new plants to replace the old and helped financially with the replacement of faulty equipment. The large tank was emptied, scrubbed and given a lengthy period of ultra-violet irradiation to ensure complete destruction of those persistent bacteria. Replaced, restocked and a nice balance achieved, it was installed on a wall-shelf erected by the hospital carpenter in a prominent corner of the Outpatients' Hall.

The tank has excited a good deal of interest amongst patients and visitors. It was, in fact, at the suggestion of an ex-patient that the Northenden Community Association Aquarist Club offered to "adopt" the tank about a year ago. Various members of the hospital staff had been helping to look after the fish, but all had their own jobs to do in other parts of the building and none was an expert in tropical fishkeeping. The Northenden Club's offer was therefore accepted with gratitude—and more than a little relief!

Photograph] [F. Wardlaw

Tank set up in the Christie Hospital, Manchester. Box beneath the aquarium contains aerator and light and heat switches.

I spoke recently to the Northenden society's secretary, Mr. E. Almond, about what his members have done so far. "We found," he said, "that the fish were being fed rather too often and that the lighting was too strong. Since correcting these two faults, the tank has given little trouble. We pay regular visits to clean the tank and do the routine jobs of maintenance. Some of our members have given spare plants to furnish the tank and others have provided fish from time to time to replace losses."

Mixed Collection

At the moment, the aquarium contains a good assortment of Angels, Tiger Barbs, Guppies, Platies, Scissortails, Zebra Danios and a pair of Head-and-Tail Light Fish. One of the Scissortails has turned out so well that it was entered in the Northenden Club's open show this Summer. Unfortunately, no one was available to collect and stage the fish on show day, so we must await another opportunity of seeing how it will fare in open competition.

The Club has recently been considering whether it would be possible to buy, plant and stock another tank for presentation to the Children's Ward at the hospital. The matter will probably be taken up later with the hospital staff to see whether a suitable place can be found in the ward where a tank would be easily seen by the children, but safe from the too vigorous investigations of small hands.

Supplying a Need

"We know that many other hospitals would like to have tanks of this sort," Mr. Almond told me. "Often they hold back only because there is no one with the time and expert knowledge on the staff. We feel that this is a valuable and rewarding service that other clubs might undertake in their own areas. It is not enough to present a tank and leave it at that; it is even more important that the club should arrange to maintain the tank and restock it as necessary."

I know from day-to-day experience how much pleasure, amusement and diversion the aquarium has given to outpatients at the Christie Hospital—and to the nursing staff—and how much it has done to relieve the tedious, but unavoidable, spells of waiting that treatment involves. I know, too, of two or three people now keeping tropical fish in their own homes, whose interest was first aroused by seeing the large tank on a visit to the hospital.

The Northenden Aquarist Club and the many other societies all over the country who donate and maintain tanks in hospitals are giving a real service to the many who have the misfortune to need hospital treatment and, at the same time, they are helping to introduce this fascinating hobby to a wider public.

Photograph] [F. Wardlaw

A corner of the Christie Hospital tank with Cryptocorynes and Angel Fish.

FOR THE YOUNG PATIENTS' PLEASURE

Last Christmas Wembley A. & P.A. (now combined with the Wembley A.S. to form Wembley & District Aquarists' Society) presented a tank to children of Princess Elizabeth Ward (Wembley Hospital). Here the Mayoress, the Mayor of Wembley, the Ward Sister and a young patient inspect the tank.

Photograph by W. Roberts.

WATER LIFE Quiz

SOME time ago WATER LIFE Quiz No. 2 was issued and copies were distributed to societies then in existence. Many new clubs have since come into being and if they would like to receive a copy of the questions and answers a postcard should be sent to The Editor, WATER LIFE, Dorset House, Stamford Street, London, S.E.1. Fresh supplies are now available and a set will be sent to them without charge.

There are 36 questions and answers and suggestions are given on a method of scoring. If your society has not yet enjoyed a quiz programme, using the information given as a basis, then send for a copy of this Quiz immediately.

Migratory Instincts in Fish, Reptiles and Amphibians

How Do the Creatures Find Their Way? — What Forces Give Them Guidance?

By Alfred Leutscher, B.Sc.

Photograph] [*H. Bastin*

Common Toad (Bufo bufo). *The species chooses a particular pond for its breeding regardless of the hazards in getting there.*

SINCE earliest times, man has been fascinated by the mysterious seasonal comings and goings of wild things. Literature is full of references. Even so, the mystery of how creatures find their way and what directs them is still as deep as ever.

Migration simply means a "movement from place to place." A naturalist defines it more rigidly as "a movement from a breeding area to a non-breeding area." Many birds migrate to Britain. It is like a shuttle service, for when one lot arrives another batch leaves.

Even more remarkable are the feats of insects and on no less an impressive scale are the journeys of butterflies. Among mammals, some bats are known to migrate; Lemmings undertake strange, almost suicidal, migrations; large hoofed animals have been known to make vast seasonal movements.

Migrants travel by air and land, even by water, and some of the sea journeys are spectacular. We know that migration takes place in almost any direction. It may be long or short and is usually regular and seasonal. What is not known, is how the migrant finds its way. Does it follow certain landmarks, or is the journey learned by following an experienced traveller? Is there some magnetic or other force which guides it?

The migration of reptiles, amphibians and fish is no less intriguing, particularly the remarkable journeys made by the salmon and eel and the turtle and toad.

Atlantic Salmon

The life of the Atlantic Salmon (*Salmo salar*) can be divided into two phases; one is in the sea and entirely devoted to feeding and growth; the other is spent in rivers and concerned with reproduction. Salmon may enter rivers as early as January, although in some so-called "late" rivers this may be delayed until well into the Summer. The journey is full of hazards and danger. There are many enemies to avoid, such as the parasitic Lamprey, itself a migrant, the shark, seal, otter and heron, not to mention human enemies, whether legal fishermen or not. Severe drought in Summer may hold up the journey, or heavy rains may swell the current, making progress over rapids and weirs difficult.

The goal, if reached, is a mud-free bed of gravel over which flows clear, cool water richly aerated with oxygen. Here the female fish will construct her nest or redd. To find this spawning site, the matured Salmon show an unerring sense of direction. At each fork in the river system they know which branch to take and, if a mistake is made, they return and go up the proper tributary followed by their predecessors on earlier occasions.

These splendid fish are at first sleek and fat with food reserves built up during their sojourn in the sea. Much is used up on the journey and in swelling of the reproductive organs. In a mature female the ovaries and eggs may account for as much as a quarter of her entire body weight.

The spawning behaviour has now been filmed. A "studio" was built on the banks of the Cheshire Dee, so that it was possible to study the salmon through a plate-glass window overlooking the gravel bed of the river. In the film, taken by Dr. J. W. Jones and Mr. G. M. King, one sees, within a few feet of the camera, the female building her nest. Facing the current, she turns over on her side, and with vigorous flaps of the tail-fin, churns up the water so that pebbles and stones are lifted to each side by suction pressure. The trough of the redd so formed may be a yard long and a foot or more deep. In this she lies, and pours out hundreds of pinkish eggs which sink between the stones.

From time to time the attendant male shoulders her aside, and pours out the creamy milt to fertilise the eggs. He may be recognised, at this time, by the curious, curved hook to his lower jaw. Much of the milt is wasted, as the current sweeps it away.

Now an interesting thing happens. One sees a number of tiny male Salmon in the "parr" stage, darting in and out of the redds, in the act of assisting in fertilization. They easily avoid the clumsy attacks of the large male fish, and can also slip under the bellies of the laying females. In this way Nature sees to it that as many eggs as possible will become fertile.

Spawning is a late affair, taking place in November or December as a rule. When it is all over, the spent parents, lean and ugly after their exertions and known as kelts, attempt to regain the sea. Those that do will recover, and may make a return journey another season.

Meanwhile the eggs hatch out into tiny alevins, each provided with a store of food in the yolk sac, and remain hidden from enemies among the stones for some weeks.

When strong and active, each alevin turns into a beautiful, iridescent little fish, called a parr. This remains and feeds in the stream but, on reaching about two years of age, a change in colour and habits takes place. The rainbow colours are replaced with a silvery dress, and the youngster begins its journey towards the sea. Known as a smolt, it seeks out the salt water in which to grow up. One day it will return, like its parents. The parr seen in the previously-mentioned film are believed to be specimens which reach maturity before leaving the rivers, and which return to the redds at an early but matured age.

Common Eels

Exactly the reverse takes place in the migration of the Common Eel (*Anguilla anguilla*). For centuries its life history remained a mystery—nobody had ever found an Eel with spawn, mating was unknown, and no eggs ever seemed to hatch. The birthplace was also unknown. Aristotle believed that Eels arose out of the mud in ponds. Others said that the elvers fell out of the tails of drinking horses. Another suggestion was that Eels were viviparous, an idea which probably arose from the discovery of parasitic worms in the Eel's intestine.

It has long been known that Eels in good condition may be caught in rivers during Autumn on their way to the sea, and that the baby elvers congregate in large numbers in Spring along the coast, and make upstream. It was left to a Danish marine zoologist, Professor Schmidt, to fill in the gap. In the many samples of sea life which he used to collect out in the Atlantic, he found a number of tiny sea-creatures, called Leptocephali,

Photograph] [*S. Crook*

Salmon in turbulent waters as they obey their migratory instinct and swim up river.

a word meaning "small heads." In 1896 these small, transparent and leaf-like animals were shown by two Italian zoologists, Grassi and Calandrucio, to be undoubtedly the larval stage of the Eel.

Knowing this, Schmidt was puzzled to find that his catches varied in size, and that the further out into the Atlantic he found them, the smaller they became. He then realised that the Leptocephali were, in fact, at different stages of growth, according to the point which they had reached in their long journey across the Atlantic. It is now known that the adult Eels make their way oversea to an area known as the Sargasso Sea. Here, in early Spring, they mate, spawn and die, never to return.

After some months the baby Leptocephali reach the surface. They are then one inch long. By the next Summer, at two inches, they are in mid-Atlantic. In the third Summer, at three inches, they have reached the European coast, after a journey taking nearly three years. In the third Autumn they have changed into the familiar rounded and transparent elvers which swarm around our coast every year. Places like Gloucester were once famous for the "Eel Fayre," an annual event when millions of elvers were trapped for food as they ascended the weirs across the Severn, resembling moving sheets of silver.

The American Eel has a similar migration, but in this case the return journey by the larvæ takes only one year, since they have not so far to travel. One wonders how these tiny creatures know which way to turn.

Tropical Turtles

Turtles, although strictly aquatic, must return to their ancestral birthplace in order to lay their eggs. This takes place at night. Under cover of darkness, along some lonely tropical shore, the female emerges from the sea to clamber laboriously up the beach. In the sand above the high tide mark, she uses her front flippers to throw up the soft sand, making a shallow pit. When deep enough she then scoops out a hole at the bottom, using her hind flippers in a careful and delicate fashion for so clumsy an animal. Each flipperful is carefully scraped out, then flicked to one side. Into this nest up to 150 rounded eggs may be laid. Finally the sand is thrown back over the eggs, and the exhausted mother slowly drags herself back to the sea. Turtle egg collectors can easily find these nests by following the creature's footprints. Where they end a thin stake is pushed into the sand, and if it comes out sticky, a nest has been found.

After a slow incubation of some months in the warm sand, the babies eventually struggle out, and make at all speed for the water. Even though this is hidden from view they seem to know the right direction to take. Many are caught on the way by sea birds who wait in ambush.

Occasionally turtles are washed up on the British coast. These have probably been caught in a westerly sea current, and have been carried "off course." They really belong to the Tropics.

Toads are well known for their particular choice of ponds in which to breed. The Common Toad (*Bufo bufo*) does this and, where its route happens to cross a roadway, many of the travellers are run down by cars. It is difficult to understand why certain ponds should always be chosen, and how the toads manage to find them each year.

During Summer the creatures are scattered over the countryside, then they retire underground for the Winter. After hibernation, they all begin their move towards the pond of their choice, which is usually some time in April. They converge from all directions, but tend to take the easier paths, along ditches, roadways and along water courses.

Mr. H. J. Moore, a schoolmaster in Dorset, has done some interesting work on this. With the help of his schoolboys, and by going out after dark with torches, migrating toads have been followed and the routes worked out. Sometimes a toad would stop, raise itself on to its legs, and give a fixed stare as if to work out its whereabouts. Many came down from the hillside behind the nearby village, marched down the main street, along the gutters, then crossed a main highway to reach the school grounds, and the lake inside. Many never got across the road because of the traffic. There is a great deal still to be known about these strange comings and goings of the wild animals. The biggest mystery seems to be the sense of direction, which might be called the "homing" instinct, possessed by all living beings to a lesser or greater degree.

Current Research

Sperm Competition in the Guppy

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

IN a previous instalment of Current Research (February-March, 1955, issue) we dealt with the work of Dr. Hildemann, then at the University of Southern California, on the effects of sex hormones on the secondary sex characters of the Guppy, *Lebistes reticulatus*. In another important paper, prepared jointly with Dr. Edward D. Wagner, that has appeared in the *American Naturalist*, Vol. 88, pp. 87-91, Dr. Hildemann has produced evidence of interspecific sperm competition in the same species.

It has long been known that females of the ovoviviparous Pœciliid fishes retain viable sperms within the ovary for many months. As many as eight broods of young (at about 30-day intervals) from one female have resulted from exposure to a male for only a day or two. When a second male becomes involved, the question arises as to what proportion of the next offspring is due to the more recent fertilisation.

In earlier studies, Winge concluded that, in *Lebistes*, the old sperms cannot compete with the fresh ones and that, ordinarily, a mixed brood is only obtained when both males are together with the female at the same time. Vallowe, in a series of matings of Xiphophorine fish, has found that, after a female has been fertilised by a male of either the same or a different species, sperm from a second male can also fertilise ova which are in the same broods. Much variation in the proportion of offspring due to either male was observed by him. Other workers have found, however, that interspecific sperm competition appears to be a significant factor as a sexual isolating mechanism between different species. Mixed sperms give primarily offspring of the species of the parental female, rather than hybrids, when artificial insemination is employed.

As long ago as 1937, Turner, in an extensive study of reproductive cycles in Pœciliid fishes, found the fertilisation of a group of ova in *Lebistes* taking place eight days subsequent to the birth of the previous brood. Further observations indicate that all ova of a group were fertilised within two days; embryos developed during the next 20 days and were then voided. This constituted the typical 30-day cycle. Other workers have stated that ova are fertilised from 9 to 12 days after the birth of a previous brood and that about 20 more days are required for gestation.

It has been reported, also, that there is an autogenous rhythm of four to seven days in the œstrous cycle of female *Lebistes*, which would explain the lag in successive fertilisations noted. It is apparent that any male copulating with a female within a week of the birth of a previous brood would be likely to father offspring in the next brood. Whether sperm from a second male *Lebistes* introduced to a female within a few days after bearing young would in all cases succeed over sperm already waiting in the ovary, was a question that led Drs. Hildemann and Wagner to the present series of experimental matings.

Fish Used in Experiments

For their studies three xanthic mutant phenotypes of *Lebistes*, viz., cream, blond and gold, each affecting overall body coloration and recessive to the wild-type, were employed. Matings were made of mature virgin females paired to males of the same strain. Males were removed after about 20 days in each case. After birth of the first brood, offspring were removed and a male of a dominant phenotype, homozygous for body colour genes, was introduced for about 20 days. Offspring of the second brood due to either male could readily be identified at birth. Male contact for a period of a week or less in each case would probably have been sufficient to effect fertilisation.

They quote the results of earlier workers who found that inseminations were not effected during the commonly observed non-contact and momentary contact thrusts, but only when the female specifically halted in her swimming. They feel that this is probably the reason why Vallowe failed to get broods of *Xiphophorus* by attempting to mate a female with two male fish in rapid succession. In their experiments, no attempt was made to mate virgin female *Lebistes* with two males in rapid succession, or to administer mixed sperm by artificial insemination. They admit that pairing two males successively with a virgin female for eight days each (completed œstrous cycles) might give results different from those they actually observed in the second broods in a series of matings, since both groups of sperm would have been stored for some time when the next ova became mature following gestation. These aspects remain to be studied.

As expected, all offspring of the first

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Current Research

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broods were of the parental phenotype. The second broods derived from the four cream females gave variable results. In two instances none of the offspring came from fertilisations by sperm of the second male. It is possible that both of these males were infertile, but more likely that their sperms were weaker or less numerous than that already stored in the ovary. In some of the matings, however, the sperm from the second male dominated completely.

The cream females died before additional broods were born. Lack of hardiness and reduced longevity are characteristic of this double recessive mutant. Matings with the four blond females provided much better data on sperm competition. In the second broods, sperm from the second male predominated in three cases and fertilised all ova in the fourth. In one of the matings, succeeding broods showed that the sperm of the first blond male gradually excluded those of the second male until only blond offspring were produced in the fifth brood. In the remaining two matings involving gold females, one female died early, while sperm from the second male completely succeeded over those of the first male in the final mating.

These matings indicate that sperm competition within this species does not always mean complete success for sperm from the more recent copulation, even though this is often the case. Rather it is probable that sperm competition depends upon the potency of the individual males. Hildemann and Wagner conclude, however, that with sperm from two sources of similar potency, the fresher ones will predominate in fertilising the ova.

Variation in Cycles

A comparison of the mating dates and birth dates showed that there was considerable variation in the reproductive cycles of females even when under similar living conditions. Although two of the cream females were placed with males at the same time, there was a difference of 20 days in the birth date of the first broods. The males were always eager to copulate. Hildemann and Wagner feel, however, that variations in the reproductive cycle probably had little effect on the sperm competition.

Hildemann and Wagner conclude that, from a practical standpoint, it is apparent that geneticists and fish breeders working with *Lebistes* or other ovoviviparous fishes, should use virgin females in all matings where pure stocks are important. Otherwise, distinct colour markings might be used to segregate offspring of non-virgins when the phenotype of the original male(s) is known with certainty.

Personality Among Coldwater Fish Fanciers

Photographs] [L. E. Perkins

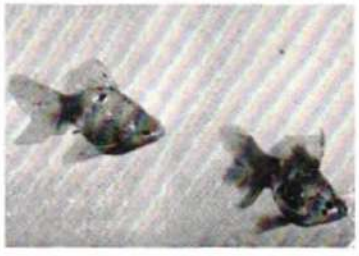
Mr. S. J. Freeman and Mr. E. G. Weatherley, inspect a young Twintail Goldfish.

SOME time ago, we visited Mr. S. J. Freeman, well know to the fraternity of Goldfish fanciers for his connection with the Goldfish Society of Great Britain since its inauguration and also his keen work in conjunction with WATER LIFE shows and other aquaria exhibitions.

When we arrived, he was discussing with Mr. E. G. Weatherley, technical director of the G.S.G.B., the results of an experiment they had been conducting jointly concerning rearing Twintail Goldfish exclusively on dried food from birth. Mr. Freeman's contention is that he has had no further trouble with flukes and diseases to which his fish were once prone. Introducing livefood to aquariums and ponds, he says, must result in subsequent attacks from other forms of life collected with the living creatures.

We were shown (and later had photographed) some one-year-old Twintails which had received nothing but dried food since they hatched and which had been bred from parents reared on an exclusive diet of dried food. Advocating deep water for better body development, Mr. Freeman transfers his young fish to one of his outdoor ponds after they have spent their first twelve weeks in tanks. His tanks, all served by a system of continuous filtration, are housed in two tiers in a glass topped fishhouse measuring 9 ft. × 6 ft. × 10 ft. high. The floor space is almost entirely comprised of concrete ponds.

In addition to his avid keenness for his fish hobby, Mr. Freeman is an assiduous gardener with a large garden to keep in trim and we left him carrying with us the impression of a man with an extremely busy spare-time programme. Even so, he has subsequently had time to build new ponds and we hope to publish an illustrated article soon describing their construction stage by stage.



Two one-year-old Twintails fed solely on dried foods. Their parents were fed similarly.

Aquatic Press Topics

Commercial Interests in Our Hobby

HAPPILY, we in Gt. Britain do not regard our aquaria traders as a race apart, to be looked upon with suspicion. Regardless of their other services—and they are many—we are well aware that without new imports of fish received periodically, our fishkeeping would lack something of its savour. However, some Continental fishkeepers take a different outlook and certain aquarist societies refuse to allow dealers to become members. Mr. M. Meinken mentioned this in a talk he gave at the annual meeting of V.D.A., a German organisation.

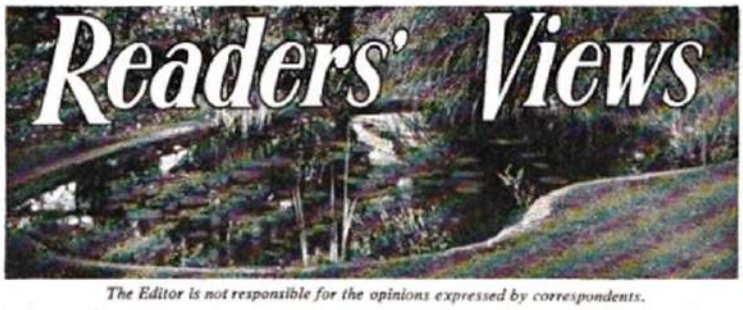
Continental Viewpoint

The text of his lecture is given in THE WORLD AQUARIST, official organ of the World Federation of Aquarists. Mr. Meinken went on to say that "a successful breeder was, to numerous aquarists, a rather unattractive and secretive person; a dealer, however, was liable to be thought a much more objectionable aquarist." That is potent condemnation by any standards and it is to Mr. Meinken's credit that he wholeheartedly refuted it and added, "All aquarists, without an exception, ought to recognise the service done to their hobby by the traders, retailers and importers who are willing to take considerable risks. There are few, if any, importers who amassed a fortune by their trade. Total and quite undeserved failures are numerous . . . The various kinds of aquarists are united by a common tie. They live in symbiosis, dependent one on another, and they might very well realise that prosperity in one group has a beneficial effect on the other."

Reviewed by **L. W. Ashdown**

With those sentiments we are in complete agreement. Occasionally the wrong type of person tries to break into the aquaria trade, but if he fails to give satisfaction the answer is simple. Soon he will seek more lucrative fields and his loss will not be mourned. By and large we are as proud of our organised trade as we are of our hobby. Its service goes a long way to making fishkeeping the pleasant pastime that it is.

A RESOURCEFUL youngster many years back was Bill Fahey, now President of Ashuelot Fin Club, New Hampshire. He got his first fish, a couple of small Swords., from another youthful aspirant, leaving this last-named to explain to his mother that the two fish had, alas and alack, given up their earthly life. Astute fellows, these two! Bill Fahey, returning to his apartment, had to solicit the co-operation of his own mother. This took the form of heating up the oven each evening. After turning off the source of heat the fish were popped in for the night and were thus provided with the necessary nocturnal warmth. Strange to say, they lived and thrived. From these unorthodox beginnings, Bill Fahey became a dyed-in-the-wool fishkeeper and he has now made fishes his livelihood. He relates his story in THE TROPICAL FISH MAGAZINE (U.S.).



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

WHY NO FISH?

SIR,—In the gardens section of the *Daily Mail* Ideal Home Exhibition were many attractive and thoughtfully designed gardens, a number of which featured ponds. Not one single pool was furnished with either plants or fish and consequently did not "live." The same has been noticed in connection with Chelsea Show, the annual three-day event of the Royal Horticultural Society.

In the majority of cases, the gardens on view have been constructed at considerable expense and it seems a pity that the effect should be spoiled by such an oversight. The cost of furnishing a pond would not be unduly great in proportion to the cost of the *tout ensemble*.

Surely here is a matter which could be rectified if taken up by some such body as the Pet Trade Association or the Goldfish Society of Great Britain. I also seem to recall that the Federation of British Aquatic Societies were recently seeking means by which interest in the hobby could be furthered and it would appear that here is a first-rate opportunity of publicising the keeping of coldwater fish.

J. SEYMOUR,
West Wickham, Hon. Secretary,
Kent. Croydon Tropical Breeders' Circle.

SELECTIVE FIN ROT

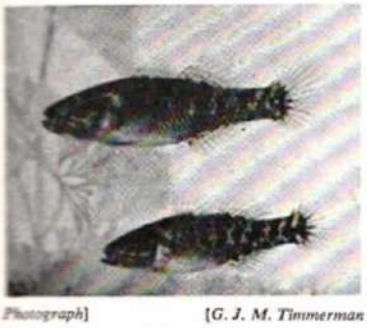
SIR,—I should like to thank your correspondent, Mr. J. Corvelli (February, 1955, issue) for his interest in my letter on this subject (December, 1954, issue), and his suggestion as to what the trouble really was. Is this, however, "Tiger Barb Plague," as it has been called? If so, I must indeed plead ignorance.

Having seen a number of instances of the disease peculiar to this species, I would explain that there were several points of apparent difference in the disease which I described. Firstly, in my experience of Tiger Barb disease, I have never been aware that it will attack other species of *Barbus*, at least so severely. Secondly, is not the Tiger Barb disease a somewhat protracted one, never rapidly fatal? I have seen many cases in which the fish lived for many weeks, and then died apparently of starvation, due to degeneration of the alimentary tract. One could plainly see the intestinal inflammation whilst the fish were still freely mobile, and their bellies usually became concave.

Maybe Mr. Corvelli and I are discussing totally different Tiger Barb diseases. The fin-rotting disease which I described attacked all *Barbus* species in the tank, with rapidly fatal results, and all were mature fish, or practically so. In some cases there was very little obvious damage to the parts; only very slight fin destruction, and no other signs of disease, but the fish were undoubtedly dead.

Finally, I should like to say (and, of course, Mr. Corvelli could not be aware of this, from my previous letter) that after all Barbs had been removed from the tank, the disease was quiescent for about three or four weeks, and then vigorously attacked the other fish in the tank, with the exception of the Characins, all of which were immune. Those attacked were: all the livebearers, Panchax, Dwarf Cichlids (three species), a Pearl Gourami, a *Betta splendens* and a Pearl Danio. Complete cure was effected in all but two cases by the mercurochrome treatment which I previously described.

Stockport, L. WARBURTON, Ph.C.
Ches.



Photograph] [*G. J. M. Timmerman*

Spotted Sleeper (Dormitator maculatus).

BREEDING SPOTTED SLEEPERS

SIR,—I should be grateful if readers who may have had an experience similar to mine with *Dormitator maculatus* can give me any advice on breeding them successfully.

After feeding them up intensively with small garden worms, the colour of the male (which I have since lost) and contour of the female, indicated pending breeding activity. Spawning apparently took place, in a stone jam jar on its side, but for some time afterwards I looked in vain for any signs of eggs or fry. A few days after, however, I was looking along my tanks, wearing a powerful pair of spectacles, and noticed what appeared to be a movement of myriads of very tiny objects in the Sleeper tank.

On close inspection, I found that the tank was, in fact, teeming with tiny fry, but smaller than anything I have seen before: one would hardly see them with the naked eye. They all appeared to be falling head downwards towards the bottom with very little movement in their bodies. There is no shadow of doubt that they were fry, but numbering thousands, and the eggs from which they hatched must have been like dust.

The sequel, alas, is sad. Their headlong downward journey was evidently their last, since none survived. I did not attempt to feed them for fear of killing them with unsuitable Infusoria medium. I had intended rather to give them a day or so to become free-swimming. The loss of one partner, of course, prevented any further experimenting. I cannot find any description of their breeding habits.

Burnham-on-Sea, L. F. M. BAKER
Somerset.

OIL POLLUTION

SIR,—Longer days and warmer weather turn our thoughts towards the holiday season. How many of those who will visit our coasts will find cause for annoyance through oil pollution? It may seem strange to find an aquarist drawing especial attention to this subject, for most of us may only be familiar with the more obvious aspects—spoilt clothes and suffering birds. Nevertheless, as students and lovers of underwater life we should feel special concern.

We have allowed many of our rivers to become sewers in which fish and plants cannot live and must watch and guard against similar effects round our shores. Dr. A. Vedel Tanning (Director, Danish Fisheries and Marine Research Institute, at Copenhagen) is reported to have emphasised the great loss of the sea's riches by the destruction of plankton and other sea organisms and fish ova.

To abate the nuisance, the long-term plan is to prohibit the discharge of oil-residues at sea, for the palliative of a limited zone is not an answer. Only strong public pressure can move Governments to immediate and effective action. We aquarists can take a part in this work by supporting such organisations as the British Section, International Committee for Bird Preservation (c/o British Museum, London, S.W.7), by taking note of cases of pollution and sending the details to the committee and also by writing to the newspapers. Public opinion must press the 1957 Conference representing the world's shipping interests to prohibit entirely the discharge of persistent oils at sea.

H. J. VOSPER,
Brockley, Hon. Sec.,
London, S.E.4. Forest Hill A.S.

TEMPERATURE TOLERANCE

SIR,—There are many opportunities for fishkeepers in the United Provinces. For the last twenty years and more I have been carrying on fishkeeping and thought you would like to know some of the general conditions confronting aquarists in this part of the world.

A large variety of fishes are available in local pools and rivers. Chief among them are *Barbus* (most species), Gouramies (two types), *Ambassis ambassis*, *Ambassis lala*, species of the Genus *Danio*, *Badis badis* and Puffer Fish.

The United Provinces have extremes of temperature. In a fifty-gallon aquarium protected from draught, it will drop to 50 deg. F. in Winter and rise to 92 deg. F. in Summer. When the lower limit is approached, Angel Fish are the first to

(*Continued next page.*)

German Breeding Methods

Alternative Ideas for the Spawning of Aphyosemions

IT is very interesting to compare German breeding methods for egglaying Toothcarps with those given by Mr. F. Bates in his recent articles on this Genus (concluded in the last issue of WATER LIFE). According to Nachstedt and H. Tusche (ZÜCHTERKNIFFE No. 1) the best method to breed *Aphyosemion australe* successfully is by using *two* tanks approximately 12 × 8 × 6 in. filled with old rain water, to which sea salt has been added.

The position should be shady and not too well illuminated, with a temperature of 74 to 75 deg.F. Some *Fontinalis* or similar plants are recommended as spawning medium. Exactly as F. Bates, the German authors recommend separation of the sexes before breeding is attempted, as these fish seem always ready to breed. Separation will ensure females heavy with spawn.

One male and two female fish are then put into one of the two prepared tanks and are kept well supplied with livefood

Male Lyretail (Aphyosemion australe).

(White Worms, large *Daphnia* etc.) but never more than will be eaten up within half-an-hour. Under these conditions the fish will spawn daily, and the eggs will adhere to the plants.

After a fortnight the tank has to be searched daily for young fry, which have to be fished out with a tablespoon and transferred to the other prepared tank, where they are supplied with the same conditions as in the spawning tank. Feeding should start immediately with Infusoria and nauplii, soon followed by Mikro-worms.

As the parent fish will continue to spawn for some considerable time, separation of the different sizes of young fish will soon become necessary, otherwise the larger ones will attack the small ones.

In Semi-darkness

Of two other methods recommended for *Aphyosemion australe* by the same authors one resembles that of Mr. Bates, only the German authors use two or three pairs of fish simultaneously and remove them after 24 hours, then leaving the tank in semi-darkness until the fry hatch. The third method is to remove the eggs of the daily spawnings and transfer them to screw-top jars, where they are covered with about 1 in. of water taken from the spawning tank. The jars are kept in a dark position, such as a cupboard, at temperatures ranging from 72 to 75 deg.F The eggs have to be inspected daily and white, i.e. unfertilised, ones have to be removed.

After 13 to 14 days, when the young fish can be clearly seen in the eggs, the water is poured off and replaced by water from the tank in which the fry are to grow up. This change of water will usually cause the fry to hatch the following day. After hatching, the fry can be moved very carefully into the prepared tank, which should have good plant cover. Light will not harm the fry but temperatures must not exceed 75 deg.F. The fry are very sensitive to bacteria and this makes overfeeding dangerous.

Whilst removal of the eggs of *A. australe* is not very difficult as they are tough, those of the *A. calabaricus* are soft and easily damaged. Breeding methods are much the same as described for *A. australe*, but only one pair should be used at the time and they prefer a darker and slightly warmer tank.

For *Aphyosemion cæruleum* the breeding method recommended originates from the late German aquarist, Sachtleben. His arrangements are reminiscent of the methods used by many aquarists for the breeding of Brine Shrimps. A 24 × 12 × 10 in. tank is divided into two halves by a piece of slate which has been drilled with a row of ½ in. diameter holes just below the top edge. The tank is so positioned that one half is facing the window and the other is kept as dark as possible with the back and sides blacked out. The light half of the tank is layered with well washed gravel and thickly planted. The dark half, which is where the spawning will take place, is furnished with a layer of 1 in. boiled and well cleaned peat. No plants are added but, of course, some rock can be introduced.

The water is soft and old with salt added. Temperature is 72 deg.F. The spawning pair will feel very happy in the semi-darkness of the spawning half and will spawn almost continuously in the peat, provided they are well fed with livefood. As the fry hatch, which takes place after about five to six weeks after spawning, they are attracted by the light that penetrates through the holes and they swim into the light half of the tank. It is definitely to their benefit that they should, as the parent fish will certainly catch any that remain in the dark side!

The young fish are as cannibalistic as their parents and it is necessary to remove them from their half of the tank as they grow and become a danger to the later hatchings. Feeding the fry represents no difficulty, as they are big enough to take small *Daphnia* and *Cyclops* from the start.

Finally, a few words on the breeding of the most difficult species in the *Aphyosemion* Genus, *A. sjæstedti*. For breeding this very lovely fish an all-glass tank about 12 × 8 × 8 in. is suggested. The bottom is covered with finest sand which is thoroughly washed and finally boiled in a strong salt-water solution. The salt thus caught in the sand will help greatly to prevent Fungus and bacteria formation. The tank is filled with soft, old water and salt is added. The temperature is 75 deg.F. and a moderate light is required.

A few days after the breeding pair has been introduced one can start to lift out the eggs with the aid of a thin glass tube and transfer them to glass jars as for *A. australe*. Darkness is absolutely essential. An occasional rinsing of the eggs, also in semi-darkness, and replacement of the water might become necessary. Hatching takes some four to five months, or even longer. A change of water after this period can provoke simultaneous hatching of all the fry. Greatest care is required when transferring the fry to their tank. The rearing is much the same as described for *A. australe*.

Readers' Views—*continued*

die, followed by Siamese Fighters. Some Guppies, Platies, Swordtails and Mollies remain alive to multiply again during the Spring. At the higher temperature, Swordtails are the first to die, but the Angel Fish are unaffected. Experience shows that during May-July and November-January, neither egglayers nor livebearers breed in aquariums kept in fishrooms protected from the colder Winter weather or the maximum Summer heat. I keep my valuable stock in heated aquariums during the cold weather and have to try to keep them cool when Summer comes.

You may be surprised to learn that the casualty rate amongst fancy Goldfish although, naturally, entirely absent in Winter, is comparatively least in Summer. According to prevailing climatic conditions, Goldfish kept in aquariums breed twice each year, once in January-February and again in September-October. Livefood in the shape of Earthworms is available in plenty from the end of January to the beginning of November and, with an effort, sufficient can be found all the year round. *Daphnia* and other crustaceans are available in large numbers from mid-November to February.

Bilari, K. C. JOSHI, B.Sc., D.Tech.
U.P., India.

HALF-BANDED COOLIES

SIR,—I read with great interest your recent notes on the breeding habits of the Half-banded Coolie (W.L. April, 1955, p.86). Perhaps the following account might help some of your readers.

Our local dealer had a pair of Loaches in a furnished 24 × 12 × 12 in. tank, in company with Fighters, various Barbs, White Clouds, Angels and some livebearers. Although one of the fish was sold very soon, before long a smaller Loach was noticed hiding behind a large rock. This fish was about 1¼ in. long and had undoubtedly been reared in this tank.

Owing to regular inspection of the tank and netting of fish it is extremely unlikely that any form of nest could have remained unnoticed and undisturbed, while the other fish would have eaten any eggs laid on plants or compost. The fish must, therefore, have been hatched beneath an overhanging part of the central rock, remaining there until fairly well grown. This seems to discount the possibility of any form of bubble-nest.

I have what appears to be the female fish in my tank now. It is about 3 in. long, bright pink underneath with a noticeable bulge between the pectoral and pelvic fins, mainly on its left side. I hope to obtain a male Coolie and to study their breeding habits further.

As a matter of interest, the water used in the dealer's tank was matured tap water at about 74-77 deg.F.; the plants were *Cabomba*, *Cryptocoryne* and *Hygrophila*, and there was little or no accumulation of mulm. Tap water in this district is fairly hard, magnesium sulphate being the main cause.

Studley, D. E. SALT
Warwicks.

PROBLEMS ANSWERED

Queries are answered free of charge by a panel of experts. They should be sent to "Water Life," Dorset 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.

Photograph [*W. S. Pitt*

Sea-horse, an unusual marine fish.

Marine Tank

I have frequently been fascinated by the antics of Sea-horses and should like to know if it is possible to keep them in a home aquarium.—(*G.W., Margate, Kent.*)

It is possible to obtain and keep Sea-horses in a tropical, marine aquarium, although their length of life is not usually more than 6-12 months. Fresh sea water is required which can be obtained either through certain aquarists' shops or can usually be purchased from some public aquaria. Water gathered around the English coasts is not normally clean enough for the successful maintenance of these fish. An efficient aeration and filtration system is essential for the aquarium, which should be of all-glass construction and kept at a temperature of 60 to 70 deg.F. Sea-horses will eat only living foods and amongst their favourites are the seawater Gammarus—sand hoppers, which abound on the shores of your coast. *Daphnia* are also taken sometimes but will die within 20-25 minutes of being put in salt water. Another alternative is small fish, such as Guppies. We would suggest that if you have not had any experience of keeping a marine aquarium, you should experiment with a coldwater tank containing specimens which abound on the rocks off the Thanet coast and then progress to Sea-horses when you have perfected your technique.

Corydoras melanistius

Could you suggest a method of sexing and breeding Corydoras melanistius?—(*K.W.P., York*).

Corydoras melanistius are peaceful little fish, sturdy, very hardy and quite colourful. The sexes can be recognised by the fact that the female is much deeper and thicker in the body than the male. Recorded spawnings of this fish are not numerous but we would advise the following method as a basis for any attempt. A tank should be set up in a shaded position heavily planted with clumps of plants such as *Cryptocoryne cordata, Sagittaria, Vallisneria*, etc. and the selected fish conditioned in it on a diet of chopped Earthworms, White Worm and a dried food containing a fair proportion of vegetable matter. The temperature should be maintained at about 75-80 deg.F. until the female fish is obviously full of roe. It should then be dropped to about 68-70 deg. and the fish should then spawn.

Sunfish Requirements

I have a spare 39 × 12 × 12 in. and my two young daughters want to keep Sun Bass in it. The room in which the tank will be set up receives the full power of the sun. I have no experience with these fish—what do they need in the way of compost, plants, rocks and food? I intend to keep 4, 2 in. long fish.—(*J.D.G., Sheffield, 9*).

Your daughters are very discriminating in their choice of fish and you are to be congratulated on your restraint in the numbers you intend to install. Sun Bass (or Sunfish) are well worth cultivating since they become very tame and grow very quickly. As they become adult you may find them quarrelling, in which case the bullied fish will have to be removed. Plant up the aquarium in the usual way and Giant Sagittaria—say six plants—are recommended. The tank will require sheltering from the glare of the sun as the *Sagittaria* will thrive best away from direct sunlight and, as Sunfish prefer partially-shaded corners to rest in sometimes, it might be a good idea to stipple the back glass. This could be done with green and brown distemper in the rough outline of plants and rocks: do not overdo it but just enough to break the glare of the brightest light. As to feeding, they are entirely carnivorous and have an insatiable appetite for garden worms, mosquito larvæ and, with patience, they can sometimes be persuaded to accept shredded liver, but take care that the water does not become polluted if this last-named is fed.

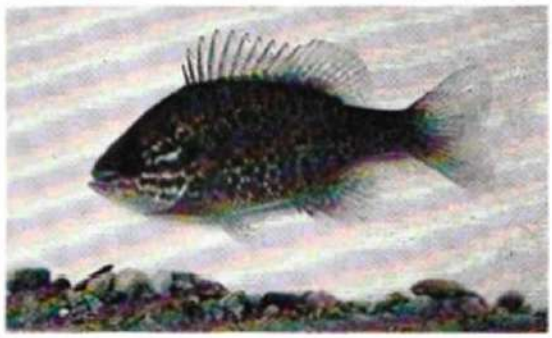
Asbestos Sheeting

Is sheet asbestos in an aquarium likely to prove harmful to fish? I have in mind using asbestos as a base on which to build up rockwork and also using it instead of glass, for the sides and back of a small aquarium.—(*R.F.S., Kettering, Northants*)

Sheet asbestos can be used in aquariums but should be well soaked and "weathered" first to work out the lime. However, it tends to become brittle after a time so that it is not advisable to use it in tanks larger than 24 in. If soaked in water for a month after the tank is set up and the water changed frequently, there is no reason why it should not give good service. It is necessary to paint the glazing surface with goldsize to prevent the asbestos drawing the oil out of the glazing putty.

FOREIGN COLDWATER FISH

Among the interesting foreign coldwater fish which can be kept in aquariums are the North American Sunfish, one of which is shown here. Being carnivorous they should not be mixed with other types, such as Goldfish, but they will create considerable interest in an aquarium of their own and can become remarkably tame.



WATER ANALYSIS

Samples should be sent (NOT delivered by hand) in a clean pint bottle, well packed, to Water Life Analyst, 12, Featherbed Lane, Addington, Surrey, together with a fee of 5s. per sample. Name and address of the sender and details of prevailing conditions should accompany each sample sent.

Sample received from L.E.S., Stanmore, Middx. Taken from a 48 × 20 × 12 in. tropical aquarium. Although L.E.S. had kept tropical fish for over 20 years he had not experienced trouble with the water supply previously, but when the sample was sent, the fish, particularly Fighters and Angel Fish, were not living long and the plants failed to make growth. In an effort to encourage plant growth, the duration of artificial light was increased but trouble with algæ was then experienced. Mulm and dirty gravel had been siphoned off weekly and additional water was put in only to replace that lost by evaporation.

Test for impurities:— Appearance: slightly turbid. Odour: none. Total mineral content: 0.1648 per cent, rather high. Organic matter: 0.0096 per cent. Nitrogen compounds: 0.000036 per cent, pollution indicated. Ammonium compounds: 0.000080 per cent, pollution indicated. Poisonous metals: none detected. *p*H: 7.4, satisfactory. Chlorine, as salt: 0.125 per cent.

Suggested corrections:— The results obtained from the chemical analysis of this sample of tank water reveal that the dissolved solids content consists chiefly of sodium chloride (common salt). Freshwater plants, generally, are most sensitive to relatively high concentrations of sodium chloride, refusing to grow and eventually dying. The high yield of nitrogen compounds is indicative of organic pollution. Indications are that an undesirable concentration of both mineral and organic pollution has been allowed to build up in the tank. The tank must be emptied and refilled with tap water. Losses by evaporation should be made good by topping up with good quality *distilled* water.

In and Around the Aquaria World

— By W. J. Page —

VISITING this country for a few weeks is Mr. L. B. Retson, of Sydney, N.S.W., Australia, who has called at this office with a letter of introduction from Mr. P. Jensen, secretary of the Aquarium Society of N.S.W., to which he has belonged for a number of years. Given a list of contacts, he set out for a tour of England, hoping to call on aquarists *en route*. Later, he proposed to visit Scotland and, in addition, to cross to the Continent to meet fishkeepers there. Mr. Retson knows Professor Emmens well and was able to give some first-hand information about the hobby which is growing in his part of Australia.

* * *

SO diffident by nature that he would not stand for the office of President, yet an energetic behind-the-scenes worker, Mr. W. A. Bone has been given recognition for his services to the National Aquarists' Society by being presented with a fellowship. This honour is bestowed sparingly by the society and it is fitting that Will Bone should join the select band that includes Mr. Katterns and Mr. Odams.

Apart from being engrossed in the automobile engineering trade, he has ventured into a field allied to the hobby, but he is best known as an unassuming council member of the N.A.S., always ready to help the society and its annual exhibitions, and as a successful breeder of tropicals at his residence at Harrow.

* * *

GOOD psychology has been shown by the Federation of British Aquatic Societies following the meeting between the F.B.A.S. and a group of clubs, a report on which appeared in the December, 1954, issue. Chief spokesmen at that meeting for the clubs who had criticisms to make of F.B.A.S. affairs, were Messrs. S. G. Lake, secretary of Slough and Windsor A.S., and G. H. Filmer, chairman of Uxbridge A.S.

Both were subsequently nominated as Council members, but neither received a sufficient number of votes at the A.G.M. held on December 11th last. Both have, however, been roped in to serve the Federation in an official capacity. Mr. Filmer is proving a useful member of the Public Relations and Liaison Committee. Mr. Lake is one of the panel of three (the others are Messrs. J. E. Edwards, Council member, and R.O.B. List, general secretary) who are ready to help member clubs that want information on club management.

It was a good move to get both these well-known aquarists on to the Federation's side of the fence. They have experience and drive. They know the wishes of member clubs. They can be expected to put forward practical suggestions.

* * *

A PUBLICATION that often contains items of interest to fishkeepers and herpetologists is "Country-side," the official journal of the British Naturalists' Association. It has been edited for the past twenty-eight years by Mr. Richard Morse, F.L.S., author and naturalist. Founded in 1905, it has a special appeal to all who like to spend their spare time in the country watching the growth and development of our flora and fauna. Mr. Morse has recently decided to relinquish the editorship although he will not give up all association with the magazine, having agreed to be its literary editor. No successor has yet been appointed. For the time being, future issues will be produced by an editorial committee c/o Haselmere Educational Museum, the curator of which, Mr. John Clegg, F.R.M.S., is the B.N.A. chairman.

* * *

EXHIBITORS are reminded that the next WATER LIFE Display takes place on January 12-14, 1956. It will again form a section of the National Exhibition of Cage Birds and Aquaria to be held in the National Hall, Olympia, London, W.14.

A meeting of the main committee has been called for June 9 when the 1955 Show accounts will be presented. Any profit made will go to charity. The Aquaria Section Committee met on May 4 when the last event was reviewed. There was a record entry, a bigger attendance than the previous year and a number of interesting new features.

Suggestions for the 1956 WATER LIFE Show have been put forward by the section's committee. Further meetings are to be held to arrange details. The Goldfish Society of Great Britain, the British Herpetological Society and the Federation of Guppy Breeders' Societies all have new ideas. It is believed that the Federation of British Aquatic Societies, from whose panel the judges will be selected, are to consider putting on a competitive exhibit which affiliated societies can enter.

* * *

MR. D. JOHNSON, of Manor Park, deservedly received warm congratulations when he was elected president of the Federation of Guppy Breeders' Societies, a position he is filling in a very capable manner. He has quite a reputation as a successful exhibitor of Guppies and has been popular for long time in the Eastern Counties section where he has also held office.

Messrs. D. Johnson and *A. J. Holloway, President and secretary of the F.G.B.S.*

Equally well-liked in F.G.B.S. circles is Mr. A. J. Holloway, of Plaistow, who, for some time now, has undertaken the onerous duties of secretary to the Federation. Likeable in character, he certainly makes an efficient scribe and is rarely seen without a smile. An exhibitor of experience, he is a former show secretary of the East London A. and P.A. The F.G.B.S. has been fortunate in its officers since its inception and these two officials are proving no exception to the rule.

QUITE a number of show dates have been selected for the coming season and indications are that more ambitious events are being held than hitherto. Relatively few one-day exhibitions are now arranged. Usually they extend to three or more days, as, for example, Lowestoft (4 days), N.A.S. (3), Southampton (3), Chester (4), Aylesbury (3), Bath (3), Portsmouth (3) and so on, to mention some scheduled to take place between now and the end of July.

In August, Hendon A.S. holds its four-day show in Hendon Park, from the 10th to the 13th, and both Banbury and the M.A.P.S. (Birmingham) have chosen the three days from the 25th to the 27th. The latter is making special plans to accommodate traders' displays. Local professional aquarists are invited to participate. Some spaces are still available, the show secretary informs me.

WATER LIFE Diplomas are being offered at the leading events. Usually one goes to the best fish in show, but where two are offered, the allocation is left to the show committee. One important show at which two are to be given is Enterprise A.S. (August 19-20) at which event the F.B.A.S. Trophy for the best Breeders' Tropical Livebearer team is offered.

* * *

IT is interesting to find that reference to our analyst's series of articles, "Water —the Basis of Fishkeeping," has been included by the Department of Scientific and Industrial Research in its May, 1955, issue of "Water Pollution Abstracts," published by H.M.S.O.

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PRELIMINARY details appear on page 149 about the annual exhibition of the National Aquarists' Society. I hope that none who remembers the leaking tanks in 1954 will have any qualms this time. The organisers have made plans to have all suspect tanks reglazed in good time before the show takes place. Further, knowledgeable glaziers of aquariums will be present at the show to give first-aid treatment to any tanks they think want attention as they are brought into the show hall.

It would help the N.A.S. organisers if exhibitors did not remove from the staging any half-filled tanks. Aquariums recently tested and found sound often develop leaks at shows through mishandling at the very time when getting them repaired is almost too much to expect. If exhibitors, especially those in the furnished aquaria classes, see that the tanks are moved as little as possible, or better still not at all, everyone will benefit. These remarks are not, of course, addressed solely to N.A.S. exhibitors. They apply to all shows.

* * *

WELL-KNOWN to a wide circle of fishkeepers as an F.B.A.S. official and judge, and as secretary of Enterprise A.S., Mr. Russell Holland has received many messages of good wishes for his recovery, following a car accident some weeks ago. I am pleased to report that this popular figure in the hobby is now back at work. He is making satisfactory progress after sustaining a number of injuries and suffering from severe shock.

From Continental Journals ***By H. O. Munro***

Sharp-shooting Archers in the Aquarium

AS Archer Fish become available in this country it might be of interest to hear how the late J. H. P. Arnold, a well-known German aquarist, kept this fascinating fish many years ago and how he adapted a tank for its particular requirements.

There are at least three species of Archer Fish, two of which, *Toxotes jaculatrix* (*T. jaculator*) and *T. chatareus*, are imported from time to time. Of the two, *T. jaculatrix* has six black vertical bars whilst *T. chatareus* is adorned with six irregular black spots. Both fish live in the coastal waters of the East Indies and are found in brackish and fresh water. Though in their natural habitat they reach a length of 10 in. or more, aquarium sizes of 4 in. are usual for adult fish. Arnold (DATZ, April issue) kept his fish, which was then, in 1934, quite a unique importation, in a big tank with brackish water, and consequently no plants. Temperature was 79 deg.F. and depth of water, 8 in. The fish was only 1½ in. long at that time. It always kept close to the surface of the water and soon took various insects which were dropped on to the surface. Arnold put a small glass tank into his big tank. He planted the small container with tropical bog plants such as rice, *Calla* etc., taking care, of course, that the rim of the glass tank was above the water level of the main aquarium. He built a top with a height of 24 in., using glass for the sides and roof. Spiders and other insects were then put on the plants through an opening in the roof. The Archer Fish learnt very quickly to watch out for the feeding hand. As soon as insects were available it swam into position and shot them down. Even at this small size the Archer hit insects up to 6 in. above water level without fail.

Photograph] [*W. S. Pitt*

Toxotes jaculatrix (T. jaculator), *one of the Archer Fish species kept in aquaria.*

The fish is apparently a good community fish and the tank just described was shared with several Scats and *Monodactylus*. Perhaps these few remarks will encourage some aquarists to try their hand with this most interesting fish, which is also regarded by many as being quite intelligent.

BROMELIACEÆ are most suitable plants for the vivarium but rather expensive, unfortunately. Here is a suggestion by G. Bruenner, found in the March issue of DATZ on how to obtain a suitable plant cheaply. When next you buy a pineapple, pick one with the leaves in good condition. Cut this top off with a sharp knife and let it dry out well. Then plant in a mixture of equal parts of sharp sand and peat by pressing down into it the top (the author does not mention dusting with hormone powder, though this ought to prove beneficial). Cover with glass and keep warm, whether it is placed in a greenhouse, in a cold frame or on a window sill. Do not expose the plant to direct sunlight. After some weeks rooting should have taken place. The plant is now transplanted into a medium of leaf mould, peat or sphagnum moss, charcoal and sand. A daily spraying with water, and an occasional addition of liquid fertiliser, are beneficial. When strong enough the plant can be transferred to the vivarium. If given a shallow mound of soil it will thrive and spread rather flat but growth will be slow. It will not flower or develop a fruit under such conditions.

THE Half-beak is considered one of the most difficult livebearers to breed and an article by Saurer in the February issue of DATZ might be of interest. Correct feeding of the parents is, as always, the best guarantee of success. *Dermogenys pusillus* is a typical surface-feeder and likes small flies, gnats and especially *Drosophila*, but will accept occasional meals of dried food. Shallow and saline water is beneficial but not essential for the young fish. Gravid females are best separated in a small tank with floating plants, but a breeding trap will do. The fish will spawn regularly every 28-30 days, and the number of fry varies between 19 and 35. The fish, which are ¼ in. long at birth, will take Mikro-worms and small *Cyclops* from the start. The "beak," the prolonged lower jaw, does not develop for the first few weeks. Then the time has come to feed with fruit flies and similar food.

Low Voltage Lighting

Mr. J. E. Edwards' Findings

WHEN I wrote about my cellar fishrooms (WATER LIFE, April, 1954, and June, 1954 issues) and covered, among other matters, low voltage lighting, I had no idea of the storm of criticism which would follow. So controversial has it become that up and down the country aquarists have been carrying out tests for themselves, sending their reports and queries to me. Over two hundred aquarists have now visited my home to see the lighting system installed and judge its merits for themselves.

May I thank those who have written in your columns? I consider the lighting system a very important subject and agree that electricity can be dangerous if one takes liberties with it. For this reason I am delighted that so much has been published. I feel that anyone reading the various letters will realise that if he is not electrically-minded he should certainly obtain advice before tackling a low voltage lighting system. I personally take as many precautions as I can, not so much for myself as for my wife and children. After all, I am away a great deal and have to leave the care of my fishes to them.

Further Testing Period

The Editor suggested that I should hold back replying to my critics until I had gained at least twelve months or more experience. It is now 17 months since I installed low voltage lighting for 40 tanks and readers will probably like to hear how I have fared and whether I still consider the system a good one.

I had tried normal domestic lighting and found it expensive and unsuitable for reasons already stated. The same applied to fluorescent lighting. I was left with little choice other than low voltage lighting using car bulbs. My problem was how best to employ the system. I wanted to try it out as an experiment before spending money on a final installation. First of all, I thought about some form of dynamo lighting. This had problems and I next considered a trickle charger and two 12-volt car batteries, all of which I had available.

In the end I had a small transformer wound for me, giving an output of 12 volts, and powerful enough to run two 36-watt car bulbs. I tried the lighting out over different pairs of aquaria until I was sure I had the answer to my problem. Then I committed my great crime and made up the two series installations which caused the criticism. At the time I was recovering from a car accident and was out of action for best part of six months. I could not get out and about very much, but I could potter about in my fishrooms and try out experiments.

Each circuit was fused and the wiring was of a heavy type. The whole time I ran this system I had no trouble and no electric shocks, and in fact only one blowing of fuses, which was entirely my own fault. The main drawback I found in operation was that when one bulb failed all the others went out with it. The other difficulty was that often I would not require all the lighting to be on at the same time, but in series it just had to be.

As soon as I was able to get around again, I started contacting electrical people everywhere I could. I also wrote to manufacturers of transformers and asked their advice. As a result of this I found that there were plenty of suitable transformers available and that they could be picked up for as little as a couple of pounds. In fact, I have acquired about nine for myself and several for other aquarists. I prefer to use several low voltage circuits of approximately ten 12-volt lamps each. In all cases, I use heavy low resistance wiring for safety and to get full benefit of the transformer output. Each transformer is earthed and has a pair of fuses in circuit.

After trying a large number of different lamp holders, I eventually decided to use the standard bakelite lamp holder we normally employ. This meant obtaining low voltage lamps with equivalent base. The only kind I had any trouble with was the small bayonet brass type. These became overheated after a while. I also found that the lamps generated considerable heat and did not like being totally enclosed, so I adapted my light covers, making open ends. This cured the trouble and they now work well.

In summing up, what can I truthfully claim? First of all, a very convenient system which allows me to use a quantity of low voltage lamps at reasonable cost. Lamps which last well and do not constantly need renewing. A strong white light which gives me outstanding plant growth of a nature that seems to grow anything, even through a tough Winter. In fact, I can say that my plants are the envy of all my aquarist friends and they are not slow in coming round for some of them.

Wattage Requirements

I must admit that my original assessment of the wattage required for the tanks altered slightly in a downward direction. For 24×15×12 in. and 24×12×12 in. tanks the rating is the same, 36 watts. The 18×10×10 and all other tanks 12 in. high and three or four feet long, have two and three 24-watt lamps, while the 14×10×8 in. and other small tanks have 12 watts only.

Quite by accident, a few months ago, I purchased a cadmium lamp instead of the normal 36-watt clear type. I decided to try it out and was astonished to find that it not only gave a light which appeared to be brighter, but also grew plants even better. In order to test this theory I fitted up five 24×15×12 in. tanks with cadmium lamps and in all cases obtained faster and more prolific plant growth.

Finaly, I still do not suffer from the algæ pest. It was suggested that the room being partly below ground was the reason for this so I tested the theory by putting a number of tanks back on to normal domestic lighting and it was not long before algæ returned once more. I find that most of my aquarist visitors look for algæ first of all and are always very astonished not to find it, even with *Myriophyllum*. As far as I am concerned I am more than satisfied.

First-hand Impressions of the 1955 Judges' Conference

Representatives Present from Other Organisations at Successful F.B.A.S. Sponsored Gathering

PENDING receipt of the official account of the proceedings, we give a report on the 1955 Judges' Conference convened by the Federation of British Aquatic Societies, based on the impressions of some of the judges and officials. It will be recalled that in 1952 the initial conference was primarily of an exploratory nature. The following year, a number of constructive ideas were put forward and delegates from the Federation of Northern Aquarium Societies attended. Last year, as we stated in our report, there was, we felt, a degree of complacency throughout the proceedings.

Amicable Atmosphere

The 1955 event turned out to be a most amicable gathering, at which there were representatives from the F.N.A.S., the Midland Association of Aquarists' Societies, the Association of South London Aquarist Societies and the South West Middlesex A.A. as well as a large number of London area and provincial judges on the F.B.A.S. list. In our opinion, it is an excellent idea for judges to get together to discuss their problems. It is equally their responsibility, or that of the convenors, we think, to give every facility for their deliberations to be made public, especially as whatever they decide may have to be implemented by show organisers or individual exhibitors.

Their decisions are put forward as recommendations and such opinions as they express are first considered by the Judges' and Standards Committee of the F.B.A.S. and then, presumably, referred to the Federation's Council and, in course of time, to the general assemblies of delegates. They will, undoubtedly, be debated by the other organisations present and should be taken into account by all societies that hold shows. This review of the gathering is given so that such societies, individual exhibitors and those judges unable to attend may be aware of the trend of thought.

EXCLUSIVE WATER LIFE CONFERENCE REPORT

The chairman, Mr. P. S. Campkin (chairman of the F.B.A.S. Judges' and Standards Committee) is a past master in the art of controlling meetings of this nature and he is to be commended on the manner in which he handled the discussions. The Federation's chairman (Mr. E. H. Riddle) welcomed the judges and then assumed the role of one of the assembly, ready to join in the discussions under the gavel of Mr. Campkin. After an account of the 1954 conference (reported in detail in the June, 1954, issue of WATER LIFE) was accepted, the secretary of the Judges' and Standards Committee, Mr. J. H. Gloyn, gave particulars of the committee's work over the past twelve months.

Useful Recommendations

Mr. Peter Hewitt, an F.B.A.S. judge, who was invited to give us his account of the proceedings, tells us that menion was made of the star scheme, comparison took place between the aims of standards and guides and that new guides are to be issued shortly. The guides came in for much favourable comment and Mr. Fraser-Brunner, referring to the WATER LIFE review of the Barb Guides (April, 1955, issue) described how certain names were incorrectly given in parentheses and explained his decision to use the name "Hamilton" instead of "Hamilton-Buchanan." New drawings will eventually take the place of the outlines used to illustrate existing standards.

There was a brief outline of the negotiations between other organisations on the question of Goldfish standards. Passing comment was also made on the fact that members of the J. and S. Committee had completed their term of office and that shortly they would have to be re-elected or a new committee appointed.

Recommendations which, if passed, will apply to show promoting societies and exhibitors and calculated to assist judges in their work, are:—(i) The use of letters instead of numbers for classes, i.e., Class A, Class B, rather than Class 1, Class 2, etc. (ii) Consecutive numbering of exhibits, i.e., at a show where in Class A there were 10 entries, in Class B, 5 and Class C, 20, the exhibits would be numbered 1 to 10 in Class A, 11 to 15 in Class B, and 16 to 35 in Class C, and so on. (iii) Multiple entries from one exhibitor should be described individually on entry forms, the idea being to avoid errors in the catalogue, in the show secretary's records and in the physical staging of the exhibits and to avoid confusion to the judges. (iv) Show promoters should ensure that the tanks are clean before judging commences. (v) With some exceptions (e.g., Black Mollies) the back and bottom panels of tanks should be of a dark colour. (vi) Top and not side lighting should be used. (vii) Exhibitors should be permitted to change electric light bulbs over their tanks for others of different colour or wattage. (viii) External backgrounds of card thickness only should be permitted.

On the left are Messrs. J. H. Gloyn, and P. S. Campkin, secretary and chairman, respectively, of the F.B.A.S. Judges' and Standards Committee. Mr. Campkin presided over the Conference. Right: Mr. Peter Hewitt of Croydon.

The conference discussed the Federation's social services, speaking highly of the work being done by the sectional secretary, Mr. Coatman. The present working of the scheme, under which societies engage judges through the Federation, was considered to be most efficient. Mr. W. L. Mandeville thought the term "decorative" preferable to "furnished" to describe set-up aquariums. Mr. Ryder urged the need for guides for coldwater fishes.

Spreading the Work

Mr. J. E. Edwards (F.B.A.S. Council member), who spoke about Grade B judges, has contributed the following summary of his views:—"Some months ago the Federation ran a Judges' Course and passed a number of new judges. It was thought that as there were many judges in the country going around placing awards at small local open shows and table shows and thus quite experienced, it might be a good idea to give them a chance of being recognised as F.B.A.S. judges.

"The response to the course was good and a number duly passed out. However, there has been some dissatisfaction voiced because these people have not had a chance of being invited to judge the larger open shows. The reason is obvious. Clubs and Associations running open shows tend to ask for the well-known names every time.

"I proposed that, in order to encourage these newcomers, individual established judges should 'adopt' one new judge, keep in touch with him and, when a decent sized show came along, invite him to go round the classes and do judging side by side with him. In this way the newcomers would get the experience needed, become known to show organisers and have a chance of obtaining work. The feeling of the Conference was favourable and the subject will come up later for discussion and action."

Producing Good Stock

Mr. S. Lake (S.W. Middlesex A.A. representative), who raised the question of availability of good stock fish, writes:—"The general view that the average would-be exhibitor should get down to breeding his own exhibition fish, as stated by those who were kind enough to answer my question, takes as its basic premise that the parent fish have within their structure the genetic ability to overcome their hereditary lack of colour, shape and size.

"Those of us who remember the start of the boom, will remember also the blood-red Platies, the deep red seven-inch Swordtails, well-bred London and Berlin Swordtails and other mighty specimens now so conspicuously rare. Mass production and haphazard mating of sub-standard fish have left us with a heritage of indifferent stock.

"I had hoped to interest some prominent aquarists in a scheme by which the prizewinning strains could be propagated by their owners and made available to club members anxious to better the standard of show fishes."

New Approach Wanted

He also says, in reference to the debate on external backgrounds to furnished aquariums:—"I am with the minority headed by Mr. Gloyn who feel that there should be no narrow restrictions on creative design. The purists may rightly campaign against the artificiality of treasure chests and divers, though these accessories may have attracted many novices to the hobby who later became serious aquarists. But should these protestations of pious horror be directed at genuine artistic attempts of serious aquarists to achieve depth and perspective and additional interest in the furnished aquarium?

"We are faced at each show with a long line of permutations of features which are known to be acceptable to judges. The back of the tank is often heavily overloaded with plants to hide the back glass. All rocks must be placed to provide a lane into the tank, and must lie with strata horizontal. A 'centre piece' plant must not be in the centre and so on, until eventually, the 'must nots' leave a rather circumscribed field within which a 'natural' tank can be made acceptable to the purist point of view.

"I believe there is much interest to be engendered and recaptured by applying new ideas to an old subject, and if necessary, we should create a new class in furnished aquaria shows, especially for the exponents of 3D fishkeeping, or vista-vision in glorious aqua-colour. I prophesy that there would be a traffic jam around those exhibits."

Show Tank Panels

Mr. Mark Welch (Nottingham A.S.), raised the question of colouring the panels of tanks for individual exhibits. His observations are:—"When fish which have been kept in planted aquariums are placed in bare tanks at shows they lose their natural colours in an endeavour to match their surroundings. I believe the spectrum reflection has something to do with this and the fish also endeavour to swim nose down through the transparent glass bottom of the tank.

"This leaves much to be desired from the point of view of exhibitors, judges and public alike and could be remedied by painting the backs and bottoms of the tanks black (green for black Mollies or Moors). This would allow the fish to feel more at home, to be presented to the public in better colour and enable the judges to give a better assessment. The only thing to which I took exception was from someone who is not a judge, but who asked 'would it be possible for judges to point all the fishes so that beginners would gain knowledge and know how and why their fishes did not get placed?' I did not get a chance to reply. I think nearly all the judges wanted to have a go at that. My reply would have been, firstly, the judge would need to be a walking comptometer, secondly, he would require much more time than he is allowed. The task of educating the beginner is the duty of the societies by engaging competent lecturers and by study of the books of show standards."

News from the North-west *By "Aquaticus"*

Studying the Movement of Lobsters

A MAN with an original bent in his water life interests is Lt.-Col. P. O'Farrell of Morfa Nevin, North Wales, who was recently telling me about his private experiments, the first ever made on the Welsh coast, to learn more about the growth and travels of lobsters. Last year he tagged 60 young lobsters with red or blue tags, returning those with red tags east of Porthdinllaen, on the Caernarvonshire coast, and those with blue tags west of the headland. Forty-one were recovered, some reds had gone into the western area and the greatest journey, at least 1¼ miles, was by a red tag.

Lobsters are much more "stay-at-home" creatures than the nomadic Edible Crab. They rarely travel more than two miles, and the Ministry of Agriculture and Fisheries, which has a fishery research station at Conway, has now started marking, with yellow tags and tail-punching, lobsters on the other side of the Lleyn peninsula, between Criccieth and St. Tudwal's, under a scheme described to me by its senior naturalist Mr. A. C. Simpson, B.Sc. Lobsters have also been tail-punched off Puffin Island. In order to test different prawn-pots, the Castle-bank (Conway) fisheries' station put 1,000 prawns in their 20,000 gallon sea-water tank and tried out the pots. Biggest catches were in the two hours before sunset, with a prawn-pot from Poole.

When I recently received the annual report of the Malham Tarn Field Study Centre, which is in the Pennines, near Settle, the first thing I noticed was that out of a record total of 1,233 people taking part in its courses last year, over 80 per cent were teachers or students from schools, colleges and universities, and only some 13 per cent were amateurs. There is a danger of the amateur naturalist being crowded out of such state-aided schemes for further education. The 1955 programme at Malham Tarn includes a freshwater ecology course for university students in the second week of July, and another for teachers and students over the August Bank Holiday period, followed early in August by a week's course on *Mollusca* (freshwater snails and small bivalves). These residential courses will centre on the alkaline Tarn and the swift streams draining into it. Students get a reduction on the normal charge of 5½ guineas per week. Amateurs are rather shy of these places because many of the courses follow a student or academic line, rather than a club atmosphere.

Exotic Introductions

Aquarists are responsible for introducing various exotic aquatic plants into the British countryside when they tip out their surplus plants into some local canal like the Reddish and Droylsden waters, or mill-pool, warmed by industrial waters, where these can survive the winter. The recent report of the South Lancashire Flora Committee records an addition to the flora of this "vice-county 59" in the aquatic *Egeria densa* which is established in a canal between Bolton and Manchester, into which hot water is constantly discharged from a cotton-mill. Until it flowered, the plant had been confused with the common Canadian Elodea. Two hybrid rushes new to the British flora are also included from near Southport, namely a sterile hybrid of *Juncus balticus* × *J. effusus* and a hybrid *J. balticus* × *J. inflexus*, both from Ainsdale. The "Northern Rush," *J. balticus*, has for years had its southern-most locality between Hillside and Birkdale and hybrids from it have occurred previously at Birkdale dunes. I am particularly interested to hear of records of the rarer aquatic plants and fauna in our north-western waters if any readers would be kind enough to send them to me.

Probably the first British aquarist to become thoroughly "aquatic" was the Victorian Rev. Andrew Matthews, rector of Gumley, in Leicestershire, who fitted himself with a rubber diving suit in which to lie on the bottom of ponds and reservoirs studying water life. Apparently the first northern aquarist to pursue a course in sub-aquatic, frog-like pursuits is Dr. J. W. Jones. He is well-known for his post-war Salmon and Trout spawning studies, and for his introduction of electrical fishing to the upper Dee waters where, by stunning Trout etc., he has been able to catch and mark them for liberation again.

One of Lancashire's younger societies, still "finding its feet," is the St. Helens and District Aquarists' Society which looks forward to its first birthday anniversary on October 11. In the heart of the glass-making metropolis of industrial Lancashire, it musters 23 members for its monthly meetings (on the last Tuesday) at the Y.M.C.A. in St. Helens. Its chairman, Mr. A. Mahin (an electrician by trade) recently reconstructed his fishhouse where, with over a score of tanks, he has bred most of the popular egglayers. His specialities are breeding Angels and line-breeding Fighters and Sphenops Mollies. Mr. R. J. Charnock (of 81, Owen Street), who was appointed secretary in April, tells me the club looks forward to a public exhibition in the town some day. Up to the present it has had to be content with table shows, quizzes, lectures and a bring-and-buy sale. A 6d.-a-side contest has been arranged with the Leigh and District A.S. for August.

The pioneer aquarist in St. Helens was, to my knowledge, the late Dr. J. Cotton. Before the first world war he was President of the old St. Helens Natural History Society in the days of pondlife aquaria and British coldwater fish. In more recent times, Jack Skelland, a confectioner by trade and angler by hobby, introduced the enthusiasm for tanks of tropicals in the town, but his wife told me, when I called at his shop, that he is now out of the hobby altogether. Despite its heavily industrialized appearance, St. Helens is the centre of a great angling interest.

It is of interest that, in order to consolidate the recording of the Bitterling as a new British fish, the Merseyside Naturalists' Association recently presented two specimens from a canal near St. Helens to the British Museum, where Mr. A. C. Wheeler of the Department of Zoology (Fishes), who had encouraged their study of the long-overlooked establishment of this continental species in the area, told the Association: "I will add them to our collection, for they are of considerable interest."

The secretary of the St. Helens Angling Association had known the Bitterling in this particular water for 25 years but, until the identity was pointed out, they had been confused with "Prussian Carp" and had been used as live-bait. Bitterling are established in about a dozen waters in south Lancashire. Aquarists and anglers have helped trace their history and the story of their discovery and history was given in a recent number (142) of the journal of the Salmon and Trout Association.

New Specialist Group

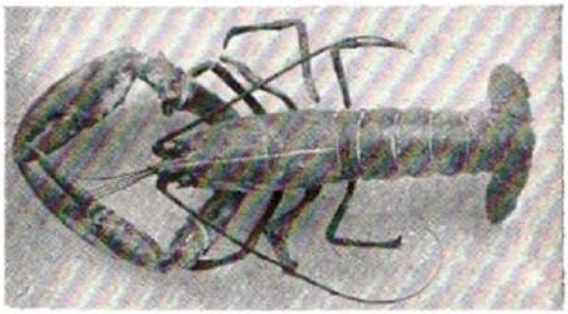
Another young club finding its feet is the Liverpool Guppy Breeders' Society, which is meeting on the second Wednesday each month in Hackins Hey. At present it musters about 16 members, the secretary being Mr. B. Thurlow of Wallasey. Mr. Thurlow is also President of the Merseyside Aquarists' Society. After a round of various "homes" since it was formed just after the war, this now meets in the basement of the Grenville Café in Tithebarn Street, and has over 50 members on its books. It recently had a lecture from Mr. Eric Hardy, the naturalist, entitled "Rambles of a Water-life Enthusiast." The speaker described a number of interesting localities on rivers, canals, lakes and other places in the North-west where aquarists could go in Spring and Summer to see aquatic life. He described the Salmon smolts descending to the sea over the Chester weir in Spring and the Salmon spawning in November in the Ribble by Pathorne Bridge or in the Welsh Dee by Corwen Bridge.

The rare plants of Knowsley Park lake, in Lancashire, of Llyn Idwal and Cwm Glas Lake in the Snowdonian mountains, in the lily-pool of the Sandiway scout camp in Delamere Forest, the rare Lesser Yellow Water-lily of Blakemere in the Ellesmere country of Shropshire and the Lampreys dying after spawning in the river Alyn and the Dee, were a few of many points described from personal experience.

Mr. A. Hart, of 4, Grace Road, Walton, is the present secretary of the Merseyside A.S., whose society maintains a hospital tank, holds members' auctions, and generally keeps the aquaria world going in the great seaport. The Garston Rotary Club has again invited it to partake in its hobbies exhibition in September and there is a proposal for a joint meeting with the Birkenhead A. & H.S., which Mr. A. Rankin founded.

YOUNG LOBSTER

Several authorities are now tagging lobsters in an effort to find out more about their growth and movements. It has been ascertained that they do not generally travel great distances. This photograph by H. Bastin shows a young specimen (8½ inches long) of the Homarus vulgaris *species.*



Organising the Trade

P.T.A. Policy and Rules Outlined

THE Pet Trade Association, which was founded in 1948 as the Aquatic Traders' Association, has revised its policy and rules to comply with the wider scope of its activities permitted under the new title. The Executive Council have issued details of the policy, which includes legal representation for members, a comprehensive group insurance scheme, action to remove irregular practices within the trade, campaigning for the removal of purchase tax, and area representation.

The objects of the association are to promote commerce in the pet trade, to bring into association full time traders, to watch over their activities and to assist their rights and interests as well as their development and protection. The management is in the hands of the Executive Council, which consists of a chairman, secretary, treasurer and three ordinary members. Rule 7 states that members shall supply goods only to genuine traders at trade prices. Rule 8 allows for the removal of names from the register of members, with a right to appeal, and Rule 12 states that not less than four general meetings shall be held each year.

Evening Course?

THE possibility of holding an evening course in pisciculture is now being investigated. If plans materialise it is likely that lectures and practical work will occupy three hours of one evening each week. Further details will be given later should the idea be adopted. The course would probably start in September and be held in London.

South-western Assembly

ASSEMBLY of the S.W. Aquatic Societies' Association will be held at Bristol Zoo on Saturday, June 18. Included in the programme is a talk by Mr. W. L. Mandeville (Birmingham).

Plans for 1955 British Aquarists' Festival

Incentive for Individuals to Support Club Displays

NEWS from the Federation of Northern Aquarium Societies indicates an optimistic approach to things for the coming year. There are affiliations of equal numerical strength to that of last year, it being reported at the A.G.M. that although eight societies had been deleted from the list of affiliations, the same number of new applications for membership had been approved. Altogether, 63 societies belong to this organisation. Annual reports submitted to the meeting, including the treasurer's statement and balance sheet, were accepted and the officers were all re-elected.

At a Council meeting which followed the A.G.M., a complaint regarding the equipment loaned by the F.N.A.S. was investigated and arrangements were made for it to be tested before being hired out in future. A long discussion took place on the 1955 B.A.F., the following decisions being reached:

The show will be held from 12 noon on October 5 to 7.30 p.m. on October 9. Benching will take place on October 1 and 2 and judging during the two following days. The Autumn Assembly of the Federation will be held on the last day, Sunday, October 9. The show will be dismantled after 7.30 p.m. on that day and on the Monday.

Classification:—1, Tropical Furnished Aquaria. 2, Coldwater Furnished Aquaria. (Competing Societies can enter in one of these two classes, not both, and must state which on their entry forms.) 3, Six pairs of tropical and coldwater fish. (All fish in this class will be judged and pointed as six true pairs.) 4, Displays. (This class will be judged on staging and layout only; the fish exhibited in the aquaria will not count. The object of this class is to ensure that the displays are made as attractive as possible. Space allotted to competing clubs, 12 ft. frontage by 8 ft. depth.) 5, Complete Display. (Points in the class will be based on a combination of those parts of each display entered in Classes 1 or 2 plus 3 and 4. Maximum points:—Classes 1 or 2, 100. Class 3, 600. Class 4, 100, giving a total of 800 for Class 5). Classes 1 to 5 are for societies only and will be open for one block entry. Only one entry per society is permitted. Class 6, A.S. Livebearer (one pair). Class 7, A.S. Coldwater Fish (one pair). Class 8, A.S. Cichlid (one pair). Class 9, A.S. Labyrinth, other than *Betta splendens* (one pair). Class 10, *Betta spendens* (one pair). Class 11, A.S. Barb (one pair). Class 12, A.S. Characin (one pair). Class 13, A.O.S. Tropical (one pair).

Entries in Classes 6 to 13 inclusive will consist of the fish exhibited in Class 3, the awards in these classes going to the individual owners of the fish.

Restriction in Class Entries

Not more than two entries per class can be made in Classes 6 to 13 by members of the societies competing in Classes 1 to 5 and not more than six of the eight classes can be entered. All the fish involved will be included in the society's block entry in Class 3. The idea behind Classes 6 to 13 is to encourage individual members to loan their best fish for their society's block entry. Equipment for the displays will be loaned by the F.N.A.S. to member societies. Societies not affiliated must supply their own. Competing societies will be expected to steward their exhibit or make some suitable arrangements to assist the organising committee in making a success of the Festival. They will be responsible for the welfare of the livestock in their display and for looking after the entry whilst the show is open.

Readers will recall that last year a similar competition, open to member societies only, drew some highly ingenious and good quality displays. It will be interesting to see whether this year the standard will be improved and if there is to be any serious challenge from non-member organisations.

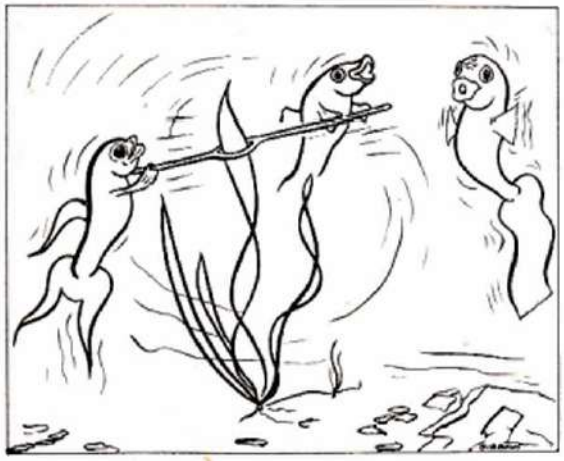
Two Public Aquariums Open at Southend

IN the hope of encouraging holidaymakers to take a constitutional along Southend's lengthy pier, the town has set up a small Aquarium on the pier head. At the end of a bracing walk for 1¼ miles out to sea, you can enjoy a free inspection of exotic fish leisurely pondering their unique position. The aquarium is modest in scope and restrained in execution. There are no garish inducements but a group of as neatly arranged aquariums as it has been our pleasure to see. At the civic opening on Good Friday, 17 furnished tanks were on view, most contained a single species or variety of tropical fish, but one was given over to Bubble-eye Goldfish, and another contained terrapins. A large community aquarium formed an impressive centre-piece.

With South Coast Aquatic Nurseries Ltd. setting up a more extensive aquarium in the Pier Hill Buildings, which was due to open at the end of May, aquarists will be able to enjoy a few hours with their hobby as well as the customary dip in the briny when visiting Southend-on-Sea this Summer.

Rally in the Midlands

THE Midland Association of Aquarists' Societies—now representing 16 societies—is to hold its Rally at Dudley Zoo on Sunday, September 11.



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"DID YOU THINK THE THING TWISTED ITSELF?"

★

Aquarists' Internationale

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

MR. C. Basil Jordan (Texas, U.S.A.) writes:—"Did you know about Sternke's new Yucatan Mollie? It is supposed to have great stamina and to live happily in the aquarium without developing the 'shakes' and, moreover, its young may be left in the aquarium until grown. I obtained 13 specimens from him (and also some real show specimens of Golden Blonds and a few young of *Mollienesia petenensis*) which had a chance to prove their hardiness *en route*. They were on the road eight days. Their can had been overturned and there was not even enough water left in it to cover the fish. Besides this, they were delivered to the Cotulla express office (42 miles from here) at night by a truck and left on an outside platform until the express office opened next morning. Now it just happened that one of those yankee northers swept down on us during the night and the water felt ice-cold when I arrived to pick up the shipment. The city water at Cotulla is blistering hot to the touch as it comes from the artesian wells and, even in the city mains, it is hot. So you see I was faced with a problem in getting water to put in the can for the return trip home, but the fish all made it and none seemed any worse for it. The next night the big male Blond jumped eight inches out of a hogshead where I had put him and was found stiff and wrapped up in dust. But I gave him my famous fish artificial respiration and within an hour he was back to normal.

"*M. petenensis* is regarded as the largest of all Mollies and has a large sailfin like the Velifera besides a sort of sword tail. I want to raise some giant specimens of these for shows and public aquariums.

"We had a surprise visit from Norman Blass the other night (from Miami, the man who brought in *Apistogramma ramirezi*). He had been out in West Texas in search of the little *Planctorus zebrinus* (*Fundulus subrinus*) but unsuccessfully. I do wish he had come by on his way out there instead of his way back, as I could have directed him to the actual spot where we caught them. He only stayed a few hours as it was very late at night. We had a very enjoyable time discussing Mexican fish from a collector's standpoint. One of the places I am anxious to explore is down below Lake Chapala, in Jalisco. However, there have been quite a few bandits down there lately and my 'wet-back' friend tells me that it might be a bit dangerous to travel until things are cleared up. It seems that heads are lopped off with matchets without too much concern."

MME. N. de Breuil (Hong Kong) writes:—"The Clown Loaches are becoming quite common on our market and one can get a pair for about 12/6d. They are worth having and are always on view in the tank, swimming, feeding, cleaning plants, or rather alarmingly resting, lying on the sand on their side, for all the world like a dead fish. Even though I knew they did it, I could not help being alarmed when my own did it. George Bing gave me a pair of *Mystus tengara* but, as they chased the Clown Loaches, I put them in the tank with Hillary (Crayfish) which lives peacefully with several Wagtail Platies and a Cambodia Betta. To my surprise, although he lets his tank mates pinch food practically out of his mouth, he took exception to the new catfish and chases them with obvious evil intent.

"Some time ago I got a Giant Gecko who lived quite happily in our sitting room. Recently a friend asked if I would give home to another which turned out to be much bigger. Two days later, I found the smaller Gecko's tail in the middle of the room. As no living creature was there apart from them and the fish in the tanks, their introduction to each other must have been a rough one. Now, the smaller Gecko, called Beatrix, keeps well away from Esmond, the bully."

Middle East Society

BAHREIN Island, in the Persian Gulf, now has an aquarists' club. Its secretary, Mr. V. Fenwick, Box No. 539, Awali, Bahrein Island, Persian Gulf, informs us that it was inaugurated in August of last year.

Encouraging the Keeping of Seawater Aquariums

British Marine Aquarists' Society Making Contacts Abroad

IN relation to other countries, the number of marine aquarists in Great Britain is small, writes Mr. L. Ogilvy-Morris, chairman of the British Marine Aquarists' Society. The reason for this is hard to define. It probably stems from the belief that marine aquaria are expensive and difficult to set up, that they require an abnormal amount of maintenance when compared with tropical and coldwater tanks, and because it is not easy to obtain advice on how to meet these difficulties.

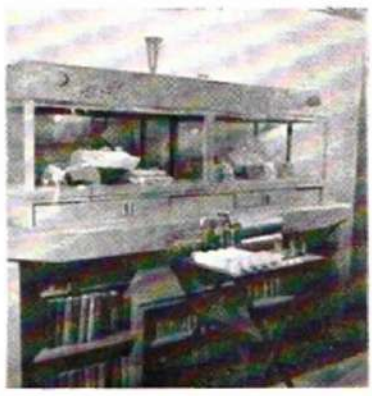
Mr. and Mrs. Ogilvy-Morris seated by their battery of tanks containing marine specimens.

Whilst there may be some truth in this if it is desired to keep large numbers of fish, it is by no means so for those who desire to keep a modest marine aquarium. With regard to the problems that might arise, the British Marine Aquarists' Society was started in 1952 for the purpose of popularising the keeping of marine aquaria, giving advice to beginners who are interested but who lack the necessary experience, exchanging specimens and providing seawater.

Among the members of the Society are science masters, curators of public aquaria and research scientists. It should not be felt, however, that the Society only caters for such experts. It welcomes people who wish to keep marine aquaria purely for the pleasure of so doing, and the experts' advice is available to everybody. Bibliography on the keeping of marine aquaria and indeed on marine fishes in general is small and this makes the service the Society can give to its members all the more valuable.

Continental Contacts

The Society now has 35 members and has started to communicate with similar societies on the Continent, in particular the "Maritima Biologie" in Holland. It hopes to link up with other organisations, including those in France, Germany, Italy and Malta, in the hope of being able to exchange information and specimens. The Ministry of Agriculture and Fisheries, H.M. Commissioners of Customs and Excise and the Board of Trade have been approached and there appear to be no insuperable difficulties, so that we hope that the contacts will widen the field for obtaining specimens. We shall be very pleased to hear from any marine aquarists' societies in other countries, including those mentioned.



A view of marine tanks owned by the B.M.A.S. chairman. On the table are displayed a pump, some filters and ceramic filter cylinders

The British Sub Aqua Club's members use their aqua-lung apparatus for the purpose of undersea exploration. It is hoped that at some later date a link may be formed between that society and ours. They have already started arranging for parties to go abroad to the South of France and this might mean improved facilities for the collection of specimens and exchange of useful information.

Enquiries from would-be members will be welcome. They should be sent to the secretary, Mr. M. Pugh-Thomas, 35 Meols Drive, Hoylake, Cheshire, who will be very pleased to answer any letters.

New Torquay Attraction

Public Aquarium at Beacon Quay

OVER 200 guests were present at the recent opening of the Beacon Quay Aquarium at Torquay. The civic authorities, who wished the venture well, were represented by the Mayor and Mayoress, Alderman and Mrs. W. H. White, the Deputy Mayor and Mayoress, Alderman and Mrs. A. L. Goodrich, other members of the town council and local officials.

The Mayor introduced Mr. George Cansdale, who performed the opening ceremony. Mr. Cansdale spoke of Roman aquaria of 2,000 years ago and referred to the development over the years of the Goldfish, commenting adversely on some of the forms now to be seen. After pointing out the beauty of an aquarium and mentioning some of the fish that can be kept in the home, he consoled with the directors, Messrs. Sinclair and Dixon, who had experienced delays in completing the reconstruction of the building and in collecting the specimens on show.

After a spray of flowers had been presented to the Mayoress, Mr. Cansdale formally opened the Aquarium by pulling a ribbon from across the doorway and was then the first to enter. The guests saw how much had been done to get the place ready. It is divided into two sections, one for cold and tropical freshwater fishes and the other for marine specimens. Among the exhibits in the first section were Bristol Shubunkins, Red Tail Sharks, Puffers, Bitterling, Golden Orfe, Kissing Gouramies and Axolotls. The marine tanks had a wealth of animal life ranging from Plumose and Opelet Anemones to Gudgeon, a Sea Mouse, Spider Crabs, a Nurse Hound, Skate, Thornback Ray and a venerable Lobster.

Director's Speech

At the Mayflower Hotel after the ceremony, the visitors were entertained to lunch. Mr. Dixon spoke of the encouragement and support they had received and proposed the toast of the Borough. Both the Mayor and Deputy Mayor replied, the latter reading a humorous ode that he had composed. Mr. Sinclair followed, giving the thanks of the directors to all whose help had enabled the new attraction to the town to be opened by the scheduled time. Finally, Mr. Cansdale entertained the company with a number of interesting stories. Members of Torquay A. and P.S. present were Messrs. R. T. Gardner, President, H. R. Brooking, vice-president, T. L. Hassall, chairman (who represented WATER LIFE), R. J. Manuell, secretary, and A. E. Poat.

Indian Conference

SUPERINTENDENTS of zoos in India met at a conference in Madras from May 2-4. The purpose of the meeting was to assess the educational, recreational and scientific value of zoos in the community life of the nation, and to decide how zoos in India could best serve society.

The conference also discussed the possibility of opening zoological parks, especially in hill towns, and organising aquariums and insectariums, rearing rare specimens of animal life, and exchanging animals and birds among various zoological gardens in India.

Photograph] [*Fox*

In the new Hallfield Primary School, Paddington, London, built on ultra-modern lines, there are several Goldfish tanks. Andrew Chatwood and Michael Brown are seen here taking the job of changing the water in one of them very seriously.

Bermondsey Competition

THE Borough of Bermondsey is again staging an exhibition of hobbies and crafts this year and in it will be included four classes for our hobby. Two WATER LIFE Diplomas will be competed for in this section. Dates of the show are August 26-27. Further details can be had from the show secretary, Mr. P. F. Petto, Borough of Bermondsey Garden and Open Spaces Dept., Town Hall, Spa Road, Bermondsey, London, S.E.16.

B.H.S. Programme

DR. MALCOLM SMITH will speak on "The Anatomy of Reptiles" at the June 20 meeting of the British Herpetological Society's London Group to be held in the Linnæn Society's Rooms, Burlington House, Piccadilly, W.1, at 7 p.m. At earlier meetings this year members have been shown colour slides of reptiles and amphibia and, in April, various live specimens were on view.

Annual Guppy Show

ANNUAL show of the Federation of Guppy Breeders' Societies will be held at the same venue as last year. This is the Pavilion Cafeteria in London Zoo. Present plans are that it will be a one-day event on Saturday, September 24.

Proof of the good relations existing between the S. Wales Guppy Section and the Welsh National A.S. is that the section has received honorary membership of the latter club. An assembly at Leicester on May 1 proved successful.

Club Notes and News

The Editor invites clubs to send brief reports of meetings and announcements of forthcoming events. News items for the next issue should reach this office no later than Tuesday, July 12.

OPEN show of **Bath A.S.** will once again be held in the Concert Hall of the Pump Room at Bath. Dates are July 21 to 23. Show secretary is Miss A. Gurney, 41 Sydney Buildings, Bath, from whom schedules can be obtained. Entries close June 29. There are 31 classes in which 15 trophies will be competed for. Mr. W. L. Mandeville will judge the tropical section.

GOOD progress was reported at the A.G.M. of **Derwent A.C.** when Mr. A. D. Brakell was returned as chairman, Mr. F. Reader as treasurer, and Mrs. P. B. Gray, 52 Westgreen Avenue, Allerton, Derby, was elected secretary.

SECRETARY of **Southport Aquarist Society** is now Mr. P. Walshe, 93 King Street, Southport.

TWENTY-NINE members of **Chelsea A.S.** visited the Horley society for the semi-final of the A.S.L.A.S. interclub competition. Chelsea were the winners with 53 points compared with Horley's 47.

DUE to business commitments, Mr. Bissett, secretary of **Perth A.C.**, has had to give up his position, which is now held by Mr. W. T. Murray, 8 Croft Bank, Craigie, Perth.

THE **Hull A. & P.S.** now meets on the first Thursday of each month and has table shows at every fixture. During August, members will visit the Pondworth Trout Breeding Grounds and Bampton Fish Hatcheries.

SET-UP aquaria are to be presented to the local Diagnostic Centre and to the Wilfred Pickles School for Spastic Children at Tixover Grange, Nr. Duddington, by **Corby A.S.**

MR. TELLING of the Exeter society gave the aquatic traders' viewpoint of fish-keeping at the April meeting of **Plymouth A. & P.S.** Mr. Johnston lectured on "Line Breeding Guppies" at the May fixture. The club is now affiliated to the F.B.A.S.

FOLLOWING the retirement of Mr. C. Baldock from the post of secretary to **Kettering A.S.**, Mrs. P. Eales, 15 West Street, Kettering, now holds this position. During April tropical and coldwater aquaria were displayed at a local cinema where the film entitled "Underwater" was being shown. There was a table show on May 19 and Mr. H. F. Woolatt gave an illustrated talk.

MR. R. ROWE spoke on "Tropicals" at the April 13 meeting of **Aylesbury A.A.** Mr. C. Norman was the judge for an eight-class table show held on May 11. A visit to Kew Gardens is planned for June 5 and, on June 8, Mr. C. A. Bartlett, B.Sc., speaks on "Aquatic Creatures."

AS the result of the A.G.M. the following officers now serve **Standard-Kolster A.S.**:—chairman, Mr. A. J. Camp; treasurer, Mr. J. Beer; show secretary, Mr. C. Wiseman and secretary, Mr. A. Langridge, Messrs. Standard-Kolster, Cray Works, Sidcup, Kent. Annual open show of the society will be staged in conjunction with the firm's annual fête on July 16.

FROM August 25-27 **Banbury A.S.** will stage its show in the Town Hall. Two WATER LIFE diplomas are up for competition. Show secretary is Mr. A. Simmonds, Hadsham Cottage, Horley, Nr. Banbury, Oxon.

MEMBERS of **Grimsby & Cleethorpes A.S.** are now working for the opening of the Grotto Aquarium where, for the fifth successive year, tanks set up by the society will be on show to the public. At the April meeting Mr. T. James gave a lecture on building a garden pond and looking after coldwater fish. There was a competition between the Gainsborough and Grimsby societies on May 10.

THE **Southall A.S.** has now settled down in its new clubroom at South Lodge Bungalow, The Green, Southall. Meetings are held on alternate Thursdays at 7.30 p.m. Preparations are in hand for the customary Summer show.

IN the foyer of a local cinema **Southern A.A. (Brighton)** have installed a tank of tropical fish. A party from the club visited McLynn's Aquarium, Ewhurst, on Whit Monday. Mr. C. Mortock delivers a lecture on "Genetics" at the July 11 meeting.

MISS D. MORRIS now serves **Horley A. & P.S.** as its secretary. Her address is 68 Balcombe Road, Horley, Surrey. The society meets on alternate Tuesdays at Horley Community Centre. Mr. R. H. I. Read was the lecturer on May 31.

A PARTY of East London members visited **Chingford A.A.S.** recently and told of their fishkeeping experiences.

FURNISHED aquaria will be staged by **Yeovil A.S.** at the Yeovil Agricultural Show on September 8. At the April meeting the President presented to the society a trophy with an Angel fish motif. During the same evening Mr. R. Stone, the chairman, spoke on "Breeding and Keeping Angel Fish." The club visited Bridgwater on May 23 when an interclub show was held.

VISITOR to **Peterborough A.S.** meeting on March 21 was Mr. E. H. Riddle, F.B.A.S. chairman. He judged a table show and also gave a talk. The annual open show will be held at St. Paul's Hall, New England, Peterborough, from September 15 to 17. WATER LIFE diplomas will be competed for.

A WELL-ATTENDED meeting of **Southport & District Aquarium Society** in April heard Mr. T. Paine speak on "Facts About Fish." Chester Zoo is to be visited during July.

SIXTH annual open show of **Southampton A.S.** will be held in the Avenue Hall, Southampton, on June 23-25. Entry forms and further details can be obtained from Mr. E. C. Golesworthy, Westways, Romsey Road, Nursling, Southampton.

A FILM strip was used as an integral part of a talk on "Life in Ponds" given at the April meeting of **Coventry P. & A.S.** Annual show dates are September 8-10. The event takes place at Queens Road Baptist Church Hall, Coventry.

MEETING night of **Birmingham F.F.S.** has changed from the first Thursday to the first Tuesday of each month. It is hoped that Mr. E. J. Druce will speak at the June meeting.

OFFICERS of the **Croydon A.S.** are chairman, Mr. P. Boyce; vice-chairman and secretary, Mr. E. Farrance, 12 Burgoyne Road, S. Norwood, London, S.E.25; treasurer, Mr. F. Henson and assistant secretary, Miss I. Bradbrooke. During May there was an interclub table show with Mitcham. On June 2 Mr. Tratt will present a film show.

FIRST table show of **Llantwit Major A.S.** was held in April when Mr. J. Weare won first prize. The Welsh National A.S. secretary, Mr. M. E. Lewis, spoke at the May 11 meeting. An interclub competition will be held in the Youth Club, Llantwit Major, on June 8.

THE **Barrow A.S.** put on a display at a hobbies exhibition held locally during April. Proceeds went to charity.

FIFTY-EIGHT aquarists attended the interclub show between **Hampstead A.S.** and the Willesden society on April 26. Hampstead were the winners with 24 points against 16, and they were also successful in a brains trust contest. Judge at the event was Mr. J. H. Gloyn. A fortnight earlier Messrs. Filmer and Lake visited Hampstead and spoke on the F.B.A.S. and the way it functions. Mr. S. R. Moore judged a table show arranged for the same evening.

MR. H. LIGHTFOOT, 39 Crosby Road, West Bridgford, Notts., is now the secretary of **Nottingham A.S.** Other officials appointed at the A.G.M. on March 30 were President, Mr. H. P. Lymn; breeders' secretary, Mr. B. Inman; vice-chairman, Mr. Hill; show secretary, Mr. W. C. Webley and assistant show secretary, Mr. W. J. Christian. The society's home aquaria competition was

(*Continued next page.*)

FEDERATION CHAIRMAN'S VISIT

Mr. E. H. Riddle, Federation of British Aquatic Societies' chairman, visited a Spring meeting of Peterborough A.S. He is seen seated here with the society's secretary and treasurer, Mrs. Y. J. Stockdale. Standing (from left to right) are Messrs. D. Malton (committee), S. Bean (committee), B. Budding (chairman) and R. Whitehead who serves as vice-chairman.

Club Notes and News—*contd.*

on April 24 with Messrs. H. Walker, T. Duckering and B. Inman officiating. Two well-known London aquarists spoke at the April and May meetings. They were Mrs. W. M. Meadows and Mr. C. W. G. Creed. Closing date for entries in the pond competition is June 18. Judging, by Messrs. Lymn, Ford and Pullon, takes place on June 26. The annual outing will be to Chester on June 19.

NEW secretary of the **North of Scotland A.S.** is Mr. G. Kidd, West Lodge, Danestone, Woodside, Aberdeen.

AN interesting film show was arranged by **Wembley A.S.** for its May 17 meeting. Mr. A. Leutscher, B.Sc., will take along live specimens to illustrate his talk on "Vivarium Animals," scheduled for June 7. Open classes will be included in a table show on June 21. There will be two lectures in July, one on Tuesday the 5th by Mr. E. G. Gage, and the other, a fortnight later, by Mr. J. Carnell.

MEMBERS of **Guildford A.C.** are to visit McLynn's Aquarium, Ewhurst, on July 17 and the following week they will inspect the Haslemere Educational Museum, of which their President, Mr. J. Clegg, is curator. A tropical table show was held on May 11. Mr. R. J. Cundall will give an illustrated talk on the "Life History of *Daphnia*" at the June 8 meeting.

FOURTEEN classes comprise the show to be held by **Bedford A.S.** in conjunction with the Marston Valley Brick Company's annual Summer show and sports meeting on July 30. It is open to aquarists living within a 40-mile radius of Bedford. Schedules can be obtained from Mr. R. R. Pope, 51 Aylesbury Road, Bedford. A challenge trophy, awarded by the Marston Valley Brick Co., will go to the society gaining the highest number of points over all the classes. There was a showing of the film "Under the Red Sea" during May.

AT a recent interclub table show between **Riverside A.S.** (**Hammersmith**) and the Slough society, Riverside won with 21 points against Slough's 17. Other recent and forthcoming activities of Riverside include a table show for Catfish, one for Characins, a quiz and a lecture on "Cichlids."

FOURTH annual show of **Leyton A.S.** is being held in conjunction with the Borough of Leyton Show on August 20 and 21 at the Coronation Gardens, Leyton, E.10. Aquarists or societies interested in exhibiting should contact Mr. R. Bergdahl, 49 Overton Drive, Wanstead, London, E.11, for show schedules. Twenty classes are planned, including four for furnished aquaria.

WE indicated in our April issue that Mrs. W. E. Spurling Jewell was newly appointed as secretary of the **Dublin Society of Aquarists**. This hard-working official of one of Eire's leading organisations has, in fact, held the position for three years.

ON June 5 **Swinton A.S.** members will visit Messrs. Shirley Aquatics Ltd. Members of a neighbouring aquarist society have been invited to attend a talk by Dr. F. N. Ghadially on June 6.

ANNUAL show of **Leicester A.S.** will be staged in the St. Mark's Schoolroom, Belgrave Road, Leicester, from August 31 to September 3. The society will also be putting on a display in the horticultural marquee of the Leicester and Abbey Park Show on August 2 and 3. Lecturers at the April and May meetings were Messrs. A. Atkins and Guthrie. In June, Mr. A. Wilson Smith will talk on "Keeping Freshwater Fish" and a film show has been arranged for July.

National Aquarists Society

All Set for Eighth Summer Show

Big Classification and Well-known Judges Attract High Quality Fish

Mr. A. Marjoram, Exhibition Secretary.

MONTHS of preparation have gone into the N.A.S. Show, which is being held on June 9, 10 and 11, at the Royal Horticultural Hall, Westminster, S.W.1, and we anticipate a record attendance at this premier Summer exhibition. This year, the show has been re-planned so as to make the best use of the space available, the lay-out being centred round the new N.A.S. stand. Special prominence is being given to the furnished aquaria classes.

Eleven judges have been engaged, namely Mrs. B. Robertshaw, Messrs. Betts, Boarder, Bowler, Cleveland, Dacre, Gloyn, Harker, Hewitt, Looker and White, for the 46 classes. We hear that the entry, which totals well over 800, includes some new species not exhibited before. Incidentally, the age of the youngest exhibitor is four! Who will qualify we wonder, for the other end of the scale? The names of prominent exhibitors ensure keen competition in the coldwater section and there is likely to be a close contest for the interclub shield.

Visitors to the show will be welcomed at WATER LIFE Stand where copies of the new book "Guide to Tropical Fishkeeping," for which there has already been a very heavy demand, will be on sale, as well as the usual range of helpful handbooks.

The Royal Horticultural Hall is within easy reach of Westminster and Victoria and within walking distance of St. James's Park Underground Station. Bus routes Nos. 10 and 46 pass within a minute's walk of the hall.

Left to right: Messrs. L. C. Betts, H. S. White, W. Dacre and W. C. Cleveland, four of the judges.

FIRST prizewinners at the March and April table shows of the **Guppy Federation's East Midland Section** were Messrs. W. Burwell, C. Taylor and T. Ford.

SHORT lectures were given at a recent meeting of **Doncaster N.S.** when the Rotherham society was entertained.

AT a Spring meeting of **West Middlesex A.S.** the annual presentation of cups and trophies was made. Messrs. C. Blagrove and R. A. Brown were first prizewinners at a table show held during the same evening. Present secretary is Mr. P. E. Woodward, 16 Jessamine Road, Hanwell, London, W.7, and meetings are held on the third Tuesday of each month at Ealing Town Hall.

RECENTLY-APPOINTED secretary of **Bolton A.P. & M.S.** is Mr. G. Birchall, 11 Louisa Street, Bolton, Lancs.

MEETINGS of **Merseyside A.S.** are now held at the Grenville Café, Tithebarn Street, Liverpool, on the first and third Thursdays of each month.

SEVENTH open show of **Hendon A.S.** will run from August 10 to 13 in Hendon Park. Classes for furnished aquaria and home-bred fish are included in the schedule, which may be obtained from Mr. M. Hartnup, 37 Park Mansions, Vivian Avenue, Hendon, London, N.W.4. On April 14 three Hendon members, Mrs. B. Robertshaw, Mr. B. Calrow and Mr. E. H. Riddle, gave talks at the London Aquarium, South Bank. Members of other societies were invited.

MEMBERS of **Oxford A.S.** have given interesting lectures at recent meetings of the society. A visitor at one gathering was Mrs. W. M. Meadows, who spoke on her fishkeeping and fishbreeding experiences.

SHOW dates of the **Bethnal Green A.S.** sixth annual show are September 9 and 10. Show secretary is Mr. F. Fox, 130 Whitecross Street, Old Street, London, E.C.1.

IN the first leg of an interclub competition between **Romford A.S.** and Thameside A.S., Romford were the winners in the table show and Thameside were successful in the quiz.

ON June 2 pond creatures will be identified at the **Halifax A.S.** meeting. For July, Mr. G. W. Cook has been booked to give a lecture on "The Art of Showing."

NEWLY-FORMED **Llandudno A.S.** has Mr. C. H. Jones, 40 Pengarth, Conway, Caernarvonshire, as its secretary.

NEW members have been successful at table shows arranged by **Forest Hill A.S.** and with the club's bonus points scheme in operation this year it is likely that a newcomer will win the trophy at these events.

AT the fourth annual exhibition of **Macclesfield A.S.** there will be a competition for club furnished aquaria. Details can be obtained from Mr. S. B. Cass, 20 Duke Street, Macclesfield. Venue is the Brocklehurst Memorial Hall, Queen Victoria Street, Macclesfield, Cheshire, and dates are July 15 and 16. New address of the secretary, Mr. A. Lunt, is 53 Stapleton Road, Macclesfield.

THE Rotary Club of Wakefield are holding a Hobbies and Home Safety Exhibition from June 2 to 4 and **Horbury A.S.** is to put on a display at the event.

AT the A.G.M. of **Rochdale A.S.**, Mr. J. Dodsworth was elected President; Mr. R. Hudson, vice-president; Mr. R. Travers, treasurer; Mr. R. Hinchcliffe, assistant secretary and Mr. K. Cousins, 774 Manchester Road, Castleton, Rochdale, Lancs., secretary. Fourth annual open show of the society was held from May 21-22.

THE **Redhill A.S.** has a new secretary. He is Mr. B. C. Robinson, 21 Hitchings Way, Woodhatch, Reigate, Surrey.

Those Barb Guides

More To Be Issued Later

OUR observations in the April issue on the Guides issued for 15 species of Barbs have led to the Judges' and Standards Committee of the F.B.A.S. sending an explanatory letter. The Committee states "We do not consider it a practical proposition to provide standards for all aquarium fishes, since many are not regularly bred and we have no information as to the possibilities of their development. The term 'standards' is, therefore, retained for the cultivated varieties. It is not thought necessary to provide a points schedule for each individual species, since a points system for fish for which there is no standard has been in use for some time and this will be applicable. . . No doubt this points system will be printed amongst the information sheets in due course."

The letter adds that more Barb species will be dealt with in the future and explains why preference is given to Hamilton instead of Hamilton-Buchanan in respect of the following species: *B. conchonius*, *B. gelius*, *B. phutunio*, *B. sophore*, *B. terio* and *B. ticto*. The Committee points out that the naming of some of the Barbs such as *B. pentazona*, was accomplished only after research involving the study of the original descriptions and figures and comparison of actual specimens both alive and preserved. The committee claims it is satisfied that the published conclusions are as authoritative as available material permits but we suggest that there may have to be a further revision when the *Barbus* classification is finally clarified.

With regard to the use of parentheses, the Committee agrees that in some instances these should not have been inserted. Assuming that Hamilton rather than Hamilton-Buchanan is the more acceptable name, we append a list of the species covered, showing the correct use of these parentheses. We query whether it is more accurate to describe Cuming's Barb as *B. cumingi* (used in the Guides) or *B. cumingii* as used in J. H. P. Brymer's new book "Guide to Tropical Fishkeeping." The British Museum authorities seem to favour the latter spelling, although the single "i" is preferred by some systematists.

B. conchonius (Hamilton), *B. cumingii* Günther, *B. gelius* (Hamilton), *B. nigrofasciatus* Günther, *B. oligolepis* (Bleeker), *B. partipentazona* Fowler, *B. pentazona* Boulenger, *B. phutunio* (Hamilton), *B. sophore* (Hamilton), *B. sophoroides* Günther, *B. terio* (Hamilton), *B. tetrazona* (Bleeker), *B. ticto* (Hamilton), *B. titteya* (Deraniyagala), *B. vittatus* Day.

Three Counties Show

THE Three Counties Show will be held in Reading this year. Its venue is the Palmer Hall, Reading, where it will be open to the public from October 13 to 15. Show schedules will shortly be available and can be obtained from Mr. F. H. Crane, 26, Kensington Road, Reading.

East Midlands Association Formed

AN association which has been in the process of formation for several months, held its inaugural meeting at Bedford on May 4. It will operate in the counties of the East Midlands and will be called the East Midlands Affiliated Aquarist Societies. At the first meeting representatives from Peterborough, North Herts., and Bedford societies were present. Object of the new group will be "to promote inter-society activities and so further the aims of the societies."

Officers elected were: chairman, Mr. Stockdale (Peterborough) and secretary and treasurer, Mr. R. R. Pope, 51 Aylesbury Road, Bedford. Two resolutions passed were that a list of speakers and judges should be made available to member societies and also a list of equipment which each affiliated group would be prepared to loan out for the staging of exhibitions. The next meeting will be held on June 15 at the Rose and Crown Clubroom, Bridge Street, Peterborough, commencing 8 p.m.

Enterprise A.S. Schedule

FOURTEEN classes have been scheduled for Enterprise A.S. Show at Friary Park, Friern Barnet, on August 19-20, made up of three furnished aquaria classes (two for clubs and one for individual tropical tanks), two for Goldfish (one for Shubunkins and one for Fancy Goldfish, each with a maximum limit of 6 in.) seven for tropical fishes (including one for Cichlids, with a maximum length of 5 in.), and two for Breeders' teams (one for tropical egglayers and one for tropical livebearers).

In connection with the last mentioned class, the Federation Trophy for the Best Breeders' Team of Livebearers is offered to the member of a society who enters and complies with the F.B.A.S. rules for this competition. Two WATER LIFE Diplomas are offered at this event and first and second prizes, with award cards for third places, are being given. The classes will be judged by F.B.A.S. judges. Entries close August 10, to Mrs. W. M. Meadows, show secretary, Meadhurst, Brunswick Crescent, London, N.11.

Technical Director Addresses G.S.G.B.

"MATING for Colour Patterns," was the title of an interesting lecture given by the technical director of the Goldfish Society of Great Britain at the specialist body's last quarterly meeting. Members were invited to bring along their breeding stock for advice on suitable pairings.

Late News

KIRKCALDY A.S. holds its first annual show at the Boys' Brigade Hall on August 19-20. Show secretary is Mr. A. Blair, 14, Miller Street, Gallowtown, Kirkcaldy. Meetings of Penistone A.S. are now held on the third Wednesday of each month. Kidderminster A.S. has been formed. Its secretary is Mrs. V. M. Hillman, Brockencote House, Chaddesley Corbett, Worcs.

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