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SEPTEMBER, 1961



MONTHLY
Vol. XXVI No. 6

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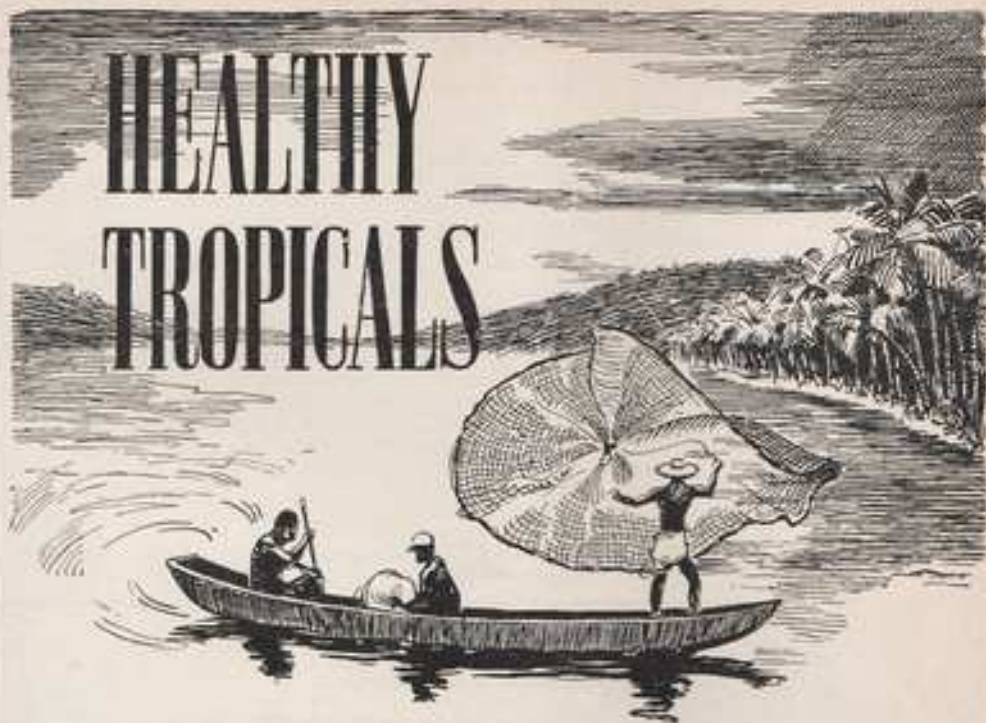


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VOL. XXVI No. 6

1961

Editorial

NEW things need new names to describe them, but, unless one is really up to the minute with events, the first meeting with some of the new terms can cause at least a moment of perplexity. What, for example, can be made of "fish muff"? When we first met this term we at once discounted the notion of a cylindrical creation of fur into which a fish could be thrust, even before we had begun to consider why anyone should want to do this anyway. It seemed more likely that the expression referred to some misperformed manoeuvre in angling, such as a failure to make the catch after the cast had been made and the bait had been taken. Then we thought that it must be a descriptive term for the would-be aquarist who finds it difficult to keep even the hardiest species alive for more than a few days. Or for the not-so-helpful type at "setting-up" night, who puts his foot through a show tank or transfers someone's prize tropical exhibit into unwarmed water. But the correct identification of this object, for such it is, would be: "Fish muff, a collapsible container made of plastic with a heat-insulating layer of glass wool, used for transport of tropical fishes by air."

A fish muff holds eight cardboard boxes, each in turn enclosing a water-filled polythene bag, in which the fishes are carried. Before each bag is sealed pure oxygen is pumped into it. Several hundred fishes are carried in each fish muff in this way, the temperature of the water remaining at the correct value for up to 5 days. If this attention in detail given by B.O.A.C. to the transport of tropicals surprises you, you will also be surprised to learn that barbs, characins and catfishes represent the air-line's most numerous passengers, flown to Europe every week from China, Malaya, Africa and the West Indies. We should all be grateful for fish muff; without them some fishes would be less readily available to us and not obtainable as cheaply as at present.

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Aquarium Gouramies

by JAS. STOTT

GOURAMIES seem to command a fairly steady measure of popularity and there is always a reasonable number of enthusiasts to champion their cause. This is understandable, of course, for they are not only attractive but interesting as well with their breeding habits.

Dwarf Gouramies

I think it is true to say that the male dwarf gourami (*Coina lalia*), when in tip-top condition, is one of the most colourful of our aquarium fishes. Unfortunately they have a tendency, at times, to seek out the darker parts of the aquarium, to hide themselves behind rockwork or in thickets of plants. This often happens when top light is somewhat strong and can be avoided by the use of floating plant life to break up the full force of surface light. *Riccia*, duckweed (*Lewia*) or floating water fern is most suitable for this purpose.



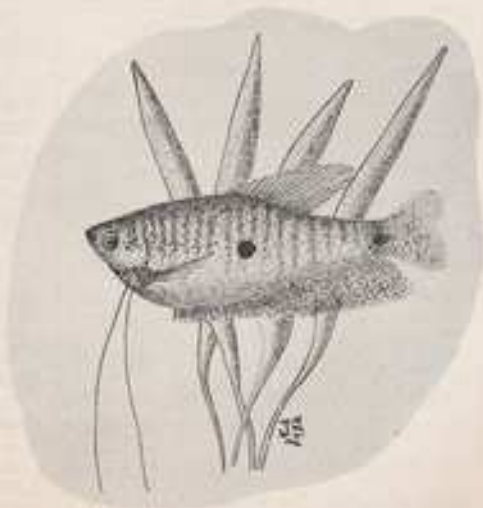
Dwarf gourami (*Coina lalia*)

Generally the dwarf gourami is a ready breeder and when the male builds the bubble nest at the surface he usually incorporates into it a considerable amount of plant material, and *Riccia* appears to be a natural choice if available. A suitable temperature for encouraging breeding seems to be around 80 F after good conditioning of the breeding pair.

While there is no great difficulty in getting the dwarf gourami to breed there is, on the other hand, the need for considerable care in the early stages of rearing the fry. The reason for this is the extreme smallness of the fry and, therefore, the need for a first food which is small enough for their tiny mouths. Green water seems to be the best for the first 3 or 4 days, but if this is fed by the drip method it is essential that the temperature of the added water should be the same as that of the breeding tank because surface chilling must be avoided as much as possible. It is for the same reason that a close-fitting cover glass is recommended: draughts across the surface are extremely detrimental during the early days. Infusoria can be supplied on the fifth or sixth day along with the green water and the two supplied together until around the twelfth day; the green water can then be stopped. Brine shrimps and screened *Daphnia* can follow, when growth should proceed rapidly. Remove the female as soon as spawning is over and the male when the fry become absolutely free-swimming.

Blue Gourami

Whereas the dwarf gourami can be considered a good community fish the blue gourami (*Trichogaster trichopterus*) should be carefully observed when introduced to a com-



Blue gourami (*Trichogaster trichopterus*)

munity of fishes; some specimens will accept community life quite readily whereas others can become aggressive. They are, however, attractive and when in good condition the blue colouring is delightful. A fully grown specimen can reach a length of 4 1/2 to 5 inches when reared under roomy conditions. They are also ready breeders and a temperature of 80°F should prove suitable for the breeding tank. It is generally the accepted procedure to remove the female after the spawning has taken place, because, as with most of the gourami species, the male is liable to become aggressive in the protection of the nest.



Thick-lipped gourami (*Colisa labiosa*)

The thick-lipped gourami (*Colisa labiosa*) is about 1 1/2 inches larger than the dwarf and not so colourful, but it is, nevertheless, a handsome fish and it is a much safer proposition in the community tank than the blue gourami. Unlike the dwarf the thick-lipped gourami, generally, does not incorporate vegetable matter into the bubble nest and the nest covers a larger area among the surface plants, of which, for this species, I think, the most suitable is the floating water fern.

Many enthusiasts vote the pearl gourami (*Trichogaster leeri*) their favourite gourami, and there is no doubting its beauty, but it is, at times, inclined to be temperamental and, like the dwarf, shy of bright top light. The fish appreciates a thickly planted tank and some surface plants in well-matured water. Given conditions of this sort, with plenty of live food, it will soon display its most attractive colouring. The pearl possesses a fairly peaceful disposition and grows to a length of 4 inches.

The snakeskin gourami (*Trichogaster pectoralis*) has not been with us in this country as long as the pearl but, if large tanks are available (for it is a larger species when fully grown), it is well worth trying. It is not so colourful as the pearl but it is still quite an attractive fish and does not seem to have any aggressive habits in the community tank. The breeding follows much the same lines as those of the pearl, but a larger tank is suggested.

Kissing Gourami

Another species for the large-tank aquarist is the kissing gourami (*Helostoma temminckii*), but this is no fish to introduce to a community tank in a casual manner, while some settle without giving trouble others can become persistent bullies. They build no bubble nest, and the eggs simply float at the surface. It is advisable to remove the brooding pair immediately the spawning is over in case egg-snatching commences. Some pairs will leave the eggs alone whereas

others will start to devour them as soon as they finish spawning. They are great algae eaters and this indicates that a fair amount of vegetable matter is needed in their diet for top condition; finely chopped spinach and lettuce should be given along with live food such as earthworms and *Tubifex*. They require a water temperature around 80°F. The temperature should be pushed up to 82-83°F for the breeding tank, in which one or two thickets of plants should be provided and the surface well covered with floating water fern.

Turning again to the smaller sized species, the croaking gourami (*Trichopoma vittatus*) is worthy of consideration. Here is a fish which is said to make croaking sounds when in breeding condition. Although some aquarists claim to have heard this I cannot say I have had that experience. It is the vibration of the air in the labyrinth organ which makes the sound. The colouring is not so bright as that of some of the other gouramis but it is an attractive fish and when fully grown is about 2 1/2 inches in length. It seems to possess a peaceful disposition and is, therefore, suitable for a community life, although it never looks at its best when seen in the company of highly coloured fishes, for the croaking gourami owes much of its attractiveness to the iridescence from reflected light.

Surface plants are appreciated by this fish and *Riccia* appears to be the natural choice. The bubble nest is built among this surface vegetation, and although the nest is small it seems to be very durable for the size. As with most of the nest-building gouramis it is the male that cares for eggs and fry, but when the free-swimming stage is reached, removal of the male is advisable. The female can be taken from the breeding tank after spawning.

A temperature of 80°F is about right for the breeding tank and well-matured water should be used. Conditioning for breeding should be encouraged by feeding with live foods such as *Daphnia*, earthworms and white worms.



Pearl or leeri gourami (*Trichogaster leeri*)

A lovely gourami that should interest the experimental aquarist, for there is much to be learned about this particular species, is the chocolate gourami (*Sphaerichthys sphaerocaudata*). This fish is about the same size as the croaking gourami and just as peaceful. It appears to need a fairly high temperature, in the region of 85°F, and slightly acid water (pH around 6). A diet consisting of a large proportion of insect food seems to be essential, but this must be small, for the fish has a tiny mouth. It will, however, take dried food, especially dried *Daphnia* and shrimp. At one time it was thought to be a mouth breeder but later reports suggest that it is a bubble-nest breeder.

An Automatic Fish-Feeder

by P. LEE

AS is the case with most beginners to the hobby, I commenced tropical fish-keeping with guppies, which caused no great concern when I was absent during the holidays. In due course, however, more expensive fishes were obtained, including some non-algae-eating varieties, so I decided to make an automatic device which could be relied upon to feed the fishes daily with the usual amount of food.

A perusal of the "surplus" advertisements in the technical magazines brought to my notice the ideal basic unit—a mains-driven time-switch movement, having a final shaft speed of one revolution in 24 hours. Several types of these movements are advertised (some of them clockwork); mine was obtained from H. W. English, Rayleigh Road, Hutton, Brentwood, Essex, price 17s. 6d.

Since a non-slipping drive was essential, Meccano chain was decided upon for the device. The length of chain required depends, of course, upon the number of links advanced per day. The smallest Meccano sprocket wheel available is one having 14 teeth. If this were driven by the motor previously mentioned, then the chain will be advanced by 14 links per day, giving a total chain movement of 208 links over a 14-days period. This corresponds to a length of approximately 31 inches of chain, which must be available in a horizontal position upon which to mount the individual food containers.

To allow space for the motor, a base board 36 inches long was obtained. The width of the base board may be varied to suit the motor to be used, so that the drive sprocket, when mounted on the motor shaft, will lie approximately in the middle of the base board. A 2-inch length of board was cut off for use later.

The motor that I used required slight modification. As supplied, the actual motor movement occupied only half the depth of the case, so that the shaft did not project beyond the case. To rectify this, the motor was dismantled and the case was cut down so as to just cover the movement when re-assembled. This left the shaft projecting beyond the case. On this motor the shaft was terminated in a

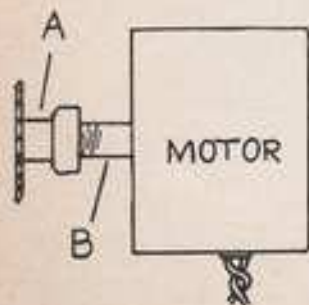


Fig. 1. A 14-tooth sprocket wheel (A) is soldered to the cap at the end of the shaft (B) from the motor.

screw-on brass cap. The 14-tooth sprocket wheel (Meccano part no. 96A) was soldered to this as centrally as possible (see Fig. 1).

At this stage, the motor was run to check the direction of rotation. It was to be mounted on the base board so that the upper surface of the chain would travel from the motor to the "delivery" end. The simplest method of mounting the motor at the end of the base board is by means of a metal strap bent over the motor and screwed down tightly to clamp the motor firmly. (In my version, Meccano perforated strip no. 1A was used.)

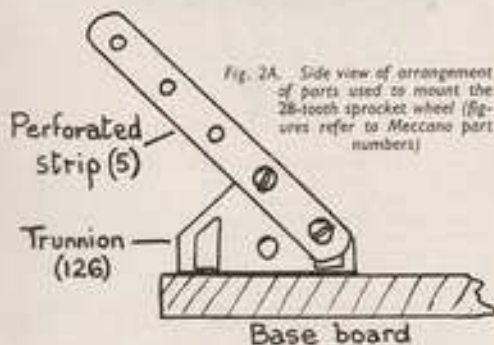


Fig. 2A. Side view of arrangement of parts used to mount the 28-tooth sprocket wheel (figures refer to Meccano part numbers)

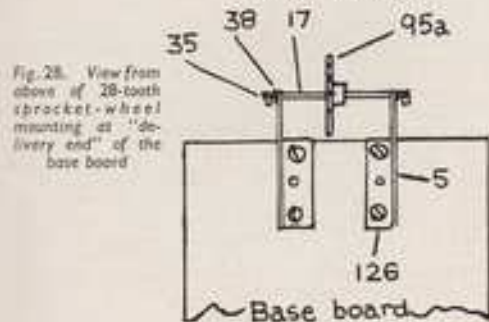


Fig. 2B. View from above of 28-tooth sprocket-wheel mounting at "delivery end" of the base board

Attention was next turned to the "delivery" end of the device. The individual food containers must be arranged so that as the chain travels over the sprocket wheel at the end of the base board, the food is tipped into the tank. Consequently, the chain at this point must project over the end of the base board, and because of this, a somewhat larger sprocket wheel was used, namely Meccano part no. 95A, which is 1 1/2 inches in diameter and has 28 teeth. Fig. 2 shows

how this wheel was mounted. The part numbers quoted are those for Meccano. Firstly the two trunnions (no. 126) were screwed to the base board so that they were in the centre of it with the uprights about 1½ inches apart. Next the 2½ inch perforated strips (no. 5) were fastened to the trunnions as shown. The sprocket wheel (no. 95A) was secured to a 2-inch axle rod (no. 17), which was placed in the end holes of the perforated strips and held there by a washer (no. 38) and a spring clip (no. 35) at each end.

Two lengths of sprocket chain (no. 94) were joined by opening the links at the end of one length and attaching the other length, then re-closing the links. Care was taken to join the two lengths with both sets of links pointing in the same direction.

The chain was now fitted by laying it over both sprockets and adjusting for length, then forming it into a loop in the same manner as that by which the two lengths were joined. If the two 2-inch perforated strips are slackened slightly at this stage, they can be used to adjust chain tension after the loop is formed, and then tightened securely.

The chain was then removed and the food containers were fitted. For these, the pressed-on metal tops from lemonade bottles were used. The cork inserts were removed and the cleaned tops were soldered to the chain as in Fig. 3. One container was attached at every 14 links. When all 14 containers were fitted, the whole device was re-assembled with the row of containers uppermost. Owing to the weight now present on the top length of chain, the whole row tipped sideways. This was rectified by fitting a 31-inch length of hardboard, 1½ inches wide, to the base board, 2½-inch double angle brackets (no. 48A) being used and the supports bent where necessary so that the top length of chain was just supported by the length of hardboard, so that the containers could not tip over enough to spill the contents.

Finally, two perforated strips 12½ inches long (no. 1) were screwed to the edge of the base board, as in Fig. 4, and



Fig. 3. In B an end link of the chain A is shown opened for attachment to the end of another length of chain. C, side view of bottle cap soldered to a link of the chain for use as food container

the 2-inch piece which was removed from the base board was used here as shown.

In use, the feeder is set up on top of the fish tank so that the food will tip over the end of the base board into the feeding ring in the tank as in Fig. 5. A convenient point to connect the motor is the socket normally occupied by the tank light. If the feeder is fitted to a small tank and a heavy motor has been used, any tendency to tip can be counteracted by attaching a weight to the opposite end.

The construction of this device lends itself to adaptation easily: for example, a 5-day version can be made considerably smaller, and could be driven by a standard 8-day clockwork time-switch. One feature which I value is that of being able to vary the type of food given, day by day.

Fig. 4. View from above of "delivery end" of base board to show projecting perforated strips and cross-piece (2 in. wide) of board (at extreme left)

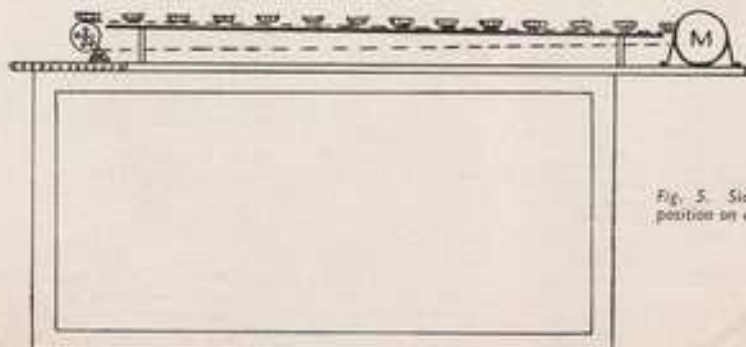
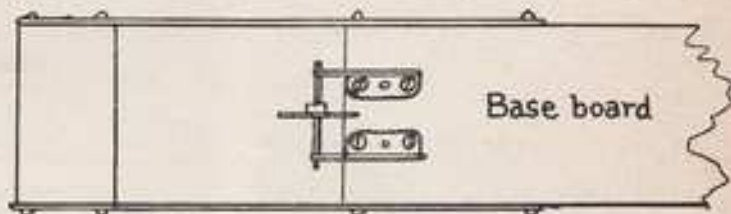


Fig. 5. Side view of automatic feeder in position on aquarium. The motor (M) is at the right



Bohama Island boa constrictor (*Epicrates striosus*). A hardy and gentle species for the vivarium.

Boa Constrictors

by ROBERT BUSTARD, B.Sc.

Photographs by the author

WHEN I tell some of my non-reptile-keeping friends that many people up and down the country keep boa constrictors they find it difficult to believe me. They picture huge, savage monsters crushing cattle to death, and many also think that these snakes are venomous. These large snakes, all of which are non-poisonous, kill their prey by constriction but their size and ferocity has been greatly exaggerated by many writers and explorers. Most snakes slither away unscathed unless cornered and provoked.

The largest boa is the South American water boa or anaconda (*Eumeces merremi*), which reaches a length of between 20 and 25 feet and achieves the distinction of being the second largest living snake species, the record being held by the Asian reticulated or regal python (*Python reticulatus*), with a length of up to 30 feet. The species with which we are concerned are all much smaller; indeed, the boa which accounts for about four-fifths of those kept in vivaria is the South American common boa constrictor (*Constrictor constrictor*) and its sub-species. This snake does not exceed 11 or 12 feet in length.

The other large group of constricting snakes are the pythons, which are also popular, but the common boa far outstrikes them in popularity and is possibly my favourite large constrictor. One advantage is that boas are reasonably easy to obtain as youngsters. Indeed many thousands of baby specimens are collected each season in South America

and shipped to the United States, from which country most of those available in Europe originate.

Purchase and Housing

I am in favour of purchasing a young boa and having the pleasure of watching it grow. This is also much cheaper, as these snakes are sold by the foot, and while a good 6-footer might cost 12 to 15 pounds, a 2 foot specimen can be obtained for between 3 and 5 pounds. It is advisable not to purchase any specimen of under 2 feet as it may well prove a nuisance to feed, unless you intend to breed your own mice. These snakes feed on warm-blooded animals (see below) and I think that many collectors, like myself, rather are disinclined or have not the time to breed the mice that they require. They therefore purchase live adult mice, and if one has a snake which is too small to be able to swallow a normal-sized mouse it can be inconvenient. It is also reasonable to assume that the very small ones have not been fed since they were caught. The collector should therefore select a specimen of about 2 feet in length.

The vivarium for this snake should give some allowance for growth. I would house one or two such babies in a vivarium measuring 36in. by 26in. by 20in. All my vivaria are made of galvanised iron with a glass front and hinged lid. They also incorporate side doors and have been described in *The Aquarist* (November, 1958) in detail. The foot of the vivarium contains 2 to 3 inches of dry sand and in places this is covered by dry moss. In one corner a

small dish of water in which the snake can completely submerge itself is placed, and kept three-quarters full of clean water, since this will also be used for drinking purposes. The aim must be to keep the vivarium dry, so water should not be spilt. It is important that the snake(s) do not suffer from draughts or sudden changes in temperature as these are liable to cause chills. I recommend a temperature of about 75-80°F, which I achieve by means of a pearl light bulb of a suitable wattage suspended from the roof of the vivarium in a reflector. This not only provides warmth but also "sunshine", or bright light, which is so important to reptiles. In my vivaria the light is switched on for 10 hours daily. The temperature at night can fall to 60-65°, but not below if chills are to be avoided. This is especially important with newly imported specimens, which I often keep at a minimum of 70°F for the first week. Since these boa constrictors in Nature spend much of their time in trees I suggest that the vivarium should be 20in. high and it should contain some stout branches for them to climb among.

Species

The appearance of these snakes is shown in the accompanying photographs. The colour of the common boa is creamy, marked with saddles of a rich brown colour. These are always darker towards the rear of the snake. These snakes have very short tails, this fact being not noticed when the snake is seen from above as the body passes imperceptibly into the tail. The general appearance is most striking, possibly enhanced by the pale ground colour. A sub-species, the imperial boa (*Constrictor constrictor imperator*) is somewhat darker in coloration and is found in Central America and Mexico. It does equally well in the vivarium.

There are several species of boa which should be avoided because of their vicious nature. These include the Cuban boa (*Epicraterus asperiflorus*) and the various tree boas, of which Cook's tree boa (*Epicraterus cookii*) is an example. These snakes have exceptionally long teeth capable of holding birds, on which they largely feed, so that they are capable of inflicting quite a nasty bite. One of the most docile snakes which I have ever kept is the Bahaman Island boa constrictor (*Epicraterus trivittatus*), which is an ideal species for the collector. It is a more slender species than the common boa, with a longer tail, and I am told that even wild specimens seldom bite when caught. The coloration is in black, dark green and grey and the bold markings are, in my opinion, most attractive.

I am often asked if a snake really becomes tame, and to this I answer that of course it does. Snakes, like other animals and people, however, vary, and some boas will be much more docile than others of the same species. This is quickly seen when I get a dozen or so new specimens of one species. Whereas some quickly allow themselves to be handled without any signs of aggression several will sit in a corner and strike at the gloved hand which approaches them (these remarks apply to *C. constrictor*). If, however, one purchases a baby specimen it will, if constantly handled, very soon become tame and remain tame as it grows. When first obtained it should be fed one mouse a week, and as it grows it will soon be able to take two at one meal. Snakes like to eat a lot at one time but feed occasionally. When it is 6 feet it will be capable of eating at least a dozen mice at a meal and should be fed about once a fortnight. Larger food such as rats can be fed if obtainable.

I usually feed with live mice, which are quickly killed by the snakes by constriction in a matter of seconds. I never feed live food, not even frogs, to snakes which eat their food alive. With constrictors I do not feel that there is any element of cruelty involved as tame mice seldom seem to realise the snake is there and when put into the vivarium usually sit down to wash their face in front of the snake.



Young South American boa constrictor (*Constrictor constrictor*), 2 feet in length. This is an excellent species for the collector to keep

Ailments

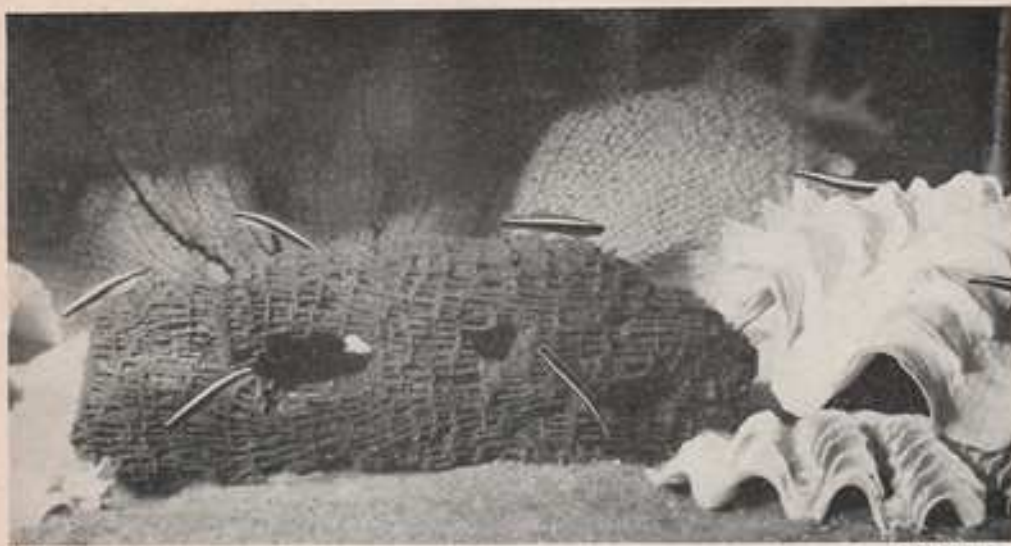
There are two ailments which can quite easily occur and which are nowadays quite simple to cure if noticed in time.

Colds. These are recognised by wheezy breathing and the presence of mucus and froth around the mouth. The old remedy was to raise the temperature to about 85°F and keep the snake protected from draughts, say, in a piece of blanket. However, good drugs are now available and the sulphanilamide drugs often speedily effect a cure. The size of the required dose depends on the size of the specimen. For a baby boa I give a half tablet each evening for 2 days and then wait 2 days to see if the snake is better before dosing it again if required. I have found it best to push the tablet some 6 inches down the throat rather than leave it in the mouth.

Mouth cancer. This is often a cause of "hunger strikes". A close examination of the jaw shows a cheesy material which literally gums it up so that the snake may be unable to open its mouth. Treatment consists of a daily probe and swab with acriflavine (1:1,000 solution) until all the cheesy material is removed (with as little bleeding as possible) and the jaws appear to be healthy. Usually, unless the disease is advanced, a cure is effected in about 5 or 6 days.

Trouble with sloughing. When about to slough, the skin over the snake's eyes goes opaque and the snake will not feed for several days—it is almost blind. If it is in good condition there is unlikely to be any complication and the slough will usually take place in one piece. However, when newly obtained it is quite possible that a snake may be about to slough and due to improper housing is having difficulty. The best method is to place the snake in a bowl of tepid water (70°F), and after a few hours this will loosen the old skin. In the vivarium snakes sometimes lie in their water dish for several days before a slough.

Boa constrictors make delightful pets and, if the instructions given here are closely followed, in 18 months to 2 years the 2 foot baby will be a healthy 6-footer that is perfectly tame and can be trusted with children and carried around with you. It can be used, as many of mine have been, to enlighten others about reptiles, as ignorance on the commonest of points is very great. In this way the favourite pet can become a good ambassador for its kind.



Photo

Neon gobies

R. P. L. Draught

The Neon Goby

by JOHN BOURSOT

TO many readers familiar with the handsome black and yellow wasp goby, and that rare desideratum, the mud skipper, it may come as a surprise to learn that many of the 500 odd species of Gobiidae are inhabitants of brackish swamps, estuaries and the open sea, according to the species.

The diminutive neon goby (*Bacanusa (Lacrimosa) oceanops*) is a colourful denizen of the warm shallow waters of the Caribbean Sea, where it lives among the rocky banks and coral reefs of the West Indies, the Bahama Islands and the Florida Keys.

As aquarium fish neon gobies are pre-eminent among the more co-operative marine tropicals. A pair should always be chosen, as each becomes inseparable from the other. This faithfulness is very noticeable and is of great help in making a correct choice. Unless the tank is very large it is advisable to limit oneself to a single compatible pair, for in common with many marine fishes neon gobies are intolerant of trespassers, and will unceremoniously eject any neighbouring goby loitering on their territory. Should the invader be large enough to resist the onslaught of the rightful owners a perpetual feud with constant outbreaks of scrapping will ensue, and the health, happiness and chances of offspring from the little pair of fish will be destroyed. Fortunately, neon gobies are most friendly towards other species, and make ideal tank-mates.

Both in Nature and in the aquarium neon gobies may be seen riding other fishes, gliding up and down their bodies searching for parasites. Many species of fishes, ranging in

size from small blue reef fish and young angels to full-grown groupers, grunts and barracudas, will deliberately seek the goby's prophylactic treatment. In my community tank I have seen a goby suddenly 'leap' on to a passing French angel, slide about over it looking for parasites and leave in disappointment when none was to be found. The angel appeared mildly indifferent but instinctively kept still until the little visitor had withdrawn. In the wild state, where fishes are the hosts of external parasites, an interesting relationship between them and neon gobies has evolved in which even large fishes will visit a neon goby lair, often taking up a head-down position with open mouths as the signal for attention. The watchful gobies then eagerly swarm out on to the giants to scour their bodies and fins, even entering their mouths and gills with confident abandon. When the larger fishes have had enough they have been seen to close their mouths suddenly and immediately open them again as a warning to the little gobies before moving on.

When first introduced into a tank a pair will immediately swim to the bottom to investigate the possibilities of a home. Following each other in and out of holes they carefully examine all empty clam shells, rock piles and recesses in the coral; they thoroughly explore hidden ways for getting from one place to another without being seen, and finally choose a cosy nook in congenial surroundings to serve as home. Within at little as 10 minutes housekeeping is in full swing, and our friendly little gobies are ready to be fed. Tiny bits of chopped raw shrimp, live brine shrimp, fish roe and dried food are readily accepted, the fish swimming up to meet the

falling pieces and swallowing them in mid-water. Owing to the fact that they never pick up anything from the bottom, it is wise not to shower the food in, but restrict the number of pieces to one or two at a time. This gives the gobies ample time to swallow all they want, and saves the subsequent tedious removal of uneaten pieces. However, they quickly become tame, and within 2 or 3 days will come to the surface to take tie-bits from their owner's fingers, but more easily and with less mess from the end of a toothpick. They should be fed several times a day.

The distinguishing feature of the otherwise sombre neon goby is a bright, broad powder-blue stripe running the whole length of the body, and asserted by many to rival and even surpass the superlative brilliance of that of the neon tetra; an extravagant assertion, largely due to immoderate enthusiasm blinding the eye to the obvious.

When commercial breeding of marine fishes gets under way, the neon goby will be among the first to be raised in quantities. "Just chuck 'em in a pail of sea water and they'll breed" is a crude expression not altogether without merit. I put a pair of newly acquired gobies into a community tank containing two royal grammas and a French angel. Within less than 20 minutes they were thoroughly at home and soon engrossed in domestic activities and the prospects of a hearty meal. Some 3 weeks had passed when I noticed that the gobies were particularly fond of visiting a half-inch space between the cement floor of the tank and a shelf of coral rock lying on the bottom in the extreme left-hand front corner. They would approach in a wide sweep over the top of the coral, twist as they went down, belly to wall, and disappear beneath it. These manoeuvres, alternating with vigils at the threshold and intermittent courting, soon aroused my curiosity. It was impossible to glimpse the interior of their home, so I concluded that a nest was probably in the making.

Three more weeks passed. Then one fateful morning I turned on the lights to see a tiny explosion burst in all directions. Swarms of minute semi-transparent V-shaped things, tipped with an intensely brilliant pin-point of light,

skidded about at the surface like insects; many fell victim to the lightning attacks of the royal grammas. I stared in cold horror. What creatures resembled a V? Would they harm the fishes? Were they parasites? Time was pressing. And obviously some sort of prompt action was imperative. So with nose to tank I scrutinised the invaders in a desperate effort to establish their identity before taking steps. Then came the sweet shock for which I was totally unprepared. They were baby neon gobies! Keeping strictly to the surface, they would scatter at the slightest alarm, but quickly returned to congregate beneath the light, where each would hang motionless forming a V with its reflection. I immediately spooned them out into a sea urchin tank, rich in Infusoria from the urchins' heavy droppings. But none of the fry survived longer than about 4 days, by which time their yolk-sacs were exhausted. Hard-boiled egg failed to sustain them, although microscopic examination revealed minute traces of it in their stomachs after death and proved that they had accepted it.

Two yearly spawnings are usual, though under optimum conditions several may take place. The eggs are attached to the underside of a flat stone or shell, and are constantly fanned by both parents as a precaution against fungus. Shells of the genus *Tridacna* (to which the 600 lb. giant clam-shells belong) are excellent. A 6 or 7 inch valve not only furnishes a dark roomy secluded interior, but the strongly plicated margin forms a number of archways when gently pressed face down into the sand. These archways afford the gobies complete freedom of movement when either entering or leaving, but bar other fishes. Neon gobies are not shy when nesting, and will tolerate considerable interference. It is even possible to raise the stone or shell with the attached eggs momentarily for a clearer view without disastrous results. Under normal conditions the eggs hatch in about 2 weeks, when either the parents or the fry should be removed. Obviously the latter manipulation is preferable as it is not only easier, but it leaves the parents undisturbed for another spawning. Owing to a marked family

Please turn to page 119



Photo

R. P. L. Struighton

Neon gobies with eggs

REPRODUCTION IN GUPPIES:

Insemination and Birth

by PETER DENDY

THE activity and general zest for living exhibited by healthy male guppies is one of their most attractive features and is influenced by sexual stimulation. The male guppy can be observed displaying to other males and fishes of entirely different species even though there are no female guppies present to awaken his ardour.

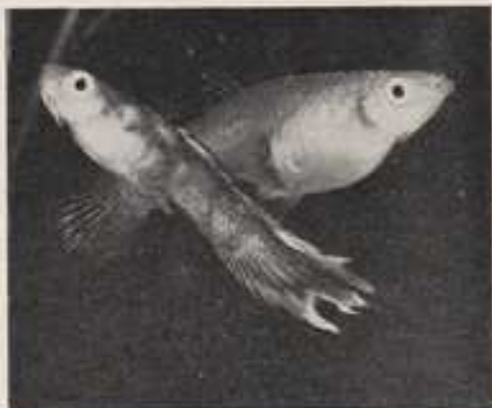
In the presence of a female the wooing becomes intensified and results in a pronounced courtship pattern, during which there are normally several distinct phases before insemination is achieved. Male guppies can be seen to make many thrusts towards a female, but these are rarely true copulations as the tip of the gonopodium does not make contact with the female and insemination can only be achieved after a positive contact with the female genital area to permit the passage of sperm.

Males indulge in frequent flicking of the gonopodium, during which this organ is swung completely round from the normal rearward-pointing position and made to project forward. This flick is usually to one side of the body and at the same time the pelvic fin on the particular side comes forward to act as a support for the gonopodium. This is the basic action required for insemination, but this will not, however, be achieved unless the female is receptive to the male's attention.

The most attractive part of the display is the almost rigid, quivering, position exhibited by the male, when the body is strongly curved in an arc or S shape with all the fins fully extended. This beautiful posture is adopted in front of a female, who will probably remain nearly stationary as if mesmerized by the dynamic vitality being demonstrated to



In this close-up view of the ventral surface of the male the modified anal fin, used as an intromittent organ during fertilization, is seen.



During the frequent approaches to the female the male guppy adopts a position favourable for fertilization to take place.

her. If the female attempts to swim away the male will often change his position to prevent her escape while he continues his display.

What can best be described as the serious part of the business is the gonopodial thrusting, when the male swims alongside the female and flicks his gonopodium forward and to the side nearest to the female in quick jabbing movements at her genital area. These thrusts are of the contact and non-contact type, as it is essential for contact to be made with the female for a period varying from just under a second to several seconds for sperm transference to occur. The great majority of the thrusts do not produce a contact and in fact true contact and copulation have only very rarely been observed.

During courtship the female spends most of her time swimming away from the male, to avoid his attentions, and may be seen slapping at him with her tail or resting on the bottom, in which position she cannot be inseminated. For insemination to occur the female must co-operate and this co-operation takes the form of a passive receptivity to the male's advances, during which the female remains quiescent to permit gonopodial contact to be made.

After mating, the sperms from the male migrate through the female gonaduct to fertilise eggs in the ovaries, and it has been shown that with a female carrying ripe ovaries fertilisation starts within 12 hours and is completed with 48 hours.

after insemination. The surplus male sperm is stored within the female body to be used as required to fertilise further broods at monthly intervals. As many as eight broods have been recorded from one fertilisation, the brood number increasing to a maximum for the third to fifth brood and then becoming smaller again. Where a female is regularly re-inseminated the brood size will remain more constant at the higher figure, which is related to the size and age of the female. So, if you want big broods, then breed from big females.

Observation of the birth process is extremely interesting, though often difficult as broods seem to come most frequently at night. Some observers claim that the fry are born head first, but from my observations this is not so and the tail comes first, against the grain of the scales as it were. The interval between each delivery varies and there can be a considerable period between the emergence of the tail and the completed expulsion of the fry. This is most noticeable when the baby is somewhat larger than the remainder of the brood, and the female may resort to violent movements to help the birth process. Sometimes the fry are ejected in rapid succession and simply come tumbling out of the female so that it is all over in a very short period.

A blockage can occur, particularly in females of inbred strains or in young females, who seem unable to expel the fry properly, and I have had several deaths through this.



I have observed females carrying a half-born baby for a day or more. If the female appears to have reached an impasse it may be possible to do what is sometimes called "giving her a slipping rope". This involves netting the female and dunking her alternately in warm and cold water, which may be successful although it may equally well result in the female expiring. Midwifery assistance in the form of applied pressure to the gravid area is not to be recommended as this invariably results in the death of the female and the fry.

With a very newly dead gravid female it may be possible to make a caesarian section by holding the female over a container of aquarium water and making an incision up the centre of the abdomen with a razor blade. The fry can be released into the water and, if you are lucky, may survive. I saved ten out of a brood of 20 once in this way and thereby continued a line that would otherwise have been extinguished.



This photograph and the one at the top of this page show the female guppy at the time of giving birth. The characteristic arching of the back which occurs is exhibited.

Glazier's Putty

Is ordinary glazier's putty suitable for securing the glass sides to the frame of a small aquarium?

Ordinary putty is quite suitable for glazing a small aquarium. After the tank has been glazed and filled with water to press the glass sides tight against the frame, it is a good plan to paint the outside edges where the putty shows with two or three coats of quick-drying enamel or aluminium paint.

The Neon Goby

continued from page 117

sense the young gobies stay with their parents for a year or more before making off on their own.

The best temperature for these little fishes is between 78° and 80° F, and once decided up should be steadily maintained.

Like all other gobies, *H. oceanops* has no lateral line. The scaleless body bears clear dorsal, pectoral, anal and pelvic fins; the last-named are thoracic and united to form a sucking disk enabling the little fish to cling to a vertical surface with ease. The caudal fin clearly shows the continuation of the dark bands running the length of the head and body above and below the broad blue median stripe.

It is my experience that neon gobies are rather vulnerable to the attacks of white spot. This is unfortunate. But they respond to treatment, and, if properly kept with adequate filtration and aeration in a well-cared-for tank, they will retain perfect health and have a long life of happy active existence.



Through the transparent abdominal surface of the female guppy, at the "gravid spot", the eye of a nearly fully developed young guppy is visible.

Pests of the Garden Pond

by A. BOARDER

Photographs by LAURENCE E. PERKINS

IN a garden pond that has become well matured with plenty of healthy water plants there are likely to be present many inhabitants other than the fishes which you have introduced. Some of these may be harmful pests and others good food for the fishes. Others might be just harmless and useless occupants. It may be well to consider some of these occupants to see which are likely to be of use and which are harmful.

On the surface of the water there are almost sure to be a number of spider-like creatures which skid about all over the top of the water. They are able to skim on the skin on top of the water but never enter it. They do no harm to fish life but live on flies etc., which fall on the water. I have never seen any fish attempt to eat one. They are known as pond-skaters or water-striders, but their correct name is *Gerris*. There are ten species and some are wingless, some have undeveloped wings and others have functional wings.

Under the surface there may be numerous "bugs" and larvae which often go un-noticed by the pondkeeper. One of the best known is the water boatman, *Notonecta*, which is found in most ponds, being well able to fly from one pond to another. There are four species of the larger boatman but many of the lesser water boatman, *Corixa*. Some of these are very small, as little as an eighth of an inch long. The



Dytiscid larva devouring a freshwater shrimp.



Larva of the water beetle Dytiscus in a characteristic attitude just below the water surface.

larger boatman can be a danger in the breeding pond as they feed on any living creature they can attack. Small fishes, especially young goldfish up to half an inch long, are favourite food for these pests. They can swim very quickly but are very buoyant owing to the air bubble they carry with them. They have to come to the surface to breathe and this is when they can be caught with a net. At night time they are caught much easier as they appear to spend more time at the surface than.

The great diving beetle (*Dytiscus*) is another good flier which can enter any pond, and they appear to be especially active in flying to a new pond during the evenings. This beetle is carnivorous and can attack a small fish. The beetles lay their eggs in a stem of a water plant and the resultant larvae are also very ferocious, eating any living creature they can capture. The larvae grow to about 2 inches in length. They can also be captured at night if a quiet visit is made to the pond with a torch and net. The beetles often rest at the surface and the larvae will climb up a stem near the top of the water, where it is easy to catch them.

Another dangerous pest in the water is the larva of the

dragon fly. There are many species of dragon fly and the two most often found in our ponds are the long-bodied type and the short-bodied type. These have large ugly larvae which live under water and are carnivorous. They can eat small fishes and so must be considered an enemy to combat where breeding is taking place in a pond. The nymph type of dragon fly has a rather delicate larva which I do not think would be very dangerous in the pond as they feed mostly on vegetation and would hardly be strong enough to tackle anything larger than tiny fry.

Many other larvae are to be found in the pond and some make good food for fishes. The larvae of the mosquito are eaten by most fishes, as are the larvae of other insects. At the bottom of the pond may be found a small creature like a wood louse. This is the freshwater louse (*Asellus*) and it eats all forms of decaying matter, but it is not averse to an occasional attack on a small fish, especially a sickly one. However, larger fishes will eat them and in a tank of medium-sized fishes they can be good scavengers by clearing up uneaten food. The freshwater shrimp (*Gammarus*) must not be confused with the water louse; it can readily be identified by the fact that it has the typical bent-up body of the well-known marine shrimp. Large fishes will also eat these shrimps, which can often be caught by shaking a bunch of water weeds in the air over a newspaper.

If newts visited the pond during the spring they will all have left the water before this time but their tadpoles are likely to be in the pond for some time yet. They will eat live foods and fry. They are readily recognized by the fact that they have their four legs at an early age but still retain the branching gills which were so obvious when they were newly hatched. Once these gills disappear the young newts must leave the water and they will not return until they are old enough to breed, when it is probable that they will return to the pond in which they were born.

Most fast-swimming creatures found in the pond are likely to be dangerous, whereas the slower ones may not be so to any active fishes. When any fishes are off colour they usually become very sluggish and are then prey to pests which would not otherwise be able to catch them. A case



Water boatman (*Notonecta*) taking air with its posterior end at the water surface

in point is that of the leech. These flat worm-like pests are often found at the bottom of a pond and, if they are able to attach themselves to a fish would soon suck its body fluids and kill it. Leeches can be trapped with a piece of meat, in a wire trap which will prevent fishes from getting at the meat. If the trap is lowered into the pond at night many may be found on the meat in the morning. Sometimes leeches can be seen at the pondside at night time, when it is possible to catch and destroy them.

To ensure that most of the many larvae that may hatch out in the pond are eaten by the fishes too much artificial food must not be given. If you expect the fishes to keep the water clear of midge and mosquito larvae do not be for ever offering them food. If the pond is well established with healthy water plants then there is sure to be plenty of food for the fishes most of the summer, unless the pond is overcrowded. Use discretion when feeding, as the balance of the pond can soon be upset if any uneaten food is left to decay and pollute the water.



Larva of the dragon fly (*Aeschna*)



Pond-skater (*Gerris*)

Oddities in the Aquarium

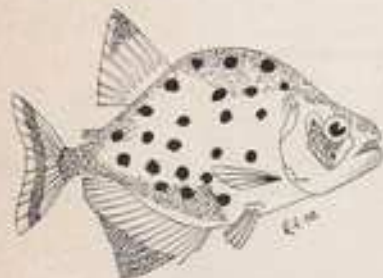
by R. E. MACDONALD

STRANGE or somewhat unorthodox fishes will always present an added attraction to any aquatic collection, for the unusual is perpetually interesting. It would be folly to believe that all of Nature's most interesting creatures dwell above water, for some of the strangest and perhaps the most beautiful live beneath the surface.

The oddities mentioned in this series of articles are species that may be kept in the aquarium, although some of them are rarely seen in this country. British aquarists can only hope that it will not be too long before we see these "elusive species" for sale in our dealer's tanks.

Piranhas

The piranhas (genus *Serrasalmus*) are fishes that have built around themselves a legend of viciousness. Their grisly fame arises from stories told of how they can strip an animal (including a human being) of its flesh, down to the bare skeleton, in a matter of minutes. People hear so many ghastly stories about the piranhas that they are apt to laugh them off as unbelievable. Well, is it all really fact or fiction? Evidence indicates that with the species of piranhas called *Serrasalmus spilopleura*, it is a fact! Other species are quite harmless to humans, though they can inflict a nasty bite. There are about 16 species in all, but only four of these can be considered as dangerous to humans. Generally speaking, however, blood must be present in the water before these fishes will attack.



Piranha (*Serrasalmus spilopleura*)

S. spilopleura inhabit the streams of South America, where they congregate in large schools. These schools of 8-inch long fish with razor-sharp teeth will immediately attack and devour raw meat with a most blood-thirsty appetite!

The head of the *S. spilopleura* possesses well-developed muscles that give the lower jaw great strength, and the dentition must be seen to be appreciated. The teeth are pyramidal in shape and the points of the upper row fit snugly into the grooves between the teeth of the lower row. Once a bite has been made a piranha will rarely release the

grip before a mouthful has been detached from its surroundings. If the chunk of meat cannot be torn clear easily, the fish will rotate its head with a semicircular motion until the mouthful is free.

It has been reported in the U.S.A. that as from 1st July, 1961, there will most likely be an import restriction imposed on the genus *Serrasalmus*, with the possible exception of specimens required for scientific purposes.

This arises from a law passed by Congress in September, 1960, giving "the Secretary of the Interior power to restrict the import of whatever he decides is injurious to human beings, for the interest of agriculture, horticulture, wildlife or wildlife resources of the United States."

So the genus *Serrasalmus* is on the short list for axing! It would appear to me that our American friends are either extremely cautious or that the natural temperatures of North American waters are mysteriously rising!

Armoured Catfish

The armoured catfish (*Callichthys callichthys*) can be said to possess a nature completely opposite to that of the piranha. It would be true to say that this fish is incapable of harming anything other than the smallest fry and, because



Armoured catfish (*Callichthys callichthys*)

of its docility, Nature has provided it with a personal means of protection from its enemies. This protection is in the form of armouring, by way of strong, overlapping, bony plates. Because of the armour-plate and the long barbels that extend in an upward as well as a downward direction from the head, this species resembles a cross between an armadillo and a lobster!

The spawning of this fish is rather unusual, for observation of the breeding habits indicates that it is a bubble-nester that builds its nest below the surface of the water under the leaves of a floating plant. It has also been found that the only inducement to this species to spawn is the effect of water falling upon the surface, e.g. rain water.

Ghost Catfish

One should not pass from the somewhat "macabre" species without mentioning the ghost catfish (*Kryptopterus bicirrhus*). The body of this fish is completely transparent, hence the name "ghost catfish", and all the internal organs



Ghost catfish (*Kryptopterus bicirrhus*)

such as the brain, skeleton, swim bladder and other viscera can be seen. Just behind the base of the opercular opening, the heart can be observed beating quite clearly. The possible reason for this transparency (I have not investigated this phenomenon personally) could be the lack of chromatophores (colour cells), which are situated between the cutis and epidermis layers of the skin and determine the colour of the fish, and the complete absence of the reflecting guanin crystals.

Croaking Tetra

The croaking tetra (*Gambusia inopis*) is a fish that is neither dangerous nor frightening to keep, but which can be somewhat embarrassing at times. This species of the family Characidae makes a very rude noise when it breaks



Croaking tetra (*Gambusia inopis*)

the surface of the water and gulps air. The singular croak that it emits can be heard quite clearly if the room in which the tank is housed happens to be quiet. It does not require much imagination to realize that if there are persons present who are unaware of the peculiarity of the species, many black and reproving looks may be passed among the unsuspecting members of the gathering before realisation eventually dawns!

Electric Catfish

A species rarely seen in this country is the electric catfish (*Malapterurus electricus*), a fish that can often prove to be too "hot" to handle! This species is capable of producing an electric discharge that can kill small fishes and stun larger ones. Although the discharge is not powerful enough to cause much harm to humans, the shock received can be enough to produce a sudden physical reaction on the part of the handler. It is a vicious species and not at all particular whom it electrocutes, and, oddly enough, it is most dangerous during the night hours. Perhaps it is logical to assume that during darkness, all unidentifiable objects appear as enemies.



Electric catfish (*Malapterurus electricus*)

It is believed that the electric catfish was known to the Ancient Egyptian civilisation, when it was bred in captivity and used in the last rites for a deceased dignitary. The electric discharge was obviously used to speed the various departed on their way to the next world.

Aquarists thinking of obtaining specimens of *M. electricus*

for experiments leading to the harnessing of the electrical properties of this fish for domestic purposes should bear in mind that these fish from tropical Africa grow to some 2½ feet in length!

Siamese Fighting Fish

I should think that the Siamese fighting fish (*Betta splendens*) is a very old friend of nearly every aquarist in the world. Certainly the breeding habits of this extremely popular species are well known. It would be unfair to the species concerned, however, if it failed to receive some mention as an oddity. Like most strange beings, familiarity can lead to acceptance and the subject then ceases to be looked on as an oddity, and this may well be the case with *B. splendens*. Those aquarists who keep this fish soon realise that anything new is never dull.



Siamese fighting fish (*Betta splendens*)

In Singapore, the sport of fish fighting has become almost a national occupation, with nearly everyone, both young and old, becoming an enthusiast either of breeding or fish fighting. Contests are held anywhere and at any time of day and sometimes fortunes are made or lost on side-bets.

Peculiar to us so far away from the natural habitat of this species, are the methods adopted by the "locals" when training the fish before a fight. Great care and attention is given to this aspect of the sport. For instance, to develop stamina the fish are induced to swim up and down a deep bottle by moving a mirror slowly in a vertical direction so that the fish dogmatically follows its reflection in a manner so well known to us all. To increase the strength of the fish it is placed in a bowl of water that is stirred round and round to produce a current against which the fish will try to swim. The speed of the current is increased day by day as the fish gains extra power from the exercise. To develop fighting techniques, the fish is placed in a jar containing a few small males and a female fish. Although the smaller fish get the rough end of the stick, they make excellent sparring partners. Sometimes a fighter is placed for only a few seconds in a cup containing whisky or brandy. This treatment is very dangerous for the fish but has the effect, so it is said, of toughening the body and causing extreme dependency in some alcoholic circles!

Twig Catfish

The twig catfish (*Foriswella acuta*) of the family Loricariidae, looks exactly as its name implies, particularly when attached to rocks etc. by its oral sucking device. This



Twig catfish (*Foriswella acuta*)

means of camouflage is most effective and is the fish's only means of protection against the many pecking beaks found below and above the surface of the water in its natural habitat.

Renting a Tidal Pool

by L. R. BRIGHTWELL

MANY attempts have been made to stage the tidal pool artificially. Men made of money have tried it, but the end is always the same. It can't be done. The only way to enjoy one is more or less to rent it—rent free! Within a hundred yards of my cottage is such a pool, and there is never a dull moment the year round. This pool is about 3 feet across, and roughly circular and 3 feet deep. It is placed 4 feet above beach level, built in the side of a huge rock mass, hard, volcanic rock, and it faces north.

January. Normally the pool is 3 feet deep, but during the month it varies from this to 2 feet, according as the sea behaves. At water-surface level there is a rough fringe of the pink *Caryophyllia*, almost stony in texture, being reinforced with lime. No fish or shell fish are in the pool, but on the other side of the rock, the seaward side, are big, almost circular patches of mussels, densely crowded. Slowly rock whelks thin them out, but all are doomed to have club shells (inevitable with overcrowding). So I transferred about 50 to my pool, and at once they started to grow apace.

February. Often the pool is half-filled with sand or small pebbles, at other times it is crystal clear.

March. Up and down. One morning a dead rat and a grape fruit were found in it. Back to normal, the *Caryophyllia* growing—a circular collar of it now, vivid pink, with intervals of emerald *Euteromorpha*. A backward season inshore, as on land. But half my 50 mussels have anchored and are twice the size of the seaward ones.

April. The first of the blennies arrives. A small one, but I feed it daily, tides permitting, on a limpet, finely chopped. The blenny, only 2 inches long, takes the lot in a dozen gulps! Before the month is out it rushes to the surface as I arrive and feeds from our hands.

Late in the month two more blennies appear. Feeding always starts with a savage dog-fight.

May. The coral weed glows like a sunset and the green weeds have to be thinned out. One or two big blennies, 2-year olds probably, monopolize things at meals.

June. A visitation of opossum shrimps fairly fills my and all other pools for a few days only, then vanishes.

July. The pool is a picture indeed now—after I have removed cigarette ends and paper. Thank heaven Portland is, for a Cornish coastal spot, undeveloped. But the visitors have arrived. Mussels, still 20 left, are growing fast. The seaward ones are just where they were a year ago.

August. Find a child with six blennies in a jam jar. All dead, of course. Gave the brat sixpence for the corpses. The otoliths show the largest, over 4 inches, to be 3 years old. I had hoped at one time that blennies might breed here, but there are too many interlopers. Swarms of hermit crabs, all on winkle shells. The pool is like one big football scrum. My cat daily follows me to the beach, and, but for me, would have cleared the pool of blennies. He had the whole of his front half well under water and took my presence very badly.

September. The last of the visitors, thank heavens, have gone. But one left the tag end of a stick of "gum" behind in the pool.

October. Still a few mussels, three sizes larger than when I planted them. Some cork-wing wrasses might have bred here. Started collecting weed and stuffing it into a rock crack, but the blenny contingent is too strong. A small

plant of *Lawsonia* which could not live for half a day in a tank started growing, but the gales weeded it out.

November. The blennies are gone, also some opalet anemones I planted in June have vanished, and the pool is paved with granite and Cornish blue stone pebbles. One small blenny is seen, most perfectly dressed in glaring white blobs and blue stone patches like the pool floor. A few little prawns about, owing to mild weather.

December. The green weed has vanished, but the pink *Caryophyllia*, much reduced, remains.

So much for just one year's steady observation of one little pool, but enough to make plain the advantages of daily change of water, continuously aerated, and daylight. In some of the sheltered creeks hereabouts no doubt much more could be done. Simel, in Jersey, made unrivalled observations on the octopus in smallish pools of only a few hundred gallons capacity, by covering them with fine-meshed netting, but it takes some doing to keep an octopus within bounds. At least my year's try-out showed why mussel beds must be so carefully weeded out. My planted-out anemones trebled their size, and a *Sagaria* transferred from another pool did wonderfully. In fact the possibilities open to one were fascinating.

So much yet could be done. It has all the resources of Plymouth's wonderful Drake's Island tank (a billiard table with a 12-inch slate wall, no more bulk around it) and a non-stop stream of sea water flowing from end to end. And even this little marine biologist's paradise lacks that one little thing, which, so far, no amount of money can bring to the indoor worker—the tides.

A letter from Mr. L. Carvin of the Plymouth Laboratory staff has just assured me that since the remodeling of the public aquaria and lighting by electricity—all sea weeds have vanished—this settles the seaweeds and daylight argument finally!



"Sometimes I change them over so that the little one can get some exercise"

Breeding *Bufo melanisticus*

by BARRY R. JAMES

TWO years ago I had the good fortune to visit Ceylon for a few days. I was actually en route for Singapore when the aircraft that I was travelling in developed engine trouble, and we were forced to remain in Colombo until spare parts could be obtained. This wait was further extended by the premature arrival of the north-east monsoon, which made take-off impossible until conditions improved. At the first available opportunity I commenced to investigate the fauna in the neighbouring palm groves.

I soon collected quite a bag of tree dragons (*Calotes versicolor*), which were abundant on the boles of the trees and on the hedges surrounding the native huts. Much to my delight I also secured a pair of tree snakes and various skinks and geckos and returned to my hotel feeling highly elated at my success.

That evening I decided to take a short walk before turning in. However, I had scarcely taken a dozen steps from the entrance to the hotel when I was aware of a sharp hissing sound beneath my feet. Thinking that it was a snake, I jumped smartly backwards and directed the beam of my torch on the offending object. To my surprise, instead of the snake I had been expecting, there was a huge toad. The creature was inhaling and exhaling in quick succession, thus accounting for the fearsome noise.

On closer examination I discovered a second individual a few yards away. I carried them back to my bedroom, carefully avoiding an encounter with the manager, and studied them at my leisure. Although I could not determine the species, it was obvious that they belonged to the genus *Bufo*, and that both were females. For the next few days I searched high and low for a male to go with them, but to my chagrin I had still not located one when my plane took off for Singapore.

There, with the help of a local uncle, I soon discovered the whereabouts of the commonest local ground toad. I caught seven specimens, only to discover that they were all males! Whilst bearing a superficial resemblance to my Singapore specimens, in that both possessed naso-orbital ridges, there the similarity ended. The Singapore speci-



Photo: C. Davies

Male *Bufo melanisticus* from Singapore

mens were a dark muddy brown with comparatively smooth skins, whereas the specimens from Ceylon were a bright orange colour, and thickly studded with warts.

When I returned to London I took a trip to the British Museum of Natural History in an endeavour to get my collection identified. To my surprise both sets of toads were identified as *Bufo melanisticus*, although the distance separating the two points of capture is many thousands of miles.

For the next few months I tried every inducement to get them to breed, without success, until one day in despair I dumped the whole lot in one of my tropical fish tanks (without the fishes, of course). I returned home that evening to find them in nuptial embrace, and by the following morning the tank was filled with strings of spawn. The eggs proved to be fertile, and in the warm water (78° F) the tadpoles developed very quickly, and within a month the toadlings were ready to leave the water.

The youngsters were about half an inch in length and varied in colour, some being golden and others, a sooty colour. It was significant that the golden ones, which resembled the females, were larger than the others.

Although spawning occurred last December I was able to find a few colonies of greenfly in the greenhouse and these, with grindal worm, provided a satisfactory diet for the babies.

I eventually reared some 20 individuals, which up to the time of writing have done very well. I did make the mistake earlier of placing them with the parents, but the latter made short work of them and I removed the survivors to separate quarters.

With the adult toads I have noticed a remarkable difference in habits. The males from Singapore spend the daylight hours searching for food, whereas the females from Ceylon are strictly nocturnal. These specimens were ready feeders on a diet of mealworms, earthworms, gentles, bluebottles and beetles and have proved hardy over a wide range of temperature between 58° and 90° F.



Female *Bufo melanisticus* from Ceylon

Our Readers Write

Hendon Annual Congress

OUR Annual Congress is once again to be held at the usual venue—Whitefield Secondary Modern School, Claremont Road, Hendon, London, N.W.2, on Saturday, 21st October, commencing at 6 p.m.

The response to our invitations to "V.I.P. aquarists" has been very encouraging and we will again this year possibly have many northern as well as southern aquarists.

The programme of 8 mm. movie films will cover a variety of subjects, from aquarium "jewels" to microscopic subjects, and the commentary will be by Mr. Carel, from Belgium. It is unfortunate that these pictures will not be shown again in this country and, therefore, it is an opportunity that aquarists should not miss.

Refreshments will be available for early arrivals and there will be a break before the end so that people may leave who have to make long journeys.

H. G. WHITE,
Secretary, Hendon and District A.S.

Under-gravel Filtration

FIRST let me thank you for a wonderful magazine. I enjoy your articles very much. In answer to a letter in the June issue by R. Szur, London, W.3, I have used under-gravel filtration in my tanks for the past 2 years and as yet have had no trouble with these. I also have raised some very fine guppies in these tanks. The only thing I can see could be the type of material used in these filters. My own are made of stainless steel. Once again thank you and keep up the good work.

J. W. THAINNER,
Prince Rupert,
British Columbia,
Canada.

American Terrapins

I WOULD like to draw your attention to an error in the August issue of *The Aquarist* in my article entitled "American Terrapins." The captions for the photographs have been switched round so that the mud terrapin (page 88) is labelled red-eared terrapin and vice versa. The cover photograph is, therefore, that of a red-eared terrapin (*Pseudemys scripta elegans*).

ROBERT BUSTARD, B.Sc.,
Alyth, Perthshire.

The Well-dressed Fish in Bermuda

Residents of the Bermuda Islands have become accustomed to almost every imaginable kind of salt-water fish (about 600 varieties have been recorded in the surrounding waters), but the recent appearance of rainbow-coloured fish, with balloons attached to their dorsal fins, stretched that imagination a bit.

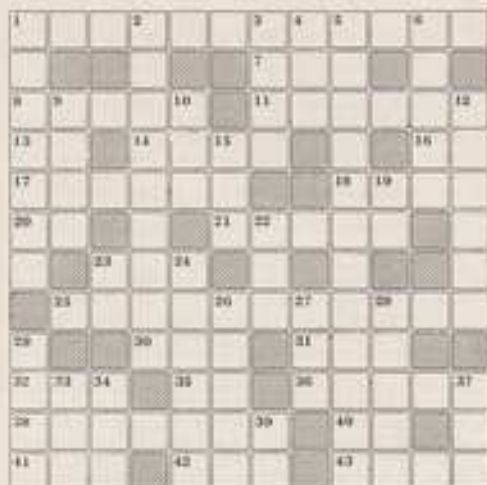
The balloons were the idea of an American zoologist who is doing summer research at the Bermuda Biological Station. Dr. Howard Winn, assistant Professor of Zoology at the University of Maryland, is studying the feeding and dwelling habits of the parrot fish, the rainbow-coloured fish whose jaws resemble those of the parrot.

Dr. Winn was interested in the movements of the parrot fish as it moved inland from its dwelling areas in deep water to the feeding ground closer to the shore. After he had attached balloons to the dorsal fins of about 100 fish which had been taken alive, Dr. Winn released them and then took notes as the balloons moved about the water.

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The AQUARIST Crossword

Compiled by J. LAUGHLAND



CLUES ACROSS

- Chief feature of *The Aquarist* (8, 4)
- Give over before reaching end of line (3)
- With 28 across, giant damo (5)
- Could be any one (3, 3)
- Mode of address for truck, the so-called Doctor fish (2)
- Dispose of for money (4)
- American public presenter leads 29 down (1, 1)
- Shorn as late surrounds the body (6, 6)
- Egg repository of bees and cockroaches (4)
- There's a small girl in the *Tenno* (2)
- Head but not brain (5)
- Author of *Kabappet* (1, 1, 1)
- See 8 across (11)
- Gourmet has a French friend (3)
- Part of the salt fish is burnt (3)
- See 30 across (3)
- Unat. first parade in, atom (1, 3)
- Roof of a school of fishes (3)
- See 2 Down (7)
- Royal cypher (1, 1)
- West Country river (3)
- Brought into existence in brief (3)
- Amphibious sea bear (4)

CLUES DOWN

- Usual grey of the juvenile netter (7)
- With 38 across X-ray fish (3)
- A tin (8)
- Nothing seems to turn up so give over (3)
- They play on the Road to Mandalay (6, 6)
- Frequently they are the bed of aquaria and rivers (3)
- Sound an odd sort of (6) (4)
- Over in a poetic sort of way (1)
- Consumers found like the cookery's method of keeping his tanks at correct temperature (6)
- Allow (3)
- Exclamation (2)
- Egg (3)
- Gourmet (1, 1)
- Specimen (24)
- Anglers get these from fishes and mosquitoes (3)
- Chief visitor of rubbers (3)
- Scrambled egg after honour for tank (3)
- Done by another name (4)
- Occupants of community tank must do this (5)
- Gift (3)
- Is she named after 9 Down? (3)
- Bit and be off (2)

(Solution on page 126)

THE AQUARIST



Notes 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 Mayor of Blackpool, Ald. Clifford Cross, J.P., president of the Blackpool & Fylde Aquarist Society, will be presenting the prizes at the society's annual open show on Sunday, 1st October.

Once again, Blackpool's schools have been invited to compete for the inter-school silver challenge trophy, which is at present held by Hutton Side Primary School. The junior section of the society, boys and girls attending Blackpool's primary and secondary schools, has during the past months, been very active and their keenness and enthusiasm have certainly surprised many of the older members.

The show secretary, Mr. R. Poston, has made available equipment for young schools represented by the junior members of the society but it is expected that many more schools will wish to take part.

Table show results of the last meeting were: *Redfish* Trophy: 1, Mr. B. Stammers; 2, Mr. B. Dore; and Mr. J. Fisher. *Junior Pair* of Fish: 1, Kenneth Silverwood; 2, Neil O'Hare; 3, John Kilgus. *Quarterly Trophy*: 1, B. Stammers; 2, B. Dore; 3, Mr. J. Worth.

FOUNDED in 1951, the Midland Association of Aquarists' Societies has endeavoured to establish and maintain Inter-Society amities throughout the Midland District. The present number of affiliated societies is 12. The Association enjoys close liaison with the Federation of British Aquarists Societies and introduced the F.B.A.S. Star Award system at the M.A.P.S. Midland Open Show at Binley Hall in August. The programme of demonstrations and lectures on the M.A.A.S. stand at this show is always well received. A strong panel of judges and speakers are available to all member Societies. Inquiries should be addressed to the Secretary, M.A.A.S., A. H. Allaway, 805, Stratford Road, Spetchley, Birmingham 11, Telephone S.P.R. 1642.

AFTER eight months of tremendous effort *Prestonpool A.S.* are emerging as a very fine general society. It is confidently expected that membership will be over 70 by the end of the year. Another very encouraging feature is the co-operation members are showing when called upon by the society. An exhibition staged at a local fête was seen by over 4,000 people and as a result of the generosity of the organizers, the society has acquired a considerable amount of valuable stock.

Publication of a monthly newsletter has begun and is proving to be a popular venture.

Another garden fish exhibition is to be held in September, to be followed by the society's Annual Show. Although only a one-day show, members are hoping to stage one of the finest exhibitions of aquatic life ever seen in South Wales.

A very lively and interesting programme has been planned for the winter. It will include visits by Mr. Vic Jones, one time curator of Bristol Zoo Aquarium and Mr. J. Emery of Hull, a well-known expert on saltwater fish.

THE Dundee Aquarist Society held its first meeting of the season recently. The table show was for the Scott Trophy and the results were as follows: 1, A. Robertson; 2, A. Fisker; 3 and 4, A. Robertson. A visit was also made to the

allocation of prizes for the "Member of the Year" trophy. The informal meeting to be held on the 15th October will take the form of a social evening, and more details will be available shortly.

THE result of the tropical fish exhibition held by Overley School, Southall, recently was: 1, Andrew Vernon; 2, Peter Barrow; 3, Peter Atack; 4 Peter Griffin. The prizes were given by Mr. Stuart Ryan, who also judged the entries, and the show was a great success.

AN Open Table Show is being held by the Bradford & District A.S. on the 1st October in the Co-operative Institute, Thornton Road, Bradford. At the last meeting Mr. G. Taylor spoke on Fish, Plants and Food. The September meeting is to be an Open Night and Auction.

THE East of Fife A.S. are hoping to stage a goldfish level competition for children on the 7th October (one goldfish in a glass container). Recent programmes have consisted of a table show for livebearers, the winners of the two classes being Mr. R. Gold and Mrs. M. Taggart. The inter-club show was held last month, the classes being Swordtails, Gouramis, Large Goldfish and A.A.V. Egg-layers.

STILL in the news are the pupils of the Southern County Grammar School. After an exhibition of slides and tape recordings provided by Haddon it was decided to organize a show, and this attracted quite a number of entries. The judge was Mr. Hunt of the A.S.L.A.S., and although the fish may not have reached a high standard the keenness of the members left no doubt as to the fact that the pupils are on the right track. This show was followed by a display on open day and this also attracted considerable attention.

The results of the show were as follows: Best Fish in Show: A. Woods, Cardiff; A.V. Goldfish: 1, Metherell, Strabrunn; 2, Parson, Gwent; Goldfish: 3, Torcs, Gwent; A.A.V. Goldfish: 1, Parson, Torcs; A.V. Guppy: 1, Joyce, Southall; 2, Woods, Dowlais; 3, Harrison, Llanymorog; A.A.V. Livebearer: 1, Evans, Southall; 2, Joyce, Southall; 3, Eaton, Southall; A.V. Catfish: 1, Wynn, African Catfish: 2, Joyce, Liverpool; 3, Joyce, Bristol; A.V. Labryntine: 1, Eaton, Brighton; 2, Evans, Blue Gwent; 3, Joyce, Penclun; A.V. Characin: 1, Joyce, Penclun; 2, Joyce, B.A. Torcs; 3, Woods, Flass; A.A.V. Egg-layer: 1, Joyce, White, C.M.M.; 2, Joyce, W.C.M.M.; 3, Evans, Avon.

A LARGE party of members and friends of the Brighton & Southern A.S. recently enjoyed a very successful summer evening at McLynn's Aquarium at Bournemouth. A table show for fish, crabs and minnows was judged by Mr. M. Pacey and resulted as follows: 1, S. Archer (White Cloud M.M.); 2, C. Phillips (Tiger Barb); 3, C. A. Dowling (Tiger Barb).

The autumn programme and full details of the society can be obtained from the secretary, Miss B. Stephenson, 14, Lincoln Street, Brighton, 2.

AT the Dublin Society of Aquarists annual plant show, the cup was awarded to Dr. Craig's last place. The other awards were: 2, Ambula (Master C. Ducas); 3, Amazon sword (Mrs. Spangling Jewell). The Ambula was a good healthy plant.

MR. KATRITSKY, the well-known authority on aquarists and house plants, gave an enjoyable talk at the last meeting of Hounslow and District Aquarist Society, followed by a show of slides of many plants he is growing at home. Many of the pictures were in full colour. Among many of the points spoken of during the evening was the correct compost for certain plants to grow in and also the periods of light they require.

THE latest newsletter from *Moreside A.S.* gave the information that the secretary, Mr. W. Kelly, had been forced through business reasons to retire from that position.

The third annual open show was held in July. There were 118 entries, including eight furnished aquaria, and the prize-winners were: Furnished Aquaria: 1, D. Hughes; 2, Mrs. B. Morris (Widow Aquarist Society); 3, B. Roe; Guppies: 1, H. Swanson; 2, L. Theobald; 3, B. Rimmer; Plants: 1, H. Swanson; 2 and 3, F. Pillingier; Molluscs: 1, Mrs. E. Swanson; 2, J. Poole; 3, R. D. Stumper; Swordtails: (and 2), H. Stumper; Best Livebearer: (Pair) H. Swanson; Fishes: 1, Mrs. E. Swanson; 2, R. D. Stumper; 3, Mrs. B. Kelly; Aquarials (other than Fishes): 1, T. Mitchell; 2, Mrs. E. Swanson; 3, B. Rimmer; Best Aquarials: (Blue Gourami, T. Mitchell; Small Characin: 1, Mrs. E. Swanson; 2 and 3, L. Theobald; Large Characin: 1, Mrs. E. Swanson; 2 and 3, B. Lewis; Best Characin: Moreside; Mrs. E. Swanson; Small Barb: 1 and 2, A. Harrison; 3, H. Swanson; Large Barb: 1, H. Stumper; 2 and 3, H. Swanson; Best Barb: (Nigger barb), A. Hawkins; Goldfish: 1, H. Stumper; 2, B. Roe; 3, H. Swanson; Top Minnow: 1, W. T. Kelly; 2, H. Swanson; 3, D. Hughes; Cichlid: (Pair): 1 and 2, B. Kelly; 3, W. T. Kelly; A.O.V.: 1, B. Rimmer; 2, L. Theobald; 3, S. Canavan; and 1, Mitchell; Breeder: 1, Mrs. E. Swanson; 2, H. Stumper; 3, H.



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Group of prize-winners at the annual open show of the Merseyside A.S. Left to right: Mr. W. O'Kelly, Mr. T. Mitchell, Mr. B. Rammer, Mr. E. Bell, Mrs. E. Swanson, Mr. H. Swanson, Mr. H. Stamper, Mr. A. Hawkins

Chairman of the Merseyside A.S., Mr. D. Jones (right), presenting some of the prizes won by Mrs. E. Swanson, assisted by vice-chairman Mr. J. Conley



Swanson. Best Fish in the Show (Mercury), 95 points, Mrs. E. Swanson.

The Society have been approached by the Liverpool Museum Authorities with the view of staging an exhibition of tropical fishes. Arrangements have now been completed and the event will take place in September, opening on the 11th and running for at least a month. During the course of the exhibition, two evening lectures will be given in the Walker Art Gallery Lecture Hall on the 14th and 21st September; the first is by Dr. F. N. Ghadially on "Breeding", accompanied by two films; the second, on the "Marine Aquarium", will be given by Mr. W. E. Lingo, who will be showing slides on the collecting, setting up and maintenance of marine aquaria. Admissions will be free and all aquarists within reach of Liverpool are cordially invited to attend. The Museum will be kept

open on both nights until 7.45 p.m. so that visitors can see the exhibition before attending the lectures.

SOME members of the East of Fife A.S. recently travelled to Dundee to participate in the first open show that the Dundee A.S. has held. Every known species could have been entered under the table classes, the only exception being marine fishes. Amongst the prize-winners were: Mr. A. Nicholson (Bass, Blue lineatus); Mr. J. Campbell (Bass *Corisodon aeneus*); Mr. R. Gidd (Baird, *Lateolabrax*).

The awards were presented by Dick McTaggart, of boxing fame.

In July the Society's monthly meeting took place in the Birkbecks. After the meeting was opened, a financial report and the minutes were

read. Details of the next Inter-Club Show were discussed as well as ideas for our "Goldfish in a Bowl" competition. The class for the table show was Liverpool. Results were—

Males (6 entries)—1, R. Gidd (green mollie); 2, W. Altinger (green mollie); 3, Mrs. M. Taggart (red-tail guppy).

Females (8 entries)—1, Mrs. M. Taggart (red waggled sword); 2, Mrs. A. Nimmo (green swordtail); 3, Mrs. S. Taggart (red waggled).

A schedule was also drawn up for the table show to be held during the forthcoming season: Cichlids (9th October), Labryrinth (6th November), Catfish and swordtails (10th December).

Change of Secretary

The new secretary of Merseyside A.S. is Mr. J. Foster, 60, Townsend Lane, Liverpool 6.

AQUARISTS' CALENDAR

9th-10th September: Willesden Open Show, Roundwood Park, London, N.W.10, 25 Chelsea. Details from Mr. J. E. Hooton, 24, St. John's Avenue, Harlesden, N.W.10.

12th-16th September: Leeds and District A.S., Trinity Church Hall, Four Lams, Leeds.

22nd September: Kingston & District A.S. Open Table Show to be held at St. Luke's Social Centre, Elm Road, Kingston-on-Thames. Details from Mr. N. Towell, 11 Belmont Terrace, Chiswick, W.4.

24th September: Odham and District A.S. Open Show, to be held at 135 Yorkshire Street, Odham. Entry forms available from Mr. C. Walker, 4 Jersey Street, Hilling, Odham, Lancs. 21 classes, Single, Breeding pairs and teams. Medals for best.

25th-30th September: Bristol Aquarist Society, Open Show to be held at Bishopston Parish Hall, Gloucester Road, Bristol. Schedule available from Mr. V. Capaldi, 18, Glen Park, St. George, Bristol (Closing date 10th September).

1st October: Bradford and District A.S. Open Table Show in the Co-op Institute, Thornton Road, Bradford.

ANNUAL Conference and A.G.M. of the British Aquarists Study Society will be held at the London Zoo (Zoological Society's lecture hall) on 20th October. The programme includes a talk by Mr. Lawrence E. Perkins on aquarist photography and answers to questions of aquatic interest by a "panel" of experts.

Crossword Solution

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