

The Aquarist

and Pondkeeper

OCTOBER, 1961



MONTHLY
Vol. XXVI No. 7

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Editorial

WHEN opportunities have been offered for men to follow the trail into Outer Space blazed by Russian dogs, there has, strange as it may seem, apparently been no shortage of volunteers. In the world of animals other than humans the desire to travel out of the Earth's atmosphere is hardly likely to be developed, but even in fancy it is difficult to imagine any of them, except perhaps the birds and bats, looking wistfully upwards and wishing to go higher and higher and higher.

Fishes least of all, it would be thought, would wish to change their habitual near-weightless aquatic state for a quite weightless condition miles above the water's surface. Not even the reckless leaps undertaken by some species when their tanks are left uncovered for a short while could be interpreted as being due to astronautical ambitions. But when man decides that they should have this experience, then willy-nilly up they must go. We have, therefore, to record the priority for travel into space by a fish, and although details of these trips are not always freely available, it rather looks as if *Carassius auratus* has here taken pride of place. This could be held to be no more than a just and proper recognition of the status of the goldfish, for long before tropical aquarium-keeping introduced the name of the guppy as the "pet fish" known to everyone, it was the goldfish that was the most popular domesticated species.

Whether or not the celestial variety of this fish was chosen for this privileged treatment is not known, but we suspect that "Max," one goldfish reported as having been rocket-propelled from Germany, was of the common type. He was later recovered from the North Sea and described as being in a very poor condition. Doubtless there will be other attempts, and, who knows, it might be that a goldfish will accompany the first man to land on the moon. It is almost certain that no other kind of fish has provided such plentiful evidence of its ability to withstand the worst possible conditions both in and on a globe.

The Royal Gramma

by JOHN BOURSOT

THE skin diver in the deep waters off the reefs of the Bahamas, the Florida Keys and the West Indies, floats in a silent blue-lit world; a world where coelenterates dominate the scene. Large handsome sea anemones abound in sheltered places. The walls of caves and grottoes are festooned with seaweed-like colonies of tiny hydroid polyps busily labouring to add new tentacles to their fragile dwellings. Dainty alcyonarian polyps united by a bond of living tissue crowd the long branching fingers of sea whips. Banks of richly coloured coral polyps like massed flowers entrench their stems in stony cushions of carbonate of lime. And, pulsating rhythmically through the water, frail diaphanous jelly-fishes, faintly tinted with pink or blue or violet, drift like fairy paravols of exquisitely wrought glass. With gossamer tentacles trailing out behind they seek their food among the creatures of the plankton. Sea fans, stinging corals, sponges and algae of many sorts and colours encrust the steep sides of the reef in forest-like profusion, giving shelter to myriads of bottom-living creatures.

Vast clouds of fishes shoal and veer in endless formation among the coral thickets and lofty coral domes. Here, too, lives one of the loveliest fishes of this strange enchanting scene, the breath-taking blue and gold fairy basslet. Sly and retiring, it seeks the shelter of overhanging ledges and grottoes, sometimes choosing an upside-down position near the ceiling. The diver, equipped with aqualung and flippers and swimming far below the dark silhouette of his dinghy as it lightly rocks among the twisting shafts of sunlight at the surface, must now fight the hampering pressure of an alien environment, and deftly ply his wits to match the basslet's clever cunning and lightning speed. Beneath him the thronging wall of life drops precipitously away from the realms of light into deep twilight regions where he cannot go, and on to the cold black abyss of the ocean floor.

The blue and gold fairy basslet, *Gramma homobryas* (also *G. lereae*), generally known as the royal gramma, is so lovely a fish that it always draws cries of admiration from the crowd gathered before its tank in any one of the public aquariums in the Caribbean region where it may be on show, and from friends of the private aquarist fortunate enough to own it. Dealers price the fish as high as £14, though they do not always stock it. Hence the inclusion of

it in this series probably calls for an explanation. Of the many good reasons the following seem to me to be wholly satisfactory. No discussion on marine tropicals would be complete without it, not all aquarists try to outdo each other in petty economy, and once seen it is irresistible. Furthermore, although the royal gramma is decidedly uncommon, it is not quite the rarity it was once thought to be. And now that it is on the breeding list prices may drop sharply and without warning.

The royal gramma is distinguished by but two fundamental colours disposed with consummate simplicity on either side of a perpendicular line ascending from the first ray of the anal fin to the top of the dorsal. All towards the head is saturated magenta (except for the faintly golden transparent pectorals). All towards the tail is lemon yellow. A black oval spot ornaments the front of the dorsal, and a short black line extends backwards from the eye, which is also black. Heavy pearly-violet shading adorns the mouth, forehead and long tapering pelvic fins. Viewed from above, the entire magenta area assumes this magnificent colour, appearing almost fluorescent. In all fairness it must be said that some individuals are bluish mauve instead of magenta, but they seem to be in the minority. As grammas are deep-water fish, subdued lighting is preferable, and since their colours are mainly confined to the red end of the spectrum ordinary incandescent bulbs are best. Fluorescent strip lighting makes the fish look very wan.

The coral heads and rockwork in the tank should be arranged so as to afford a number of dark recesses to which the grammas may retire, and from which they will often emerge in an almost inverted position. When observing movements on the surface they will frequently lie on their sides in mid-water, though this position is usually assumed against the side of a rock or the wall of the tank.

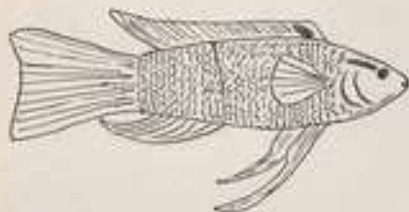
Royal grammas are leisurely swimmers, sculling themselves along with their pectorals and trailing the tail behind. They are delightfully inquisitive and will eagerly advance in fits and starts towards the glass to exchange impressions with a motionless human face looking in. This is fortunate as it facilitates close inspection. But, move unexpectedly and they vanish into the rockwork. When the danger has passed they will reappear at the entrance, standing on their tails and leaning backwards at an angle of about 70 degrees,

or will peep out with only their heads showing from under the overhanging ledge. Suspicion freezes them into strange postures at the entrance to a rocky recess with nothing but the dull glint of golden light from the rippling pectorals, and an occasional faint twitching, to betray their presence. With their yellow parts hidden, their deep rich magenta is surprisingly inconspicuous in the dim shadow of a rocky crevice festooned with dark-green algae.

Feeding is no problem; dried food, earthworm, raw beef, raw liver and raw shrimp, are all relished. Dead or stunned baby guppies make delicious tit-bits, and may be offered as often as possible. I use baby red flag mollies for this purpose, but any fish small enough to be swallowed will do. Dead baby guppies etc. will not sink when thrown into sea water, so their swim bladders must be burst by gently pressing them from head to tail between very clean fingers. As the food sinks down the grammas will approach it, quietly engulf it, slip backwards and make for shelter.

When young the royal gramma closely resembles the Spanish hogfish (*Hodianus rostratus*). But once the aquarist is thoroughly acquainted with the overall appearance of the two species he should have no difficulty in telling them apart—after a good hard look.

To the freshwater aquarist, leaping out from the marine branch of fish-keeping, it may come as a shock to learn that the prerogative of kissing is not his and the kissing gourami's alone. The royal gramma, in common with the yellow



The royal gramma

gramma (*Haemulon flavolineatum*) and the blue-striped gramma (*H. aeneum*), is quite partial to this curious activity. It is not the furtive kiss of the bashful country maiden, or the thick-lipped kiss of the gourami, or the voluptuous 20-minute smother of a Marilyn Monroe, but the kiss of lovelessness and warning. Usually a kiss terminates a short chase; a fleeing gramma will suddenly turn to face its pursuer and the two will kiss. Then each goes his own way. I have witnessed it innumerable times, and suspect it of being an act of quiet aggressiveness. Each participant, with wide open mouth, may merely gape at the other, though contact is the normal procedure. On occasion their jaws will actually lock.

Royal grammas are remarkably peaceful and should not be kept with aggressive species. They are superb jumpers, and will be on the floor before you can bat an eyelash. The aquarium cover should therefore never be left off. However, when conditions are to their liking they seldom attempt this suicidal manoeuvre.

The occasional assertion that the fish is delicate solemnly and unwittingly convicts the aquarist of negligence and poor tank conditions. I feel the gramma should be rated as quite disease resistant, for when white spot does strike it is the last to get it. With proper care the gramma keeps its colour well and is a hardy species, as the following episode in the life of one of mine will show.

After several months of continual kissing the inevitable happened. Tell-tale tooth marks like tiny pin-points

appeared on the front part of the lower jaw of one of my grammas. The smallness of the spots and the continuation of the fish's normal activities foolishly led me to hope that the spots would heal themselves, despite the subsequent appearance of fungus. As time went on the fungus did seem to disappear, but the spots grew into a single white patch which slowly spread along the right lower jaw bone to the angle of the mouth. Ultimately the right and left halves of the jaw separated, reducing the entire mandible to a pair of chop-sticks. The virulence of the disease was now unquestionable. The fish's appetite, which had progressively deteriorated as the disease worsened, was now completely lost, and the fish itself remained in hiding. As will be seen, the loss of appetite was probably due to pain rather than to the mechanical discomfort of the divided jaw bone. I decided to act quickly.

The fish was removed at about noon to a 10 gallon vented tank only half-filled with clean new sea water. A small flat stone leaning against the back of the tank in a corner, to make a three-sided shelter, together with an air stone, constituted the entire furnishings. One level teaspoonful of sulphathiazole sodium, first dissolved in a cup of sea water, was added. The following morning, though the bare bone gave no evidence of it, the disease had been arrested. Small wriggling pieces of earthworm loosed from the end of a toothpick as it touched the water were ravenously devoured and even scooped up from the bottom despite the raw condition of the jaw. Owing to the fish's extreme nervousness during the first few days in hospital, such feeding had to be carried out so that the fish saw nothing but the falling pieces of food. The merest glimpse of anything else sufficed to ruin the attempt. A 3 weeks' period of convalescence followed, during which no water was changed nor even filtered. The gramma's strength and vitality returned. Slowly fresh colour invaded the blanched bone, faint at first, but steadily deepening to normal. Then the great day came. With the customary precautions against abrupt changes of temperature and salinity the now healthy and happy gramma was returned to his companions.

Owing to the subdued light in the ocean, especially at considerable depths, some individual fishes seem prone to partial or total blindness in an aquarium lighted by too strong a bulb. Grammas are among those occasionally afflicted, though by no means commonly so. The eyes look perfectly normal, and it is only the fish's restrained excitement at feeding time and constant reluctance to join in that arouses suspicion. Partial blindness responds to treatment. A lower wattage may be used, and the fish fed by gently lowering a piece of food (preferably raw shrimp, as it is white) on the end of a toothpick gripped in a pair of forceps of adequate length (I use a home-made 22-inch wooden forceps, an invaluable tool). The food is held motionless near the fish, which will quickly learn to approach and snap it up. When, possibly after several weeks, an improvement is seen, pieces of white food may be dropped in front of the fish as it waits expectantly after the others have been fed. Total blindness is treated likewise, except that the lips should be lightly touched with the food. Another, and perhaps easier, method is to put the fish into a separate tank without light and darkened with black cloth on the top and round the sides. Aeration must be continued as usual. If the fish will not feed when food is touched to its lips, it must be very gently held in one hand while pieces of shrimp are put into its mouth with a toothpick held in the other hand. After the fish has swallowed the food it must be equally gently released. When signs of improvement are seen one side of the tank may be uncovered, and so on until the fish has regained its sight. Have extreme patience. Allow ample time. Do everything to bring about a recovery and you may be rewarded—then provide dark rocky corners in future.



"Monster"

Sea Fishes of the MIAMI SEAQUARIUM

In the world's largest sea-water aquarium are kept in near-natural surroundings some of the largest and most bizarre sea animals

▲ In head-on view this pufferfish appears to be without a body. Hard plates within the mouth of this fish are used to crush the food (shell-fish and small crabs) and spikes over the body surface can be raised as a means of defence against predators. This specimen is exhibited in one of the corridor tanks at the Miami Seaquarium.

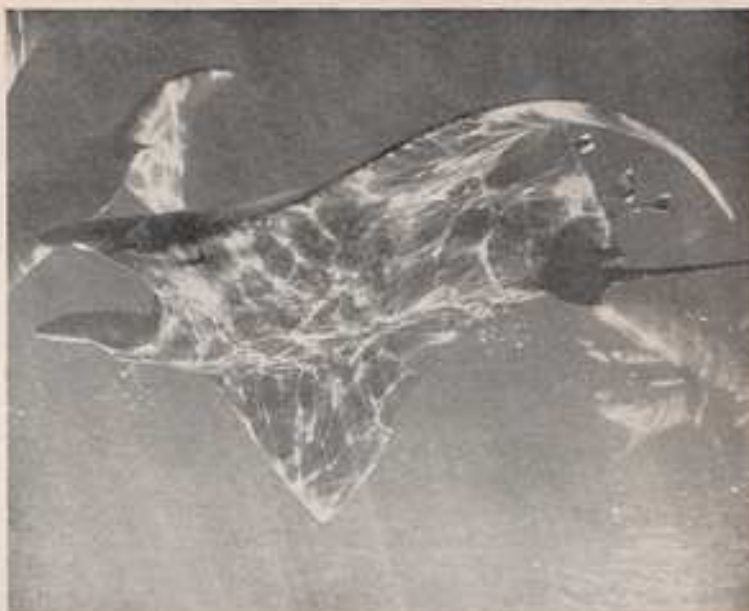


The main tank at Miami Seaquarium houses dolphins, and here "Bebe," a variety botta specimen, is seen swimming with its mother.



Giant members of the "grouper" family, these jacks weigh about 300 lb. each. The one on the left shows an abnormal profile as its head is malformed, either as a result of a defect in development or after an injury sustained before capture.

Manta ray or sea devil swimming in the Miami Seaquarium's 750,000 gallons tank. Its head is towards the left of the picture and the projecting small fish seen at the hind end belong to remora or sucking fish, which "leech-like" on larger fishes by attaching themselves to them by their adhesive head discs. Porpoises can faintly be seen in the background.



▲
Head of the giant manta ray seen in close-up view, showing the wide mouth and projecting "horns," which are really scapular fins (extensions to the pectoral fins). These fins are used to sweep food into the mouth.



Another large scapular of the Miami Seaquarium's largest tank is the ocean sunfish (Mako). The wavy outline to the left is its slender caudal fin (tail). Its dorsal fin is high but short, like the anal fin, and the body of the fish ends between these fins.

Collared Lizards and Chuckawallas

by ROBERT BUSTARD, B.Sc.

Photographs by the author

THE collared lizards (*Crotaphytus*) and chuckawallas (*Sauromalus*) are American lizards belonging to the family Iguanidae. Both are handsome vivarium inmates which can be obtained from the more discerning suppliers. It is difficult to state the precise cost of these animals but chuckawallas can be expected to cost between £3 and £5 and collared lizards about £2.

Chuckawallas

These desert lizards inhabit the south-western United States and Northern Mexico. With the exception of the gila monster (*Holodermis supercroceus*) they are the largest lizards to occur within the boundaries of the United States. Adults measure about 16 inches, of which approximately half is accounted for by the tail, which is very thick at the base. These lizards have a flattened body and tail; the body, which is large, may exceed 3 inches in breadth.

The general appearance is shown in the accompanying photograph.

The coloration is very variable, and indeed they have considerable ability to alter the intensity. It has been suggested that in these, and many other desert lizards, colour change is used as a method of temperature regulation. All reptiles are poikilothermic ("cold-blooded"), which means that their body temperature tends to be similar to that of their environment. As it is desirable that their body temperature is kept within a certain range (should it become too hot they will certainly die) the lizards show behaviour to aid this. Thus many desert-dwelling reptiles feed in the morning before the heat of the day and again in the evening and retire underground during the day. Those that bask in the full heat of the sun seldom do so for long periods at a time. In the early morning chuckawallas are dark coloured and black markings predominate.



Collared lizard (*Crotaphytus collaris*)

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Chuckawallas (*Sauromalus obesus*). These large desert lizards are from south-west U.S.A. and north Mexico.

Black absorbs heat readily and thus the lizard soon warms up to its optimum temperature. As this happens the colour becomes paler and in heat is pale brown to creamy-white; white does not absorb heat and thus the lizard is able to some extent to prevent its temperature rising excessively. The body of chuckawallas is often speckled over large areas with red or orange.

In captivity these lizards should be given a vivarium about 36 in. by 20 in. by 20 in. This need be provided only with some sand and rocks. The temperature during the day should be high; in my vivarium it is always 80-90°F and specimens often remain basking on the sand when the temperature is 110-115°F. This behaviour is reminiscent of the horned lizards (*Phrynosoma*), also from the United States. They will seldom feed below about 75°F. They are vegetarian and will accept a wide range of food including grass, lettuce, dandelion leaves and flowers, melon and banana. Since in Nature they browse from time to time it can be difficult to keep the food fresh in the vivarium because of the heat. I have overcome this by feeding my specimens mainly on lettuce, which is kept in the refrigerator for a few hours before feeding. I feed my specimens in the morning and again in the evening. These lizards obtain much of their water requirement from the succulent food they consume, and water, as such, is difficult to come by under desert conditions. Like some other desert lizards they are able to absorb liquid through the skin and this allows them to use the dew common in deserts. In captivity, if they are sprayed several times a week, the water will be quickly absorbed as if the skin was made of blotting paper.

Chuckawallas are not specimens for the beginner. They require quite a bit of attention, but those interested in keeping the more unusual lizards are recommended to try them, especially if they have kept mantigues (*Uromastyx*), whose requirements are similar.

Collared Lizards

Those usually available in Britain are the eastern collared lizard (*Crotaphytus collaris collaris*) or the western collared

lizard (*C. c. baileyi*). Occasionally the attractive reticulate collared lizard (*C. reticulatus*) may be available. Their preference for rocky hillsides should be borne in mind when planning the vivarium, which should be of a similar size to that recommended for chuckawallas. A temperature of 75°F is suitable.

Total length of collared lizards is about a foot, of which two-thirds is accounted for by the tail. As usual, the coloration of the males is the more impressive. The ground colour is grey or straw yellow, and the body and tail have darker cross-bands. There are two black collars on the neck region. The ground colour is often suffused with orange. Other specimens which I have kept had a bright greenish tinge. They are certainly most handsome creatures and the appearance is quite unlike that of any other lizard.

Collared lizards are insectivorous and because of their size can cope with quite large insects. In natural conditions they eat a large number of grasshoppers, which are relished in captivity. They will also eat lizards, and as they have pugnacious habits they should be kept away from any smaller lizards. Collared lizards are strongly recommended.

BOOK REVIEW

The Pan Book of The Home Aquarium by John S. Vinden. 226 pages. Pan Books Ltd. 2s. 6d.

NO-ONE will be surprised to find a "complete guide" to aquarium-keeping in the home amongst the paper-backs, for these books have come to be accepted media for every subject under the sun. Mr. Vinden has made a good job of describing and providing practical information about the keeping of coldwater and tropical aquarium fishes, and it is a pity that his text could not have been accompanied by the extra illustrations and photographs that it merits. The 21 figures in line are good of their kind, however, and it cannot be questioned that at its price this book is top value.

Oddities in the Aquarium

(PART II)

by R. E. MACDONALD

IN his search for the truth, man need look no further than the water that surrounds him; for in this particular element alone, the innermost secrets of life itself may be found.

Upside-down Fish

Some considerable time must be spent watching the inverted habits of the upside-down fish (*Synodontis nigricans*) before one really becomes, shall we say for the want of a better word, "acclimatised" to this species.

There is some difference of opinion over the reason why this species of the family Mochocidae spend their lives swimming and resting in an inverted position. One school of thought suggests that it has been caused by a reversal of the balancing organ in the ear which has become genetically fixed over the following generations. Others say it is because the mouth is situated on the underside of the head, which therefore necessitates an upside-down position before the fish can feed from the surface of the water or pick algae from the underside of the vegetation or rocks.

My views are with the former school, because unlike other "upside-down" fishes, such as the plecostomus (*Hypostomus plecostomus*)—a species that will swim for short distances and often remain suspended for some considerable time in an inverted position—the upside-down



Upside-down fish (*Synodontis nigricans*)

catfish makes this peculiarity its way of life by spending all the time with the abdominal region gazing into outer space!

This fish naturally hangs inverted in the water at any required depth by using its swim bladder to vary its own specific gravity to correspond with that of the surrounding water.

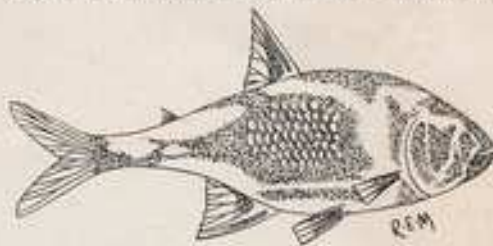
A feature that supports the "crossed connection in the balancing organ" theory is that the counter shading or protective coloration is also reversed in some species of this genus. The colour pattern of most fishes darkens over the back area and lightens under the belly. The reason for this is that when seen from above the dark back tends to blend with the river, lake or sea bed and when seen from below, the light-coloured belly blends easier with the surface light. Thus to some considerable degree, protection against predatory forms of life is afforded by

camouflage. The coloration of the species *S. nigricans* is a rather drab spotted brown that darkens under the belly and lightens over the back.

Should this catfish be attacked, however, it makes use of three strong spines or rays which are situated singly, one at the front of each pectoral fin and one at the front of the dorsal fin. These spines can be turned in their sockets and locked at right-angles to the body to deter predatory beings from ingesting it.

Blind Cave Characin

If the upside-down fish invokes amusement, the blind cave characin (*Anoptichthys jordani*) surely makes one wonder at first how some fishes manage to survive at all. The way in which this species is able to detect food or objects in the surrounding water is most uncanny, for this



Blind cave characin (*Anoptichthys jordani*)

fish does not possess eyes! Obviously, full use, with perhaps some modification, must be made of the lateral line. Maybe it would assist the reader to understand the peculiarities of this species if the lateral-line system was explained.

The lateral-line system of fishes is formed by the presence of one or more tubes that are embedded along each side of the fish's body. At intervals along the body where there is a muscle segment, there exists a minute opening or pore in each scale through which a nerve passes. This nerve is connected to the lateral-line tube, which is innervated by the lateral cranial nerve. The lateral-line system (linea lateralis) enables fishes to detect low-frequency wave vibrations caused by fishes swimming or the movements of other creatures in the surrounding water. Fishes use their lateral line in a manner similar to the way we use radar scanners. By constantly twisting and turning the body in the water and altering course, the fish can detect wave vibrations from any direction it may desire.

It would be logical to assume that the lateral-line system

of blind fishes is able to detect and reconstitute the echo of its own low-frequency swimming vibrations that are bounced off objects in the surrounding water. This is very similar to the method used by bats, except, of course, that bats use high-frequency sound waves. By this method, blind fishes can detect the nature and whereabouts of all objects in the vicinity.

Orientation is achieved by the perception of currents and although this fish is completely without sight it is found to move away from light. It may well be that either the skin or lateral-line nerve endings are sensitive to ultraviolet radiation or some other similar radiation present in light.

Like so many other fishes after spawning, the blind cave characin will seek out and devour its own eggs. The hunt is usually most successful. There are other species of blind fish such as the blind barb (*Cyclobarbus petersi*) that live in caves in complete darkness. To assist the blind barb when it moves about in the never-ending search for food, Nature has provided it with tactile barbs which are used as feelers.

Hatchet Fish

The jumping skill of the hatchet fish is greatly superior to that of many other fishes of similar habits. The leaps are made with the use of dynamic pectoral-fin muscles which are said to account for a quarter of the total body weight. This fish can also move over the surface of the water by constantly beating the surface with the pectoral fins. Other fishes, such as the well-known flying fish, require the presence of strong surface winds before flying can be achieved.

The wing-like construction of the pectoral fins assists

the hatchet fish to make long-distance leaps. I have known a silver hatchet fish (*Thoracocharax stellatus*) to jump 5 feet.

The habit of jumping is most prominent at spawning time, and, if the tanks are left uncovered, there can be one



Silver hatchet fish (*Thoracocharax stellatus*)

glorious mix-up of stock as the result. These fish may easily miss the next tank during an expedition into space and make a disastrous landing on the fish-house floor, so extreme methods of captivity are required for these aquatic astronauts!

In the next article, an introduction is made to some of the lesser-known species and also to a few of the "old favourites."

Alestes Characin

by LAURENCE SANDFIELD

RECENTLY I purchased two *Alestes* species. I understand that this African characin is not well known and the following few observations are offered to readers.

The two fish were purchased separately, at 24 hours interval, and I did not realize at the time of the second purchase that there was any difference between them. Further examination showed that one was metallic and the other calico, to borrow terms from the goldfish fraternity. Their immense golden eyes are capable of movement, which I have not noticed to any great extent among the American characins I have kept. The calico one is rather more elliptical than the metallic, which latter seems slightly rectangular. They both share the characteristic red adipose fin, and also a faint pink flush. There is also a pale-yellow iridescence which is very attractive. The metallic one has very faint black vertical marks at intervals along its sides, whereas the calico has but one mark at the shoulder, as so many characins have.

They are very fast, and at feeding time, when I use a ring at each end of my 3-foot tank, they rush from one end to the other, taking a mouthful from each. At times, they become very excited and circle around each other, not attempting to bite but behaving as if this were their version of that play which all characins seem to indulge in. When bullying occurs, it is always the metallic one which does the chasing and biting. But the other seems to come to no harm.

Since they have been in my tank, several livebearing

females, chiefly guppies, have been found with their bellies missing on the compost, but whether or not the *Alestes* are responsible I cannot at present be certain. Their big, underslung mouths look capable of it!

Potted Ferns in the Fish House

ALL the species and varieties of maidenhair and hart's-tongue ferns mentioned in previous articles may be cultivated as pot plants to decorate the corners and shelves of the fish house. As root growth is vigorous, they should all be repotted in larger pots every 3, or at the most 4, years, and the usual compost of two parts of loam, two parts of leaf mould and one part of silver sand, with a little added charcoal, should be used.

The polypodies are a group of ferns with slender, creeping rhizomes; this habit enables them to be grown in shallow pans in the fish house. They are accommodating ferns, flourishing in a moist, loose loam with their rhizomes planted as near the surface as possible, but with all the roots covered. They appreciate an annual dressing of chalk or limestone chippings. Many of the varieties are so beautifully tasselled, cut and fringed that they are scarcely recognisable as originating from the native *Polypodium vulgare*, with its small, undivided pinnae.

In the humid fish house atmosphere, only sparing watering of these potted ferns will be necessary throughout the year. They should be kept away from unshaded windows, which would otherwise quickly intensify the sun's rays, resulting in severe burning of the fronds.

C. D. Sculthorpe

Do Fishes Talk?

by DAVID GUNSTON

DO fishes talk? Most people, especially anglers, would smile at the suggestion. But is it so improbable as it sounds?

After all, most other creatures have some form of communication with their own kind. Even the so-called dumbest animal can produce some form of noise at times, notably during courtship and mating, even if only a faint piping or grunt or snort. We know now that even bees "talk" by fanning their wings at one another at variable speeds and pitch.

Whales, long thought to be completely silent creatures, are now known to grunt and groan and make clicking noises under water, and recent work on dolphins has proved beyond any doubt that they are highly intelligent animals that are most visible, conversing continually among their own kind with a startling repertoire of squeaks, clicks and whistles. In fact, dolphin language is at this moment being seriously studied by phonetics experts in America who hope to learn it themselves and, eventually, to teach captive dolphins something of our own form of speech.

Will men ever similarly set out to study fish talk? The chances are that they will, for it seems fairly certain that fishes can and do produce quite a lot of noises, intended primarily as a means of communication with other fish of their own kind, in short, as talk.

There are two prerequisites for any form of talk: the ability to hear it, and the need to make it. In fishes both these requirements are present. All fishes can hear, if in a way different from ourselves. And almost all fishes need to be in some form of touch with each other, not only during their breeding season, but also for keeping in shoals, migrating together and moving towards food together.

Fishes possess an internal ear provided with the usual tubules and the same liquid-filled spaces as are found in other animals, including ourselves. But they have no external, visible ears and also, most importantly, no aperture in the head to connect the internal ear with the outside world, as have whales and dolphins.

Yet in all animals this inner ear has two functions: to hear with, and to maintain balance. It is this latter function which a fish's inner ear is believed to serve most.

For fishes are more complex creatures than we tend to imagine. Take, for instance, their lateral line: in very many species it is a single grooved line running along either side of the body from head to tail, and containing various sense organs. This line acts as a device for detecting variations of water pressure, and its owner could hardly get along without it.

The lateral line of many fishes has regular perforations, and beneath it lies a shallow canal containing sense cells and nerve endings. With the constant aid of these the fish can tell even in complete underwater darkness how near it is to bank or rock or other obstacle; how close it is to other fish in the shoal or swimming close by, the exact temperature of the water and its rate of flow. It is also probable that a fish can similarly register vibrations entering the water that are more or less alien to its habitat, like the screws of a passing ship or motor-boat, footfalls

on the river or lakeside bank, even an angler knocking out his pipe on the side of his boat!

It is also most likely that the lateral line augments the fairly simple ear most fishes possess by providing its owner with a lot of information about the doings and intentions of its neighbours in the water, including a sensitive reaction to the movements of a fin or tail close to it, as in a shoal.

Thus equipped for the detection of sounds and vibrations in and near the water in which it lives, a fish must also possess some means of producing "talk" itself. Now although the harsh "bark" of a landed conger eel and the so-called "breathing sounds" of certain fishes such as carp are not true fishy voices, being merely air-conducted noises caused by the sudden expulsion of the oxygen and nitrogen gas from the fish's swim bladder, many fishes have the physical equipment for making sounds which clearly has no other purpose.

It will be realised that although water is a much more positive conductor of sound waves than air, the sounds of fishy talk are different from those we ourselves hear in the air. With its ear (and lateral line) already in the water, a fish can register the sound vibrations travelling towards it immediately in the liquid inside its own ear. It does not have to effect the change from sound waves in the air, as our ears do. So what with changing water pressures and currents and temperatures, plus the fairly constant "dim" set up under water by almost all swimming creatures, from shrimps to sharks, a fish's hearing is probably more sensitive and more selective than we imagine. For the all-pervading hush of the underwater world is, as we now firmly know, a complex myth, as war-time sonic and seismic operations proved. There are always plenty of noises beneath the surface, and they are largely made by fishes.

Some fishes have scraping devices for making submarine conversation, others are equipped with special adaptations of the swim bladder that can produce water-borne signals. It is a remarkable fact that certain fishes can vibrate their swim bladder in the water so that sound waves emanate from it, to be picked up by other fishes at some distance. For instance, the spotted catfish has a couple of springy projections on the front of its swim bladder and their action, aided by special muscles, causes a violent vibration of the bladder. A fish taken out of the water has been known to produce a noise audible a hundred feet away.

Sticklebacks can produce a scraping sound by rubbing the bottom of one of their dorsal spines against a bone, and the miller's thumb similarly rubs a spine against its gill cover. The Indian catfish scrapes its dorsal fin up and down the serrated surface of part of its backbone and makes quite a noise in this way on occasion, when it feels inclined. A similar sound is made when the common sunfish grates its upper throat teeth against the lower.

There are even fishes with combined "voices" of mechanical scrapers and swim-bladder amplifiers. The drumming trigger fish creates a frictional noise with its bones and then broadcasts the sound via its swim bladder.

Please turn to page 143

Reflections on the CICHLIDS



To many the porcupine fish (*Symphysodon discus*) is the King of Aquarium Fishes, and in its time it has commanded higher prices than any other kind. Although still expensive, it is a wonderful species that no collector of cichlids would willingly do without.

by H. LODER

Colour photographs by B. PENGILLEY

BIG fishes? Well, of course, in comparison they are, but are still only "tiddlers" to the fisherman and angler. To the aquarist, yes, they are big fellows. To the contemporary aquarist, with his diet of long-tailed Yankee guppies, they seem monsters. And, I'll admit, cichlids will eat his little Yankees, no matter what price he has paid for them! Cichlids are no respecters of line-breeding. But to me (I'm sorry, F.G.B.S. and F.G.A.), that's what guppies are for. I like to see a fish enjoying its food, and cichlids are certainly guppy fanciers (come to think of it, they were the original guppy fanciers!).

Fault number one is that they do eat small fishes. They do need lots of room. That's fault number two. But let us examine these faults. The first is easily rectified: don't put them with the little fellows.

Large Aquarium

Fault number two. Well, at this point we could get down to a long talk on fishkeeping and the merits of large and small fish tanks, but it boils down to this. A chap can have only what he has room for or what the "missus" will allow. After all, the ladies have to live with these aquaria; often they spend more time with the fishes and see more of the tanks than do their menfolk, who are out at work all day.

Often the husband comes home, makes a bee-line for the fish tanks, checks the temperature, looks for signs of white spot, feeds the fishes, does a bit of siphoning and then sits down to a good tea. And, after he's got down the last

mouthful, he says "Well dear, how've you been to-day?" Yes, there are fish widows as well as golf widows! But the fish widow still has the corpse at home. Look into the wife's eyes first, then into the aquarium. That's the way to more and bigger tanks.

If the wife won't have a 4 ft. or even a 3 ft. aquarium about the house, no matter how romantic you get, you can still manage a good pair of medium-sized fish in a 2 ft. by 1 ft. tank, although the small size does add to the difficulty. But with a little common sense most difficulties can be overcome.

Plants and Furnishings

Don't bother with plants for the cichlid tank, except for a good cover of floating fern—strong specimens. It looks well, helps to keep the water clear and this "roof" also seems to give the fish more confidence. Rooted plants are completely useless with cichlids as they will be pulled out and bashed about until a tank looks like a bomb site.

Because we are not using rooted plants we do not need much, if any, gravel. But a tank does look better with a covering on the bottom, though not too much, for cleanliness' sake. A couple of rocks of good appearance in the tank will serve a dual purpose. The fish seem more at home with their cover and the tank has more of the "aquarium beautiful" about it. In fact, with your floating fern, your selected rockwork and your grand pair of cichlids, you really do have something to catch the eye.

Cichlids are eye-catchers if nothing else, but in fact they are something else. They are the most interesting of



Photo: Laurence E. Packer
Keyhole cichlid (*Aequidens mazoni*)

fishes (well, of tropical freshwater fishes), and their intelligence, coupled with their courage and nobility of bearing, makes them more individualistic; each one has a personality. A cichlid is the sort of fish you can call "old Joe" without feeling too foolish. I never heard of a guppy being called "old Joe" and I never knew a neon tetra with a pet name yet. No, it takes the big fellows to engender that sort of affection.

These are the fishes with the Latin temperament. Pairs can be very devoted to each other. Often, when I have separated a pair, the fish remaining in the tank has started

such a heart-rending search for the other that I have been unable to resist putting her back (it's usually the female that I've removed), and when I've put her back she's been given the hiding of her life for being missing! Yes, they are very human in their affection for each other, just a bit more primitive.

Favourite and New Species

Over the last few years there have not been many new discoveries in large cichlids. Quite a few dwarf cichlids have arrived, and some of the old favourites have been "rediscovered" and are quite new to to-day's aquarists.

The orange chromide (*Etroplus maculatus*) is very popular and the new pearl chromide (the one like an orange chromide with white spot) has had quite a popular reception. *Geophagus brasiliensis*, as a "new" big cichlid, is also treated with some reverence and is really rather costly for such a prolific fish and one that is really a very old member who was not very popular in the past. The "Hawaiian" mouthbrooder (just what species this fish is, scientifically speaking, no one seems to know) is really new but there is nothing about it except newness. I don't predict much of a future for it. The day when a fish might be purchased and treasured just because it is new has gone. A fish has to have some other appeal besides newness to-day.

The most wonderful cichlid of all, the pompadour (*Nympheus discus*) is readily available at a reasonable price. In this respect the modern aquarist is lucky. It's not many years ago that I sold a pair of pompadours to Mr. Gerald Iles for the Belle Vue (Manchester) Aquarium for £37, which was a great bargain at the time.

Some time ago I received a consignment of a new cichlid called the chocolate cichlid in the trade (*Cichlasoma cryphacanthus*). I have now a really fine adult specimen of this, 6 in. long and very deep in the body. It is a mild, shy fish that shows lovely colour changes, but I think that a little more cichlid aggressiveness would add to its beauty. The brave attitude to life is one of the charms of the cichlid.

Keeping cichlids is easy if you stick to a system to produce show-standard fish (other kinds should never be produced). Provide good water, good food and plenty of



Aquarists usually avoid any cichlid of the genus *Tilapia*, and often these fishes are aggressive even towards larger cichlids. *Tilapia macrocephala* is not a species for the beginner but under proper conditions and with the right owner it is a long-lived and interesting aquarium cichlid



The popular name of the Jack Dempsey cichlid (*Cichlasoma biocellatum*) indicates just how long it has interested aquarists. To most it is the typical cichlid, with its large size and aggressive manner. At a show a good specimen is hard to beat.

it, and as much space as possible. Maintain clean tanks, with a little sea salt added to keep bacteria down, and siphon the bottom sediment off once a week, adding fresh water to make up the level.

Breeding—well, a section on this could be made into a book, and each species would need a chapter. So I'll just say: leave it to the fish. They usually surprise their proud owner with a family if they are properly kept and left to settle down in peace. Remember that cichlids love food, and baby cichlids need more in ratio than do adults. This applies to most fishes but specially to the cichlids.

One last thing. People often think that a large creature can stand more bad treatment than a small creature, and many aquarists do have the wrong attitude here: "Oh, he's big enough to stand a bit of cold"; "He's fat enough—I haven't fed him for a fortnight." It won't do. Captive creatures should always receive the best of attention at all times. From a rabbit to a rhino, in captivity only the best is good enough.

After all, they are doing a life sentence just for being foolish enough to be caught in the first place. So let's make their stay with us as pleasant as possible.

The Festive Cichlid (*Cichlasoma festivum*)

by JACK HEMS

Colour photograph by B. PENGILLEY

CICHLASOMA festivum, once known as *Acara bandeira*, and more recently as *Misonauta insignis*, is a fairly expensive and rather delicate cichlid from the rivers and streams of British Guiana and Brazil.

For these two reasons alone, it is not the sort of fish to recommend to the beginner in tropical fishkeeping. But given the right conditions, and cared for by someone used to cichlids and their strange moods, it will live for several years and make a most attractive pet for the decorative aquarium. It is no new arrival to the aquarium scene. It was certainly known to pioneer tropical aquarium keepers in Germany as long ago as 1908; and those interested in the history of our hobby will find plenty of references to it among the aquarium literature which has been published in this country and abroad during the last quarter of a century.

In shape, the fish resembles any one of the larger gouramies. That is, the body is flattened from side to side—laterally compressed, as some writers describe it—and its snout tapers to a blunt point. It has, however, the typical

spiny dorsal and anal fins of a cichlid, but its ventral fins are longer than those of the majority of the family, and terminate in a fine needle point.

Colour and Sexing

The body colour is brassy yellow lightening to silvery white on the belly. Six or seven wavy vertical bars cross the side. These markings vary from grey brown to dark chocolate according to the temperature, the light, or the condition of the fish. A dark brown to black oblique stripe extends from the small mouth, through the copper-rimmed black eye, to the tip of the dorsal fin. A chocolate spot margined with creamy yellow adorns the base of the caudal fin.

In adult fish, the male may be distinguished from the female by his larger and more pointed dorsal fin. Sometimes his dark markings are more definite than those of the female; but not always, and it is not wise to presume the sex of a young or an old fish by comparing coloration alone. When scared by a sudden bright light or pursued with a net,



Cichlasoma festivum is a species worthy of the breeder's attention, as it is now rather rare in Britain. It is beautiful at all ages and sizes and is a good mixer with other fishes; it has a temperament like that of the angel fish, perhaps being less aggressive, and is good with plants.

the fish often becomes marbled all over with chocolate brown and dirty yellow. At a quick glance, the fish then looks rather like the rare Malayan gourami (*Sphaerichthys ophramenioides*).

Although the festive cichlid, as the species is commonly called (in America it is sometimes called the pretty cichlid), will grow to a length of almost six inches, it seldom reaches this size unless it is kept in a very spacious aquarium, say, one holding about 30 gallons of water. At all times, however, it needs plenty of water—clear, well-oxygenated water with a markedly acid reaction. A temperature of between 75° and 85° F should be maintained all the year round for, unlike some other cichlids from the warmer parts of South America, it cannot stand cold.

It is a timid fish, and always seems most uncomfortable when it has to share quarters with other species. If through lack of accommodation it has to be placed with other fishes—and, I might add, it is peaceful enough at most times to be trusted with livebearers—do make sure that it gets sufficient food, and is not driven away into the plants at mealtimes.

While on the subject of food, it must be made clear that though the species can be trained to accept most of the commercial brands, it should be given chopped earthworms, *Tubifex* and the like as often as possible. Newly acquired specimens often go on hunger strike for days on end unless the food they have been used to is provided for them; so it is a good idea when buying the fish to ascertain from the dealer the preferred diet.

Unless a couple are planning a family, the plant life is left undisturbed, and it is possible to grow perfect clumps of *Cryptocoryne* or similar plants without fear of their being pulled up or pulled to pieces. Another thing, as the fish are dainty swimmers and spend a lot of time in the upper levels of the water, they do not churn up sediment and so choke the pores of the vegetation.

Not Ready Breeders

Besides plant life, rockwork should be provided for the fish to look behind when they grow tired of being gazed at by admiring humans. And like most cichlids, they like to play about and do their courting around the rockwork. (Any observant visitor to the seaside may notice that rocks

have the same stimulating effect on many human beings, old and young. But that is another story.)

I have not bred the flag cichlid, but it is said that it follows the usual cichlid pattern of behaviour and deposits its spawn on a cleaned surface such as the inside of an overturned flower-pot, the bare floor of the aquarium, or the more conventional small patch of lip-scoured rock. Unfortunately, I have never heard of the species being an easy fish to breed—even the clever Germans say it is one of the difficult species—and this, I fancy, accounts for its comparative rarity and rather high price.

But if I may be excused for reiterating what I said in the beginning, it is well worth obtaining and studying in the decorative aquarium.



Photo:

Laurence E. Perkins
Marbled cichlid (*Astronotus ocellatus*)

The Garden Pond In October

by ASTILBES

I WONDER how many pondkeepers wish that they had known as much about pond construction when they made their pond as they do now? I feel sure that there are very many such people, myself included, who would be able to make a much better job of it had the task to be repeated. My effort of about 25 years ago was in the form of two ponds, one large and the other small. These were joined together with a small bridge between the two ponds. My major mistake was to fill the ponds too soon. I knew that concrete sets better under water, once it has partly set, but the weight of water broke the back of the ponds near where they were joined. This necessitated some repair work on the crack and I have never felt happy about it to this day. As I have often repeated, it is most difficult if not impossible to get fresh concrete to adhere to old. It seems to hold for a time and then comes away. If the old surface is well roughened and then painted over first with a wash of neat cement it helps matters a lot.

As for the positioning of the pond, well, I have been well satisfied with this as the pond is located quite near the back of the house so that it is always visible from the dining room. This makes it far more interesting, as one is never at a loss to know what is going on there. Even if it is raining hard it is possible to sit at the french windows and watch the movements of the fishes. Another point about siting the pond near the house is that it is easier to get fresh water to it if necessary. Also one may be able to keep an eye on the neighbours' cats! If I were making another pond now I would certainly construct it in the form of a cross, perhaps with one long arm and shorter ones running at right-angles about half way along. This would enable me to fix sockets at the arms so that each of the four compartments could be shut off quite easily with a shutter. When one is breeding it is very useful to be able to divide the pond in such a way, or even if breeding is not contemplated the scheme would enable one to house several types of fishes which would not mix well. For instance, a shoal of lovely perch could occupy one part and a pile another. This would leave one part for a mixed group and another for one particular variety of fancy goldfish.

As for the actual construction of the pond, I would use thicker concrete and take more care when laying it. I would consolidate the bottom before laying the concrete to make sure that the chance of subsidence was reduced to a minimum. Then I would have out less than 3 inches of concrete. If possible I would lay this in one go for the reason stated above. This means very hard and rapid work and if the pond is 8 feet across or more I suggest that a friend to give a hand with the mixing would be a great advantage (not only to share the work but to see that the concrete was laid as soon as possible when it is watered). If the sand and aggregate is fairly dry there can be a short lapse after the cement is mixed but once water has been added the concrete should be laid as soon as possible.

For large ponds it may be necessary to lay a coarse coat first and then float over with a stronger mix of cement and sharp sand, but if the concrete can be laid in one go it is possible to tamp it down all over and this will send the large clumps down lower and bring up the fine ones to the

surface. This not only makes a better finish but it ensures that there is no possibility of there being a break later on where the top surface was added. The depth of the pond would not exceed 2 ft. 6 in. anywhere, as I do not think that any garden pond need be more than that in depth. I consider that if the water is very deep, that which is near the bottom does not get sufficient oxygen. Water near the surface is in better condition for the fishes as it is in contact with the atmosphere and so enables the exchange of foul gases with oxygen. It has often been said that the pond should be at least 2 ft. 6 in. deep to ensure that fishes would be safe from frosts in the winter. I do not think that this point is nearly as important as it is made out to be. The depth of the water can be as little as 12 in., and provided that the water is pure the cold alone should not kill the fishes. It is the trapped foul gas under thick ice which kills the fishes, not the cold. A deep pond is more dangerous to fishes than a shallow one, as the water at the bottom is more likely to be foul than the water in a shallow pond.

Do Fishes Talk?

(continued from page 138)

That curious fish, the croaker, probably makes its odd spawning cry in like manner, for even when produced 50 feet below the surface, it can be heard in the air by human beings. There is a possibility, too, that in some of the spiny fish, the sharp grazing sounds may be warning notes, intended to frighten off attackers.

Many other fishes undoubtedly produce distinctive "talk" by contractions or vibrations of the swim bladder, in a way we do not fully understand, any more than at the moment we are still not sure just how dolphins make their clicks and quacks. For no water creatures possess vocal cords as we know them.

Whales and dolphins and perhaps fishes also are suspected of being able to find objects in the dark depths of the ocean, where the only known clue to their ability to do so is their sensitivity to waves of ultrasonic frequency, bounced back to their hearing equipment, radar-fashion. Although just how they detect the direction of a sound under water at any frequency is still undecided.

But this explanation alone does not explain why fishes and all mobile water creatures need to make a noise, to "talk." Sending out a single continuous "pulse" for sonic perception is one thing, but creating a variety of underwater noises recognizable only to other fish of the same kind is quite another. From observations on captive dolphins and sharks we know that solitary captives tend to be mostly silent, whereas two or three or more confined together become immediately voluble.

Clearly, then, fishes talk among themselves, often at perhaps a basic level of communication, but to a rigid pattern that makes sociability in the shoal or group easy, breeding untrammelled by distance, darkness or solitariness, and life not quite so dull and simple as might be supposed.

OUR EXPERTS' ANSWERS TO TROPICAL AQUARIUM QUERIES

I can grow *Cryptocoryne* and *Sagittaria* very well in my aquarium, but whenever I plant *Cubosba* it just runs away before a month is out. Please can you tell me how to grow this attractive plant?

Cubosba needs a strong top light for several hours every day and sediment-free water. It also grows best when it is grown in a small pot of sandy loam. To encourage side shoots and a bushy growth the tip of the last whorl should be pinched out. A temperature in the lower seventies appears to suit it best.

Is the black shark easy to feed and peaceful enough to share a tank with other medium-sized fishes?

The black shark is not a quarrelsome species, but when it grows large it becomes rather clumsy in its movements and often uproots shallow-rooted plants. It will eat anything, including algae, and is a good scavenger.

While I was placing some new plants in my aquarium I noticed a dark, worm-like creature detach itself from one of them and glide through the water in undulating movements. Before I could get my net, it disappeared under a stone. I have not seen it since, and wonder whether it is still alive and harmful to the fishes?

What you saw was probably a leech. Small ones will often attack snails and attach themselves to dead or dying fishes. They usually hide away in the daytime under a stone, but at night they will crawl over the glass sides of the aquarium, and can then be caught by sliding them up the glass on a clean rag wrapped round the end of a thin stick.

I have a 24 in. aquarium placed in an alcove alongside a window facing due east. It does not get a very good light, but I keep a 40 watt electric lamp burning for about 8 hours every night. The plants do not grow at all well, and I have to spend a lot of time keeping the sides clear of brown algae. What should I do to get rid of this unsightly growth?

Your aquarium is not getting sufficient light. Scrape the brown algae from the sides and siphon it away. Then replace the electric lamp you are using now for one of 75 or 100 watts. The extra light will inhibit the growth of brown algae, which prospers in a poor light, and will have a beneficial effect on the higher plant life.

Will you please tell me what food should be given to the kissing gourami (*Heterotis niloticus*)? The couple I introduced into my community tank a few days ago have grudgingly accepted a few crumbs of dried food but simply refuse to touch white worms or scraped beef.

H. niloticus is largely herbivorous and has a fondness for the tufted algae that grows on the sides of a well-lighted aquarium. It will also eat duckweed, chopped lettuce and certain kinds of boiled and shredded green vegetables such as spinach, kale and similar alternatives. Of dried food, it appears to favour the flaky types, or cereals such as Bemax. Tubifex worms, that it can suck from the bottom of a perforated feeder, and *Daphnia* are among its favourite live foods.

One of my angel fish has developed a milky-looking film over one eye. What treatment would you advise?

You can bathe the eye every now and again with a solution of one-eighth of an ounce of boric acid crystals dissolved in a quarter of a pint of tepid water, or drop 2 drops of a 1 per cent. solution of protargol direct on the eye, when the fish is held out of water in a net.

I am a newcomer to tropical fish-keeping, and I am worried about my zebra fish because they are swimming jerkily in a somewhat tail-down position. Please can you tell me what is wrong with them?

Your zebra fish are probably suffering from the effects of a chill. Raise the temperature of their water a few degrees above normal, and feed them on live food or scraped lean meat. Unless they are in a very bad way, the fish should recover in a few days. But it is best to transfer them to a

shallow water "hospital tank." Add sufficient block cooking salt or evaporated sea salt to the water to give it a slightly salty taste (a level teaspoonful of salt to every gallon of water in the tank is about right), maintain an even temperature of 80-85°F, and, if possible, supply artificial aeration.

The other night I took the temperature at the bottom of my aquarium. I was surprised to find that it was several degrees cooler than the temperature at the surface. Will this difference in temperature affect the health of my fish? At the moment they are in tip-top condition.

It is what fish are used to that matters. If a fish is normally kept at a steady temperature of, say, 75°F, and is then transferred to water having a temperature of 68°F, it will most likely develop an illness or disease. It may even react unfavourably if it is transferred to an aquarium having a temperature that varies 10 degrees between early morning and late at night. It must be borne in mind, however, that most fishes in the wild are used to a variation in temperature. The sun-warmed shallows are always warmer than the cooler lower depths, as are the upper layers of water.

As a matter of fact, a slight rise and fall in the temperature in every 24 hours usually results in healthier aquarium fishes.

I am thinking of fitting fluorescent lighting over my large community tank. I have been informed, however, that plants and fishes do not do very well under this type of lighting. Is this true?

The tubes that give a cold white light are of little or no benefit to plants or fishes. You must use a tube that gives a warm, yellowish light. Under what is known as warm white (yellowish) light, plants and fishes usually do well.

I should very much like to breed barbs. Are *Barbus* species difficult to breed in the aquarium?

Some of the barbs are easier to breed than others. Among the easiest to spawn are the rosy barb and the nigger barb. To breed barbs, set up a tank of clear water thickly planted along the back and ends with bushy-foliaged plant life. A temperature of about 78-80°F should be maintained.

Recently I acquired a *Plecostomus catfish*. It has eaten all the algae in the tank, but does not seem to be at all interested in dried food or *Daphnia*. Please will you tell me what I should give to this fish to prevent its dying of starvation?

Plecostomus catfish need plenty of algae in their diet. If they do not get this they will soon go into a decline. If you cannot keep your fish supplied with algae, introduce small amounts of cooked cabbage, spinach or similar green vegetables reduced to a purée. As *Plecostomus* catfish take most of their food after dark, it is not always easy to tell what individuals prefer in the way of live food. But most of them will take chopped earthworms, Tubifex and tiny pieces of lean meat.

I have had two dwarf gouramis die of dropsy. Is this disease common among dwarf gouramis?

Dropsy is no more common among dwarf gouramis than it is among other popular anabantids. Anabantids that have a definite tendency towards dropsy are paradise fish and Siamese fighting fish.

Continued on page 153

COLDWATER FISH-KEEPING QUERIES answered by A. BOARDER

I set up a 15 gallon tank with plants and fishes a short time ago. Every plant was well washed before being put into the tank. Now the tank is over-run with snails. How can I get rid of them? Is there anything I can put in the water which will destroy them but not harm the fish?

The snails probably came from eggs which were on the plants but not seen by you when the tank was set up. Anything you put in the tank strong enough to kill the snails would almost certainly kill the fish as well. If you net out and crush the snails they will then be eaten by the fish. Keep catching them for a week or two and they will decrease in numbers and be easier to control from then on.

I wish to breed red Planorbis snails. What is the food for them?

Most red *Planorbis* snails are bred and kept in tropical tanks and you may not do well with them unless you are able to provide some form of heating in the colder weather. Snails feed mostly on soft decaying vegetation but they will also eat packet fish food.

Since setting up a 18 in. by 18 in. by 18 in. aquarium last November I cannot get any plants to grow. I have had three separate batches of *Vallisneria*, *Cladophora*, *Hydrocotyle*, *Sagittaria*, *Ludwigia* and *Myriophyllum*, all of which have showed not the slightest effort to grow and in time have withered and died. I have a sub-gravel filter under 1 1/2 inches of gravel. Why do the plants not grow?

Would you think of planting anything in your garden in a heap of stones without any soil? Of course you would not, and yet you expect water plants to grow in gravel in your tank! Some soil should be included when setting up the tank. Place about 2 inches of soil at the back of the tank and up to about its midline. Then cover this with your gravel. See that the plants have some roots and get these where they can reach the soil. This will give them a good start. It is only when a tank is well established and stocked with fishes that the plants are able to find sufficient nourishment from the gravel. It might also be an advantage if you shut the under-gravel filter off until the plants become established.

I am in the Air Force and have to move about on occasions. I would like to breed coldwater fishes but I can only have tanks not larger than 24 in. by 12 in. by 12 in. and I find that fishes advertised as breeding pairs are 8 to 8 inches long. This means that if I apply the usual standards for surface area I shall not be able to house each fishes safely. Can you advise me on this matter?

I expect that you will wish to breed some kind of goldfish. It is a mistake to suppose that these will breed only when 6 to 8 inches in length. I have bred from fantail goldfish when they were only 11 months old and not more than 3 inches long overall. I suggest that you try with small fantails, as these, being short-bodied, will be better for your tanks than common goldfish. Provided that fishes have been reared well they should breed the year after having been hatched.

I am interested in culturing king carp for edible purposes. I would be grateful if you would inform me how to do this.

The carp on the continent are bred in large ponds and as the weather is warmer there they grow far more quickly than they would do over here. You could buy carp from any of the leading dealers who advertise in *The Aquarist*, but it would take some time to grow the fish over here to a good size. You might purchase your stock at about 3 or 4 inches in length. It would be not less than 3 years before they were large enough for eating. Even then it would depend on how well they had been fed during that time. Plenty of space and food are essential for the rapid growth of these fish.

I have been reading about breeding goldfish and have seen the advice to feed fry on Infusoria. How can I get this and is there any substitute?

Infusoria is obtained by adding crushed lettuce leaves to pond water and leaving it for a few days. The Infusoria is a low form of life which thrives on decaying vegetation. Potato peelings in water can be used for the medium and many other forms of vegetation. There is an excellent substitute for Infusoria on the market, advertised often in *The Aquarist*.

The water in my pond has a reddish look. What is the cause of this?

The red tint is probably caused by a form of Infusoria in the water, encouraged by certain conditions. These conditions will probably soon disappear and the red will go at the same time. Feed the fishes in the pond on live food only for a fortnight and conditions should improve.

I have a plague of water boatmen. How can I destroy them without injuring the fish?

Water boatmen can fly, and so you may have to watch out for more of them in your pond once you have reduced their numbers there. There is no magic formula which would sort out and kill water boatmen and not harm the fish as well. You might as well put a number of Englishmen and Russians in a room and try to kill one kind only with a special gas. The surest method of reducing the numbers of the water boatmen is to visit your pond at night, when, with the aid of a torch you will see most of the boatmen at the surface of the water. You can then net them out and kill them quite easily. They spend much more time at the surface at nights than they do at day time.

I have a small pond and wish to increase it in size and raise it above ground level. I am anxious to seek advice on the method of sealing the join of the old concrete with the new, the water-proofing of the new concrete and the thickness required.

It is always difficult to get fresh concrete to join up with old. The method you can adopt is to thoroughly roughen the old concrete at the join position by chipping with a cold chisel. Then make sure that all old fine material is cleared away. Next paint this part with a creamy solution of cement and water (without sand) and then when this is partly dry the ordinary compost can be added. Freshly made concrete with a composition of one part of cement to three parts of clean sharp sand will do for most of your needs. If it is well scrubbed after it has set and washed well it should be safe for your fishes.

I have your booklet *Coldwater Fishkeeping*, in which it says that coldwater paradise fish can be kept without artificial heat. All those I have seen advertised are tropically bred. Will these fish be all right in a conservatory without artificial heating?

As long as the water in your tanks does not actually freeze it would be possible to keep paradise fish if you go the right way about it. It would not be wise to get tropical fish and put them straight into cold water, but if they were purchased in fairly warm weather their container could be floated in the new tanks and after a time the fish could be allowed to swim in. The water in the conservatory would be about 70° F at least, and the fish would be quite happy in this. Then give no artificial heat at all and allow the tanks to cool gradually with the weather as winter approaches. I have bred paradise fish in an unheated tank in a living room without any trouble and have had them in water as low as 40° F with no apparent harm come to them.

Preparations for Winter

by A. BOARDER

DURING the summer months the garden pond will usually function quite well with minimum attention, but unless special care is taken during late autumn trouble can ensue after the winter. Very often little or no trouble is encountered until the end of the winter or beginning of spring. Fishes then start to give the danger signal by being attacked by fungus disease. The pondkeeper rarely connects this outbreak with something he has done or not done during the previous autumn but many losses in early spring might have been avoided if certain steps had been taken before winter commenced.

What then can the pondkeeper do to make sure that as far as possible his fishes will go through the winter in a healthy state? Generally speaking healthy fishes are found with healthy water in the pond. This seems common sense but so many aquarists fail to recognise this fact. One never knows how severe the winter will be; last year it was so mild in the south of England that hardly a frost was had or heavy snow. We may be as fortunate again, but it is well to be prepared for anything. One might suppose that there is little that can be done to prevent trouble in the pond but this is not so. As long as a healthy state of the water can be maintained then little need go wrong. Fishes have a protective covering of mucus which keeps away attacks of diseases like fungus, and the state of this covering is partly controlled by the general health of the fish. Herring accidents, its protection will ensure that the fishes go through the winter in good health.

Remember that water can be soon polluted, especially in a small pond, by over-feeding and by the decay of water plants. The over-feeding is easily attended to. No more food should be given at a time than can be cleared up in 10 minutes at the most. There is usually plenty of food of a kind in the pond and so too much extra will be left to decay and cause trouble. The feeding must be reduced gradually to almost nil. The appetites of the fishes will always decrease as the water gets cooler. Do not expect then that it is safe to keep feeding at the same level as when the water was warmer. Once the temperature of the water drops below 50°F, the fishes will move about less and consequently require less food. Also they take much longer to digest what food is taken in. It is well known that well-fed fishes will go through the winter in better condition than those in poor condition, but the pondkeeper must be careful to see that he does not overdo this feeding so late in the year. Fifty per cent. of the troubles met with in the pond will be due to wrong feeding. It is not always that too much food has been given but that the wrong kinds have been put into the pond and such foods may not have been cleared up. If small pieces of garden worm can be offered, in a position where it can be seen if the fishes are taking it or not, then it will be fairly easy to ensure that over-feeding does not take place.

Without doubt I would state that the next most likely cause of water fouling is the decay of water-lily leaves and flowers. It is hard to imagine this handsome flowering plant, the gem of the pond, causing the loss of many fishes but this is a fact that can soon be ascertained by anyone caring to take the trouble to make an experiment or two. As the water-lily leaves die they turn yellow at first and then brown to black. Move one of these leaves in the autumn and you will see an oily film pass on to the surface of the

water. Again, place a water lily in a spare tank for the winter and see how the water will smell foul in a short space of time. How then can we fight this trouble? In the first place it is essential to remove all dying leaves and flower heads as soon as they show signs of decaying. At least twice a week is the minimum frequency to attend to this task. Other pond plants can have some attention as well. The underwater oxygenating ones appear to be able to take care of themselves, and most do not need to be thinned out unless they have become so dense that the swimming space is restricted too much. It will be found that most pond plants have their leaves and stems above the water, so that it is a fairly easy task to cut these down.

The removal of any dead leaves from trees near the pond which have fallen into the water should be seen to as often as possible. If a large net is carefully swept over the surface of the water each day it will only take a few minutes to remove these leaves and so save a great deal of trouble which could follow the decaying of too many leaves. A few are not likely to do much harm and it will be almost impossible to prevent some from falling to the bottom.

Should the pond be cleared out or not? Many pondkeepers manage to keep their ponds in good order without cleaning them out but many ponds would be better for this autumn cleaning. Large ponds present too great a problem for the average pondkeeper and so must be left to season by themselves, but small ponds are more likely to run into trouble and so it is important to make sure that the water is in good condition at the beginning of the winter. Frequent changes of water should not be necessary and more harm can be done by continually running cold tap water into the pond. Use common sense over the matter; if the water seems sweet then leave well alone, but if there is any smell or bad colour to the water then it should be changed before the winter prevents such a task.

Remember that it is not the cold which kills fishes in a pond when the water freezes over but the foul gases trapped beneath the ice. If water is quite pure then the fishes will be quite safe below inches of ice. The solution of the problem of losses through fungus etc. in the spring is for the pondkeeper to take care to ensure that the water is kept in as pure a state as possible at the approach of the winter.

WINTER FEEDING

FOOD for most coldwater fishes should be reduced considerably once the temperature of the water drops.

The fishes may still take food which is offered, but they will take a long time to digest this and are much better kept on the hungry side as long as the water is cold. All goldfish types need very little food once the water temperature drops below 50°F, and so there is a danger that too much food will be given, which will do more harm in the tank than good. In a well set-up tank with plenty of plant life there is always likely to be a certain amount of food in the form of soft vegetation for those fish which love to browse over the plants. Most goldfish would keep quite fit if left without food from the end of November to the end of February, as long as the water in the tank remained cold.

Rivulus hartii

by JACK HEMS

ALTHOUGH not among the most colourful of species, *Rivulus hartii*, one of the larger cyprinodonts, is deserving of wider appreciation for it has many good qualities. For one thing, an adult pair can be kept and bred in a tank holding no more than 2 gallons of water. For another thing, though the fish is native to tropical regions (Venezuela and Trinidad), it is tough enough to stand a temperature down to about 65°F without suffering any harm. Added to that, it is not a finicky feeder, and ordinarily eats any coarse-particled prepared food with evident relish. By nature, however, it is a carnivorous species, and, in the wild state, lives mainly on insects and their larvae. So to maintain it in good health, generous helpings of live *Daphnia*, small worms and suitable alternatives such as red meat should be included in its diet.

Despite its wide mouth, *R. hartii* is perfectly trustworthy in a community tank, provided that no very small fishes are kept there. But it does not make an ideal community species because it spends a lot of time idling at or near the surface of the water. Yet it can move very quickly when it wants to, and is an excellent jumper into the bargain. It is soon tamed, and readily takes tit-bites from the fingers.

A full-grown *R. hartii* measures about 4 inches in length. Its greenish olive to muddy brown body, darker above than below, is narrowly cylindrical, with the sides adorned with bright-red dots arranged in horizontal rows. The caudal fin of the male is yellow in the base, blue-black towards the centre and yellow on both upper and lower edges. The pectorals are clear. All the other fins are yellowish, peppered with red dots. The female is distinguished by her heavier build, a black spot in the upper base of her caudal fin, and fewer and fainter red markings on her sides.

To breed the species no special preparations are necessary; for though a couple prefer the seclusion offered by a well-planted aquarium and a soft light, they will spawn under almost any conditions and at a temperature range of 68° to 85°F.

With the onset of the amorous mood, the male assumes richer tints and capers around the female in an excited manner. If the female is ready for egg-laying, this activity is followed almost immediately by the couple taking up a side-by-side position in the plant life. There, accompanied by much shaking and trembling of their bodies, the large, adhesive eggs are laid.

The female does not lay all her eggs at one time; she deposits a few of them every day for about 2 weeks. Then, after a short rest, the performance is repeated all over again. Spawning like this takes place several times a year, usually between the months of May and October.

The parent fish rarely eat any of their eggs or fry, which hatch out within the space of about 12 days. They resemble newly born guppies but are darker coloured, larger eyed and less active. They are on the alert for food almost right away, and grow quickly if fed frequent meals of small live food and powdery dried food.

Every now and again, the fry that are growing well should be transferred to another aquarium, for if they are permitted to remain in the spawning tank they will deprive their smaller (and younger) brothers and sisters of much food. Further, too many fry in a small tank soon leads to trouble.

If properly cared for, *R. hartii* seldom falls prey to disease, and normally has a life span of about 3 years. It was first domesticated in Germany about 30 years ago.



Mr Charles Birtwell

THE death occurred on 17th August of Mr. Charles Birtwell, well-known naturalist of Haslingden, Lancashire at the age of 75 years. He was known to hundreds of aquarists and horticulturists in Lancashire, and was a well-known figure at many of the aquarists' shows in East Lancashire.

One of the early workers in aquarium-keeping, his hey-day was in those pre-war days when our hobby was beginning to expand. He was an authority on many subjects, and his many friends in different branches of horticulture, agriculture, farming, and aquatics in its many branches, will miss his valued advice and cheerful chatter. At one time the writer listed the subjects on which he was called to lecture or give authoritative advice and these included canaries, budgerigars, rabbits, bantams and all poultry diseases, cattle and dogs, but we knew him best for his knowledge of orchids, cacti and succulent plants, coldwater and tropical fishes, and his supply of and experiments with aquatic plants and vivaria. He was a retained consultant by a group of horticulturists, and had won hundreds of "cards" and awards at shows all over the country.

His greatest pleasure came from the pre-war exhibition of aquatics at the Manchester Central Library, where he showed 40 varieties of aquatic plants. An early experimenter with line-bred guppies, he had had some success in retarding the metamorphosis of tadpoles, and he was the cause of scores of aquarists taking up our hobby. He was ever willing to pass on information from his fund of knowledge, and our local shows were always the more successful for his advice and criticisms. Although advancing years had curtailed his activities, he was collecting specimens only a few days before his death.

"Charlie" will be missed by East Lancashire naturalists. He was a product of an age when knowledge was less easily obtained, and many of us know the sacrifices he made in his pursuit of knowledge. He is survived by his wife and two daughters.

D.D.

REPRODUCTION IN GUPPIES

Brood Sizes and Sperm Replacement

by PETER DENDY

IN my last article I dealt with the mating act and the birth of the fry and I now want to discuss brood sizes and intervals in more detail, coupled with an analysis of 2 years' breeding covering more than 100 broods and 2,000 fry.

In an earlier article I mentioned the keeping of records and the compiling of information so that you know, or can hope to know, just what you are doing. The record side of guppy breeding can not be stressed too strongly if you are seriously trying to breed an outstanding guppy. The minimum information required in your record book is origin and all known details of the parents, age of female, date of birth of brood, number in brood and a space for remarks, which can be filled in as the fish develop. A description of the female finnage shape and colour is important to enable you to try and determine, after much trial and error, how to choose the right female to continue the line. I make no apologies for raising this point once again as it has caused and will cause more head scratching among guppy breeders than any other single aspect of the hobby.

Generally speaking, brood intervals in the guppy are reasonably constant for any particular set of conditions, but the arrival date of the first brood is much more erratic. This is thought to be due to an oestrous cycle in the female during which ova are produced and ripen and in the absence of fertilisation are periodically absorbed into the system. If insemination is effected at a point in the cycle when the ova are not matured or are in process of being absorbed then a delay in fertilisation occurs. For subsequent broods a rhythm seems to become established in which a period of 4 or 5 days elapses after the birth of a brood, during which time fresh ova mature ready for fertilisation. This theory seems to fit in well with my observations and accounts for the fact that on several occasions the first brood has been produced within 22 days of insemination; obviously mating has occurred when the ova are ripe and fertilisation has been achieved immediately. The longest period I have recorded for a first brood is 40 days, although a period of 48 days has been noted by other observers.

Temperature can have a pronounced effect on brood interval and my figures (Table 1) all relate to a temperature of 75°F, varying a degree or so either way. I have

separately considered inbred and outbred strains, as outbred strains have shown a consistently greater number of fry per brood. Inbred strains have been taken to be strains that have been continued by brother to sister mating for at least four generations, and females were usually kept virgin for 4 months before being mated.

Table 1. Analysis of 112 broods producing 2,116 fry

	Inbred strains	Outbred strains
Number of broods	69	43
Total number of fry	1,056	1,060
<i>Average number of fry</i>		
First brood	15	22
Second brood	16	30
Third brood	11	32
<i>Average brood period (days)</i>		
First brood	32	32
Second brood	33	27
Third brood	31	27
<i>First brood</i>		
Shortest period (days)	22	22
Longest period (days)	40	39
<i>Subsequent broods</i>		
Shortest period (days)	26	26
Longest period (days)	35	60
Number in largest brood	35	60
Number in smallest brood	2	5

Although I consider that my largest recorded brood of 60 is quite good, broods of 100 have been recorded.

Sperm Replacement

The influence of the second male on a fertilised female has been the subject of much discussion and experiment. One might say that there are two schools of thought on the subject, each backing their argument by quoting the results of experimental work. One school holds that provided re-insemination takes place within a short time of brood delivery the fresh and more active sperm will carry out fertilisation in preference to the original sperm stored in the female body. Mr. Harold L. Rosenthal, of Philadelphia, has shown that sperm replacement by a second male takes effect in a varying degree according to the period that elapses between brood delivery and re-insemination in accordance with Table 2.

Table 2. Sperm replacement

Delay in re-insemination after a delivery (days)	Percentage sperm replacement
1	83
4	60
6	36
8	0

The other school believes that sperm replacement takes place only gradually and never affects the first brood produced after re-insemination. Mr. W. H. Hildegann and Mr. E. D. Wagrass, of California, recorded the results of an experiment with 10 virgin females and 20 males. The females were introduced to a second male on the same day as the first brood was born. The subsequent broods showed the following characteristics:

Second brood: All true to first male.

Third brood: Two true to first male, three mixed broods and four taken over by sperm from the second male.

At a later fifth brood one female produced fry true to the first male, although her two previous broods had been mixed.

So there you are, you can take your pick of which school of thought you prefer to follow, but quite obviously it is important to play safe and keep your strains quite separate.

AQUARIST'S Notebook

MORE and more aquarists are taking up photography as a hobby to be combined with their fish-keeping, and evidence of this interest is given by the British Aquarists' Study Society's choice of Mr. Laurence Perkins as lecturer at their Conference at the London Zoo this month. One aspect of photography that is gaining many new devotees is cine, and here especially there is scope for the aquarist, to obtain some interesting and useful aquarium films. A series of articles on filming underwater life has recently been included in the weekly magazine *Amateur Cine World*.

To prove to himself that his methods of "packaging" his fishes for air transport were efficient an American tropical-fish "farmer," Mr. W. H. Rice, has sent some livebearers on a round-the-world trip. The fishes were in four polythene bags, two containing 1 quart of water and two containing 4 pints of water each, and the bags were tied off with a volume of oxygen about equal to that of the water. Sulphathiazole and acriflavine were added to the water as bactericidal agents and platys were placed in two of the bags (35 in 1 quart and 35 in 4 pints); in the other two bags of swordtails (25 in 1 quart and 25 in 4 pints) were included. The bags were packed in a cardboard box and their trip by air from Florida back to Florida, via New York, Frankfurt, Calcutta, Bangkok, Hong Kong, San Francisco and New York, took 4 days. All the fishes reached Rice's Tropical Fish Farm without signs of travel fatigue but were somewhat thinner than when they set out. Since the normal practice of the Fish Farm is to despatch these fishes in 4 pints of water for journeys which will take not more than 48 hours to complete, Mr. Rice is well satisfied with the results of his experiment.

Readers will have missed seeing the name of Raymond Yates at the head of this feature in recent issues. He has contributed to "Aquarist's Notebook" since January 1953, and has now decided to discontinue this so that he can devote more time to his many other spare-time interests, which include photography. It is hoped, however, that articles from his pen will appear occasionally in *The Aquarist* in the future.

Mr. Robert P. L. Straughan, Florida's well-known specialist in marine tropical-aquarium keeping, whose photographs of marine tropical fishes have appeared in the *Aquarist*, reports that some of his charges were involved this year in an international "incident." Aboard the American plane that was on its way to Texas when it was taken over by force and flown to Cuba a little while back were 60 sea horses belonging to Mr. Straughan. The sea horses were not held in custody by the Cubans and eventually were returned to him with no ill-effects from their adventure.

A useful pamphlet entitled *Uses for Polythene in Horticulture* is available from Transatlantic Plastics Ltd. (29 Victoria Road, Surbiton, Surrey). This will interest aquarists who are also gardeners and it has a section on garden ponds made from polythene sheeting. Practical notes include details of methods for joining sheets of this material. The pamphlet mentions that ultraviolet light causes gradual deterioration of polythene; its life when used in a greenhouse is said to be 18 months to 2 years. "Gauge numbers" for the sheets refer to thickness, and the range available is from 100 gauge (0.001 inch) to 1,000 gauge

by
AQUARIUS



(0.01 inch). As well as sheets the firm can supply seamless polythene tubing of various diameters.

This month a Conference in New York will be attended by biologists whose speciality is the study of pigment cells that can become cancerous in man and animals including fishes. The original investigations of these black cancers in swordtails and platys were made by Dr. Myron Gordon, a geneticist who contributed a great deal to aquarists' knowledge of heredity in these species. It is fitting that the New York Academy of Sciences is dedicating this month's Conference to the memory of Dr. Gordon, who died in 1959, and a Myron Gordon prize is to be awarded for the best scientific paper presented at the meeting.

Tropical Marine Communities

Here are six selections of tropical marine fishes recommended for a 36-in. by 15-in. aquarium.

- (1) 2 small French angels (about 2in. each).
2 butterfly fish (banded, least or four-eyed species).
2 top-hat fish (about 1½in. each).
1 sergeant major (about 1in.).
2 cownose (about 1½in. each).
2 or 3 sea anemones.
- (2) 2 cownose (1-2in. each).
2 spiny box fish (1-2in. each).
4 butterfly fish (any species, about 1½in. each).
2 clownfish.
- (3) 1 queen fish (about 3in.—reaches 2ft. in length!).
1 cardinal fish.
1 demoiselle fish (1½-2in.).
3 clownfish.
1 *Dascyllus* (about 1in.).
- (4) 6 clownfish.
6 *Dascyllus* (any species).
- (5) 1 Moorish idol (about 4in.).
1 lionfish (about 4in.).
- (6) 3 royal grammas (about 3in. each).
1 black, green, blue or French angel (about 2in.).
1 beau Gregory.
1 *Dascyllus*.
- (7) 20 large sea horse (*Hippocampus punctulatus*).
20 dwarf sea horse (*Hippocampus zosterae*).
- (8) 2 rock beauties (about 2in.).
4 butterfly fish (about 1in.).
2 sea anemones.

our readers



write

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.

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

"Klee's Lemma"

I FOUND much amusement in reading your Editorial for August. Klee's Lemma (can someone please define "lemma"?) is a restatement of the articles of Piragale's Constant, the only variable constant in the world. This is known to engineers and science-fiction readers (terms quite frequently synonymous) the world over. The primary contention, which is implied in Klee's Lemma, can be summed up in the phrase "If anything can go wrong it will." The application of the Constant to aquaria simply proves what we have known all along—that the universal eusedness of inanimate objects is carried over to the animal world in no small measure.

This should, of course, include the plant world, because it is axiomatic that if one has managed to acquire a Madagascar lace plant it will be the only plant in its tank that will (a) be attacked by a fish that does not normally attack plants or (b) succumb at once to conditions that one fondly imagines ideal for it.

One corollary in engineering is the following: "The mistake impossible of solution at 4.45 p.m. on Friday will be seen as childishly simple at 9.00 a.m. (or an hour earlier if the problem is in the shop) on Monday morning."

This is quite obviously equivalent to awakening in one's hotel on the first morning of a 3 weeks' holiday to remember that last night one put a Buenos Aires tetra in a tank full of luscious and possibly prize-winning *Vallisneria*.

LAURENCE SANDFIELD,
London, W.13.

"Lemma: assumed or demonstrated proposition used in argument or proof."—*Concise Oxford Dictionary*.

Acid Aquarium Gravel

WITH reference to D. J. Kirk's article "Is Your Gravel Really Clean?" (*The Aquarist*, July), I should like to make the following point.

Gravel treated with hydrochloric acid is of no use in a tank in which it is intended to grow plants. Such treatment removes all loosely attached metal ions, many of which are essential to plant growth, e.g. calcium and potassium. Not only that, it will leave certain gravels in a highly acid state. I personally tried to clean gravel with hydrochloric acid, so that I could find the effect of known amounts of the above-mentioned metal ions on plant growth. After I had carefully washed all traces of acid away, I added measured quantities of the above-mentioned metal

ions. On taking the reaction the following day, I found it to be acid (under pH 4). Dilute sodium hydroxide was added, readjusting the pH to 7.2, but the next day the pH was again under 4.

The explanation of this is that some of the constituents of the gravel are "ion-exchange compounds." These usually contain calcium, potassium etc., which in normal circumstances slowly become available to plants. Treatment with acid removes these and replaces them all by hydrogen ions (incidentally depriving the gravel of nutrients for plants). This "hydrogen-ion-gravel" is the most stable form of gravel in acid solution, hence its formation. When removed from the presence of acid, it becomes much less stable and tends to react slowly with any cations (i.e. hydrogen and metal ions) present. If, however, no metal ions are present it will remain unaltered. Metal ions are present, however, in all waters, with the exception of distilled and rain water, and these ions react with gravel to liberate acid. The acidity produced depends on the amount of metal ions present (i.e. the higher the concentration the lower will the pH of the water become).

Such gravel would be ideal for a spawning tank where soft acid water was required. Certain precautions would, however, be necessary. The water added to the tank would require to be very soft. A regular check on the pH would be a good thing, as it would be impossible to keep salts (which contain metals) out of the tank altogether, as almost all foods contain some. Salts from other sources, such as glass, rust and dust, would tend to have a cumulative effect.

T. D. POTTER,
Ayr, Scotland.

New Zealand Ponds

MY wife and I are interested in fish breeding and water gardens and would be pleased to correspond with someone in Britain who breeds goldfish and/or is interested in water gardening.

Our climate is quite mild here on the east coast of the North Island so we can follow our hobby outside as well as inside the house. In the house we have a tropical aquarium with guppies, Wiesbaden swordtails and neon tetras. Outside we have 25 ponds which have been built with broken concrete cemented together like bricks. We use well water as we have fluorine in the town supply and I think the goldfish are healthier in well water. We keep shubunkins, fantails, orandas and moors.

It was a very poor breeding season in our district last

year. In August it was very mild and quite a few of the breeders had very early spawnings. I was fortunate with two small spawnings, one of orandas and one of calico fantails. About 20 orandas and 12 fantails were reared, and these are of good type with bodies now over 2 inches long. Later fry all died in batches up until late October, and the fry obtained then did not grow. The weather was not warm (60-65°F instead of our usual 80°F), with many cold south winds. The lilies and other plants did quite well, some blooming profusely.

Our ponds range in size from 4 ft. by 4 ft. by 1 ft. deep to 10 ft. by 4 ft. by 2 ft. 6 in. deep. We use the shallow ponds for rearing fry, gradually grading the larger ones into deeper ponds. They stay in the deep ponds through the winter and are then brought back into shallower ponds for spawning. Frosts here are up to 12° but the ponds do not freeze unless we forget to keep a trickle of water running into them.

MELVIN J. ROGERS,
101, Barden Street,
Hastings, N.I., New Zealand.

Girl Guides can be Aquarists too

WITH reference to your reader's letter in the August 1961 issue, headed "Scout Aquarists," it may also interest your readers to know that the Girl Guides Association, on the recommendations of the F.B.A.S., issue an aquarist's badge, which is only granted after the applicant has passed an examination on the subject. One of the first badges issued went to my daughter, who is very proud at having achieved this.

R. O. B. LIET,
London, N.W.6.

Film Show

CAN I through the columns of your magazine publicise my lecture and film services to aquarists' societies? The programme has not changed a great deal since last year, except for one film which is worthy of note. This film titled "Safari to Treetops," was made by my brother and I. My brother is the Managing Hunter at Treetops, the world-famed Kerryan game-watching post in the Aberdare Forest. I find this 16mm. film provides a very fine finale to my fish films. I am willing to travel almost any reasonable distance to show these films to Societies. I provide all the equipment required. Here is a list of the films in my programme:

The Fighting Fish of Siam (colour).
Blue Gouramis from Sumatra (monochrome).
Tropical Aquarium Fishes (colour).
Fishing at Malindi (colour).
South African Clawed Toad (monochrome).
Tropical Aquarium Plants (colour).
Safari to Treetops (colour).
The programme lasts 1½ hours and all the films have sound on tape.

NORMAN MARSH SMITH,
42a Rustat Road, Cambridge.

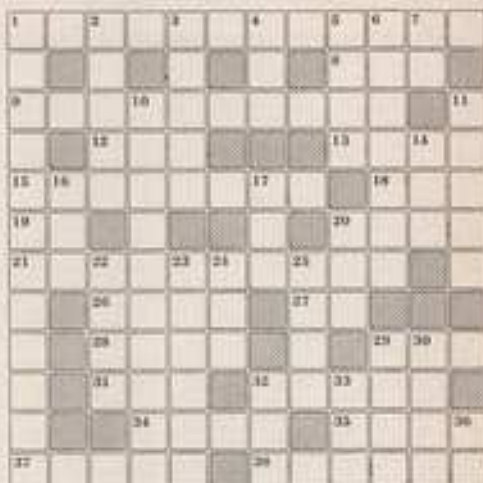
Low-priced Beauty

I THINK that your Editorial in the September issue contained at its tail a well-deserved note of thanks to those who keep us supplied with the numerous species of fishes from abroad. It always surprises me that I can buy a gorgeously coloured creature from the other side of the world for a mere few shillings, so that I am able to enjoy its beauty in my home. I am anxious to see more dealers offering us marine tropical fishes and showing us that they can be kept in aquaria of the popular sites, for these fishes seem to me the most beautiful of all.

T. L. VICTOR,
Morden, Surrey.

The AQUARIST Crossword

Compiled by J. LAUGHLAND



CLUES ACROSS

- Bloody weapon, then the end of a favourite tropical (3, 9)
- Head of a basin for ground of U.S.A. (13)
- Zebra fish (5, 5)
- What the cacti is (3)
- Membership of a medical society (1, 1, 1, 1)
- Had no lie for this goldfish (4-4)
- This kind of water is not the best for fishes; it what is chemically treated (3)
- A small advertisement in The Aquarist solves many problems (this one, too) (2)
- Factor controlling hereditary traits (in man?) (6)
- Two islands "down under" (5, 7)
- Brings forth young (4)
- Cat's whiskers? There are the mussy's head (2)
- Irritation felt by fishes as well as other animals (4)
- Member of a learned body (1, 1, 1)
- A terra comes from this river (2)
- Was this the fish with halibut's? (7)
- Golden fish of our ponds but not a goldfish (4)
- Broken pane hump big tide (4)
- Ray of a fin, perhaps a ray's (2)
- Totems, you herpetologists (6)

CLUES DOWN

- Popular snail for aquaria (A, 6)
- In dog for the wild one (5)
- Angry and bad at heart (5)
- Fishes' eggs (2)
- Casual fish (4)
- Usually born, undeveloped (7)
- Idiot (2, 3)
- Conversion into an ion (10)
- Above, top part (5)
- The Japanese or hali container has the ability (3)
- Something fishy in the idea (2)
- Casual fish without a head will suckle (3)
- Animal son-of-a-gun, broken, sounds angry (3)
- Damn or fish-trap (6)
- Agony (6)
- Clear before this (1)
- Little thing from the moon (4)
- Run or fly, sounds as if it might jump (8)
- Race comes up for this fish, an ichthyoderm (4)
- Super aquarist! (3)
- Casual fish, quite often (3)
- Usual afterthought (1, 1)

(Solution on page 122)



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.

THE annual show of the Midland Aquarium and Pond Society was held at Birmingham recently and the results were as follows: Common Goldfish and Coarse: 1 and 2, H. T. Jago; 3, A. E. Roberts. Breeders Class, four fish: 1 and 2, P. R. Closs; 3, P. V. Keeling. Breeders Class, six fish: 1 and 2, P. R. Closs; 3, W. Hicks. Bristol Shubunkins: 1, 2 and 3, W. Hicks. Galaxi Veilfish: 1 and 2, P. R. Closs; 3, E. A. Mason. Bristol Shubunkins bred 1951: 1 and 2, H. J. Whiting; 3, P. R. Closs. Scaled Veilfish: 1, W. Richardson. Moor, bred 1951: 1, 2 and 3, T. A. Davis. Bristol Shubunkins bred 1951: 1 and 2, P. R. Closs; 3, V. W. Pegg. Galaxi Veilfish bred 1951: 1 and 2, P. R. Closs; 3, G. V. Keeling. Bristol Shubunkins (mixed pairs): 1, W. Hicks; 2 and 3, P. R. Closs. Telescope (other than Moor): 1 and 2, G. V. Keeling; 3, T. W. Pegg. Moor: 1 and 2, C. H. Barrett; 3, J. L. Dwyer. Bristol Shubunkins (3 in. body limit): 1, 2 and 3, W. Hicks. Calico Fanails and Nymphs: 1, G. V. Keeling; 2, E. A. Mason; 3, R. F. Bidale. Scaled Fanail: 1, A. E. Roberts; 2, J. D. Brethford. A.V. Pond or River Fish: 1, A. R. Haddock; 2, J. D. Brethford; 3, S. Wood. Individual Coldwater Aquarists: 1, W. Richardson. Inter-Society Coldwater Aquarists: 1, Midland Aquarium and Pond Society; 2, Atherton A.S.; 3, North Warwickshire A.S. Bristol Shubunkins (Novice): 1, J. Stangson; 2, S. J. Ryan. Tropical Birds (Tyrone, Dileptus, Common tree parrot): 1, W. Devison; 2, S. Prior; 3, —. Dyer. Birds (Tyrone, Nigropinnatus, Chonchona, Tit (true pair)): P. R. Hinks; 2, R. B. Fenon; 3, P. W. Jenks. Birds, A.O.V.: 1, F. Holloway; 2, C. Griffiths; 3, P. A. Stokes. Dams, Brachydanio and White Clouds (true pair): 1, P. A. Stokes; 2, J. Holloway; 3, H. M. Woodward. Any Barbs: 1, G. V. Keeling. Characins (Hyphessobrycon, Hemigrammus and Cardinal): 1, F. Holloway; 2, P. W. Jenks; 3, P. A. Stokes. A.O.V. Characins: 1 and 2, H. E. Jones; 3, W. Devison. Male Fishers: 1, Miss P. W. Jenks; 2, H. E. Jones; 3, S. Wood. A.O.V. Male Anabantid: 1 and 2, E. R. Fenon; 3, Miss M. Fenon. Cichlids (Angels): 1, W. Devison; 2, —; Dyer; 3, H. M. Woodward. Cichlids (Dwarf): 1, P. W. Jenks; 2, E. R. Fenon; 3, W. Devison. Cichlids (any other): 1, and 3, M. E. Bosch; 2, P. A. Stokes. A.V. Male Guppy: 1, J. E. Wootton; 2, P. Dandy; 3, G. V. Keeling. A.V. Mollus: 1, G. V. Keeling; 2, P. A. Fildes; A.V. Plants: 1, S. Puse; 2, J. Bardsell; 3, G. V. Keeling. A.V. Succulents: 1, D. A. Thomson; 2, J. Bardsell; 3, W. Richardson. A.O.V. Tropical: 1 and 2, F. A. Fildes; 3, E. R. Fenon. Breeders Class (6 eggplants): 1 and 2, P. A. Stokes; 3, P. A. Fildes. Breeders Class (8 livebearers): 1, J. E. Wootton; 2, D. A. Thomson; 3, P. Fenon. Any Catfish: 1, Mrs. B. M. Smith; 2, J. P. Potts; 3, D. G. D. Lucas. Any Characin: 1, Miss P. W. Jenks; 2, J. C. Burrell. Any Danio, Brachydanio and White Cloud: 1, J. Gillies; 2, J. P. Potts; 3, J. P. Dandy. Any Barbs (Novice): 1, G. M. Haddock; 2, —; Finch; 3, Mrs. C. E. Forrest. Any Livebearers (Novice): 1, J. P. Dandy; 2, Mrs. M. Green; 3, Miss M. Fenon. Any Male Anabantid (Novice): Mrs. M. Green; 2 and 3, J. P. Potts. Trainers Class: A.V. Tropical Fish: 1 and 2, Paisley Aquarists; 3, Stuart J. Ryan. Individual Tropical Aquar-

ists: 1, D. W. G. Fretwell; 2, W. Richardson; 3, D. A. Richardson. Inter-Society Tropical Aquarists: 1, Southwicks and District A.S.; 2, Walsall Aquarium and Pond Society; 3, North Warwickshire A.S. Inter-Society Competitive Display: 1, Midland Aquarium Pond Society; 2, North Warwickshire A.S.; 3, Hales A.S.

RECENTLY the Mrsweyside A.S. had a lecture from Mr. A. Bland who spoke on the breeding of *Succinea Fighting Fish* and the methods he used to breed them. Other speakers have been Dr. P. N. Guadalupe, his subject being "Breeding Tropical Fishes," and Mr. G. Legge of Chester Zoological Gardens who gave an illustrated talk on "Marine Aquaria." The society also gained many firsts at the Arrington show.

THE Nottingham and District A.S. introduced a novelty at their last evening meeting when they held a "Take your Pick" competition. On 20th October Mr. Pringle will present some of his collection of slides on all aspects of aquatic life and this show will be held at the V.M.C.A., Shakespeare Street. There will also be a table show for daisies and white clouds.

AT a recent meeting of the Hford and District Aquarists' and Pondkeepers' Society Mr.

J. Vosper, geologist and naturalist spoke about the use of natural rockwork in aquaria and described various rock and stone found in different parts of the country. Mr. Vosper brought with him about two cwt. of specimens of rock and fossils from his collection and he was ably assisted by Mrs. Vosper in presenting a collection of most interesting coloured films on the subject.

Meetings are held on the second Monday evening of each month (8 p.m.) and visitors will be most welcome. Further details are available from the Secretary, Mr. V. Poles, 14, Hove Road, Barking, Essex.

AT the last meeting of the Aitborough and District A.S. Mr. S. Skinner gave a talk on his interest in fish keeping, his experiences and the developing of fish by evolution.

Mr. Skinner also judged the table show, an A.O.V. class, the result being: 1, Mr. R. Wade (Harting); 2, Master Lawson (Zebra); 3, Mr. B. Armstrong (Mountain Minnow). Recently the Society set up two furnished Aquaria at the Mazon Hospital (Ilkley), Flower Show. A diploma of merit was awarded to the Society by the Hospital.

The next meeting is on the 2nd November and new members will be welcomed. The venue is: The Brass Band Hall, Copper Hill, Top of Hunsley Lane, Yeadon, at 8 p.m.

THE Bristol Tropical Fish Club first Open Show was held recently and 247 entries were launched. The various Trophies, awards and cards were presented to the successful exhibitors by Mrs. L. Nightringale, wife of the Club Chairman. The following is a detailed list of the winners: Best exhibit in Show: Mr. L. Littleton. Best Goldfish: Mr. F. Brown. Best Molly: Mr. W. G. Gray. Best Club Furnished Aquaria: Porrypool and District A.S. Most individual prizes in show: Mr. F. Brown. Club Awards were as follows: Fighters: 1, W. G. Gray; 2, J. L. Mappson; 3, P. Brown. Other Labyrinthine: 1, Miss O. M. Day; 2, F. A. Mould; 3, D. Lovagrove. Barbs: 1, Miss O. M. Day; 2, L. E. J. Challenger; 3, F. Brown. Hemigrammus and Hyphessobrycon: 1, M. J. Stewart; 2, F. Holloway; 3, R. Gray. A.O.V. Characins: 1, B. Hanes; 2, M. J. Stewart; 3, P. Brown. Cichlids: 1, F. Brown; 2 and 3, R. P. D. Tovey. Catfish: 1, G. S. Stone; 2, Miss O. M. Day; 3, J. Arns. A.O.V. Euplatys: 1, R. Gray; 2, L. Egglestone; 3, T. Arns. Mollus: 1, W. G. Gray; 2, L. E. J. Challenger; 3, D. A. Wilson. Guppies, Lomaxi: 1, R. S. Mason; 2, L. E. J. Challenger; 3, J. W. Wheeler. Short Tail: 1, R. James; 2, J. R. Wheeler; 3, L. E. J. Challenger. Females: 1, J. R. Wheeler; 2, L. E. J. Challenger; 3, C. Craddock. Severnids: 1 and 3, H. Littleton; 2, F. Brown. Plants: 1, J. R. Wheeler; 2, F. Brown; 3, A. B. Carpenter. Breeders Anglers: 1, J. T. L. Mappson; 2, V. J. Trinchard; 3, D. A. Wilson. Breeders Livebearers: 1, F. Brown; 2, L. Littleton; 3, J. T. L. Mappson. Tropical Plants: 1, L. E. Egglestone; 2 and 3, L. E. J. Challenger. Furnished Aquaria Club: 1, Porrypool and District A.S.; 2, Stroud and District A.S.; 3, Bristol Tropical Fish Club. Furnished Aquaria Individual: 1, Mrs. I. M. Stone; 2, D. Lovagrove; 3, G. James.

AT the first of the last two meetings of the Blackpool and Fylde A.S. Mr. F. Wilson spoke about his method of breeding Characin and Molluscs. His talk was followed by an informative discussion.

A number of coloured slides, with a commentary on tape, were shown to members by Mr. R. N. Fwerdow at the second meeting. The film, made in the United States by the San Francisco Beto Co., and loaned by the Hendon A.S. dealt with the collection, preservation and dispatch of brine shrimp eggs to many parts of the world.

The table show results of this meeting were: Leggs Trophy—1, Mr. B. Dixon; 2, Mr. J. Wilms; 3, Mr. B. Swenson. Best Aquatic plant: Mr. B. Swenson. Junior Single Fish: E. Walsworth.

AT recent meetings of the Dewsbury and District A.S. members have heard talks from



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volunteers within their own ranks. On one evening the Secretary, Mr. E. G. Peace spoke on "My Hobby" and Mr. A. A. Brown on "The Construction of a Fish Pond" and at a later date Mr. J. Thompson gave a talk on "The Setting up of Furnished Aquaria (with special reference to pre-cast rockwork)" and Mr. Pollen spoke on "Home produced live foods." All these papers proved that the hobby had proved informative and entertaining and even amusing at times.

THE Hartlepool A.S. held their third Annual Show recently. The judges were Messrs. J. Skinner and E. Chapman, and the results were as follows: Furnished Aquaria: 1, Mr. Trevenant; 2, Mrs. Whittam; 3, Mr. Payer. Characins: 1, Mr. Fenwick; 2, Mr. Goodin; 3, Mr. Ritchie. Molias: 1, Mr. Jones; 2, Mr. Payer; 3, Mr. Collins. Swordfish: 1 and 2, Mr. Carter; 3, Mr. Collins. A.O.V. Livebearer: 1, 2 and 3, Mrs. Whittam. Labyrinth: 1 and 2, Mr. Asherson; 3, Mr. Aaron. Fishies: 1, Mr. Hay; 2, Mr. Ritchie; 3, Mr. Raine. Cichlids: 1, Mr. Beard; 2, Mr. Henson; 3, Mr. Aaron. Barbs: 1, Mr. Adamson; 2, Mr. Pratt; 3, Mr. Fenwick. Guppies: 1 and 2, Mr. Jones; 3, Mr. Porter. Unclassified: 1 and 2, Mr. Moorhead; 3, Mr. Goodin. Breeders' Egg-layers: 1, Mr. Lancaster; 2, Mr. Ritchie. Breeders' Livebearers: 1, Mr. Carter. Breeding Pairs: 1 and 2, Mr. Carter; 3, Mr. Lancaster. Furnished Jars: 1, Miss Jones; 2, Mrs. Smith; 3, Mr. Clark.

The leading positions and points gained in date for The Shanks Trophy for the most successful exhibitor of the year are as follows: 1, Mr. J. Clark 56; 2, Mr. R. Ritchie 36; 3, Mr. A. Jones 34; 4, Mrs. S. Whittam 31; 5, Mr. W. Payer 27; 6, Mr. G. O. Kellie 26; 7, Mr. R. Hay 20; 8, Mr. R. Fenwick 20.

AT the last meeting of the Dundee A.S. the Table show was for Scott Trophy—Swordfish and Molias. For the evening programme, it is hoped to be able to present a new set of coloured slides by the Heron Society, along with a script, and also a tape-recorded talk on "Barbs" by Mr. Basil Holland. The social evening will be on the 11th October.

THE Taunton and District A.S. held a most successful display in conjunction with

the Local Flower Show. The focal point was a pond with a most effectively arranged waterfall. Mr. B. Collins was placed first in the furnished aquaria competition. Mr. P. Gibbon was second and Mr. C. Scarr third. Dr. Griffin's red-finned shank was the best tropical and Mr. C. Scarr's British Shubunkin the best cold-water entry.

AT the meeting of the Northampton and District A.S., members had another opportunity of hearing Mr. G. Twisdon on "Reptiles and Amphibians." He brought with him many foreign species, explained their habits, and spoke of the requirements for keeping them in captivity.

Results of the monthly table show were: Characins—1, J. South; 2, R. Memory; 3, R. Webb.

THE current bulletin of the Bradford and District A.S. contains details of the Home Aquaria Competition and the method of awarding the points, and details from the usual judging of furnished aquaria. The positions in the Monthly table show competition show Mr. G. Holmes in the lead with 25 points with Mr. N. Norris a close-up second with 23 points. The Annual Dinner will be held on Friday the 1st December and is the highlight of the social year.

WINNERS of the Home Aquaria and Garden Pools competition of the Coventry Pool and Aquarium Society were as follows: Home Aquaria—1, Mrs. G. Prescott 74 pts.; 2, Mr. R. Hunt 73 pts.; 3, Mr. F. Pyscott 72 pts. Garden Pools—1, Mr. Stanton 77 pts.; 2, Mr. Randall 76 pts.; 3, Mrs. Gurr 75 pts.

THE table show at the September meeting of the East of Fife A.S. was for Barbs and Guppies. Mr. W. Minny took first and second places in the Barbs and Mr. A. Nicolson was the winner in the Guppies. The winners for the October meeting are Dunfermline A.S. and the lecture will be given by Mr. P. Bell on his experiences in breeding Angels. Table show classes for this meeting are Cichlids (large and small) and A.V. pairs (male and female).

AT the first annual general meeting of the Prevalance A.S. a most encouraging report was issued by the secretary. It was stated that the membership had increased from five to twenty-five in nine months including many beginners to the hobby, and that the balance sheet presented gave the club ample scope for going ahead with many future programmes now being compiled. The duties of treasurer have now been handed over by the secretary to Mr. S. Shield. Both Mr. Shield and Mr. Thomas are now members of the British Aquarist Study Society, which affords the club many added facilities. Following this meeting came the club outing when, members and friends, included in this day out a visit to Mr. McInerney at Focharm.

SECRETARY CHANGE

A change of secretary is reported from Ayrshire A.S. The new secretary is Mr. T. D. Porter, 8, Church Street, Ayr.

Crossword Solution

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

TROPICAL AQUARIUM QUERIES

(continued from page 144)

Please will you tell me what I can use as a substitute for Infusoria to keep baby fish alive until they are large enough to take micros worms or brine shrimps?

Hard-boiled yolk of egg is a good substitute for microscopic live food. Shake a few crumbs of the yolk in a small amount of water and then add drops of the cloudy yellow suspension into the aquarium containing the fry. Be careful to avoid adding excess of this fluid for egg soon decomposes in water and forms poisonous products.

Some time ago I purchased a worm-like leech called *Ancylodermis*. In the dealer's tank it kept in a horizontal position on the bottom, but in my tank it remains most of the time on its side with its suckers pressed to the side of the glass. Is this a natural position, or has the fish got some disorder?

A. saccincola often takes up strange positions in the aquarium. Do not worry about it. A few blobs of white worms or *Tubifex* dropped in front of its nose will soon make it change its position.

I have been told that penguin fish (*Thayeria* sp.) are bullies and not suitable for the community tank. Is this information correct?

Generally speaking, penguin fish get along quite well with fishes of about their own size, but some individuals like to bully timid fishes away from food and nip at their

fins. But by no stretch of the imagination could one term penguin fish as pugnacious.

I have set up a 26 in. long aquarium in an alcove that receives very little daylight. To make up for the lack of light I have fitted two 25 watt lamps in a reflector placed close to the surface of the water, but though I leave the lights on for about 7 hours every day, the plants do not prosper. Do you think the lighting is at fault?

A large tank placed in a dark corner of a room needs a stronger light than that given by two 25 watt lamps. Substitute 60 watt lamps, and in a week or two you will notice a marked improvement in the condition of the plant life.

I wish to know the sort of food necessary to keep a wasp goby in good condition?

Give your wasp goby (*Dachygobius*) tiny worms, *Daphnia* and similar live food. It will also take shredded lean meat. As this goby takes a lot of its food after dark, it is a good idea to drop its preferred food into the aquarium after the other fishes have settled down for the night.

I have just introduced some zebra fish into my community tank, but they seem to worry the other fishes by chasing them around. Will the zebra fish become a nuisance, or cause trouble?

Zebra fish are very lively and sociable little fish and like to play, as it were, with the other occupants of a tank. They will not do any harm.

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