

The AQUARIST AND PONDKEEPER

Founded in 1924 as "The Amateur Aquarist"



THE BUTTS, HALF ACRE, BRENTFORD,
MIDDLESEX

Telephone: HOUnslow 9301

PUBLISHED MONTHLY

SUBSCRIPTION RATES

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

QUERIES

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

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Photo:

Dr. F. N. Ghadially

It is not clear whether the green microscopic organism *Euglena* is to be regarded as a plant or animal, but it is easily cultured for fry live food as described on page 254. In this picture the *Euglena* cells are magnified 750 times

VOL. XIX No. 12

1955

Editorial

TO anyone suggesting that the denizens of aquaria are "poor fish" because "all they do is swim" we may give the short and expressive transatlantic "Fooy!" for answer. However, even the devoted aquarist, observing what he may think amusing disportive antics of his fishes, is not always aware that what he sees are meaningful patterns of behaviour. Some activities of fishes, studied and analysed for us by the work of Professor Tinbergen, were reported in an article in our February issue; but many more await interpretation by careful and patient observers. This month we are pleased to include some original work in the field of fish behaviour by Desmond Morris, who describes on page 247 his studies of the courtship "dance" of the swordtail.

Any consideration of behaviour is incomplete if it does not mention the work of Dr. Konrad Lorenz, a scientist who has also given fishes his attention. Author of the truly remarkable book *King Solomon's Ring*, Dr. Lorenz is honoured this year for his service to zoology by the award of the Gold Medal of the New York Zoological Society. Although interpretation of observed behaviour is a field in which the theorist has wide scope, and hence is one which may tempt an amateur to go too far with his explanations, the scientist is well aware of the dangers and puts forward theories with due reservations. The recognition of fixed sequences of actions in fishes or other animals under various circumstances is, however, of fundamental importance to our ultimate understanding of nature, even if wrongly interpreted at first.

We can all be observers of fish behaviour in aquaria, granted patience, but the accumulating record of experiences of "aqua-lung" divers in natural waters is revealing some aspects of fish life to which most of us are strangers. A recent film, *Hunters of the Deep*, showed this in sequences photographing responses of two large sea groupers to a submerged human who fed them. No trick known to domestic dog or cat waiting for table scraps was new to those two charming scroungers!

Recent Tropical Arrivals

*Photographed in the aquaria of the
London Aquarium, South Bank*

by LAURENCE E. PERKINS



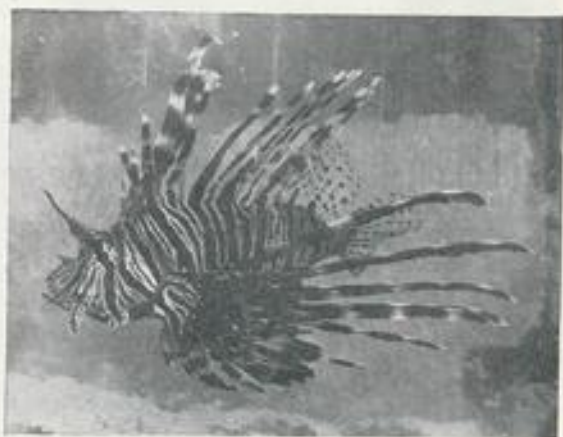
One of several closely-related species of coral fish, *Dascyllus carneus* comes from the tropical east coast of Africa. Although apparently drab in colour, under certain lighting conditions this little fish reveals a purple which suffuses the dorsal fin, the tips of the ventral fins, and part of the body sides. In length *D. carneus* grows to 3½ ins.



Abudedefduf sardidus is a species occurring in very great numbers in the Indo-Pacific region. It grows to a length of ten inches



A dwarf "grouper" from the Pacific Islands, *Grammistes sexlineatus* is the only known species of the genus. The specimen pictured here is coloured black, with white stripes, but body colour is often brownish and shows horizontal golden stripes varying in number from three to nine. This hardy fish grows to ten inches in length and is highly suited for aquarium life. It must, however, be kept alone, for it can swallow fishes three-quarters its own length



The scorpion fish also rejoices in the names of butterfly, dragon, devil, lion or viper fish. It can be distinguished from other *Pterois* species by the black-spotted caudal fin. Colour of this fish is extremely variable, showing patterns of red and cream stripes. Beautiful but dangerous—it can release a poisonous secretion from the tips of its dorsal fin spines—the scorpion fish grows up to a foot in length

The Courtship Dance of the Swordtail

by DESMOND MORRIS

THE swordtail (*Xiphophorus helleri*) is a fish which is immensely popular both with aquarists and scientists. It breeds readily in aquarium tanks and this, combined with the existence of a number of colour-forms, has led to its being the subject of many genetical experiments. (See, for example, Dr. Myron Gordon in *The Aquarist*, Vol. XVIII, pp. 10-14). The fact that females of this species often change sex and become equally functional males has attracted the interest of physiologists and endocrinologists. But its reproductive behaviour in general is also fascinating and recently I have in particular studied the way in which the male courts the female prior to mating with her.

The Sword-Dance

If male and female swordtails are kept together in a tank, every now and then a mad rush of activity can be seen. Closer observations reveal that such outbursts are often the result of a male making frantic swimming movements around and about a female. (They may also be the result of two males threatening one another, but this will not be discussed here.) At first sight the high-speed movements of the male appear to be made at random in almost any direction. But this apparent variability of the movements is only the outcome of their high speed and the typical agitation of the female involved.

The more the dancing males are studied, the clearer it becomes that their movements are, in fact, extremely rigid in form and possess a stereotyped and ritual-like quality. The ritualised nature of the activities can only be clearly

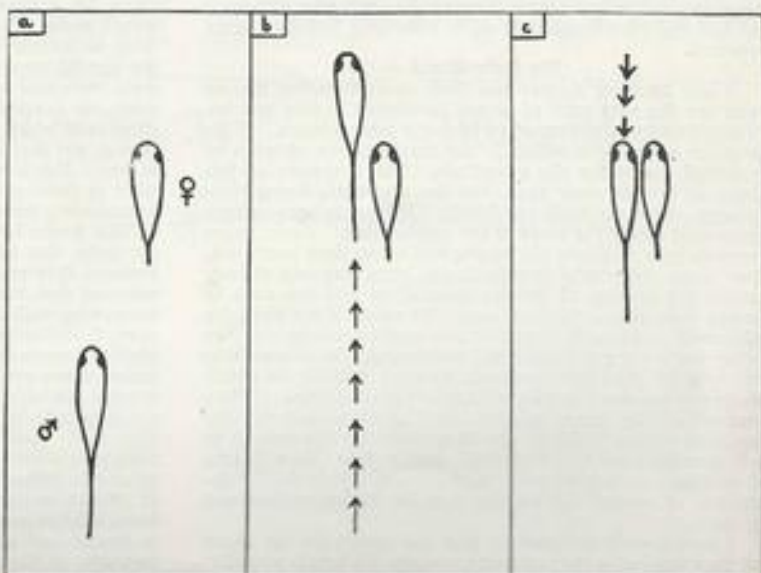
understood, however, when a correction is made for the repeatedly changing position of the female. The male's movements, viewed by themselves, without reference to the changing position of the female, seem to be very erratic, but once this is taken into consideration it can be seen that the male is in reality making quite simple and characteristic movements in relation to the movements and direction of the female. These movements can best be understood by reference to the accompanying diagram.

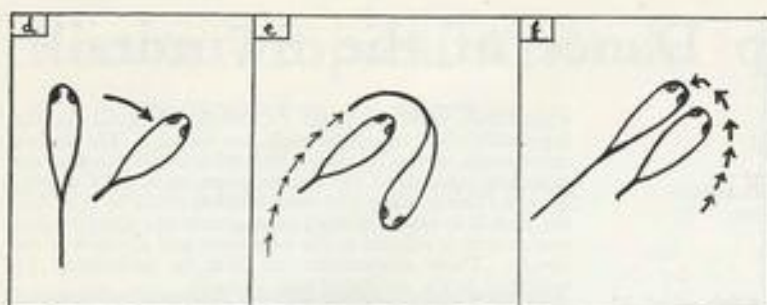
In the diagram, the fish are seen from above. In figure (a) the positions of the male and female at the beginning of a courtship sequence are shown. When a female pauses in an open space in the tank, a male may be observed to take up a slightly head-down posture some distance away and behind her. He hovers in this pose and may even back away from her slightly. Then, after a slight pause, he makes a sudden forward dash at very high speed, swooping towards the female (figure (b)). He comes up parallel to her, head-to-head, but does not stop immediately alongside her. Instead he "brakes" just in front of her in such a way that his sword is just by her head. From this position he immediately begins to shiver slowly backwards (see figure (c)). During this slower backward movement the sword is vibrated energetically past the female's face and thus is efficiently displayed to her.

If the female makes no attempt to swim away at this point, the male may attempt to perform the consummatory sexual act by passing his sperm to the female with his gonopodium (a modified anal fin). Invariably, however, a female will not receive a male so readily, and as the male assumes the mating position alongside her, after his backward shiver, she quickly turns away from him (figure (d)). If the male is not very active sexually, she may successfully swim off at this stage and the courtship then breaks down. But typically the male is too quick for her and before she can do more than just turn away, he has performed his next and perhaps most important dance-step of all.

This consists of a forward dash as fast as the initial

Swordtail pair seen from above, male fish to the left. First position in the courtship dance is shown at (a) with the male behind the female. Arrows at (b) indicate the path taken by the male in his high-speed dash to a position at the side and slightly in front of the female and in (c) the backwards shimmying path of the male that brings him alongside the female is shown.





Avoiding action by the female swordtail (d) is countered by the curved swoop of the male in front of her (e) followed by his reversal to a position favourable to mating (f).

swoop, but now, instead of being performed in approximately a straight line, it is curved (see figure (c)). It is curved in such a way as to bring the male into a position relative to the female so that her path of escape is blocked. Not only is the swimming path of the male curved, but also his body and sword, and the latter is curled round the head end of the female. From here the male once again begins his slow backward shivering movement, this time around the female. Once more the shivering brings his sword past the female's face and he ends up, as before, alongside her body in a position suitable for the mating act (figure (f)).

There may be variations in the above courtship sequence. The behaviour pattern I have described here is a simplified and idealised version of what usually happens, but such simplification is always necessary when unravelling the complex dances of any species. The most usual variation in the case of the swordtail dance is as follows. Very often the female follows her first attempt to swim away with a second and a third, and so on. Each time the male forestalls her with repeated curved dashes around her front end, always blocking her path. This goes on until the either finally escapes, or pauses long enough to permit the male to make his backward shiver to come up alongside her. In this way males can go on badgering females for long periods of time, often for many minutes. Such performances by the males appear to have a sexually arousing effect on the females, because although females will seldom permit males to mate with them at the beginning of a spell of dancing, they frequently do so after long bouts of being courted.

No Pair-Bond

These courting dances and their consummatory mating acts are the sum total of sexual behaviour in this species. There are no pairs formed as in many other species. This absence of pair-formation is the result of the absence of parental duties for the swordtails. Many species of fish have to protect their eggs, but the swordtail, being viviparous, has no such problem. The eggs are amply protected inside the body of the mother fish. Again many species have to guard the young fish when they hatch out, but when the young swordtails are born they can already swim fast enough to protect themselves and can rush to cover immediately if necessary. So there is no need for the male and female parent of this species to stay together after the mating act has been performed. It follows that there is no need for swordtails to form pair-bonds which keep the parents together whilst they are breeding. They can afford the luxury of the casual romance without any ensuing responsibilities! In all probability this applies to all members of the swordtail family (the New World Poeciliidae, or live-bearing tooth-carps). This family includes, of course, the equally popular platys, mollies and guppies.

I have already pointed out that one reason for the dance of the swordtail is the fact that it arouses the female sexually,

but it is still worth asking why it takes the particular form I have described, rather than some other form. The explanation was discovered by accident. Anyone who has kept a number of different species of fish in aquarium tanks will know that certain species are more difficult to catch than others. As one chases a particular individual with a small tank-net it flees from capture in a manner characteristic of its own species. Some dash madly about in all directions, relying on the great speeds they can produce with their fin movements. Others rush for cover and hide skilfully, or leap to the surface and even out of the water. Still others manoeuvre cunningly, repeatedly changing direction.

Reason for the Dance

The swordtail belongs to the last type. I found that, when chasing individuals of this species in a large tank with a small tank-net, I was constantly being tricked by the fish suddenly and without warning turning through a large arc and swimming off quickly in a completely new direction. In order to forestall this manoeuvre, the net had to be jerked quickly from side to side as it neared the individual concerned. If this was done quickly enough it confused the fish as to the direction of approach of the net, and in the pause in locomotion resulting from this confusion, the net could be swiftly brought over the victim.

After catching a number of swordtails in this way, I suddenly realised that they were making me do what the females made the males do in courtship. The sharp turns taken by a fleeing swordtail, so typical of this species, would make it very easy for a reluctant female to escape from an attentive but non-dancing male. Only by use of the special dance steps described above is it possible for a male swordtail to "capture" a female. Instead of swimming up normally to a prospective mate, a male hovers some way away and waits his chance. Then in a quick swoop, too fast for the female to avoid, he throws himself at her. But instead of stopping alongside her he goes a little in front of her and then backs, thus dissuading her from fleeing forwards (her quickest path of escape).

This forces her to manoeuvre an escape, and she turns abruptly, but he has an answer to this too—the curved forward dart around her front end. Now she turns this way and that, straining her escape tricks to the utmost, but he parries each thrust, so to speak, with more and more curved dashes around her head-end, always blocking her path and repeatedly forcing his attentions upon her. This latter phrase really means that he is enabled to repeatedly display his shivering sword to her and thus arouse her sexually little by little, until she will permit him to mate.

Further Observations

In this short article I have attempted to show how the courtship behaviour of an aquarium fish can be analysed. It should be noted that no special apparatus or technical knowledge is required for such a study. All that is needed is patient and accurate observation of the movements and postures of the species concerned. Many such observa-

tional studies are being made in Europe at the present time by students of animal behaviour, but there are thousands of species of animal to every student of behaviour, and the work has really only just begun. The behaviour of many species of fish is totally unknown; that of most is only sketchily understood. In a few cases, such as certain of the sticklebacks and cichlids, detailed studies have been made. But even in the latter instances, the sticklebacks, for example, which have been the subject of exhaustive analyses for a quarter of a century, still pose many completely unsolved problems.

The main point which has emerged from the various studies of fish (and other animal) courtship is that the diverse displays performed by sexually inclined males to females are never, as generally supposed, meaningless and funny "love antics," but are, in fact, serious and meaningful sets of sexual signals and/or manoeuvres, which release or

arouse sexual behaviour in the partner. It is only our ignorance that makes them seem meaningless crazy antics. In every case that has been studied carefully by students of behaviour, a distinct ritualised pattern of deportment has emerged from an apparently random mass of actions. Some fish raise their gills, others roll on their sides, or erect or lower certain fins; still others wag their tails, or nod their heads, or twist their bodies into an S-shape, and yet others jump in zig-zag courses, open their mouths wide, or stand on their heads!

All these actions may seem funny to the human observer, but they are in every instance an intricate part of the code of signals, or "visual language" of the species concerned. The study of how such actions have come into being, and what effect they have on the other individuals of the species involved, is a fascinating pursuit for anyone interested in the way in which fish live.

Breeding *Apistogramma pertense*

by R. BRITAIN
(Medway Aquarists' Society)

A *PISTOGRAMMA pertense* is one of the easiest dwarf cichlids to breed. There is, in my opinion, a possibility of confusing the species with *Nannacara anomala*, which it resembles, so before breeding make certain which fish you have.

A. pertense will breed in a community tank, so it needs no special set-up, but for best results provide a pair with a 18 ins. by 10 ins. by 10 ins. aquarium to themselves. The males are easily picked out—they have longer dorsal and anal fins and are always bigger than the females (which seldom exceed two inches in length). Feed the pair well with live foods if possible, though they will come into condition on dried foods, and keep the water at a temperature of 72°-75° F.

I have never seen a great deal of preparation before this species spawns; the fish certainly clean up the spot they are going to use, a rock, flower pot or the glass side of the

tank, but this does not take several days as it does with the large cichlids. The spawning act is typical of the cichlids, however. The female lays a string of eggs and these are fertilised by the male in several batches, and then the female takes complete control of them. She assumes what I always call her "coat of camouflage," for that is what it looks like, and the male should be removed to prevent her chasing him away.

For the first few days the female fans the eggs, and makes little attempt to move the fry after hatching until they become free-swimming. The fry feed on Infusoria or dust-fine dried foods for about a week, and can then be given micro worms or sifted *Daphnia*. All the time the female keeps guard on her young, shepherding them from one spot to another in search of food. For the first two months they grow rather slowly, and if they should have been hatched in a community tank the female will watch over them until they are too big to be eaten by other fishes present—I have seen one drive away a six-inch *Tilapia* which strayed into her half of the tank.

After two months the young grow more rapidly and should reach their full size of 2-2½ ins. within nine to 12 months.

FRIENDS & FOES No. 34

Biting Midges

FORCIPOMYIA

THE larvae of *Forcipomyia* can be found in the early spring among filamentous algae. Until examined under a lens they will often be mistaken for worms, for they are round bodied, many segmented, and free from false legs or other outgrowths. They are colourless, however, and have a distinct head and two pairs of eyes. When disturbed they will leave the algae and swim strongly with graceful undulations through the open water. They are not provided with gills, absorbing oxygen through their skins or integument. The larvae reach almost an inch in length before pupating. The pupa is only half this length, with dark markings on each segment of its pupa case, and with a pair of breathing horns. Upon emergence as an imago, it delights in biting anglers and strollers on the banks of the pond from which it emerged.



Forcipomyia larva. x10

It is eaten quite readily by most fishes, and makes a change from the usual run of live foods. It is advisable to keep tanks well covered after the introduction of these larvae or pupa, for those that escape being devoured will most assuredly escape as small blackish flies through the smallest crack and make themselves a great nuisance in the fish house or in the home. The extra warmth the larvae find in tropical fish aquaria will speed up pupation. A good food, but one which needs careful handling.

C. E. C. Cole

Aquarium Fishes before the Lens

by CYRIL SAUNDERS

Photographs by the author

THE photography of small fishes behind glass is no easy task. Before the advent of the "electronic flash," several high-powered lamps were used to obtain the necessary light. This brought about countless reflections from the glass sides of the tank, or if the lamps were placed above the tank, overheating was likely to occur, with detrimental results to the stock.

Fortunately, electronic flash has solved most of these problems at one fell swoop. The light is intensely bright, which allows smaller lens apertures to be used; this means a greater depth of sharp focus. It is extremely fast, and capable of arresting the movement of even the liveliest specimens. And it is, to all intents and purposes, a cold light. Quite pleasing results can be obtained with a single lamp, used at the side of the camera, slightly behind and above, at an angle of about 45 degrees to the front glass. For a picture of the whole tank, the camera would normally be placed about five feet away. However, for close-ups, it must be brought in nearer to the tank, and, unless it is capable of focussing down to three feet, a close-up or portrait attachment must be used.

Even with suitable lighting such as electronic flash provides, there still remain several problems which require attention. The outside of the front glass must be kept clean and polished, and free from any dried splash marks. These will show up plainly with the strong side light. Another point to be considered is the reflection of the camera itself; the twin lenses of my camera can be seen just above the tail of the gourami shown in the photograph. This is due to some of the light being reflected on to the camera from the glass, the polished parts becoming conspicuous. This can be obviated to some extent, either by turning the camera to one side—to the same side as the



Reflections from the glass is one of the problems of aquarium photography. A faint image of the camera lens can be seen a little above the pearl gourami in the picture above



An angel fish picture spoilt by uneven illumination—the right-hand fish is heavily shadowed

flash, or by covering the offending parts with thin strips of black paper.

The side light is not the only type that can be employed. If the general tank illumination is removed, the lamp can be held above the tank, giving a more natural result, which many will prefer. The lamp must be placed so that some of the light falls on the side of the fish facing the camera, otherwise only silhouettes will be obtained.

Film exposed to electronic flash requires an increase in the development time, up to 50 per cent. more; but this should not be overdone as the delicate detail in the fish, reflecting quite a large percentage of the light, will be lost. Many keen aquarists will, of course, not possess the equipment necessary to take their own pictures, although if the loan of an electronic flash is available, very successful results can be obtained with the simple box camera, provided a close-up attachment is used. Some "boxes" have this built in.

Those enthusiasts who have neither the facilities nor the inclination to attempt their own photographs, would be well advised to approach their local camera club. The address of the secretary can be obtained from the local public library, and a word or two to him may provide a member with the necessary equipment, who will be pleased to oblige for a small remuneration to cover expenses.

AQUARIST'S Notebook



by
RAYMOND YATES

I RECENTLY had the opportunity of being shown over the aquarium at the Belle Vue Zoological Gardens in Manchester by the curator, Mr. Brian Cheshire. As public aquaria go this is not large, as there are only 29 tanks on display for the public, but the set-up is modern, the aquarium having been completely rebuilt within the last two years, and the fish displayed are of first-class quality and include a large number of the rarer and more unusual varieties. Behind the scenes there is none of that hole and corner business so common in public aquaria. Here there is ample room and lighting and a novel feature are floor drains with sand-gravel traps set therein. Another unusual feature are the "dimmers," which allow the tank lights to be slowly switched on and off, saving the fish the shock of being plunged into inky blackness or vivid light.

I gather that there is little, if any, trouble with disease, although almost all public aquaria make the same claim. No doubt the large tanks and the more settled life the fish live compared to those of ordinary aquarists is the reason. White spot does occur now and then and this is cleared with quinine. The usual copper piping is in evidence and no ill effects follow—the solution must be that these are so oxidised that no chemical action occurs. There are no coldwater tanks now but two are given over to marine life. There is a most amusing trigger fish which lives in a shell at night, pipe fish, sea horses and a poisonous, if pretty, lion fish. This latter eats only guppies and if these are not sizeable it ignores them. Sea horses are hard to keep from the feeding standpoint, *Daphnia* (cultured in huge quantities in lakes in the zoo gardens) lasting no time at all when put into sea water.

Some breeding is done and during my stay I saw what was being done with blue gularis, jewel fish and *Pelmatochromis*. The curator confirmed the experience of many other aquarists in that he finds blue gularis are very much an annual fish, rarely lasting much over twelve months. They just fade away and die. The aquarium has had bad luck with the four discus fish which they had; for a time all went well but the feeding trouble seems to be the secret. These fish are faddy and what tempts them one day revolts them the next. Hunger strikes occurred and one by one they died off—fortunately, the last of the four is very much alive, seems to be in the best of health and is certainly in excellent colour. There is a large archer fish which is quite happy in fresh water, but attempts to add to the collection have failed, young specimens having been all bullied to death by big brother. There are other bullies, of course. In one tank a large tiger barb chased everything until one day a three-inch black shark (*Labeo bicolor*) was put in. Since then the black shark has proved bully number one.

The aquarium cat is quite at home behind the scenes and never bothers the fish. Long ago an electric catfish was in an enamelled bucket and pussy pulled him out. What happened is not known but the cat never touched the catfish once on the floor (it survives to this day) and has lost all interest in fishing since. Those tanks which contain no plants have the lights raised two feet or more above the water—this diffuses the intensity of the illumination. All tanks have covers of quarter plate glass, this prevents losses as a result of jumping out and keeps eels to their own quarters. Most of the tanks are well planted and I saw an unusual type of the Madagascar lace leaf plant with leaves less than half an inch across. The public probably get quite a kick out of watching the large electric eel but the feeding of the mud skippers is quite an event. These are very greedy and very bad-tempered creatures, and they

fight over food, often damaging each other severely. Docile as they look they can move very quickly.

An idea of the rarer varieties on show can be obtained from the following list of those seen during my visit, *Leporinus frederici* and *striatus*, butterfly fish, *Botia strigata*, clown loach, *Rasbora leptosoma* and *einhoveni*, *Metynnus maculata*, *roosevelti* and *schreitmulleri*, bulldog-headed fish (*Epicystus microlepis*), Malayan angels, lung fish, razor and razor finned fish, *Barbus filamentosus*, spotted spiny eel, radar fish, reed fish, telescope mouthed fish, snakehead fish, Senegal sail-finned fish, climbing perch, the blue lined fish (*Labeo dadiburjori*—a weakly fish), *Hemiodus semitaeniatus*, plus, of course, the rarer types previously mentioned in my notes. Commoner fish on view include livebearers, angels, neons, glowlights, harlequins, pencils, catfish, snakeskin gourami, firemouths, *C. severum*, *C. festivum*, jewels, Senegal cichlids, large sun fish, rainbows, giant gourami, wasp gobies, fighters, kuhli loach, *Anostomus* and glass catfish. In all a collection well worth visiting. As there is no extra charge for the aquarium almost all visitors to Belle Vue gardens have a look at the fish, which are a grand advertisement for the hobby. Excellent as are the present quarters there is talk of building a new and larger aquarium on a more distant site in the gardens, so aquarists in the north can look forward to even better things.

Not very long ago quite a craze developed for the use of willow root as a spawning medium. There is no doubt this is very good but it suffers from the necessity of collection and sterilisation. The only way to collect it is to put on waders or gum boots and it can be a messy job. Many leading breeders have got over all these troubles by substituting Nylon wool, which can be obtained for a few coppers. Half an ounce, cut into lengths and weighted, provide all that is necessary. Any colour will do; for my part I think dark colours are more natural.

When I visited the big show at Birmingham organised by the Midland Aquarium and Pool Society, I was struck by the fact that very few of the rarer and more expensive fish won awards, or even gained places. On the whole I think this is to be commended as, in the past, far too many rare and unusual fish have taken the awards at shows up and down the country. There has been a strong suspicion in the minds of many showers that these have won the awards merely because they were rare and unusual. Some of these fish which have appeared are quite new to the average aquarist and a very ordinary specimen (for its type) may seem to him to be well worthy of a show award. The judges are expected to be competent to assess the merits of all fish entered, but if they have only seen one or two specimens of a particularly rare type how are they to know what the true exhibition standard should be?

With this in view some judges fight shy of the expensive and unusual entries and concentrate on the better known varieties. Generally speaking this pleases most people, as the many feel they are not cut out from winning by the few with bottomless purses, and those who do show rare fish would probably do so anyway as a matter of general interest for the good of the show and the hobby, without

thought of award cards. Some of the less common fish on view at Birmingham were *Epalzeorhincus kalopterus*, *Dorichthys marteni*, *Labeo bicolor* and *chrysopehadioides*, *Cyclocheilichthys apogon*, *Panchax dayi*, *Pelmatochromis kribbensis*, *Tilapia macrocephala*, *Eitrophus maculatus*, *Botia strigata* and *macracantha*, and *Anastomus*.

An item of interest to aquarists appeared recently in *The Manchester Evening News*, which gave some details of a pet trout belonging to Mr. George Burton, who lives at Taniwha Springs, Rotorua, New Zealand. This fish has become so popular that it has been insured with Lloyd's for £100 at a premium of 21 guineas. This fish is called Harvey, and is unique because the front part of its body is dark green and the rear half lemon yellow. At meal times or when excited the dark green changes to yellow and the yellow to khaki. The fish has become so tame that it can be fed by hand. Mr. Burton charges visitors 2s. 6d. to see this very unusual fish.

No two aquarists agree on the ideal aquarium background, some having clear glass, others using coloured or black paper or even painting the outside of the back glass. A wiser course is to obtain some old picture glass of roughly the same size and give this one or two coats of Chinese lacquer of the desired shade. When dry this can be leaned up against the back of the tank, giving a grand effect and extra insulation. When not wanted it can be removed with ease. Paper and coloured cellophane stuck to the back glass are unsuitable because condensation from the cover will run down, sooner or later, and ruin them for visual purposes.

From time to time I get requests from fanciers who are anxious to obtain a specimen fish of a particular variety, usually for breeding. As there is nothing up to the standard they require in their locality they ask me if I have seen anything anywhere in the recent past which would fill the bill, and to let them know where to apply. This is not a very good method because most good fish are not for sale, and many owners of good fish could not send them long distances (often 250 miles) with any guarantee of safe arrival. Then again one person's idea of what is a good fish often differs from others. Frankly, I think this is a thankless task and a most unsatisfactory way of obtaining fish at any real distance. An advertisement in the "small ads." of this paper is more likely to put one in touch with what is wanted. Even so, buying fish you haven't seen is a risky business if breeding is the object. A wiser course is to visit the larger shows, where many fish change hands at the end of the show. Where the fish wanted are the less common ones advertising seems to be the only way out.

One of the most popular fishes of the present time is *Aploncheilus lineatus*, and small specimens can be obtained from most of the larger dealers. It is a fine fish when large and never loses its colours unless it happens to severely injure itself in jumping from the tank to the ground or against the cover. If floating plants are used this fish never jumps, and, once used to its tank and the floating plants it will come to the surface and feed from the hand of the aquarist. The floaters can be removed in time and the fish will not then jump if treated quietly. At no time is it scary and it very soon learns that the lifting of the cover means food with a capital F. These fish are never a nuisance in a tank where all the other fish are all about the same size as themselves, and will live blameless lives like perfect gentlemen in such a set up. If they are put with fish small enough to be swallowed whole the small fish will quickly disappear. They bully each other a little but this does not mean any fin damage, and the weaker one usually hides away for a

time out of sight. I think they prefer shaded conditions and not too high a temperature, although they seem quite happy at 80° F. They need live or meaty food and snap up *Tubifex*, *Daphnia*, raw meat, liver, raw fish and particularly relish tongue or boiled ham from the table. They also accept dried *Daphnia* and are never choosy. They prefer the top portion of the water but will go after falling food if hungry. Even so they are never gluttonous and will not take more than one mouthful at once of the larger foods.

Aquarists calling on a dealer sometimes see fishes of vastly different size on sale which they would like but are afraid that if the twain were taken home in the same jar the more diminutive one would be made a meal of on the way. This is just not true, subject to certain conditions. You can carry most fish home together in the same can or jar provided they are in total darkness. It should be remembered that the act of catching a fish and transferring it to a strange environment and often different water gives the fish something of a nervous shock. Feeding is the last thing in its mind. Once in the dark it doesn't matter anyway. It is better to have the smaller fish in first and the larger ones last. I have carried many, large and small together in this way, including baby neons and *Rasbora maculata* with large cichlids with 100 per cent. success. Even several male fighters can be carried this way if in complete darkness. A word of warning. *Corydoras* often panic in small jars and are likely to damage other fish which are unable to avoid their hard, rough exteriors. Some time ago I saw a number of dead platys and similar fish which had shared a Kilner jar with a *Corydoras*. All died within half an hour except the catfish, the cause of the trouble. It is also inadvisable to carry large snails in cramped quarters with fish. Diseases such as tail rot can set in. Carry large snails on their own.

The technique of sending fish long distances in plastic bags has come to stay. For those of us who never send fish by air it may seem remote, but the system is now coming into vogue locally for sending fish by train. One enthusiast who makes quite a speciality of this is Mr. W. Hutchinson of the Bankhead Tropical Fish Hatcheries, Seaham, Co. Durham. He has Polythene bags made for him to a size of 12 ins. by 18 ins., these being free from smell or taste and capable of being used over and over again. Mr. Hutchinson's method of packing is to use a cardboard carton about 12 ins. by 12 ins. by 12 ins., with some wood wool or hay on the bottom. He then puts in a can about eight inches deep and packs wood wool very tightly round this. He now removes the can, which leaves a space ready for the Polythene bag. The bag is about two-thirds filled with water, the fish put in and the space above the water filled with oxygen. The top of the bag is then given a twist and fastened with a strong rubber band. The advantage of this method is that almost all shock is absorbed and there are no hard corners to damage the fish. Other forms of insulation could be used such as cork or packed newspapers, cardboard or onazote. A bag of the size mentioned costs about 1s. 8d. It will be realised that the greatest advantage of this method is that no water can be spilled, even if the package is turned upside down.

For all practical purposes lead has no ill effect on tropical fish and for this reason it is commonly used for weighting plants in furnished aquaria. It is so easy to cut and to bend that it is the perfect metal for the job; the most economical way of buying it is probably the rolls of window lead (for window decoration) which cost about three shillings. As a roll is often too much for individual hobbyists clubs can purchase two or three rolls so that members can buy from the club the amount they need.

Rosy Barb

(*Barbus conchonus*)

ORDER:—Ostariophysi, from Greek *ostarion*—a little bone, and Greek *physa*—a bladder.

FAMILY:—Cyprinidae, from Greek *kyprinos*—a kind of carp.

SPECIES:—*Barbus conchonus*, from Latin *barbatus*—bearded, and Bengali *Kunchoi pougti*—the native name.

IT would be difficult to find an aquarist who has not at one time or another included a pair of rosy barb in his collection of fishes. Peaceable, lively, long-lived, and easy to breed are only a few of their pleasing characteristics. Add extreme temperature tolerance, a certain degree of beauty, and no food fads, and you have the reasons why this fish has such a host of friends, especially among beginners, who lose so many fishes through ignorance or carelessness.

A native of Northern India, it lives in some of the Holy Rivers of that country, where it grows to over five inches in length. The largest specimens I have seen in anybody's tank in captivity (bred and reared in captivity, I mean) have never exceeded three inches, which is quite large enough for most tropical fish fanciers. When young, both sexes are exactly alike. Their backs are a greenish brown, which pales on the sides to silver with a hint of green suffusing it. Fins, too, are greenish gold. Above the anal fin on the middle of the body line is a black mark, surrounded by a gold setting. The scales are large, and brilliant, flashing back as gleaming silver the light rays which strike them.

When the fishes begin to mature, the males develop sexual characteristics. The dorsal fin shows black pigmentation on the upper part—the anal and pelvic likewise, and a rosy glow becomes evident on the sides of the fishes. The females simply grow larger, and become swollen with eggs—their colours remain unaltered. A breeding male in full colour is an extremely beautiful creature, and never fails to excite favourable comment from all who see him.

To induce first class condition it is necessary to feed a proportion of live food such as earthworm, *Daphnia*, *Cyclops*, freshwater shrimp, mayfly larvae, gnat larvae, *Tubifex*, etc., and provide a layer of fresh vegetables such as duckweed, or a little anacharis. Everything in this line will be eagerly devoured and your care rewarded by an increased brilliance and liveliness on the part of the barbs. Spawning after treatment of this nature will be vigorous, prolific, and fertile. The male manifests his interest in the female by nosing her, pushing her, and chasing her about the tank at express speed. This is one of the species of tropical which can be stripped of eggs and sperms artificially, but most people will not consider this worth while.

Semi-adhesive eggs are thrown in large numbers, and to ensure them being caught and to keep them safer from the cannibalistic attentions of the breeding fishes, it is best to have a number of thickets of fine-leaved plants like *Ambulia*, *Cabomba*, or *Myriophyllum*. Spawning temperature can range from 65° to 80° F. As mentioned before, rosy barbs



Male rosy barb

are not fussy over temperature. Indeed, and this may take some believing, a pair of one inch barbs passed one winter in a small unheated tank in my fish house, unnoticed until the spring. The temperature of that particular tank was often below 50° F. during severe weather. Within a fortnight of heating the water, the two barbs spawned, giving me another shock, because I did not imagine they were big enough.

Once the fishes have spawned, remove them, leaving only the egg-laden weeds in the breeding aquarium. To give the fry a chance of development, this should be as large as possible. At a temperature of 72° to 75° F. the eggs will hatch in about three days. The fry will not need feeding for another day or so. Green water and Infusoria should now be added every few hours. Packed with food the fry will make rapid growth. If for any reason neither of the above recommended foods are available, a good substitute is powdered egg, released as a cloud of particles beneath the surface of the water. This, too, seems difficult to obtain these days of "off the ration," so a little yolk of hard boiled egg swirled around can be used. Follow in about a week with micro worm.

Although the fry are fairly large (as tropical fish fry go) and could possibly swallow micro worm from the second day of feeding, it is useless to give it to them, as they are unable to digest the worms, which pass out of the body of the fry in the same condition as when they enter it. This can be verified by placing one of the babies under the microscope after a good feed of worms. You will have the disappointing but undoubtedly enlightening experience of watching the worms moving up and down the intestine of the baby fish, to escape none the worse for their temporary incarceration. Within a month, if food has been suitable and adequate, the fry will be large enough to take small size dried food, and can be considered as good as raised.

Cacti in the Fish House

If at any time it is found that a particular plant appears never to dry out, it should be removed from the pot and examined. It will probably be found that the drainage hole has become clogged; if the soil is continually wet the plant will soon die. When re-potting such a plant remove all the old soil and then see that the crock placed in the bottom of the pot is so shaped as to allow all surplus water to drain away readily. A good porous soil must always be used and a freshly potted plant should be watered sparingly until new growth is seen.



Euglena is an organism that can be seen only under the microscope (it is smaller than the Infusorian *Paramecium*). Magnification in this micro-photograph is 120 times life size

EUGLENA is an organism that would be difficult to classify, either as a plant or an animal. Though it moves around like an animal by means of a long whip-like process known as a flagellum, it also contains chlorophyll, the green colouring matter of plants. It is about a tenth of the size of the common infusorian *Paramecium* and forms an ideal first food for some of the fry of egg-laying fish species which are too small to take *Paramecium*. It is, perhaps, the smallest live food in use by aquarists to-day. It is fairly easy to produce really thick cultures (often over a quarter of a million organisms per drop), which keep well for over five months.

The technique of setting up a culture is shown in the photographs accompanying this article. The first step is to produce a culture of bacteria by letting some cooked wheat decompose in water. As bacteria thrive better in the dark, we keep the container in a fairly dark place at this stage. In about two weeks' time, when a good culture of bacteria has developed, we seed the medium with *Euglena*. If you



Materials needed for *Euglena* culture: a glass jar about the size and shape of a pint milk bottle (here a 500 ml. conical flask is shown), a jam jar of water (one pound size, about 150 ml) and some grains of wheat (a level teaspoonful)

"Green Water" as

by DR. F. N. GHADIALLY

Photographs by the author

have a microscope and learn to know what this creature looks like you might locate this organism in some pond and start off your own culture; failing this you could obtain a culture from some other aquarist. About four years ago I distributed quite a lot of these cultures and these have been successfully carried on now by numerous aquarists.

Once the culture is seeded it is necessary to place it in a warm, fairly bright spot. As already mentioned this is a green coloured organism and so, like any plant, it needs light.

You will notice that we use a piece of cotton wool stuck into the mouth of the culture flask instead of an ordinary cork; this is to allow a fairly free exchange of gases between the contents of the flask and the external atmosphere.

Most of the fry of egg-layers can be given this food for the first three or four days, either alone or with an ordinary Infusoria culture. As already mentioned it is almost indispensable for some of the very tiny fry and is also a good stand-by for others when at times we have forgotten to set up an Infusoria culture or have been a bit late in starting one. Fry can be reared on *Euglena* alone to a size when they will take micro or newly hatched brine shrimp, but this is not advisable as it will take longer to do it than when an Infusoria culture is used, following the *Euglena*.



The wheat grains are cooked before using in the culture flask by placing them in boiling water contained in a saucepan for ten minutes. It is important not to exceed this time. After cooking for ten minutes the water is drained off and discarded

Fry Food: How to culture EUGLENA



After placing the cooked wheat grains in the flask, 150 ml. of cold tap water is added and the neck closed with a cotton wool plug. It then stands in a dark cupboard for two weeks



Whilst in the dark the flask should be shaken daily without wetting the wool stopper. To the milky solution obtained after 14 days add about an egg-cupful of a Euglena culture



Stand the flask in a warm (50°-75° F.) bright place and shake daily. The culture will turn green in two to four weeks and it can be used from that time until about six months old

Using Peat for Water "Conditioning"

EXPERIENCE has shown that acid water is beneficial to the majority of aquarium fishes and water plants. In the early days of the hobby, an acid reaction used to be obtained by adding a small amount of hydrochloric acid, distilled vinegar and the like to the water. But aquarists who followed this practice always ran the risk of altering the pH value of the water too quickly for the health of the fishes. Furthermore, such drastic treatment of the water often led to sudden depletion of the oxygen and rapid decline of the plant life.

Old-time German aquarists were not long in discovering that almost ideal water conditions could be obtained by placing a thin layer of well-rotted oak leaves, beech leaves or peat under the usual floor covering of fine grit or sand. Their success in breeding difficult species was largely due to the study and preparation of the water in their tanks. Slowly, the value of peat as a water "conditioner" spread throughout the aquarist world, and to-day, in the better-stocked aquarium shops, one can buy small bags of peat all ready to suspend in the water and "mature" or rather, acidify it.

Personally, the writer prefers to have a permanent layer of peat under the sand. For the plants which root in it show a richer green colour, and grow stronger than when planted in sand alone. And there is no doubt that a peat subsoil tends to keep an aquarium healthier; that is, free from fungoid and algae growths and many troublesome diseases. But the novice fishkeeper often finds peat a nuisance to use because if it is stirred up from the bottom it will move slowly about the water in the form of a dirty

brown cloud—a sort of underwater smog. And it is very difficult to clear the water again unless the bottom is well-siphoned, and the water itself is cleared by mechanical filtration.

The art in preparing a peat bed for the aquarium is to empty the approximate amount of peat needed into an enamel bowl and pour a kettle of boiling water on to it. This will not only sterilise it, but at the same time free the fibres of the fine brown dust which otherwise would work free into the water. After this preliminary scalding, the peat should have fresh water poured on to it, and then carefully tipped away to carry the dusty particles with it. After some squeezing to get rid of excess moisture, the peat should be pressed down hard on the floor of the aquarium. A layer averaging half an inch in thickness should be sufficient for the ordinary aquarium. When this layer has been pressed down, cover over with well-washed coarse sand or small sized grit. Sufficient compost should be introduced to cover the peat to a depth of more than two inches. This will preclude all but the actual burrowing fishes, such as some loaches and catfish, bringing the peat to the surface. When plants are set in the compost, try not to disturb the subsoil.

The aquarist who has never before tried peat in his aquarium will be well advised to give it a trial before the lengthening days bring the usual run of algae-infested tanks, unsuccessful spawnings and unaccountable outbreaks of fin-rot or white spot disease.

Jack Hems

Microscopy for the Aquarist—6 by C. E. C. COLE

IT is an extraordinary fact that whenever one examines second-hand microscopes, the eyepieces and objectives originally supplied by the makers are missing. And yet there is always a wide choice of other makes offered. For the life of me I cannot think of any reasonable explanation why this is so. Fortunate indeed are we that most modern oculars and object glasses are interchangeable and will work satisfactorily on any standard model.

There are several kinds of eyepieces or oculars, but the ones most suitable for our use are those known as Huyghenian. Their purpose is to magnify the image formed by the object glass or objective. Examination will show that they consist of two lenses separated from each other by an air-filled tube. The lower lens is called the field lens and is the diameter of the tube less the thickness of mount. The upper, or eye lens, is much smaller and surrounded by a collar which prevents the eyepiece from sinking into the draw-tube of the microscope, into which it is an easy sliding fit. Generally speaking the greater the distance between the field lens and the eye-lens, the less powerful the magnification.

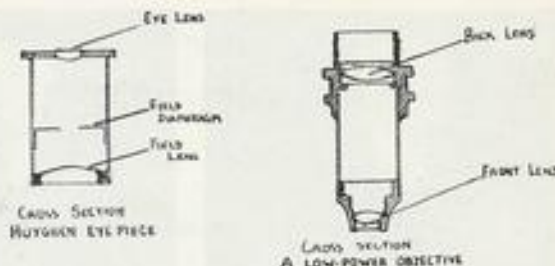
The oldest lenses were marked 1, 2, 3, etc., by the makers, but most of them now specify the magnification $\times 5$, $\times 6$, $\times 8$, etc. The best "powers" to obtain, as far as we are concerned, are a $\times 5$, $\times 10$, and, if wished, $\times 15$. Any of the Huyghenian eyepieces of the makers I mentioned last month will be satisfactory, provided they are not badly scratched, or have not been damaged and reset badly. Scratches are visible if the surface of the lens is turned so that light shines at an angle upon it. Between the two lenses, in the tube, is a black metal ring, with a hole in the centre. This is the diaphragm of the eyepiece, accurately positioned at the focus of the eye lens, and limiting what can be seen through it (limiting the field). The lower lens does not magnify at all, serving merely to collect as much light as possible and steer it upwards to the eye lens.

Objectives

However good the performance of an eyepiece, it simply cannot magnify what is not there in the primary image, for which the objective is responsible. Thus the object glass is without question the most important part of the microscope. The work involved in the production of first class objectives is extremely great, and it is small wonder that they are expensive. With care, however, they will last several lifetimes, giving excellent service throughout, and viewed from this angle, money spent on them is by no means wasted.

Many of the objects we shall want to examine are visible (but not in detail) to the unaided eye, and as a consequence we are primarily interested in a modest degree of magnification. Objectives which will give us all we need for a very long time are the lowest powers obtainable, and these are also the lowest in price. If you can secure a 2 inch, a 1 inch, and a $\frac{1}{2}$ inch they will be ample. In millimetres these would be a 50, a 25, and a 12.5. Ask for "achromatic" objectives—there are others for specialised or advanced work—much more expensive and requiring a degree of skill in their manipulation which, at least in the beginning, you will not have. Farther on I will introduce you to them, but the time is not now.

Examine the chosen object glasses with extreme care. As with eyepieces scratches should preferably be completely absent, but with second-hand goods this cannot reasonably be expected. Discard the most or deepest scratched ones. Allow light to shine at an angle on the surface glass and



look for rainbow effects. These indicate the deterioration of the cement between the component lenses—the objective is in need of attention from an expert. Finally, ask the dealer to set up the microscope and show you a slide through it.

Watch carefully as he does so. If he is used to handling "scopes" he will not fumble and fuss about, but place the slide on the stage, under the stage clips, tilt the mirror so that light passes through the slide and object, rack down the object glass to approximately the right distance, and then glance through the eyepiece to make final adjustments. He will then invite you to look for yourself. What you see is an open question, which I will discuss in detail next month.

Microscope Query

Q. Is a microscope equipped with objectives of $\frac{1}{2}$ in. and 1 in. suitable for the study of minute water life?

A. The $\frac{1}{2}$ in. objective is quite suitable for the study of minute water life. In the hands of a novice, however, great care must be taken in focussing such a "high" power, and a good light is essential. As this series progresses it will cover both these points in detail. The 1 in. objective will easily detect the presence of minute life, but is too low a power for their detailed examination. Its best use is the study of the larger aquatic organisms. The inclusion of an intermediate power—say a $\frac{3}{4}$ in. objective—is recommended for this outfit, for there is too great a difference between operating a $\frac{1}{2}$ in. and a 1 in. objective.

Artificial Lighting

FISH cannot adjust their eyes to the sudden turning on or off of electric light and there is some tendency to panic when this happens, according to the type of fish. In a room the curtains should always be opened first in a morning instead of, as usually happens, the room light being switched on. If possible, when a tank light is switched off the room light should remain on a few more minutes. Fish dive for the bottom when light is switched off. Most fish rest during total darkness but not all—some anabantids are never still. It is wrong to turn out all the lights so that your fish are in total darkness and then switch on again two or three minutes later. This is asking for trouble—real panic starts and all sorts of injuries can result. If the fish are in the dark they need a reasonable interval to become used to it and dormant.

JOURNAL of a Marine Aquarist

by L. R. BRIGHTWELL

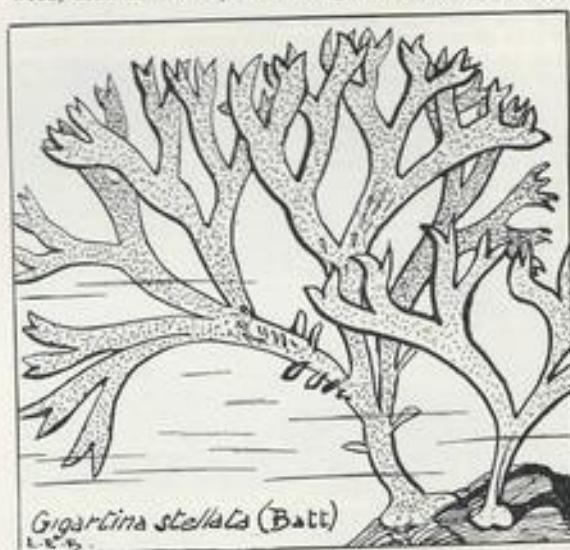
THERE are I suggest, two main reasons why the Sea Water Aquarium movement is making progress, slow but sure as the tides which have lately played such havoc with the best endeavours of man to cry "halt" to the eternal sea. First, there is (as you may have noticed) a good deal of the sea to discuss. Second, all this moisture is so full of unsolved problems that those interested just haven't time for cup-hunting or dog-fighting over a set of show points for the blenny or any of the thirty odd kinds of starfish found in British waters. As an example, marine aquarists are beginning to revise their ideas about seaweeds, and over seven hundred species of these highly decorative organisms may be termed "native," anywhere between the Isles of Scilly and the Shetlands. Almost hourly they play a bigger part in industry—cattle foods, poison gas, plastics, fireproof curtains—but that by the way. The aquarist, however, may yet play his part in helping big business.

The great pioneers of the marine aquarium, Gosse, Kingsley and others, exhorted the aquarist to abstain from introducing any kind of plant into his tanks, and leave it to nature. She would introduce plants via the spores usually abundant in unfiltered sea water. That extraordinary stormy petrel of the aquarist world, Saville Kent, on the other hand, visualised a day when great public aquaria would have such ample supplies of fresh sea water, and efficient pumping and aeration plant that even the fuci and huge laminaria would be kept alive, and give the public a true picture of the underwater jungles that flourish in even our cold and storm-swept seas. But though we are still far from this ideal, recent experiments, i.e. covering the last decade, have elucidated this much. Most of our seaweeds appear to be annuals. They are plants of small stature. The great laminaria and some fuci are now regarded as perennials, but the green, red and brown algae that appear and flourish in home aquaria exposed to sunlight are almost certainly growths of a year's duration only, and herein lies a problem for the aquarist. When autumn comes these rampant summer growths automatically die and rot surely as the flowers of the field. The gales commence, changes of current maybe occur on the sea bed, and so the dead stuff is weeded out, carried away, and by nature's alchemy turned into salts and phosphates vital to next year's crops both plant and animal.

But in the narrow confines of an aquarium nature's processes end with the death and decay of the algae that made the rocks glow with vivid colour in the days of sunshine. Red and green give place to rusty black, and a pH indicator shows the acidity to be rising alarmingly. Experience has taught me to take drastic steps. I scrape off as much of the weed as possible, stir the tank floor vigorously and siphon off the whole. Prawns, blennies and crabs take this treatment with surprising equanimity. After all it can be no worse than what they endure on a night like this, with the sea thundering against the cliffs, only 47 yards from my writing desk, chimneys sailing into the next county, and fences collapsing on such a scale that neigh-

bours have agreed to let the laws of trespass lapse, until such time as the harassed builders can put things right. Some three months hence, all being well!

In twelve hours the siphoned-off soup from my tanks clears, and most of the water can be returned. A few gallons I always keep in reserve, stored in stone jars. For even with the sea at one's elbow these phenomenal gales make the getting of fresh supplies difficult at times. My sea water I have to carry up 110 steps in the cliff face. There were 112 two years ago. (N.B.—One gallon of sea water weighs a little more than the same quantity of fresh, and one gallon of fresh water weighs ten pounds.) Even so, seaweeds are to be encouraged, and the full extent to which they can be employed is not yet known. At Millport it was found that *Gigartina stellata*, a fucus-like weed, used in industry for making jellies, etc., would not



only keep alive but grow in a jar of static sea water over a period of 18 months.

On a recent visit to Plymouth I came back with a member of the beautiful little anemone *Corynaeis*, nearly related to the madreporal corals, but making no living home around it, and the famous *Galliaeris parasitica*, or hermit crab anemone, both of which are unknown in the Brighton Channel. Yet they have settled down well in local sea water, and the hermit crab anemone, being well fed on raw mussel (it is a most voracious beast), is quite independent of its crusty messmate. It was at Plymouth that in September I had the luck to see the Portuguese man o' war come ashore, and find accommodation in a spacious tank. An awesome sight indeed to see the long, neon-light blue stinging threads of this famous jelly fish, slay at a touch fully grown corkwing wrasses, and draw them up to the waiting mouths. Too cautiously touching my upper lip with the tip of a glass rod which had contacted the nematocysts nearly an hour previously, severe inflammation and quite enough pain resulted. But application of (an old South African pre-

(Continued overpage)

In the Water Garden in MARCH *by Astilbes*

THIS month sees the beginning of the year's tasks for the pondkeeper, especially if the pond in question is a natural type one. The strictly formal pond, say one of rectangular shape set in a lawn, is not the type which will require any special attention this month. The pond I have in mind is the one with either a rockery or a bog garden incorporated with it. Where any pond is of an informal shape and merges with the surrounding garden it is always well to see that plenty of flowering plants are set near the water's edge; nothing improves the look of such a pond better than plenty of flowering specimens to brighten the scene and throw reflections in the water. Many of the water-side plants are perennials and so will reappear each year, but some fresh kinds can be grown from seed in the spring to make a new vista. Many of the perennials can be raised from seed and this is a good time to make a start with this fascinating and fairly inexpensive method of getting new plants.

The primulas are great favourites for the pond-side and may be raised from seed sown this month. Do not forget that the forget-me-nots, *Myosotis*, which can be bought in many shades of blue, are ideal for small pond edges, growing sometimes actually in the water. *Impatiens* can also be grown but these must be treated as half-hardy annuals. *Mimulus* in several colours can be had and the Queen's Prize strain and Red Emperor are very good kinds. *Polyanthus* must not be neglected, as these will flower very early in the year and continue for several weeks to give a grand show. They should be massed not more than nine inches apart to look their best.

It is difficult to recommend any particular *Primula*, for they are all good in their way so long as you make sure when ordering the seeds that they are hardy and not just for the greenhouse. Some grand kinds for the pond-side are: *Primula cashmeriana*, with large globular heads of flowers in colours of white, mauve, purple and violet; it will flower in February; *P. besiana*, shades of purple with a yellow eye, blooms in June and July; *P. florindae*, sulphur-yellow flowers, sweetly scented; *P. helodoxa*, with golden-yellow flowers in April and June; *P. japonica*, in many shades (this is the type which has flowers in many tiers up to 18 inches high and flowers in May and June); *P. pulverulenta*, also a tiered-type flower in several shades of rose, pink and blush, grows about two feet high and flowers in June and July; *P. sikkimensis*, another pale yellow, scented variety which flowers in May to July. The *Trollius* or globe flower is also a good plant for the water garden side and *T. Golden Queen* has a golden flower with an orange centre and grows about four feet high.

To grow any of these plants from seed it is necessary to use the John Innes seed compost. This can be purchased from any good nurseryman if you only require a small amount. If you would like to make up your own mixture this can be done as long as you are able to sterilise the loam for ten minutes at a temperature of 180° F. The mixture is: two parts sterilised loam, one part bacterised peat, one



Photo:

Laurence E. Perkins

Primula japonica—variety "Postford White"

part sharp sand. To each bushel add: 1½ oz. superphosphate and ¼ oz. ground chalk. Mix well and do not store too long before using. Sow in large pans and rake the surface level and free from any large pieces. Firm slightly and sow the seeds very thinly. Very small seeds need not be covered at all and no seeds should be covered with soil to a greater depth than their own diameter. Moisten well by partial immersion in very warm water, allow to drain well and place in a frame. A temperature of about 60°-65° F. will soon start germination. The seed pan should be closely covered with a sheet of glass and shaded with paper until the seedlings appear. Light must be gradually introduced then and the glass removed. Do not place in strong sunlight for some time and prick out to seed pans or boxes as soon as the seedlings are large enough to handle. The plants can be set into their flowering quarters in May.

Journal of a Marine Aquarist

(continued from preceding page)

scription, the juice of *Metembryanthemum edule*, gave almost immediate relief.

That night my landlady, always eager for any news of "the lab," demanded the latest bulletin.

"Oh, a couple o' Portugese men o' war came in" was my

rather absent-minded reply as I struggled out of a sodden mackintosh.

"Well, well!" she rejoined, "that ought to do the public houses a bit of good on a night like this!"

Incidentally, the men o' war were the first seen for eight years—brought from warmer waters by the phenomenal south-west gales which marked a memorable year. A week after the Plymouth invasion, one was recorded from Bognor, and another as far east as Hastings.

COLDWATER FISHKEEPING QUERIES *answered by A. BOARDER*

I am sending a sample of weed which grows in my pond clinging to other plants. Is it hair-grass? Is there any way of clearing it from the pond by chemical means? Can you throw any light on how this weed came to be in my pond? Most of the plants have been introduced from a local river after they had been well washed.

The weed is blanket weed, sometimes called flannel weed. It is a form of algae, probably *Vaucheria* or *Spirogyra*, but there are several forms of hair-like algae. Hair grass (*Eleocharis acicularis*), is a very different plant which has roots and does not get tangled up with other plants. I do not believe in clearing blanket weed or any other form of algae by chemical means. There would be a great danger to the fish and also to the useful plants in the pond. For clearing floating algae from reservoirs copper sulphate is sometimes used in a weak state, but unless you are very careful with this more harm than good can be done. The best means of clearing the weed from the pond is to pull out as much as possible by hand. A broken stick twisted into a mass of the weed will remove large amounts and it will be found that as the other water plants grow they will tend to choke out the blanket weed. Remove as much as you can once a week and you will be surprised how soon you will master it. The algae have several means of propagating, and tiny spores could be blown into your pond. It is probable, however, that most of yours came originally from the river plants. One tiny piece, too small to be seen without a magnifying glass, could start the trouble.

Can you give me some information about the freshwater minnow. I put some in my tropical tank and so far they are feeding well and look all right. Can I breed from them?

The minnow, *Phoxinus phoxinus*, is essentially a river fish, and I do not think that you are likely to succeed with them in a tropical tank. As long as the oxygen content of the water is all right they may be safe, but as soon as this drops the fish will die. Some aeration would help to keep them alive but they are not used to high water temperatures. I do not think that you are likely to breed from them in your tank. Normally they congregate in large numbers at breeding times on shallow water over sand or gravel where the water is clear and running. Unless you can obtain these conditions you will not stand much chance of breeding them.

Can you tell me if all-glass tanks are available nowadays and how do prices compare with iron-framed tanks?

It is possible to obtain all-glass tanks and if you look out in *The Aquarist* you may find some advertised. As a rule they are smaller than the sizes which you can get in metal framed tanks, but size for size I think they cost about the same, or perhaps a little dearer. Some of these all-glass tanks are quite good but most I have seen and used have glass which is not quite clear. This gives a somewhat distorted view of the fish. Of course they never leak as long as they are not cracked, but a crack can appear when the tank has been standing on an uneven surface or has had a knock, however slight. The tank should stand on a piece of felt or baize for safety.

I have had some trouble with my shubunkins. When spawning the males have driven the females so vigorously that they have died. Was this due to the fact that the males were too large for the females?

It is rather strange that the females should have been killed. I have never known this happen to my own fish but I have heard of it happening to others. I suppose that if you had several large males and only one or two small females they might prove too strong for them but I should think that this would only be if the females were not ripe. Again, it may be that the spawning pond was not large enough for the females to find cover. I think, though, that

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

it is safer to use females larger than the males when there is restricted space and chasing is vigorous.

I have had some experience with breeding tropicals and now wish to start breeding fancy goldfish. I am thinking of converting a large greenhouse for the purpose. Could I make concrete tanks for along the base at ground level?

It is quite possible to make concrete tanks for your proposed fish-house. I have made many such and some I use for hatching can be seen in the accompanying photograph. These are only half-an-inch thick and are not



Photo:

Laurence E. Perkins

Concrete hatching tanks used for fantail goldfish by Mr. A. Boarder, seen in a home-made concrete-strutted glazed frame

reinforced. They are quite strong and hold water, as can be seen. The only difficulty for you if you put them with the water at ground level is that it will be more difficult to empty them when necessary. If they stand with the base on the floor level they could be emptied by siphon if needed. If you make tanks so that the water is on floor level you will, of course, have more room for extra tanks on staging above them. If you do this see that you leave plenty of space for servicing the tanks.

I am able to purchase some old kitchen sinks quite cheaply and wonder if I could use them for breeding goldfish either outdoors or in a garden shed? What plants can I use?

The sinks would make ideal hatching tanks and if one pair of fish were placed in each and then removed after spawning it would be possible to breed in them quite well. I think that it would be safer to block up the drainage hole completely as otherwise the plug may become loose and allow all the water to escape. The hole could be sealed with a mixture of one of cement to one of sand. The sinks could, of course, be used either out of doors or in a shed,

but it must be remembered that they will not hold a very large amount of water and in a severe winter they could freeze almost solid; they would then be almost sure to crack. You can use any kinds of coldwater plants for spawning. Goldfish are not fussy and when in the mood will lay their eggs on anything. Where special containers are used for breeding or hatching it is a good plan to use only those plants which do not require a lot of compost or soil in the bottom of the tank. I know of no plant better for your purpose than hornwort (*Ceratophyllum demersum*). This grows without making any roots and so does not die off or rot soon after having been moved from one tank to another, as often happens when breeding operations are in progress. If other types of plants are used they can be rooted into small plastic or other pots and the whole can be moved as necessary.

When would be the correct time to place fantails out of doors for breeding purposes and what is the usual breeding procedure with fantail goldfish?

You probably mean when can fantails which have been kept in some warmth all the winter be placed out of doors with safety? Well, there can be no stated time as so much will depend on the weather. They should not be placed outside until all chance of bad frosts is over. I am sure that there is no surer way to upset the fish than to put them outside too soon, especially if they have been kept in a temperature in the region of 60° F. If this has been the case I do not think that the fish should go outside before early May. When they are put in the pond or outside tank see that you choose a fair day and test the temperature of the water to see that it does not vary more than about five degrees from that of the indoor tank. Once the fish are in the outdoor position they are not so likely to be harmed by changes of temperature. Fish can easily get used to gradual changes of temperature but it is when they are put straight from a temperature of about 65° to one of 50° F. that they can suffer. The usual procedure for breeding fantails is as for that of other types of goldfish. My booklet *Coldwater Fishkeeping* (2s. 8d. post paid from *The Aquarist*, not from me personally) will tell you all you want to know to breed fantails.

Will you kindly advise me on the best set-up of aquarium compost, such as minimum depth, and should I use peat under the sand?

I am still getting many queries about this subject although I have dealt with it in articles more than once. If the question was just one of growing plants alone, then I would suggest a whole meadow-land turf on the bottom of the tank with some coarse sand on top. This could be four to six inches in depth, especially if the tank was 15 inches deep. The better the loam in the bottom the better would the plants thrive. If on the other hand you wish to make an ornamental set-up tank with fishes and plants then it is necessary to consider one or two more points. In the first place any soil in the tank which could turn foul would be almost sure to alter the balance of the water and could cause harm to the fish. Again, if too much compost was used so that it reached far up the front glass this would look unsightly and hide part of the picture. In this case do not allow the compost to show from the front but pile it up as high as you like at the rear. There is no need to put any peat under the compost. This may make the water too acid. You must not lose sight of reasons for using plants apart from their beauty. They assist in keeping healthy conditions in the water. Not only do they increase the oxygen in the water and use up some of the carbon dioxide but the action of the roots of the water plants is to denature harmful products from droppings from the fish and so help to sweeten the water. Plants require certain amounts of minerals and chemicals for their proper growth and they are able to get some of these from the waste matters in the

tank, such as decaying uncaten foods and fish excreta. If you give your water plants too much nourishing soil to begin with then they are not likely to be of so much benefit to the water. In other words, the more you have fed them the less will they need to search for the waste matters in the tank.

I have a 30 ins. by 15 ins. by 15 ins. tank in which the plants do not seem to thrive. I have two 2 ft. 20 watt "warm white" fluorescent tubes over the tank which are kept on for eight hours a day. The plants started to flourish but have now gone back badly. What is the reason?

The fluorescent tubes may be the reason why the plants do not flourish. I have known aquarists who have had to change back to ordinary bulbs to get their plants to grow. Although some appear to get by with them I am certain that in some cases the tubes have not been a success. Of course, a great deal would depend on the amount of natural daylight the plants could obtain. Some plants will not thrive when they only get artificial light but others seem to get along fairly well with the minimum amount.

Can you recommend a good glazing cement which is on the market? I have tried one kind without success although I carried out the instructions.

I am afraid that the glazing of a large tank such as yours can be a difficult task for some people. I don't suppose many aquarists made a success of their first venture. You may have carried out all the instructions, but it is like a lady making a dress for herself, she might apparently carry out all the directions and yet not attain success at the first attempt. Basically, if you do all the right things in the proper order everything should end up right, but it does not always turn out that way. There are a few little knacks which one learns with practice and I would suggest that you have another try. I do not think that the actual cement you use makes much difference, as I am sure that an experienced tank glazer could make a tank water-proof with any one of half a dozen composites on the market. I can glaze a tank by using linseed oil putty, as is used for windows, and many others use nothing else. There are several kinds on the market equally as good or maybe better but unless you take care with the essentials you will not make a good job of the glazing. The glass should be thoroughly clean to start with, and the frame should be dry and have been painted. The putty should be fairly fresh, and quite free from any hard bits. The bottom glass should be placed in first and, like the other pieces, it should be the correct size. Too small pieces of glass mean too much putty. Do not try to squeeze cut all the putty but leave sufficient to give slightly when the tank is filled. When pressing the glass into position only apply pressure near the frame, never in the middle of the glass. See that the frame lies on the table so that you press down towards the table. Try to keep the same amount of putty between the frame and glass all the way round. When finished be careful not to press on any glass from the outside and fill with water as soon as complete. The weight of water helps to settle the glass into position, and the spare putty can be cut away after filling.

How can I get rid of brown algae in the tank?

I have had several queries on the same subject and am sure that at this time of the year (winter) it is more likely to appear. The ordinary water plants are not in such vigorous growth and so the brown algae can get a hold. Excessive growth of the algae is often caused by lack of light, and this is in line with the winter conditions prevailing. Sometimes it is found that acid conditions in the water encourage its formation. Others have noticed that if too much dried food has been given and some of this is allowed to decay, the brown algae will result. Try to give some more light and cut out the dried food for a time.

our readers

Readers are invited to express their views and opinions on subjects of interest to aquarists. The Editor reserves the right to shorten letters when considered necessary and is not responsible for the opinions expressed by correspondents.

Tame Fish

I HAVE been a regular reader of *The Aquarist* for some considerable time, and to me, it has proved to be a mine of information. I noticed in your January issue a report from *The Toronto Weekend Magazine* concerning tame fish in New Zealand.

Now, I would like to point out that this report is not strictly true because it is out-of-date, and the facts about these fish I have set out for your information, and I am sure you will find them as interesting as I did. I first read about these tame schnapper and blue cod at Marlborough Sound, N.Z., during the January of 1953. It was a fair-sized article with pictures of Mr. W. L. Ker feeding, fondling, and actually picking up his fish. Some of his fish-friends' names were given, e.g. "Little Bella," "Hector," "Leckie," and "Lummy." The article goes on to explain that two of the original tame fish "Blanche" and "Big Winnie" failed to return during the last season.

The next article was in June, 1954, and it stated that Mr. W. L. Ker was leaving Marlborough Sound with a great deal of reluctance. Mr. Ker did not, however, want his finny friends left to become prey to any wanton persons who would take advantage of their tame ways, so he wrote to the N.Z. Government asking them to preserve the place as one of local interest. We hear no more until October, 1954. The marine department would not undertake to look after the tame fish, and so Mr. Ker, at last, had to sell up and move to Picton. Mr. Ker need not have worried about his "pals," because the incoming tenants, Mr. and Mrs. R. H. Coker and their son Ronald, undertook to care for the fish and feed them.

Marlborough Sound is now one place of great interest, and at weed-ends, launch-loads of holiday makers gather to see the fish being fed. All the information regarding these tame fish came from *The Wide World for Men*, a monthly magazine—British and therefore the best.

H. D. JONES, Wrexham, Denbs.

Hard or Beautiful?

In reply to the letter from Mr. G. F. Hervey published last month "Pisces" writes:

We are told in T. S. Palmer's *Index Generum Mammalium* (American Fauna No. 23, 1904) that most generic names have been bestowed for the sake of drawing attention to some characteristic or resemblance of the animal. The same rules apply generally to fishes as well as mammals and many other groups. Has Von Linné left any precise written explanation of the meaning he intended to convey? If Mr. Hervey can produce it in support of his contention



write

Address letters to The Editor, *The Aquarist*,
The Butts, Half Acre, Brentford, Middlesex

I will climb down and acknowledge my error.

The adjective "beautiful" to describe the South American catfishes is so far from accurate that it is laughable. On the other hand the words "hard-skinned," if not 100 per cent. accurate, is a very fair description. No—I am convinced, although Mr. Hervey will doubtless contend that I have a *callus* disregard for accuracy, that the translation "beautiful" was a *kallos*-sal mistake, since perpetuated. I find I am not alone in this. Dr. G. S. Myers, who was responsible for the classification in Innes' *Exotic Aquarium Fishes*, translates *Callichthys* as "a fish having bumps or callouses."

Mollie Hybrids

I HAVE three hybrids from a female guppy and male black mollie. They are now about 12 months old and as far as I am concerned, are just a nuisance; they all show male characteristics, and have been kept with both female guppies, and female mollies, but appear to be sterile. I reared seven of them, and have given four away as curiosities. I am quite willing to give the remaining three away but I wondered if anyone would be interested in them, other than as curiosities. If you know of anyone perhaps you would put them in touch with me.

G. W. ROSE, Coventry.

Letters will be forwarded—EDITOR.

Notes from Malaya

IN a past issue of *The Aquarist*, which has only just come to hand, a query was raised concerning the breeding habits of *Sphaerichthys osphromenoides*, the "airship fish." This fish is a mouthbreeder, and I have caught several females carrying eggs or young in their mouths. Although these specimens survived a rough journey by car over bad roads for many miles, all died a few days later. I am not sure whether this was due to the change of water conditions or to the weakened state of the fish after going without food, or to a combination of the two, but we are endeavouring to find an "easy formula" for breeding this species.

Your readers may be interested in the natural conditions under which their Malayan fishes live and so I would like to offer the following notes, deliberately avoiding technical data. Clear, swift-running streams, shallow, with sandy and pebbly bottoms, almost inevitably produce the following: *Barbus binotatus*, *Rasbora trilineata* (scissors-tail); sometimes *Barbus fasciatus* and *B. lateristriga* are found. *Rasbora heteromorpha*, *R. maculata* and *R. einthoveni* are usually found together or within the same area in deeper, slow-moving streams with muddy bottoms and plenty of greenery. All these species can be caught with an ordinary dip net quite easily.

Rasbora halochroma, which, we understand, is not well-known in the United Kingdom, is found in peaty water. It is comparatively rare even out here but is a most attractive fish. A suffused purple is the predominant colour of those caught by us, with two black blotches on each side below the back edge of the dorsal fin and another smaller blotch above the centre of the pectoral fins. All fins, and the tail, are bright red. This fish is difficult to catch with a dip net, and it is a great jumper. It grows up to about three inches.

Barbus hexazona and *B. partipentazona*, rarely found together in our experience, like deep, clear, slow-moving streams or clear ponds, with sandy bottoms. Both are difficult to catch and the former species is even more difficult to get home alive and keep alive for more than a few days. Those that do survive do amazingly well in our concrete open-air tanks, where we leave them to "get on with it." "Bumble bee" fish are usually found in shallow ponds, generally rice fields, and they like to bask in the warm water of only a couple of inches depth. We have caught *Dorichthys martensii* hugging the stonework of a bridge, but unfortunately they died in transit.

We require no heating apparatus here as the climate remains steadily between 80° and 90° F. Live feeding is just too easy, for *Tubifex* and mosquito larvae are in abundance all the year round. Infusoria is almost a curse in our tanks whilst green water can hardly be avoided except by constant filtration. If anyone can produce a cheap, handy filter for this market let him contact us!

A. H. DUTTON,

Hiltons Aquariums, Selangor, Malaya.

Earthing Aquaria

THE statement is made in your January issue that the correct way to earth an aquarium is to solder a wire to the outside of the frame and connect the other end to an earth pin. I would like to point out that fatal accidents can occur from this procedure.

The danger from an unearthed tank arises mainly when the heater or thermostat develops a leak so that the water becomes potentially "alive." If a person makes contact with the water he will receive a shock, the severity of this depending on how good a contact he is making with earth. If he is standing on a dry wooden floor the shock should be only a minor one, but if he is standing on a damp stone floor the shock will be severe and possibly fatal. If the tank is earthed as suggested above, since the water is not normally in contact with the frame, a person putting one hand in the "live" water and the other hand on the frame would complete the earth circuit, and current would flow from one hand to the other, and, traversing the heart, would almost certainly be fatal. It would be safer not to earth a tank at all than to do so in the way suggested.

To earth a tank safely the earth wire must make contact with the water and with the frame. I suggest that a piece of lead wire be soldered to the frame and the free end immersed in the water. The frame can then be safely earthed by soldering a wire to the outside and connecting it to an earth pin.

N. A. DOZE, A.M.I.E.E.,
Birmingham.

ON looking through your January, 1955, issue, I see that in your answers to readers' queries your expert advises the earthing of aquarium frames. But since water is a conductor and normally there is no electrical contact between the aquarium frame and the water, if a fault should occur which makes the water live, a serious shock could be obtained by touching the water and the frame. In order to eliminate this risk a piece of zinc could be bolted to the top of the frame so that it makes contact with the water.

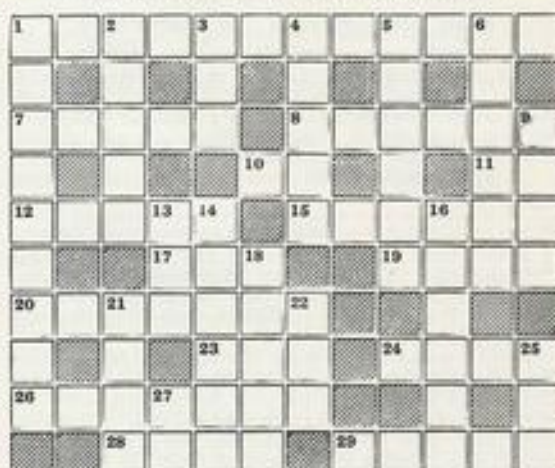
A disadvantage of this system, however, is that if a fault should occur the mains fuse will automatically blow. But if a neon bulb or mains lamp is included in the circuit the

fuse will not blow, but the lamp will light, thus warning the aquarist that his tank is live without putting his heating system out of action.

F. C. BOUCHER,
Rochester, Kent.

The AQUARIST Crossword

Compiled by J. LAUGHLAND



CLUES ACROSS

- Pistia stratiotes* (5, 7)
- The perfect state of insect life (5)
- Any plant of genus *Viola*. The water this is *Hottonia palustris* (5)
- Ego; found in the *mers* (2)
- Relaxes (5)
- Ides ran as the clouds condensed (6)
- Dam returns and is wild (3)
- Remedy commonly applied to dead herrings, haddock, et. (4)
- Sesuvioideae* is the most popular variety of this vivid fern (7)
- Manuscripts in short (3)
- Small fat river fish (4)
- Tuft of grass (7)
- In his answer is without in the Latin way (4)
- There is a flatfish in the wind-driven water (5)

CLUES DOWN

- Blonde lure for young herrings (9)
- Upset batrachians are sad to change (5)
- A popular tetra is named after the S. American river (3)
- Young eel (5)
- Not all our so-called tropicals come from this belt (6)
- Elver with a hundred is upset but smart (6)
- Water movement from diet (4)
- There is a bird in the mud (3)
- Our noblest river fish (6)
- Beautiful plant for the deeper pond or lake; *adansoni* and *latae* are varieties of it (6)
- Suckers of the octopus (5)
- Deep-voiced fish? (4)
- Cask minus the top (3)
- An inward bend of the shore (3)
- Head of 14 down forms land of Jan Smuts and Kruger (1, 1)

PICK YOUR ANSWER

- The Siamese fighting fish (*Betta*) with a cream body and dark fins, known as the Cambodia, is also known in America as: (a) the Bangkok, (b) the Narcissus, (c) the Orchid, (d) the Saigon.
- Chirocentrus podici* (the blue fin) is native to: (a) California, (b) Florida, (c) Guatemala, (d) Panama.
- One-spot live-bearer is the popular name of: (a) *Afura amazona*, (b) *Glaridichthys falcatris*, (c) *Phallocheilichthys caudomaculatus*, (d) *Poecilia reticulata*.
- Which one of the following species is not a mouth-breeder? (a) *Tilapia dollei*, (b) *Tilapia natalensis*, (c) *Tilapia nilotica*, (d) *Tilapia zillii*.
- Oryzias latipes* (the medaka) will withstand a temperature as low as: (a) 35°, (b) 40°, (c) 45°, (d) 50°.
- Featherfoil is a popular name of: (a) *Cabomba*, (b) *Ceratophyllum*, (c) *Myriophyllum*, (d) *Najas*.

G.F.H.

(Solutions on page 263)

ADDRESSING the annual general meeting of the **Accrington and District Aquarist Society**, chairman Mr. J. C. Holding said that last year had been a profitable one for the society, with its successful four days show in September and several outings to places of interest. Officers elected were Alderman W. W. Cocker (president), Mr. J. C. Holding (chairman), Mr. R. Duckworth (vice-chairman), Mr. F. W. Hartley (secretary) and Mr. M. Scadd (treasurer).

BEXHILL and **District Aquatic Society** plans to hold a home aquaria competition early this summer, when judges will inspect entered aquaria at the homes of members. In addition a furnished aquaria contest will be held in conjunction with the local horticultural show. At the first table show held this year Mrs. E. J. Good took first and second in the cichlid class and Mr. J. Willcocks took third prize with a female *Pelmatocentrus trilineatus*.

IN reviewing last year's activities **Forest Hill and District Aquaria Society** reports that they exhibited seven stands at local shows, arranged nine lectures by visiting aquarists for a special beginners' course in addition to lectures from society members, held eight table shows, and a home furnished aquaria competition, and made five visits to places of interest. A further beginners' course is being held this year.

SPEAKING to members of the **Guildford and District Aquarist Club** Mr. Paul Worsfold recommended the possibility of keeping together in one aquarium fishes and plants which had a common geographical origin. He also said that to stimulate additional interest an aquarium can be kept housing one particular fish group, such as the live-bearers or the bubble-nesters. The lecturer, a Guildford society member, gave many examples of interesting communities and illustrated his remarks with regional maps.

TO facilitate membership of the **Hendon Aquatic Society** for provincial aquarists it is proposed to issue an advance programme of weekly meetings, covering six week periods. Thus aquarists travelling to London can select a suitable time for their visit. The programmes will be available from the secretary Mr. Andrew, 51a, Golders Green Road, London, N.W. The club library, now containing 370 books on fishes, with a breeding reference file, is also open both to members and visitors.

STEADY membership figures and satisfactory finances were reported at the annual general meeting of **Kingston and District Aquarist Society**. A loss was incurred in the society's open show last year, and it is not proposed to hold the event this season. A number of inter-club table shows are planned however, with championship classes repeated in spite of weak support for this feature last year.

A JUDGING chart (List 1—characins) has been issued by the **South-West Middlesex Aquarist Association** for use by the judges who qualified at the Association's examination last year. Other lists of fishes are being prepared; they give popular and scientific names, size and details of finnage and colour, and are intended as guides supplementing F.B.A.S. Standards. The Association held a "gala" night last month on the occasion of the finals contest between Uxbridge A.S. and Slough and Windsor A.S. for the Diana M. Charles Memorial Trophy. The Uxbridge team were the winners after a tie had necessitated an additional pointing. During the judging visitors saw a film show; "Marvels in Miniature" and "Coral Wonderland".

New Aquarium Curator

APPOINTMENT of a new curator to the London Zoological Society's Aquarium at Regent's Park was announced last month. Dr. H. G. Ververs will be taking over the Aquarium in September, when Mr. H. R. Vinall, who with nearly 54 years' service is the longest-serving member of the Society's present staff, is due to retire.

March, 1955



from AQUARISTS' SOCIETIES

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

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

Show Fish Guide

LOOSELEAF sheets describing tropical aquarium fishes for use by show exhibitors and judges are being issued by the Federation of British Aquatic Societies. The first batch of 15 sheets, each sheet dealing with one fish and giving popular and scientific names, history of origin, distinguishing characters, judging points, minimum showing length and an illustration, concern *Barbus* species and are accompanied by an introductory sheet of information about the genus. Species dealt with are *Barbus concolor*, *B. cuneatus*, *B. glanis*, *B. phoeniceus*, *B. wappaei*, *B. fasciatus*, *B. oligolepis*, *B. persianus*, *B. pentazona*, *B. tephrosus*, *B. zeylanicus*, *B. zebra*, *B. siepi*, *B. stramonis*, *B. vinnatus*, and *B. vittatus*. Price of the 15 sheets is 3s. post free, and they are punched suitably for inclusion in the well-board loose-leaf folder titled "Technical Information" which is also available from the F.B.A.S. price 3s. including postage and packing. Further sheets dealing with other species will be issued from time to time, and for any details of the scheme applications should be made to the secretary Mr. R. O. B. Lee, 1, Cranston Court, Willesden Lane, London, N.W.4.

Film Strip Hire

FILM strips for use by aquarists' societies are available for hire from **Pemberton and District Aquarist Society**. All information concerning these may be obtained from the society secretary Mrs. V. J. Pemberton, 2 Stone P, lace Eastgate, Pemberton.

New Societies

Herne Bay and District Aquarist Society Secretary: Mr. E. J. Payne, 27, Poplar Drive, Herne Bay, Kent. Meetings: Third Thursday each month at the Royal Hotel, Wilton Street, Herne Bay.
St. Marylebone Aquarist Society Secretary: Mr. R. J. Marshall, 4, St. James Street, Marylebone, London, N.W.1.

Secretary Changes

CHANGES of secretaries and addresses have been reported from the following societies:
Accrington and District Aquarist Society (Mr. F. W. Hartley, c/o North Street, Accrington, Lancs.); **Barnold Green Aquatic Society** (Mr. D. Percival, 10, Waterloo Street, London, E.2.); **Epworth and District Aquarist Society** (Mr. E. W. Wain, 21, South View, Ashford, Surrey.); **Hull and District Aquarist Society** (Mr. J. Whitworth, 123, Condon Lane, Wigglesworth, Halifax, West Yorkshire.); **Greenwood and District Aquarist Society** (Mr. A. D. Harkin, 2, Walsingham Road, Leyton, Essex.); **Leyton Aquatic Society** (Mr. E. S. Bentley, 49, Overton Drive, Waltham, Essex.); **Marble Arch Aquarist Society** (Mr. E. R. Sarnon, 22, Ladbroke Road, West, Middlesex.); **Mid-Somerset Aquarist Society** (Mr. J. Stamp, Postman's Green, Dulverton, Somerset.); **Widnes Aquarist Society** (Mr. F. Smith, 24, Bevington Road, Widnes,

Lancs.); **North Birmingham Pond and Aquarium Society** (Mrs. D. B. Neale, 65, Sandy Lane, Great Barr, Birmingham 22a); **Nuneaton and District Aquarists' Society** (Mr. J. H. Roberts, 158, Long Street, Nuneaton); **Penistone Aquarists' Society** (Mr. G. Scarfe, 60, Ward Street, Penistone, Nr. Sheffield, Yorks.); **Perth Aquarist Club** (Mr. I. M. Bisset, 50, Tulloch Terrace, Perth, Scotland); **Royal Leamington Spa Aquarists' Society** (Mrs. P. E. Rayment, 3, George Road, Warwick).

Aquarist's Calendar

26th March—**Cambridge and District Aquarists' Society** show at Tracey Hall, Cockburn Street, Cambridge. Judging 3 p.m.

4th-16th April—**Southport Aquarist Society** second annual show in Gaumont Cinema foyer, Lord Street, Southport.

7th April—**Bath Aquarists' Society** public evening meeting "Any Questions?" Details from secretary Mrs. M. I. Crisp, 3a, Bartlett Street, Bath, Somerset.

14th-16th April—**Todmorden and District Aquarists' Society** open show at Tracy Street Sunday School, Halifax Road, Todmorden. Schedules and entry forms available from Mr. J. Holroyd, The Cottage, Railway Street, Todmorden.

23rd-28th May—**Blackpool and Fylde Aquatic Society** fifth annual open show at Trinity Schoolroom and Lecture Hall, Coronation Street, Blackpool. Schedules and entry forms available from Mr. J. Peck, 82, Bathurst Avenue, Blackpool.

9th-11th June—**National Aquarium Exhibition** at Royal Horticultural Hall, London, S.W.1.

7th-10th July—**Chester and District Aquarist Society** annual open show, at St Peter's Parish Hall, Chester. Schedules from show secretary, Mr. C. Morrison, 22, Belgrave Place, Handbridge, Chester.

25th-27th August—**Midland Aquatic Show** at Bingley Hall, Birmingham.

Crossword Solution

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

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1 (c). 2 (b). 3 (c). 4 (d). 5 (b). 6 (c).

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W. G. PHILLIPS, judge and breeder. Fancy Guppies. Over 200 awards. Invites enquiries, including rare green laced variety. 164, Regal Way, Kenton, Harrow, Middx. S.A.E. please.

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