

The AQUARIST AND PONDKEEPER

Founded in 1924 as "The Amateur Aquarist"



THE BUTTS, HALF ACRE, BRENTFORD,
MIDDLESEX

Telephone: ISLeworth 6221

PUBLISHED MONTHLY
SUBSCRIPTION RATES

The *Aquarist* will be sent post free for one year to any address for £1 2s. 0d. Half-yearly 11s. 0d. Canada, U.S.A. \$3.00 yearly; \$1.75 half-yearly.

QUERIES

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

Correspondence with intending contributors is welcomed.

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VOL. XXIV No. 4, 5, 6

1959

Editorial

IN common with other periodicals, *The Aquarist* has been prevented from publication by the recent printing dispute. This issue, which is a combined number for the months of July, August and September, has been prepared under difficulties which have occasioned changes in content and we wish to express our regret for this to readers. We hope that with the next issue things will be returned fully to normal.

The season is approaching when some of the popular live foods for fishes, such as water fleas and water-insect larvae, will be more difficult to obtain. This does not in any way mean that the aquarium diet must become poorer as a result. Even if *Tubifex* worms, easily obtainable all the year round in most parts of the country, are not used there remain a number of other live foods that can be available without too much trouble. *Tubifex* are the subject of a perennial controversy about their acting as a means by which disease can be introduced into the aquarium and, although we have used the worms supplied in the London area for years without any undesirable consequences and consider them to be no more of a risk than any other live food obtained from natural waters, many aquarists roundly condemn them.

However, some preparations are necessary now if other live foods are to be used in quantity and at minimum cost during the winter months. "Cultures" of white worms or micro worms can be started and under the right conditions they will yield well throughout the year. These are perhaps the least troublesome cultures to maintain, and for practical details of culture procedure and for information on other ways of enriching the winter diet of fishes we recommend readers to consult *The Aquarist* booklet *Fish Foods and Feeding* by Dr. F. N. Ghadially.

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In the Marine Aquarium—A Lobster Novelty

by ERIC HARDY

LOBSTERS are not too difficult to keep in the marine aquarium, provided that you obtain fresh specimens from the lobster-fishermen or your own lobster-pot. Specimens may still be alive and moving when unpacked at your local fish-market, even by the seaside, but these seldom survive long in captivity. They require some sort of a hole amongst rocks into which they can retreat, and they should be fed on waste fish, crab and other animal food, if it is fresh.

Although an albino lobster was shown in a pre-war Aquarium (London, I think), variation in this common crustacean of our rocky coasts is chiefly in the large front claws, or chelae.

Heavily armoured like the knights of old, it uses these to defend its territory against intruders and rival lobsters which may seek its food. It also uses them to seize and crush its prey after stalking some unwary crab or other creature, by moving forward on tip-toe, with the same ungainly gait of the freshwater crayfish in the tank. The hand-like forceps on the larger front claw are the means by which it both seizes food and defends itself. This is heavier than the other claw and equipped with knobs inside the pincers to aid this crushing action. The other, the cutting claw, used to tear up the food, has sharp, saw-toothed edges instead.

Unlike the hermit crab's larger claw, which seems always to be on the right, claws that are "left-handed" are fairly often found on lobsters, though their big crushing claw is usually on the right. The discrepancy in size between the claws varies from slight to a marked difference. Sometimes, after losing one or both great claws in a fight, the lobster grows a small replacement which increases in size at each moult. What is much more unusual, however, is the freak occurrence of two large knobbed or crushing claws on the same lobster, which I exhibited at a recent meeting of the Merseyside Naturalists' Association held in Liverpool University.

This interesting specimen was given to me by a fellow member of the Lancashire and Western Sea Fisheries Committee, who caught it in one of his lobster-pots along the Caernarvonshire coast of North Wales. Although catches had not been specially scrutinised for this malformation it was the first example recognised out of several thousand lobsters handled in the Lleyn lobster-fishery where this was found at Morfa Nevin.

Common lobsters as well as the deeper water crawfish or spiny lobster, and the south-western giant spider-crabs, often sport a luxurious growth of barnacles in their old age. But apart from this and a rough assessment from length, there is no means of telling the exact age of a lobster as there is of an oyster or other shellfish. This is because the crustaceans do not produce annual growth rings like the molluscan shell. They split and shed their old dead skins and stretch their bodies (by as much as 15 per cent.) to harden the new skin. From its size, however, this 10-inch cock lobster from Morfa Nevin would be at least 7 or 8 years old. Lobsters grow slowly and a 9½ lb. specimen taken in Cardigan Bay last year might have been 20 or 30 years old.

Lobsters are much more sedentary than crabs, some of which are the wandering gypsies of the sea. Their activities depend much upon the water temperature, increasing with the gradually warming summer water and reaching their maximum activity when the water is about 60°F. Correspondingly, they become less active as the water cools in



Photo:

Eric Hardy

This lobster, caught on the North Wales coast, possessed two large crushing claws instead of the usual single claw of this type

winter, when they are more difficult to lure into traps. This gave rise to the erroneous fishermen's belief that they migrate offshore in winter and inshore in summer. I think about 10 miles is the most a tagged lobster has travelled, and 1 or 2 miles is much more typical. But the gradual, though slight, warming of the North Atlantic water this century as part of the climatic cycle which has effected interesting changes in the distribution of animals like cod northwards, more frequent turtles into European waters so far north as Norway and more southern fishes like garfish into Shetland waters, has also made the lobster more active on both sides of the Atlantic. This includes a corresponding influence of slightly warmer winter water temperatures.

Books tell you very little about the lobster's behaviour, least of all its travels. It is possible that any travels the lobsters make beyond 2 to 10 miles are caused by their tiny, free-swimming larval stage drifting with the current. To watch a lobster inspect and select a new rock-hole is as interesting as to watch the hermit crab inspecting a new shell for its body. Jerking its whiplike long, slender feelers with sudden movements, the lobster first makes sure by its sense of touch that no enemy lies concealed inside, before it backs inside, or enters and turns facing the front on guard.

Lobsters appear to spawn only every other year. Whereas the young or "lobsterling" (to use a Manx term) moults 14 to 17 times in a year, after 5 years it moults only once a year if male, and every other year if female, alternating moulting with spawning. One which lived for 12 years in the Port Erin Aquarium grew to 13 inches long and had cast 13 times since hatching. The first three larval stages are planktonic, swimming with the thoracic appendages. The fourth stage is a miniature adult. Later, too heavy to swim, it lives on the bottom, hiding under stones or in seaweed. Cod appear to destroy many young lobsters. Reproduction is interesting because the female or hen lobster fertilises her eggs as she lays them with sperm from pockets on the underside of the male. When "berried," she will have 3,000 to 10,000 eggs, like blackberries, under her tail-plates for 10 to 11 months from late summer. She is mature at 10 inches or more in length.

Some Experience with Ticto Barbs

told by Members of Hendon & District Aquatic Society

ALTHOUGH the ticto barb (*Barbus ticto*) must surely be known to every aquarist it seems to be kept by relatively few. This very distinctive fish is seen at almost every show, so perky and attractive, and can be likened to the "starlet" with everything that could be asked for yet somehow failing to make the top notices. The aquarist with no tictos indeed misses much that is both interesting and ornamental.

Ted Seymour (Dundee), tells of his experiences with coconut fibre

I purchased my first ticto barbs (sub-species *stoliczkanus*) from my local dealer, and all turned out to be females, but I managed to obtain some males from a Midland fancier. These were brought to maturity and conditioned for spawning on *Daphnia*, white worm and dried food. A 24 in. by 12 in. by 12 in. tank was cleaned out and fresh tap water (my supply is pH 6.8) to a depth of 8 in. was run in. The thermostat was set to 80°F. Coconut fibre was used as a spawning medium. This was boiled, rinsed under the tap and layered the full length of the tank and to within 2 in. of the front glass (this makes it easier to get the breeders out without disturbing the spawning medium).

Both fish were put into the tank at night and the light turned out. Next morning the light was put on and after a few false starts spawning commenced—a merry chase up and down the tank, the female scattering eggs in all directions.

This went on for 1 hour, and I then removed the fish to the community tank.

The first fry were seen after 36 hours and when they became free-swimming a few drops of Liquifry food were put in. As they developed I started to remove the coconut fibre, giving them more space to swim about in and allowing them to grub about on the bottom, which I find all barb fry like to do. They were next introduced to newly hatched brine shrimps (which I feed to all my fishes) and micro worms, then to Grindal worms and chopped white worms. After a few weeks I disposed of the majority of the fry, as there were far too many for the tank. The remainder developed very well. If you want to bring up all the fry make sure you have plenty of spare tanks.

The ticto is a very easy barb to spawn; no tricks are needed. When young the sexes can be distinguished quite easily, the males having black markings on the dorsal fin. The female's dorsal fin is just a light-rose colour with no black markings. When they reach maturity there is very little difference in the markings, but, as always, the female is larger and has a deeper body outline. These barbs greatly appreciate a partial change of water and you will find that this will keep them on their toes (or should it be fins?). You will also find that it is the first fish to go to the top of the tank and mope if it is subjected to the slightest overcrowding.

Nylon mops are convenient for spawning says Bert Wainwright

It seems rather pointless trying to describe the ticto barb; it can be found well illustrated in any of the popular books like those by Innes or Hervey and Hems. Their size, according to Innes, reaches 3½ in., and Hervey and Hems say about 3 in. I cannot say I've seen any of either size but possibly they do exist. Mine do not come that big when considered by body length alone. Book illustrations do fair justice to the colours of the ticto but even the cleverest printer would be hard put to it to capture and reproduce



Ticto barbs (*Barbus ticto*)

that lovely live golden sheen that flushes over them when they are in the peak of condition.

They seem to require very little effort on the part of the aquarist to keep them on top of their form; a roomy tank with a few healthy plants and clean water at a temperature around 68-75°F suits them perfectly. They appreciate a varied diet, but when live food is not easily obtainable they are still ready to take a steady diet of dry food and thrive on it.

An occasional change of water seems to be relished, too, and about every week or 10 days or so I draw off (from the 24 in. by 12 in. by 12 in. tank in which I keep half a dozen adults) about 2 gallons of water, replacing it with water drawn fresh from the tap. This new water has been warmed up a little but is still a degree or two cooler than the tank when it is siphoned in. The reaction of the fish as the new water enters the tank leaves no doubt about their appreciation.

Given these living conditions it is not long before good healthy fish are really in the peak of condition and the males making passes at the females. I have bred a good many in the way I will now describe and you may like to try it but, and I say this from past experience, if it doesn't work for you first time, just remember nothing ever does; be patient and you will have all the tictos you want.

When I see my males chasing the females around I clean out a smaller tank—it will most likely be an 18 in. by 9 in. by 9 in. as I find this adequate for one adult pair; they are not cramped and there is room for the female to get away if the male gets a little too rough for her liking. The tank is scrubbed, not forgetting the underside of the frame at the top, and the back and ends are covered with brown or other dark-toned paper. Enough medium gravel to cover the bottom lightly is also well washed.

I have two strips of glass, cut long enough to fit across the tank from front to back on the inside and ¼ in. wide; they are cushioned into position after a piece of air tube has been slit open and fitted over the ends. One piece of glass I fit about 3 in. from one end across the bottom, and my washed gravel is spread over the larger area of the bottom and the tank put into its permanent position, as

near the stock tank as possible but away from really strong light. Some 7 or 8 in. depth of water is then run in and the second slip of glass is fitted. This will fit immediately above the lower piece, part above and part below the water surface. Into the section thus formed over the clear bottom goes any food I may need to give the adults, and any that is neglected can be seen and removed easily and cleanly; no food can fall on the compost.

I have some mops made with nylon yarn. This can be bought from any shop that sells knitting material: the hank just as it comes from the shop is cut into three and each part fixed by its centre to a clean cork (a chemist will sell you all the corks you want for a few coppers) and the mops are boiled. The colour of my nylon is light green, but I should think white or brown or light blue would be just as practical. One of these mops is let into the tank; as the nylon takes up the water it will fall, to remain suspended by the cork about half an inch clear of the gravel. A few loose strands of nylon are put in the tank to lay over the bottom at the end away from the feeding section. The thermostat and heater are included and connected to the mains, the cover glass is put on and the tank left to settle.

All this preparation is done as soon as the fish are seen to be sporting around and, I hope, before they have finally sorted themselves out. I want the water to age a little and I want the temperature to level out with the stock tank. I also want to take those adults when they are at their peak. In my small school there will be a pair that are showing a distinct preference for each other, swimming the tank side by side, yet not touching, with a tenseness of body and fin movement; their colour will be intensified, particularly in the male, and the belly of the female will be rounding nicely. That is the pair I want in my breeding tank when it is 2 or 3 days old and, within a degree or two, the same temperature as the stock tank.



Mr. Bert Wainwright photographed
in his fish house

I wait until it has been dark an hour or so and, taking off the cover glasses, switch on all the lights; one deft swoop with the largest net I've got and, before the pair know what's what, they are in their new home and the lights are out again. There is no diving and chasing with the net; I know the pair I want and I don't want them scared. If I fail first time the lights are switched out and I have another try when I think they have settled down; but I use a really big net and usually get them first go. In this way I find that they settle in their new tank right away and the next day are spawning.

I have found that the ticto barbs will spawn at any time of day so long as there is light by which to see each other, if they are ripe. My own experience has all too frequently been that they have picked a time when they are not being watched (not that watching puts them off), and there is no one to stop them having a good feed of eggs once their ardour has cooled off! But when I have been able to watch I notice the spawning runs gradually lessen in intensity until they stop altogether. The male, instead of courting the female with displays of fin spreading and general showing off, chases her away or ignores her altogether, giving all his attention to the eggs that are scattered around.

When spawning has taken place in my absence and I later see none of the courting signs but both fish feeding from the gravel, where no legitimate food can possibly be, I know I must move them out right away if I want to save any eggs; out comes the net and back into the stock tank they go. I then put a couple of drops of egg-layer Liquifry food in with the eggs.

The eggs will hatch in 1½ to 2 days, and the magnifying glass will show the fry hanging, like little splinters, to the nylon and sides of the tank; by the time they are ready for it those couple of spots of liquid food will be Infusoria. The fry will not have to seek food, it will be there ready to fall into their mouths the moment they open. Twice a day, I very carefully draw off a pound-size jam jar of water from the tank and into that jar I drop enough Liquifry to cloud the water lightly when it has been stirred up; I can see the food but I can also clearly see the other side of the jam jar. I carefully lower the jar into the tank and lay it on its side in that part of the bottom without gravel. Before long the fry are nowhere else but in or around that jam jar, and the nylon mop can safely be moved, with care, from the tank. In a few days I use a little of the food made for livebearers, and if, with my magnifying glass, I see the fry taking it I continue with it until they can be given micro worms or sifted *Daphnia*. If I get them that far its then plain sailing; it is that first feeding, as soon as they are free swimming, that is so important, not only with ticto barbs but with all fry.

I haven't always used nylon as a spawning medium; earlier I would fill a flower-pot saucer with compost and cram as many sprigs of *Hygrophila* or *Myriophyllum* into it as it would hold and place the saucer into the centre of the tank. The bottom of the tank would be quite clear of gravel. That did equally well. I have used coconut fibre without success, although friends of mine have been very successful with it. All things tried, nylon is, in my opinion, the best medium by far: it is very clean, lasts indefinitely and is cheap enough.

I know full well that tap water in my district (hardness 285 parts per million) can be a very different substance to tap water in another district, but if the fish live and thrive in local water then they certainly will breed in the same water; there is no doubt about that. The only point for discussion is, would they breed more prolifically in the tap water of one district than another? As I've said, that is a point for discussion, and I'm writing about how I breed ticto barbs—not arguing about water!

Notes on Varieties of Goldfish

by R. J. AFFLECK, M.Sc. (*President of the Goldfish Society of Great Britain*)

MOST aquarists know that about a thousand years ago the first domesticated goldfish arose in China from the wild-type fish. These first fish were almost certainly colour mutants having the form of the wild type but with the well-known orange colour. All the varieties known to-day appear to be direct descendants from them. Unfortunately, little detailed information is available about the early varieties and although scholars have searched amongst old Chinese literature there are no known records of when paired caudal fins, celestial eyes or other characters made their first appearance. The only known records of mutations in goldfish are: net-like transparents, recorded by Dr. Matsui (1927), and mock-metallics and pseudo-matts recorded by Miss D. Morris (1952).

Because little definite knowledge exists and also because goldfish come from the "mysterious East," it is not surprising that many strange beliefs about them have come to be accepted as facts by people of the Western World.

Although most of the variations found in domesticated goldfish arose in China and then later were introduced into Japan, Japanese fish tend to be different from Chinese ones. It is difficult to define the difference but in general Chinese fish are bizarre whereas Japanese specimens are dainty.

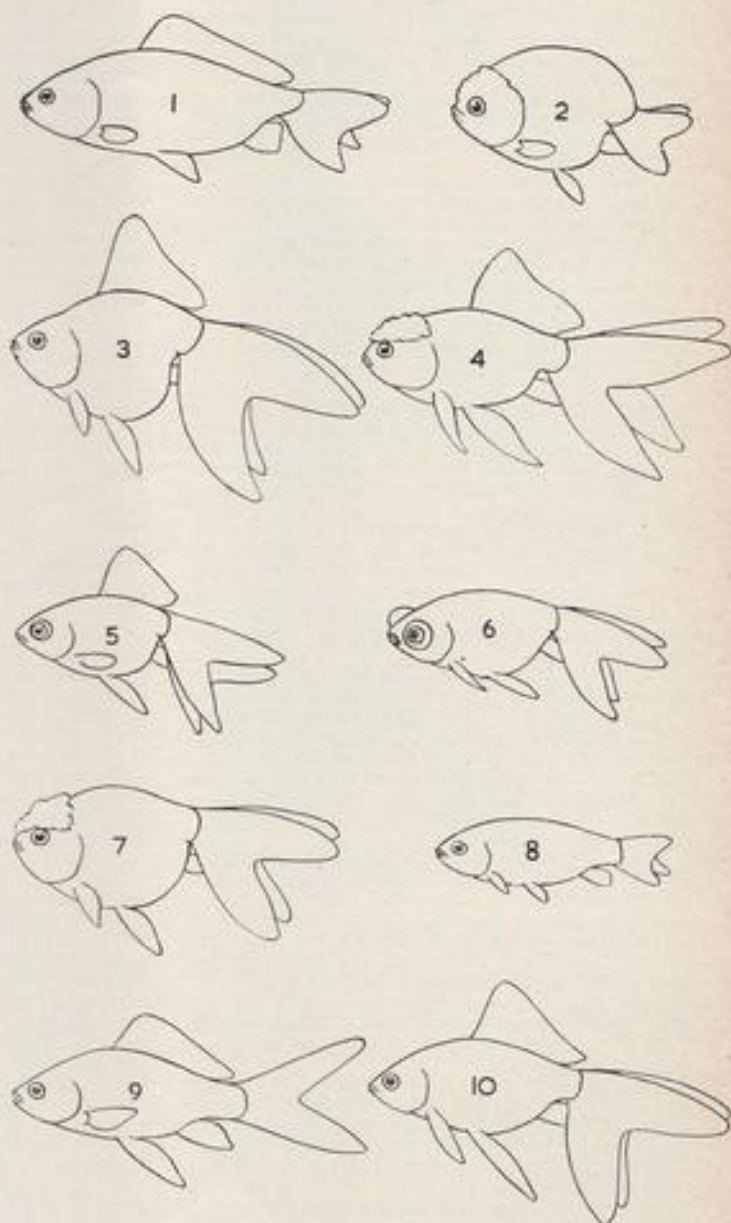
It is true that goldfish were known in Britain before 1900 but serious goldfish breeding was practically unknown until after the First Great War, when fish were imported mainly from U.S.A. Our ideas on goldfish have mainly originated from the Japanese via the U.S.A.

A paper by Dr. Matsubara, director of the Imperial Fisheries Institute, Tokyo on "Goldfish and their Culture in Japan," written in 1908, gives an excellent description of Japanese goldfish and is admirably illustrated with coloured plates.

The varieties mentioned by Matsubara are Wakin, Ryukin, Ranchu, Oranda-shishigashira, Demekin and Deme-ranchu, which were established varieties, and Watonai, Shukin, Shubunkin and Kinranshi, which had been produced by crossing some of the older varieties.

Wakin. The body is long and slim and somewhat similar to that of a wild-type fish. The fins are short and, according to Dr. Matsubara, the caudal fin may be single, tri-lobed or paired.

The fish illustrated is metallic, i.e. the whole body has a shiny, metallic lustre.



1, Wakin ; 2, Ranchu (after Tanaka) ; 3, Ryukin ; 4, Oranda-shishigashira ; 5, Demekin ; 6, Deme-ranchu ; 7, Shukin ; 8, Kinranshi ; 9, Shubunkin ; 10, Watonai (illustrations 1 and 3—10, after Matsubara)

Ryukin. The body is short and deep. Fins are very long and the caudal and anal fins are paired. The fish illustrated is metallic.

Ranchu. The body is short and deep. Fins are short with the caudal and anal fins paired but the dorsal is absent. A hood is present in the cranial, sub-orbital and opercular regions of the head. This is the most highly prized Japanese variety. The fish illustrated is metallic.

Oranda-shishigashira. The body is intermediate between that of a Wakin and of a Ryukin. The fins are long with the caudal and anal fins paired. A hood is present. The fish illustrated is metallic.

Demekin. The body is similar to that of the Oranda. The fins are long with the caudal and anal fins paired. The eyes are enlarged and protrude laterally. The fish illustrated is metallic.

Deme-ranchu. The body is similar to that of the Oranda. The fins are short with the caudal and anal fins paired but the dorsal is absent. In the text Dr. Matsubara says that the eyes protrude and are turned upwards through 90 degrees. The fish illustrated (a metallic) is evidently a young one, as the eyes have not rotated into the final position. This variety is usually termed a Chotengan.

The above varieties were well established in Japan when Dr. Matsubara wrote his paper, but between 1880 and 1900 four varieties were produced by crossing some of the older ones.

Watonai. The body is long but shorter than that of a Wakin. The fins are long and similar to those of a Ryukin. The fish illustrated is metallic. A Japanese aquarist who had only one pond kept all the above-mentioned varieties in it. A few Watonais turned up in the offspring after a mass spawning in the pond.

Shukin. This fish is like a deep-bodied Oranda without a dorsal fin and was produced by crossing Ranchus and Orandas. Ten of each were mass-spawned and 300 young fish resulted. Twenty of these lacked a dorsal fin and were grown on and eventually mated. These were the beginning of the strain seen at the Fisheries Exhibition Tokyo, 1883. The fish were metallic.

Shubunkin. In China some Demekins are nacreous. Ten of these Chinese-type fish were mated with Wakin and 500 young fish produced. Of these about 100 had the form of a Wakin but with the dappled markings of a nacreous fish. As a Shubunkin is merely the nacreous form of a wild-type fish (some with slightly longer fins) and nacreous fish were known in China many years before 1900, Shubunkins were obviously produced in China but discarded as unworthy of serious attention.

Kinranshi. This fish is like a Wakin lacking a dorsal fin. Ten Ryukins were mated with 10 Ranchus and about one-third of the offspring were Kinranshis. All were metallic.

In referring to the annual exhibition for Ranchus held in Tokyo, Dr. Matsubara mentioned that the best fish might be sold for £25 to £35 (in the year 1907), but that "not one specimen in ten thousand commands such a price."

Discussing the new varieties Matsubara states that the Shukin is the most popular but that the Shubunkin is the most profitable, as only a few have to be discarded because of crooked or irregular fins.

The first important paper on inheritance in Japanese goldfish is by Dr. Matsui (1934), entitled "Genetical Studies on Goldfish of Japan." This work is a summary of 20 years of study, during which over a million fish were bred. Dr. Matsui mentions all the varieties in Matsubara's paper and six others in addition.

This is no place to discuss in detail the results obtained by Matsui but it is interesting to learn that the Shukin had become extinct and the other varieties which had been produced by crossing had been ignored by the experts.

Dr. Matsui gives detailed results of breeding experiments and showed conclusively that Japanese varieties do not

breed true. In one experiment with fish with paired caudal and paired anal fins less than 25 per cent. of the offspring had both of these fins paired.

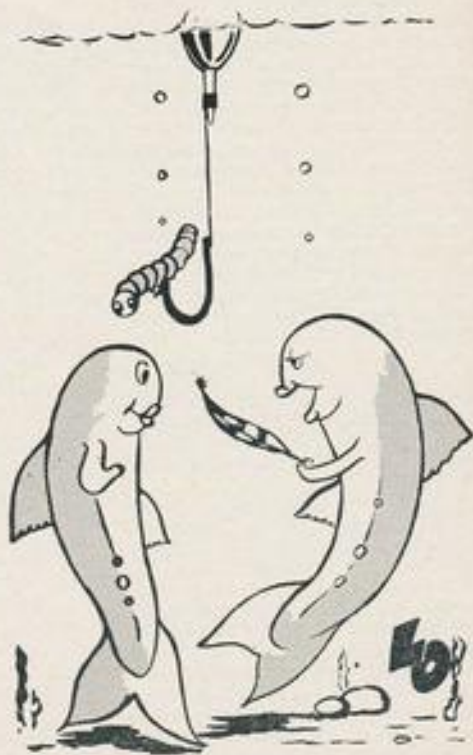
It is surprising how many people in Britain blithely talk about varieties in China and Japan being true-breeding without any evidence for their statement.

I think the following points should be particularly noted:

1. In Japan a few highly developed "varieties" were imported from China, and by selective breeding over many years breeders evolved strains from which some good specimens were produced.
2. Each variety had its own few characteristics so that an aquarist might concentrate on breeding the long fins of a Ryukin or the enlarged eyes of a Demekin.
3. New varieties with intermediate forms were not favoured by the experts.
4. None of the varieties was true-breeding and only an extremely small percentage developed into outstanding fish.
5. The vast majority of the fish bred were rejects.

FINNY BUSINESS

by
LD



"Let's tickle his maggot—he'll think he's got a nibble"

THE AQUARIST

Breeding the Thick-Lipped Gourami (*Colisa labiosa*)

by E. WALLWORK

RECENTLY this colourful fish has not been in general supply, owing to the increase in imports of more glamorous fishes, but to my mind it really is most attractive, especially when in breeding condition. When first purchased my stock was only about 5/8th in. long and very much resembled the young of the dwarf gourami, having a dull greenish-grey body with faint blue-green stripes inclined forwards. Where these stripes crossed the lateral line, however, they appeared to be darker.

These fish, four of them, were kept in a community tank and fed on a variety of foods, but mainly *Tubifex*, white worms and dried foods. They soon put on weight and at about 1 1/2 inches long were easily sexable. Males were more colourful than the female; their fins did not appear much different. At this point the sexes were separated, though I did not consider this to be necessary, as they can be brought to sexual maturity in the community tank without any difficulty and they often spawn there.

Sex was more apparent at 2 inches long. The female's sides were conspicuously bulging with spawn and her colour was increased but not to be compared with that of the male, whose dorsal fin had pointed towards the tail and extended over the caudal peduncle. The male was brightly coloured with an overlay of chocolate brown; his fins had become edged with an orange-yellow border and the pectorals quite bright orange.

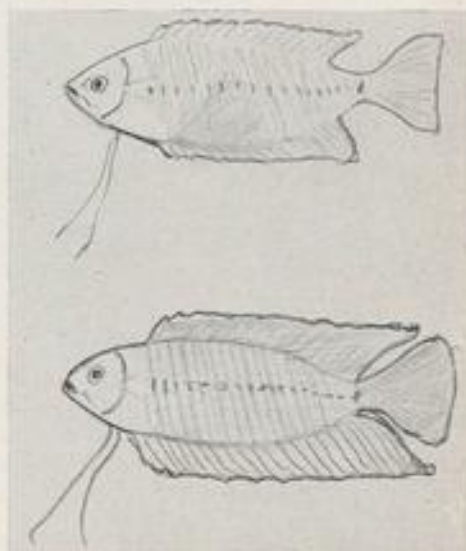
Most books tell us that these fish breed in typical labyrinth-fish fashion, but it is my experience that procedure varies considerably within the group, due to the differing character of eggs and their individual requirements.

Large Tanks for Rearing

One thing is certain, however: to bring up a reasonable batch of youngsters from this fish, a reasonably large tank is required. The fish will spawn in a 12 in. by 8 in. by 8 in. tank without difficulty but few are likely to be brought to maturity. Personal preference is for a 24 in. by 12 in. by 12 in. aquarium, which was used, though the water depth was only 6 inches. Water was greenish, taken from a tank which had stood in good sunlight for some weeks in the early summer, and temperature in the breeding tank was raised to 82°F. This green water is most valuable in rearing thick-lipped gouramies.

Almost as soon as the fish were introduced they showed interest in one another and within an hour the male had started blowing fine bubbles indiscriminately all over the tank; they were very fine bubbles, probably half as large as those used by the Siamese fighters. The following morning spawning was in progress in one of the front corners of the tank, which was a good thing, as I could not have seen them in the rear of the tank because of the green water! There were no rooted plants in this tank, but at the surface were *Riccia*, bladderwort and a few strands of *Myriophyllum*, and it did not occur to me that a nest was present at first, until I saw that it was quite shallow and spread over an area 3 to 4 inches in diameter.

The female showed no fear, but was nudging the sides of the male and he swam parallel to her for a few seconds, then arched his body in U formation over the centre of the female, exerting pressure on her sides. Together they rolled over in their embrace for half a minute or so, before parting. It is quite remarkable to see a short, stocky fish such as the male, bend his body in such a way. After the embrace both fish blew very fine bubbles underneath the nest, so copiously that I could not see any eggs. Four



Thick-lipped gourami. Male, lower fish; female, upper fish

hours later, as spawning had apparently stopped, I removed the female. Then, under strong top light and with a medium-power lens, I saw the eggs, which were very tiny and at times indistinguishable from the bubbles. In character they were quite different from those of other bubble-nest builders, for whereas those of the fighters are opalescent white and those of the dwarf gourami are faint amber and transparent, these were hyaline, colourless and freely floating. After another day the male stopped blowing bubbles, the nest disintegrated and the male was removed. Before very long the bubbles broke up and I was really amazed to see what I judged to be 700 to 800 eggs, scattered all over the tank, moving in little circles because of convection currents from the heater. These were approximately 1/4 mm. in diameter.

Feeding the Fry

After 48 hours or so, it seemed to me they had all hatched out and they were very tiny indeed and difficult to see except at the front edge of the tank. Naturally, I visualised tanks full of thick-lipped gouramies before long, enough for dealers and friends, but it was not to be. Drip feeding of *Infusoria* was commenced after another day, at the rate of 2 pints daily of thick culture. At the end of the first week after hatching the fry had bulging tummies, though their numbers seemed to be less than when I first saw them, and within the next few days the water was not so green as before. Very light aeration was then applied. Soon it was quite clear that only about 250 fry remained. *Euglena* was then used to feed the fry, and gradually brine shrimp, micro worms, *Daphnia*, shredded earthworm, *Tubifex* and dried food were added. Irregularity of growth of the batch was such that some of the fry were four times as large as others at the age of 1 month, and their numbers had dropped to

(Please turn to page 71)

Getting the Best from the Poeciliids



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

THE poeciliids, or as they are more commonly known, the livebearers, are the easiest of all tropical fishes to breed. The guppy, for instance, will breed under the most detrimental and unusual circumstances, but it will be appreciated that under poor conditions the resultant fry stand very little chance of becoming healthy specimens of their particular strain.

It is obvious therefore that every effort must be made to see that the fry are not left wanting during the early stages of their life.

The same applies to the parents, but in their case the care and attention should begin long before the fry are born. This care and attention is often referred to as the "conditioning" of the fish, i.e., getting them ready for mating. It is as necessary to condition fish before breeding as it is for a boxer to train before a fight. In both cases the conditions before the event decide the ultimate result.

There are many ways of conditioning fishes but the best way to start is by flooding the breeding tank with light. Livebearers love a well-lighted tank and, apart from making the males more promiscuous in their sex life, the light will also produce the algae on which most poeciliids naturally feed.

A steady variation of about 10°F in the temperature of the water will increase the strength and hardness of the fish, more than that of a constant heat of, say, 75°F. The fish will enjoy and benefit most from a temperature range of between 75 and 85°F. in the summer, which also encourages them to breed freely and a drop to between 65 and 75°F. in the winter to give the fish a rest.

It is also important to remember to keep the tanks well covered, as the males particularly are adept in the art of jumping and many a handsome fish has ended its life on the cold hard floor of a beginner's fish house.

Although it is not important, it helps when conditioning fishes to ensure a plentiful supply of oxygen to the tank, because the more energetic the fishes are the greater becomes the need for correct aeration of the water. Fishes

by R. E. MACDONALD

(Photographs by PAUL POPPER)

need oxygen just as much as human beings. Plant life should be kept clean and only healthy vegetation allowed in the tank.

As with *Homo sapiens*, the old saying that "you can't make love on bread and jam" applies. Whenever conditioning livebearers they should be given a good substantial vegetable diet. Bemax or chopped spinach are the best substitutes for algae but it always pays dividends to supplement the vegetable diet with meat, such as minced earthworm (which is the most nourishing), small live *Daphnia* or mosquito larvae.

The majority of tropical fishes show cannibalistic traits when producing young so this introduction of meat to their diet should help to satisfy any craving for animal food.

It is useless to make rules about how often fishes should be fed because in natural conditions they are more or less feeding all the time. Therefore the only advice that can be given on the subject is to feed them little but often.

It should be remembered that over-feeding causes a certain amount of unwanted food to lay at the bottom of the tank, so always be thorough with the siphon or dip-tube, as dirty conditions do not breed fishes, only disease.

Some aquarists maintain that an effective method of increasing the attention and interest that the male displays towards the female is to separate the sexes by dividing the tank with a sheet of glass. This is a most unnatural procedure and, in my opinion, from observation, only brings distress to the unfortunate pair. Poeciliids are by nature extremely free in producing young, therefore apart from giving them the best possible conditions to breed in



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

they should be left alone to carry out their courtship in the manner most natural to them.

Always avoid moving female livebearers when they are pregnant, particularly the female mollie (genus *Mollienesia*), as besides the risk of the mollie contracting "shimmies" a premature birth may result or the brood may be delivered stillborn.

All the fry of livebearers are large when born, perhaps amazingly so to the beginner, some being as large as half an inch in length. When giving birth the female will lay steady in the water about 4 inches from the surface and eject the fry from the anal vent at the rate of approximately one every 4 seconds. An interesting point to note is that the fry leave the body of the female tail first and not head first as with human beings.

The only immediate difficulty of the newly hatched fry is the functioning of the swim bladder. To overcome this the fry make their way to the surface of the water in a series of jerks, where they will spend the first days of their life. From this it can be seen that one of the secrets of success is to instal floating plants such as *Riccia* and floating fern, which will enable the fry to escape and shelter from the cannibalistic tendencies of the parents.

It is advisable to remove the female from the tank for a



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



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



few days after giving birth so that she may rest and is not subject to the never-ending courtship of the male.

The new-born fry will feed first from their yolk-sac, then from the algae formed in the tank, which will be present in abundance in a well-lighted tank.

Although they will not need such small-sized food as Infusoria the feeding of the fry will need careful attention.

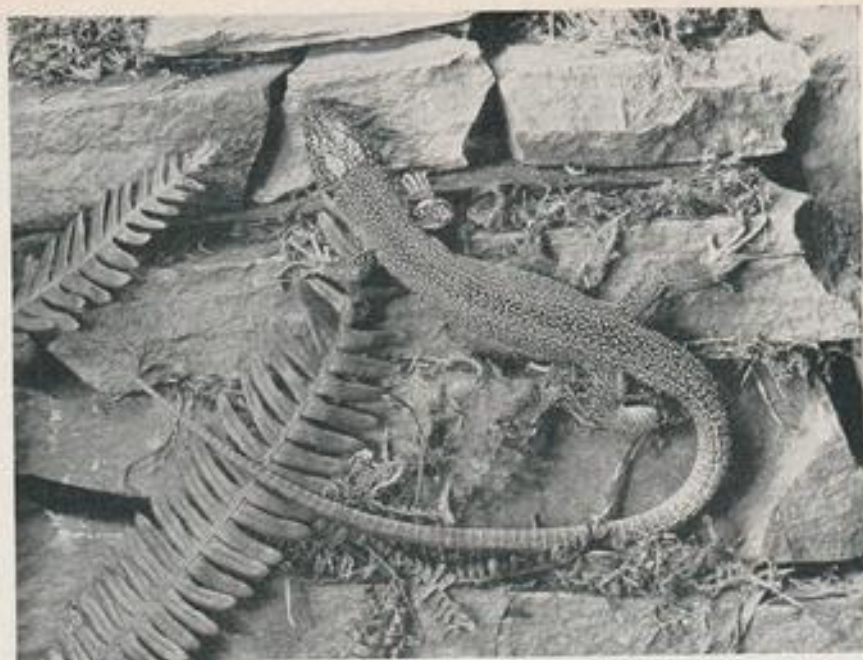
One way of ensuring rapid growth of the fry is to give them sifted live *Daphnia*, powdered dried foods or mashed earthworm.

Above all give the fry plenty of room. If you want them to grow into respectable fish they must have space in which to develop; cramped conditions create "cramped" fishes. This observation is all the more important when it is remembered that a female may deliver as many as 200 fry in one brood, depending of course on its size and age. Unless there is ample room it is far better to sacrifice the majority to the angel and other carnivorous fishes and be content with rearing only a few dozen healthy, resplendent specimens in the best possible surroundings.

Heated Pond for Goldfish

ONE of the most unique fishponds was designed and constructed in 1768 by the Italian architect Ducart for Lady Roden at Brockley Park near Stradbally in Ireland. It was 20 feet in diameter and 3 feet deep. The walls were built of cut limestone to a perfect radius and coped and oversailed by a neat moulded capping in the same materials. The last foot of the wall base on the bottom of the pond was in fact a flue, built in brick and hydraulic cement mortar and rendered watertight with this material. This flue was connected with a fireplace, 4 feet below the level of the pond bottom in a heat cellar, and an outlet to the flue was formed at the opposite side of the pond leading to a neat chimney stack in cut stone 10 feet high. A large charcoal fire provided sufficient heat to warm the water in the pond in frigid weather and prevent ice forming. In the pond Lady Roden kept "golden carp" of many species, we are told. It is said that these goldfish, as that is what they were, changed colour in the heated pond in winter, from gold to a brownish tinge of scaling. We are told that when the goldfish was first introduced into Britain, about 1690, it was kept in heated aquaria, the heated water being supplied by engines, or pumps to be more correct. Lady Roden's heated pond is of great interest as a unique feature of eighteenth-century gardening.

C. J. Robb.



Photos:

Robert Bustard

Green lizard (*Lacerta viridis*). This specimen is "peppered" with yellow dots

Lizards from Southern Europe

by ROBERT BUSTARD

MOST of the subjects of this article have been popular vivarium inmates for many years. They are easy to obtain, featuring in dealers' lists each season. They are attractive lizards which do well in captivity with a minimum of attention.

The green lizard (*Lacerta viridis*) is, as its name suggests, a handsome shade of green. Some specimens have numerous tiny yellow flecks on the back. The ventral surface is yellowish. Male specimens are easily identified in the breeding season by the bright-blue coloration on the throat and jowls. The base of the tail is always thicker in male lacertids than in females and this is a fairly reliable guide to sex in many species of lizards. A large adult will measure about 16 inches, the average size of specimens imported being between 12 and 15 inches.

This lizard is at home in the outdoor reptiliary, where it is seen to advantage. Green lizards do not appear to do nearly so well indoors, where they often suffer from skin complaints. Owing to its larger size (as compared with the wall lizard, for instance) and its active nature, it is especially suited to the garden enclosure. These lizards although shy at first—when handled they may give quite a sharp nip—become quite tame in time. The usual insect fare such as mealworms, gentles, bluebottles and spiders is suitable. I have found they are very fond of cabbage-white butterflies and I collect the fully-fed larvae and place the resultant pupae in the reptiliary, where the butterflies emerge in due course. This is one of the advantages of the completely enclosed reptiliary. Mine is fly-proof and food, therefore, cannot escape before it is eaten. I often

think that we in Europe undervalue this lizard since we can obtain it relatively cheaply (prices vary between about 4s. 6d. to 7s. 6d. per specimen). Friends abroad rate this lizard very highly.

Eyed Lizard

The largest European lacertid is the eyed lizard (*Lacerta lepida*). This strong well-built lizard grows to about two feet. Owing to its more southerly range—it is found in Southern Europe and North-West Africa—it should be housed in a roomy indoor vivarium, 30 in. by 18 in. by 15 in. would be ideal for a pair. I keep my specimens at 70-75° F. by means of an electric-light bulb, except when the vivarium can stand in the sun. The vivarium can have a floor covering of sand with logs or stones for the lizards to hide behind and bask on. As always, a small water dish must be present. The ground colour of the eyed lizard is green with dark-blue or black markings on the back. On the flanks these markings may take the form of closed rings or "eyes", hence the name of the lizard. Below it is yellowish or pale green.

Owing to its large size this species should be kept apart from its smaller relations. It does well on the usual insect diet and most of the specimens I have kept have also readily taken strips of raw meat. This is a very good species. Specimens vary in price from about 10s. to 30s. depending on size.

The Spanish lizard (*Psammodromus hispanicus*) has a similar range to the eyed lizard and therefore requires similar conditions. This small 6-inch lizard has keeled scales

and does well in a sandy vivarium with dry moss and stones for hiding places.

Lizards requiring similar conditions are those of the genera *Acanthodactylus* and *Eremias*. Specimens are often available and are easily kept. They like a dry warm vivarium (temperature about 75°F.). The usual insect fare is acceptable. They are usually small in size and some are very attractive. *Acanthodactylus boskianus* has golden stripes on the body and *A. pardalis* from the Eastern Mediterranean has brown markings on a khaki background.

Russian Steppe Lizard

As an example of the genus *Eremias* the photograph shows the Russian steppe lizard (*Eremias velox*). In these lizards the lower eyelid has a transparent section which protects the eye without loss of vision when the lizard is digging in the sand.

The glass "snake" (*Ophisaurus apodus*), often listed by dealers by its Russian name of "Scheltopusik", is a native of S.E. Europe, S.W. Asia and N. Africa. This giant legless lizard takes very kindly to captivity and does well in a roomy indoor vivarium at 70°F. It can be kept out of doors if the situation is really sunny but care must be taken to see that it cannot burrow out of the enclosure. The glass "snake" has been a popular pet in this country for very many years. It is hardy and long-lived. My specimens have been fed mainly on raw meat sometimes dipped in beaten raw egg. They also relish large earthworms, slugs and snails. Small and medium-sized mice are also suitable. The European glass "snake" (other species also occur in the United States) is said to reach a length of four feet, but the specimens imported are usually between two and two-and-a-half feet. The largest specimen I have kept measured 39 inches.

This lizard has long been a favourite of mine. It becomes very tame and appears to be quite intelligent. Care



Russian steppe lizard (*Eremias velox*)

must be taken in handling a new specimen, as if it breaks off its tail it appears to have broken in two! The head is olive-coloured and decidedly lizard-like. Specimens vary in price from about 15s. to 30s.

Thick-Lipped Gourami

(continued from page 67)

around 120 by this time. Of these only 87 reached maturity, but even that was quite rewarding. It is clear then that a large tank is essential, because it gives more swimming space to the batch, greater aeration surface per fish and is less liable to contamination by Infusoria and dried foods. Size of Infusoria is also most important; in my opinion, *Paramoecium* is too large in the early stages and

Euglena is about right, *Stentor* and *Stylonychia* being acceptable when young. Green water is the most acceptable food at first if a good batch of these fish is to be raised, as the fry are very small indeed and the early food has to be in small sizes. As with all labyrinth fishes it is important to prevent cold air from passing over the surface of the water, especially at the end of the second week, when the labyrinth is forming, and the fry are most susceptible to chills, which prove fatal. For this reason a good fitting cover glass is essential.

AQUARIST'S CALENDAR

1st-9th August: Southend, Leigh and District Society open show at Southend.

20th-22nd August: Walthamstow A.S. annual show at Hawthorne Road Halls, Walthamstow.

26th-29th August: Midland Aquarium Pool Society annual open show at Ringley Hall, Birmingham.

2nd-5th September: Coventry Pool and Aquarium Society open show at Old Grammar

School, Hales Street, Coventry.

4th-5th September: Bethnal Green A.S. annual open show at 229, Bethnal Green Road, London, E.2.

8th-12th September: East London A. and P. Association annual show at Central Hall, Barking Road, East Ham, London, E.6.

12th-13th September: Willenden and District Aquarists Club annual show at Roundwood Park, Willenden.

4th-10th October: Leeds and District Aquarists Society annual show at Leeds.

10th-11th October: British Aquarists Festival at Belle Vue, Manchester.

14th-17th October: Bradford and District A.S. annual show at Mechanics Institute, Bradford.

30th-31st October: Bristol Aquarists' Society annual open show at the Bishopston Parish Hall, Bristol.



BRITISH AQUARISTS' FESTIVAL

10th and 11th OCTOBER

Belle Vue Zoological Gardens, Manchester

Classes cover all tropical and coldwater fish

Hon. Show Secretary: Mr. Geo. W. COOKE, "Spring Grove," Fieldhill, Batley, Yorks.

OUR EXPERTS' ANSWERS TO TROPICAL AQUARIUM QUERIES

I have a pair of black speckled mollies. The young just dropped by the female are coloured grey. Will they stay grey all their lives, or will they colour up like the parent fish?

The young of speckled mollies are usually greyish when born, but as they develop they will show specks and dark blotches on the sides. Many of them may even become velvety black by the time they are 6 months old.

I removed a gravid female molly to another tank to have her babies. Soon after the transfer was made, she gave birth to several dead and deformed babies, and died herself within a few hours. Did I do wrong in moving her?

A gravid molly, or any other female livebearer, should not be moved when she is about ready to deliver her young. The shock of being caught in the net and of being transferred to another body of water, usually leads to the premature delivery of the babies and the subsequent death of the mother fish. In some cases the mother fish dies soon after removal to another tank with the babies still inside her.

A female platy I have has a very bloated body. At first I thought she was going to deliver young, but now I realise that her condition is not due to an advanced state of pregnancy but is a symptom of some disease. Can you tell me what is wrong with this fish?

We feel sure that your fish is in the advanced stages of dropsy. This disease results in the body tissues filling with water. As the disease progresses, the scales stand out at right angles to the body. The victim will often linger for weeks before it dies. Dried food will accelerate the progress of the disease. Live food will keep the fish alive for a longer period.

I recently added some potassium permanganate to my aquarium water to try and clear it of algae. Now all my plant life has a brown scum coating the stems and foliage and the sand has turned brown. The sides of the glass are also coated with a brown film. How can I get rid of this brown coating without dismantling my aquarium and buying new plants?

Rake the sand over with a dinner fork tied to a piece of stick and scrape the sides of the glass with a razor blade; tap the plants gently to remove the brown sediment adhering to the foliage and siphon the bottom of the aquarium to get rid of it. The plants will soon throw out new green leaves and stems, and the water will become clear. The fishes will not suffer in any way during these operations.

I give my 24 in. by 12 in. by 12 in. tank 8 to 9 hours of electric light every day. I use a 100 w. bulb. But my trouble is the water soon turns green with free-swimming algae, and filamentous algae soon festoon the bottom of the aquarium and grow into and clog the plants. What should I do to get rid of all this algae, yet keep my plants growing well? My tank gets little natural daylight.

Reduce the hours of lighting to 6 or 7 hours every day. Your plants will grow quite as well, but the algae will suffer from the lack of light and will soon become starved out of existence.

Please tell me something about the breeding habits of *Nannostomus marginatus*.

N. marginatus lays adhesive eggs which stick to the sides of the aquarium and the plants. At a temperature of 78°F the eggs will hatch in about 3 days. The fry do not become free-swimming until 2 or 3 days later. The species is not a very easy one to breed, but you can keep trying every now and again. Keep the sexes separated until you place them together in the spawning tank. Meanwhile feed them on live food and tiny pieces of red meat. When the male wears rich colours and the female looks plump on the sides, place the two fish together.

I am about to set up a tropical aquarium and would like your advice on the best plants to buy for supplying oxygen to the

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

water, to make a good background for the fish and, at the same time, look decorative. My aquarium measures 36 in. by 12 in. by 15 in. It will receive a good, bright light.

You cannot do better than plant a double row of *Vallisneria spiralis* along the back and ends. This plant will grow to the top of the water, form a solid green background and, under a bright light, will look very decorative. For the centre of the aquarium, plant Indian fern, *Hygrophila* or water wistaria. In the shadier parts, plant one or two clumps of any of the *Cryptocoryne* species. The latter are slow-growing and have attractive foliage.

I have been told that it is best to fill an aquarium with distilled water. Is this correct?

We do not advise the use of distilled water to fill a tank. Distilled water lacks the salts and minerals found in clean soft water obtained from an unpolluted stream or pond. Tap water left to mature outdoors for a few days is quite suitable; so, too, is newly drawn tap water brought to the boil, and then cooled down to the required temperature. Do not use water obtained from water-butts fed from a newly tarred or bituminised roof. And do not use water from a metal water butt, especially one that has been galvanised.

I have just started keeping guppies. The females appear to drop young in small numbers every few weeks, but they never lose the dark appearance in the region of the anal fin. Should they not lose the gravid spot after dropping their young?

You must remember that the female guppy is in a pregnant state for most of her life. Immediately after delivering her young she does look thinner and paler about the anal region, but very quickly she starts to fill up with more young, and is ready to deliver them in 6 to 8 weeks after delivering her first batch of fry. This goes on throughout her life, which is not long; say, 2 years or so. Broods often number up to 40 or more baby fish, but as some of the babies are eaten by other guppies in the tank it often seems that the female has dropped only a few fish. If you want to save most, if not all of the babies, you can place the female in a breeding trap placed in a tank unattended by other guppies, or place a female immediately she has delivered her young in another aquarium thickly planted with *Myriophyllum* or lesser bladderwort.

I have a large tank which I wish to use as a decorative feature in our lounge. I intend to build up a platform of rocks at the back and two ends and cover the top with peat and moss in which to grow moisture-loving plants. The water level will be maintained just below the top edge of the rock platform. I should be grateful if you can tell me the names of some plants which would thrive in the permanently wet peat. The lighting will be supplied by electric lamps in a hood raised some distance above the water but not so far above it as to starve the submerged plants of sufficient light to keep them in a healthy condition.

There are a large number of plants which will grow very well in the sort of environment you intend to create in your tank. We suggest that you obtain any of the following: *Ficus pumila* (repen), this will soon smother the rockwork with its small leaves; so, also, will the little creeper known as *Helxine*. Most of the smaller *Philodendron* will flourish, and the *Tradescantia* in variety, and *Zebraia pendula*. If you can camouflage small pots containing a mixture of peat and fibrous loam, which will remain permanently moist but not really wet, you will be able to grow tiny ferns, ornamental grasses, small rushes (*Acorus*) and the like.

In The Garden Pond *by* ASTILBES

It is very pleasant at this time of year to sit in a deck chair on a warm evening and watch the movements of the fishes in the pond. Where any type of goldfish are present there is one almost sure way of encouraging them to come to the surface to be seen. This is to drop a few small pieces of dry brown-bread crust into the water. If the fish are in good condition it will not be long before some of them are up biting at the bread. Even fishes such as tench which normally keep lower down in the pond will come to the top for such a feed.

One pest which might be troublesome to pond fishes at this time of the year is the fish louse (*Argulus*). This pest can swim freely from one fish to another, although as a rule once they attach themselves to a fish they do not leave it unless obliged. First signs of the pests on a fish may be a red sore spot, and if any fish is seen with such a spot it should be caught and examined. Fish lice appear as small almost transparent discs, about three-sixteenths of an inch across when full grown. They look like a miniature plaice, and attach themselves by means of suckers and extract nourishment from the fish. A number of these on a fish can be very weakening and the wounds caused can soon be attacked by fungus.

Quickest way to get rid of fish lice is to immerse the fish in a solution of half a teaspoonful of Dettol in a gallon of water. Leave the fish in for some time and watch it to see that it is all right. If it turns over it should be removed to fresh water. A stronger solution can be used for large fishes, but be very careful to be on the watch all the time they are in the solution. When the fish is immersed the lice will quickly leave it and in a fairly strong solution will soon die. It may be necessary to give many of the fish in the pond this treatment, and it can be repeated after a week or so. *Argulus* lays its eggs on plants or stones in the water and the young swim about until they find a host. It can be realised from this that a second treatment is essential, and provided that the treatment is correctly carried out all the lice in a pond can be eradicated. It is usually only if a fresh fish carrying pests is introduced into a pond that any further trouble could occur. If all fresh introductions were placed in quarantine for a time before being placed in a pond there would be much less trouble. When examining



lily-leaved duckweed, shown floating on the pond surface, may need to be thinned at this time of year



Photos:

Laurence E. Perkins

Blossom of *Pontederia cordata*. This may be attacked by greenfly in summer

a fish for lice be sure to look under the body or inside fins, as one or two may be hiding there.

Some old ponds become infested with leeches. These can attach themselves to a fish and cause bad wounds. They can be removed from fishes with tweezers or by the immersion method described. As they do not live wholly on fish but in the muck as well, it is important to try and get rid of them all as soon as possible. One way to catch them is to place in the water a small piece of meat tied to a string and surrounded by some wire netting to prevent fishes from eating it. The leeches get to the meat and feed on it, and if the string is carefully drawn out each morning many leeches can be removed and killed. If the pond is not too large it can perhaps be emptied and the leeches caught. However, at this time of the year it is a very difficult task to clean out a pond, especially if there are water lilies and other plants present.

Sometimes the flowers and leaves of the water plants are attacked by caterpillars or greenfly. It is quite impossible to kill these by spraying with insecticides as most of these contain D.D.T., which is very deadly to fishes. Caterpillars can be picked off when seen and the fly can be knocked off into the water with a strong jet from the hose. If the surface of the water has become too strongly covered with duck weed or other floating plants, much can be removed with a net, or the weed can be forced to one side with a jet from the hose when it will roll up into a fairly compact mass which can be removed quite easily.

If some of the fish have spawned it is probable that they may have been somewhat weakened by the spawning act. Such fish need plenty of garden worms to assist them to build up their strength again. Any live foods will be accepted but it is a good plan to break all worms in two at least, and break open all maggots before feeding them

to the fish. If any small fry are seen some fine food can be placed in the shallowest part of the pond for them. It is difficult sometimes to be able to partition part of the pond for the fry. If a fine screen can be introduced near one corner of a shallow region it will be found that the fry will congregate there and be fairly safe from the large fish. Although you may not be able to keep all the fry from getting through with the big ones it is surprising how soon the fry learn to keep in a safe part away from the larger fish. If fine food is given at this spot it will also encourage the fry to keep in.

Where few water plants are in the pond for shelter and some youngsters are required it is better to catch some of the fry and rear them elsewhere. This does not mean that one can take a number of these fry and place them in a small tank and expect them to grow on quickly to large fish without much attention. It will be found that it is far more difficult to keep these young ones healthy in a small tank than in a fair-sized pond. It is useless to try and raise more than a dozen fish in a 24 in. by 12 in. by 12 in. tank once they get over half an inch in length over all.

If a pond loses water slowly because of a small leak it

may be possible to carry out temporary repairs without actually emptying it. Lower the water as much as you can without unduly disturbing the water lilies and other plants, and as the concrete dries the cracks should show up. Scratch these to deepen them with a metal spike and net out the waste matter. Wash out the crack well to remove all loose material. Then get some Prompt (Prompt Cement Products Ltd., Bethwin Road, Camberwell, London, S.E.5) quick-drying cement and some fine sharp sand. Sand which has gone through a perforated-zinc sieve will do well. Mix a small quantity of the cement with an equal part of sand, add a little water to make it into a paste and force this into the cracks. Do not let the mixture overlap the rest of the concrete. This cement dries rock hard in 30 minutes and so it is easy to fill up the pond soon after the cracks have been filled. See that any excess of cement which falls into the pond is removed. Once the pond has been filled you may see a few small patches of coloured film on the surface; these can be removed with a saucepan. The film is some of the free lime but when the repairs have not been extensive this will do no harm.

COLDWATER FISH-KEEPING QUERIES answered by A. BOARDER

I am writing to enquire as to the quickest way to make a pond. If it is made with cement how do I make it safe for fish?

The quickest way to make a small pond is to get a large sheet of heavy-gauge polythene. This can be purchased up to 12 feet across. Dig a hole large enough to take the sheet and then ram all the earth well down to make a fairly solid base for the polythene. Make sure that there are no sharp stones or other hard matter which might puncture the sheeting. When you place the polythene in the pond hole the edges can be secured with large stones or pieces of flag stones. Such a pond can be filled and then taken into use immediately. It is better, however, to get some water plants growing healthily first. The water plants can be planted in pots and gently lowered into the water.

If you make a pond with concrete it will be a much harder job and take longer. The pond will have to be filled with water and left for a few days, then scrubbed well with a stiff broom; two treatments like this should make it quite safe for fish.

I have made a new pond and would like some information about stocking it.

You cannot do better than get the book *Coldwater Fishkeeping* (price 2s. 10d. post free from *The Aquarist*), as this not only tells you how to make a pond but also how to stock it with plants and fishes, how to feed the fishes and maintain the pond to keep everything in good order as well as how to breed several kinds of freshwater fishes.

My fish have something like green wool hanging in patches on them. What is this and how can it be cured?

The fish have been attacked by fungus. This goes green when there is a lot of green algae in the pond. You can cure the fish with the salt treatment. Place the fish in a solution of a heaped tablespoonful of salt to a gallon of water. The fish should be cured in about 4 days.

My pond seems very foul, as fish will not live and even snails die. What should I do about it? The pond has not been emptied for some years.

When water snails will not live in a pond it is a sure sign that the water is very impure. Empty it and clean it out as much as you can. It is very difficult at this time of the year to do this as the water plants will have made rampant growth.

However, if you remove as much water as possible and a good deal of muck from the bottom it may then be all right. Once the pond is refilled do not put any fish in until the water plants appear to be growing well and the water looks a good colour and has no bad smell. If some water fleas and snails are put in before the fish it will soon become apparent if the water is pure. The creatures die in foul water.

Flowering Cryptocoryne



Photo:

Allan Brown

This *Cryptocoryne* is in flower (centre of leaf stems) and has been identified as *Cryptocoryne beckettii* Thwaites ex trimen by botanists at the Royal Botanic Gardens, Kew. It was submitted by its grower, Mr. Frank Stone, who also presented a plant for the collection at the Gardens

THE AQUARIST

ALGAE

by Dr. F. N. GHADIALLY

AMONG the few serious misfortunes that can befall a well set-up furnished decorative aquarium, none is more disfiguring than a serious overgrowth of algae. The prevention and cure of this trouble can at times be extremely difficult. Some time ago I accidentally discovered a way of dealing with this menace and for the past year I have been purposely encouraging algae growth of various types in some of my aquaria so as to try out this remedy. The results have been most satisfying and have prompted me to write this article.

From the aquarist's point of view there is no need to classify the various types of algae scientifically. A description of the broad divisions of the various types is all that is needed. For practical purposes algae may be looked upon as a form of plant life; the small unicellular ones float about in the water and turn the water green, and others produce a slimy green or blue-green film of growth which covers rocks, gravel, glass and plants in a deadly smothering blanket. Then there is the unpleasant dirty-brown algae which is believed to be tougher and more difficult to eradicate than the green varieties. Finally, we have the hairy varieties. Some are quite attractive and make bushy growths easy to remove by mechanical means. I have found that when this type of algae appears both plants and fishes do very well and the water remains bright and clear. There is, however, another variety of hairy growth which grows as a short bushy beard on the leaves of aquatic plants. This variety is deadly to the plant it grows on and extremely difficult to eradicate.

Requirements of Algae

In order to control algae one must know something about its needs and its requirements. As it is a type of plant life its requirements are very similar to those of the higher plants growing in the aquarium. The first requirement for the growth of plants and algae is light. With the aid of the green substance chlorophyll they synthesise carbohydrates, i.e. sugars and starches, from molecules of carbon dioxide and water. This reaction also results in the production of oxygen, which is liberated into the water surrounding the plants. This process, as every aquarist knows, is called photosynthesis, and it needs light energy for its successful accomplishment. The sugars and starches produced in this manner constitute the food and energy supply and stores of plants. When light is deficient, green plants including algae cannot synthesise this essential food and the chlorophyll begins to disappear; the plants at first turn pale green then yellowish brown and they finally die and disintegrate.

Besides light, plants, including algae, need various simple inorganic salts (e.g. nitrates, phosphates, etc.) if they are to live and grow. These compounds must be available in a simple soluble state, for as is obvious plants have no mouths to take in and digest large particulate material. Anything that is not in solution is of no immediate value to our plants. However, the ultimate source of these salts is from complex particulate organic matter lying in the tank. The excreta of fishes and snails, the bodies of dead snails, decaying plants and uneaten food all constitute the complex

organic waste material which, when broken down by bacterial action, produces the inorganic salts necessary for the growth of plants and algae.

This brief review of the essential needs of plants and algae shows that the needs of both are broadly similar. Thus conditions which stimulate the growth of higher plants will also stimulate the growth of algae. If the needs are similar then it must logically follow that since the two share the same microcosm there must also be a constant competition between these two for available nutrient materials. This concept of competition is an important one and explains many common observations. Thus it is well known that a tank in which the higher plants are growing and multiplying rapidly, rarely if ever develops a serious attack of algae. It would appear that under such circumstances the plants rapidly use most of the available nutrient salts, and there is nothing left for a colony of algae to develop on. Trouble with algae, particularly serious algae trouble, is usually encountered at a time when the higher plants are more or less quiescent, i.e. not showing active growth and multiplication. It is then that a dangerously high level of inorganic salts is likely to build up in the water to support a rich growth of algae. There are two occasions when such a situation develops.

The first is in a newly set-up tank. Here the plants have not had time to establish themselves and hence are not actively growing and offering adequate competition to the algae and algae spores present. If this situation is further aggravated, say, by too much light and overfeeding, as so frequently occurs in the first tank set up by a novice, then an attack of algae is almost a certainty. The second situation is when a tank becomes overcrowded with plants. This, of course, is seen in an old-established aquarium in which plants have been growing well for some time, with no trace of algae, until almost every square inch of aquarium floor is covered with plants. Leave well alone is a bad principle under such circumstances, for the aquarist will soon find that because of overcrowding the plants begin to suffer and show little or no new growth. A concentration of available organic salts follows, with the inevitable algae not far behind. The important point which emerges from this is that if you can keep the plants growing you will not be worried by algae. This, of course, is small comfort to a person whose tank refuses to grow plants and insists on producing copious quantities of algae, but nevertheless the idea is a sound one. Achievement of this happy state of affairs, however, is not always very simple. There are other factors involved which we must consider to understand this problem more fully.

Excess of Nitrogenous Waste Material

I have already pointed out that various objects such as uneaten dried food particles, decaying plant leaves, dead fish and snails and their excreta are the ultimate source of organic salts which feed both plants and algae. Now in a tank with a fast growing colony of plants much of this will be used up, leaving little for algae to thrive on; but there is a limit to what can be removed in this fashion. The fastest growing plants cannot be expected to remove gross excesses of inorganic salts resulting from bad aquarium management. Let us then consider the various common mistakes which tend to increase salt concentration and hence the chances of algae development in a tank, even when the higher plants are growing freely and doing their bit to keep the concentration low.

The first and commonest cause of algae trouble brought about in the manner described above is excessive and careless use of dried food. This, of course, is the common mistake made by every beginner. Too much food is put into the tank and some is left behind to rot and provide food for the algae. On the other hand, the quantity given may be correct but the particle size may be wrong. Too

large or too small a particle size may be the cause of the trouble. Little fishes cannot eat large particles of food and conversely large fishes will not touch dust-fine particles. In each case food will be left behind to rot and cause trouble later on.

Any form of dead and decaying organic matter must be looked upon as a potential source of trouble. Dead plant leaves should be diligently removed at frequent intervals and not left to rot and disintegrate in the aquarium. Growing plants are an insurance against algae but dead and dying plants are a menace and the sooner they are got rid of the better.

It is not commonly realised that overcrowding a tank with fishes can be an important factor contributing to the production of algae. Under such conditions the excess of excretory products produced will once more tend to provide an excess of potential food for algae. The condition is perhaps further aggravated by the large amount of carbon dioxide freely available for photosynthesis. Few aquarists would knowingly leave dead fishes to rot in a tank, but when a fish dies in some odd corner behind a piece of rockwork then it adds to the rotting organic waste and hence constitutes a potential source of algae. Thus disintegrating bodies of dead snails and the excreta of living ones also add to the organic waste in a tank, but this is only one side of the story as we shall see later; a few snails are an asset and help to keep down the growth of certain types of algae.

Excess of Light

No amount of breaking down organic waste will produce algae unless a fair amount of light is also available. It is also, I think, true to say that under a given set of circumstances too much light, particularly daylight, will encourage algae formation where none would have formed otherwise. The accurate control of light is thus important, but it must be remembered that the reverse, i.e. starving the tank of light, is also not without danger. Plant growth will be adversely affected and one of the main means of keeping down the concentration of nutrient salts will be rendered ineffective. There is a further real danger which must be appreciated. Organic waste plus light, as we have seen, produces algae, but organic waste with little or no light produces a large population of bacteria and unutilised salts, i.e. a state of pollution. The water, instead of going green, will become turbid and foul-smelling. Of these two evils algae is certainly preferable, for at least the fishes are happy and not adversely affected as in a polluted tank. Thus a judicious reduction of light is useful when algae threatens, but this must be accompanied by a drastic search for other causes tending to lead to a build-up of waste material. Dried-food feeding is best cut out altogether until the trouble is halted.

Further, whereas the green varieties of algae need copious amounts of light the brown variety does not and will thrive in poor light conditions. The cure for this type of algae is to raise the intensity and duration of illumination, thus favouring the growth of aquarium plants and rendering conditions unfavourable for the development of brown algae. At the same time steps must be taken to rectify any build-up of organic waste in the tank.

It has been suggested that by varying the colour of the light, algae may be brought under control. It has been reported that blue light can clear a tank of algae trouble without any damage to plants. This can be achieved by fixing blue cellophane to the outside of the glass side of the tank and cutting down or cutting out ordinary illumination from the top. I have no personal experience with this method; it is an idea that needs investigation; further before we can judge its value.

A few snails are an asset in any aquarium; they assist in keeping the surface of the plant leaves clean and healthy. Plants respire through their leaf surfaces and also in many instances absorb water and other substances through their leaves; it is therefore important that this vital surface is kept free of debris and algae growth. Snails play a vital role in doing this for they can remove the fine deposits of at least the soft varieties of algae. Blue-green algae and the short bushy hairy algae are unfortunately not touched by snails.

Thus it will be obvious that snails help in a dual fashion. Firstly they remove traces of algae directly and secondly by keeping the plant leaves clean; thus, by favouring healthy plant growth they produce a condition in the tank unfavourable for the development of algae. On the other hand, too many snails can be a serious menace. They are voracious feeders and will produce a large amount of excreta which will increase the organic waste in the tank. They will tear up healthy plants, particularly the soft-leaved varieties (e.g. Indian fern). By interfering with plant growth they set up a condition where algae can thrive.

(To be continued)

Herpetologist's Notebook

IN July and August the common lizard (*Lacerta vivipara*) produces its young, which are usually about half a dozen in number. Since this may well be the first birth which the collector will encounter, some notes on the care of the young may prove useful.

If the lizards are in the outdoor reptiliary and this is well planted the youngsters will find sufficient food. They can be safely left there provided that there are no larger lizards, e.g. green lizards (*L. viridis*) which might eat them. Even the sand lizard (*L. agilis*) may attack and eat young common lizards, so care must be taken and the young removed if they are in danger. If they must be kept indoors, then they are best moved to a small vivarium, by themselves, which should receive as much sunshine as possible. There they should be fed on tiny gentles, small flies (*Drosophila*, the fruit fly, is ideal and these are easily cultured) and other small insects. Growth under optimum conditions is fairly rapid.

This is the time of year to add to the tropical and sub-tropical collection and the following lizards and snakes are recommended. Lizards: baby iguanas (*Iguana iguana*); baby monitors (*Varanus niloticus*, *V. salvator* and *V. goldi* for instance); Anoles (*Anolis carolinensis*); U.S. bronze skink (*Eumeces obsoletus*); stump-tailed skink (*Trachysaurus rugosus*); blue-tongued skink (*Tiliqua scincoides*); S.African skinks (e.g. *Mabuya capensis*); zonares or girdle-tailed lizards (especially *Cordylus cordylus* and *C. cataphractus*); chameleons (such as *Microsaura pumila* or other dwarf species—avoid *Chamaeleo chamaeleon*); geckoes (many suitable species); bearded dragon (*Amphibolus barbatus*); bloodsuckers (*Calotes versicolor*); fence lizards (*Sceloporus*); and alligator lizards (*Gerrhonotus*). Snakes: king snakes (*Lampropeltis getulus* and others—strongly recommended); common boa constrictor (*Constrictor constrictor*), avoid tree boas and Cuban boa; Indian python (*Python molurus*); African pythons (*P. sebae*) and royal python (*P. regius*); Australian carpet python (*Morelia spilotes*); U.S. yellow rat or chicken snake (*Elaphe quadrivittata*); red rat snake (*E. guttata*)—a very handsome species; hog-nosed snake (*Heterodon contortrix*); African house snakes (*Boaedon lineatus* and *Lamprophis inornatus*); egg-eating snake (*Dasyatis scaber*); and mole snake (*Pseudaspis cana*).

Readers will realise that this list is only a suggestion of a limited number which the author has found particularly interesting and suitable for vivarium life.



from AQUARISTS' SOCIETIES

Monthly reports from Secretaries of aquarists' societies for inclusion on this page should reach the Editor by the 12th of the month preceding the month of publication.

OWING to increased membership the Brighton Amateur A.S. has found it necessary to find new headquarters. Thanks to the efforts of the vicar of Brighton and the committee of the Central School, excellent accommodation has been found at the school. One of the main objects of this Society is to interest younger members of the community in the hobby and several contacts have been made with the Brighton schools for this purpose. The hon. secretary is Mr. E. A. Billmeyer, 23, Osborne Road, Brighton, 6.

It is much regretted that Mr. L. Dane has had to resign the secretaryship of the Independent A.S. owing to ill-health. The members wish to pay tribute to Mr. Dane for all his services to the Society during his long spell of office. The new secretary is Mr. R. Butt, 23, Lebanon Road, East Croydon, telephone, ADDISCOMBE 8671. Club meetings are held every Monday evening at the Montern School, Hornsey Road, N., at 8 p.m. New members will receive a hearty welcome.

THE annual general meeting of the Scottish A.S. was held in Glasgow, but unfortunately, due to health and business reasons, the president and vice-president were unable to offer themselves for re-election. It was unanimously agreed that the new president for the season 1959-60 should be Alec Lang, and the vice-president, Robert Christie. There were no other changes in the office-bearers of the Society. It was announced that the annual open show of the Society would be held in the McLellan Galleries, Sauchiehall Street, Glasgow, from the 21st to 24th October. Schedules are now available and anyone interested in obtaining same should apply direct to the honorary secretary, K. A. M. Robertson, 32, Edzell Drive, Newnton Mearns, Renfrewshire. Monthly meetings of the Society are held in the Christian Institute, 72, Bothwell Street, Glasgow, C.2., on the first Tuesday of each month from September to June and anyone wishing to attend will be most welcome.

THE Llanwit Major A.S. held its sixth annual meeting during July. After being secretary since Mr. R. S. Wigg resigned as hon. its inauguration, secretary-treasurer. He was presented with a writing set for services rendered to the society. The following were elected to office. Chairman: Mr. D. John. Secretary-treasurer: Mr. H. V. Jenkins. Librarian: Miss B. Rees. Show Committee: Messrs. H. Harris, S. Tucker and R. S. Wigg.

A table show has been arranged for 9th September. Meetings are held on the second Wednesday, 7.30 p.m. in the Llanwit Major Youth Club. The Hon. Sec. is Mr. H. V. Jenkins, "Mispah", Fom-y Cary Rd., Rhosce, Glast.

THE joy in the life of a paralysed patient in St. Francis Hospital, East Dulwich, was threatened when the fish tanks beside his bed began to leak. For his main occupation in life was watching the fish.

The hospital authorities said the tank was beyond repair and would have to be scrapped—and a replacement could not be bought out of hospital funds.

But now the patient, who is in his early twenties has a new aquarium, stocked with extra fish, bought by the hospital's League of Friends.

The hospital matron, Miss J. MacDonald, drew the League's attention to the matter.

Within 24 hours the aquarium was bought out of the League's funds.

THE two most noteworthy events within the Dublin Society of Aquarists recently were a talk to the members by Mr. Gargan and a radio broadcast on behalf of the Society.

Mr. Gargan spoke on marine fishes to be caught either by hook in the open sea or by net in rock pools, and his popularity as a speaker is such that he was answering questions for three-quarters of an hour after the talk, the outcome of which sent members along the coast to find some of the specimens named. As one member has been keeping 12 deep sea fishes in perfect condition for the past 11 years this was a great encouragement. Apart from the usual Blennysome fifteen-spined Sticklebacks, Butterfish, Scorpion and pipe fishes were acquired.

The broadcast in "Gardening Magazine" from Radio Eireann on July 1 by Mrs. S. Redmond, Mrs. Spurling Jewell and Dr. J. J. Craig was heard by many throughout the country who were interested in aquarium plants. Mrs. Redmond spoke on the maintenance of the hospital tanks and Dr. Craig told of his experience in getting the Madagascar lace plant to grow. Mrs. Spurling Jewell gave advice on underwater gardening as applied to the tending and upkeep of aquaria plants and explained the pleasure and reward to be gained from this form of horticulture.

The Society's annual show to be held in the Moleworth Hall on 4-5 September promises to



The Aquarist's Badge

PRODUCED in response to numerous requests from readers, this attractive silver, red and blue substantial metal emblem for the aquarist can now be obtained at cost price by all readers of *The Aquarist*. The design is pictured here (actual size). Two forms of the badge, one fitting the lapel button-hole and the other having a brooch-type fastening, are available.

To obtain your badge send a postal order for 2s. 6d. together with the Aquarist's Badge Token cut from page xiv, to Aquarist's Badge, *The Aquarist*, The Butts, Half Acre, Brentford, Middlesex, and please specify which type of fitting you require.

be an even greater success than the one last year. There will also be 14 classes for fishes as against the usual three, and the two days will give an opportunity to many to visit this event.

AT a recent meeting of the Bristol Aquarists' Society, Mr. F. S. Lennox, treasurer to B.A.S., gave the Society a presidential badge of office. The president, Mr. G. Harper, was invested with the new badge of office by Mr. E. R. Blunsden, the oldest member of the Society.

The Open Show for 1959 is on 30th and 31st October and schedules can be obtained from:—V. Capaldi, 18, Glen Park, St. George, Bristol 5.

THE GOLDFISH SOCIETY OF GREAT BRITAIN

A CHANGE of Treasurer was announced by the above Society at the last meeting. Mr. G. L. N. O'Neill, 68, Lavender Way, Wallington, Surrey, was appointed in place of Mr. R. Birkenhead, who retired from office, and Messrs. Mann and Whiteylost were appointed lay members, but otherwise the committee remains as before.

A tape recording, by Mr. R. J. Affleck, on Hand Spawning, was played and gave rise to much discussion. As this is available to members and Societies this recording should make a new approach for Societies seeking material for lectures. It is hoped that this will be the first of a number of such records. There was also a discussion on the three varieties, Celestial, Bubble Eyes and Pearl Scales and several specimens were on show. It was decided to proceed in the preparation of a set of standards for these fish. A set of provisional standards, made three years ago, will form the basis, and these should need very little modification. The quality of brambleheads on show was very good and interest in this variety is on the increase. Mr. P. Upchurch, of Hitchin, took first place with Mr. A. T. Tagg, of Camberwell, filling the second and third places.

THE ninth annual show of the Blackpool & Fylde Aquatic Society will take place in conjunction with that of the Blackpool & Fylde Horticultural Society's Chrysanthemum Show on the 6th, 7th and 8th November. Particulars are available from Mr. R. W. Crook, Show Secretary, 37, Lunedale Avenue, Blackpool, S.S.

AT a recent meeting of the Merseyside Aquarist Society there was a presentation of awards won at the Open Show, and Mr. Brian Roe gave a short talk on keeping and breeding the Danio. The talk was enlivened by a demonstration of an ingenious and simply made breeding trap designed by the speaker. The accompanying table show, judged by Mr. D. Hughes, produced an unusual result, when the first three places were filled by Mr. Brian Rimmer's entries: 1st, Spotted Danio, 2nd, Pearl Danio, 3rd, Giant Danio.

RECENT events in the programme of the Bradford and District Aquarists Society have been a lecture on breeding methods by Mr. Skinner, a member of the Leeds Society, and also a Table Show of Characins and a film show. The September meeting will feature a quiz with Dewsbury Society with a member's Table Show for Anabantids.

MEMBERS of Southend, Leigh and District Aquarist Society are keen on their hobby and several members devoted part of their annual holiday to preparing the exhibition hall at Southend Pier Head for the Society's second annual show.

From the start it was well patronised and the Society are to be congratulated on a high standard.

The show attracted entries from all parts of S.E. Essex and the London area; entries were considerably up on the previous year.

Membership of the Society is growing steadily, and it is hoped this year's show will result in a greater influx, particularly of young members.

Cup winners were: R. F. Jones Cup for best tropical fish in show—J. Wylie; A. Jones Cup for best coldwater fish in show—J. McNaughton; best team of livebearers—I. D. Connor (Coronation Cup); Barnes-Gake Cup—J. Wylie; highest points in show (Abbott Cup)—S. Halsey; De Russion Cup for best Black Widow in show—

J. Wylie Brooks Shield for best individual furnished aquaria—L. Willis, runner-up G. Pryor.

The results were: Cichlids, Section "A"—1, J. A. Horne; 2, D. J. Robinson; 3, J. Taylor. Ditto, Section "B"—1, R. Castle; 2, S. Halsey; 3, S. Halsey. Barbs—1, D. J. Robinson; 2, J. C. Bryden; 3, T. Hodges. Characins—1, J. Wylie; 2, S. Daniels; 3, J. C. Bryden. Rasboras, Danios—1, T. Hodges; 2, J. C. Bryden; 3, G. Britton. Egg-laying Tooth Carps—1, C. E. Berkley; 2, W. A. Ryan; 3, E. Angus. Fighter—1, A. L. Stebbing; 2, S. R. Law; 3, J. Taylor. Labyrinth—1, J. McNaughton; 2, W. A. Ryan; 3, C. Marriott. Catfish—1 and 2, S. Halsey; 3, R. Klein. Tropical egg-layers—1, A. Lewis; 2, S. Halsey; 3, J. Taylor. Swordtail—1, H. Barlow; 2, J. Wylie; 3, H. Barlow. Platys—1 and 2, D. Connor; 3, A. L. Stebbing. Mollies—1, J. Wylie; 2, P. Beavan; 3, E. Angus. Guppy—1, A. L. Stebbing; 2, J. Bayhard; 3, A. L. Stebbing. Common goldfish—1, T. Sherwood; 2 and 3, J. McNaughton. Shubunkins—1, F. Ahrens; 2, T. Sherwood; 3, T. Sherwood. Fancy goldfish—1, 2 and 3, F. Ahrens. Egg-layer breeders, Section "A"—1, D. Connor; 2, S. N. Cornock; 3, S. N. Cornock. Ditto, Section

"B"—1, J. Wylie; 2 and 3, J. C. Bryden. Live-bearers breeders—1, W. B. Hes; 2, D. Connor; 3, S. Halsey. Breeders, coldwater—1 and 2, F. Ahrens; 3, G. H. Pryor. Club tropical furnished—1, Southend A.S.; 2, Bethnal Green A.S.; 3, Walthamstow A.S. Club coldwater furnished—1, Walthamstow A.S.; 2, Southend A.S. Individual tropical furnished—1, L. E. Willis; 2, G. H. Pryor; 3, E. I. Gibbs.

SECRETARY CHANGES

CHANGES of secretaries and addresses have been reported from the following societies: Brockley and District Breeders Circle (H. J. Vosper, 23, Thurlby Road, West Norwood, London, S.E.27). Lancashire Aquarists Breeders Society (D. E. Talbot, 24, Ashton Street, Bolton, Lancs.).

HARTLEPOOLS AQUARIST SOCIETY

RESULTS of the Hartlepool Aquarist Society Show are as follows: The Cameron Cup—Best Egg-layer: Mr. R. Berthou; The Bute Trophy—Best Livebearer: Mr. G. Kellelt; Foggy Furze

Trophy—Best Characin: Mr. S. Saint. F.N.A.S. Diplomas—(1) Mr. G. Kellelt (Velifera Mollie); (2) Mr. R. Adamson (Jack Dempsey); (3) Mr. R. Berthou (Nigger Barb). Furnished Tropical Aquaria: 1 & 3 Geo. Kellelt; 2, Mrs. Whittam; 4, Mr. S. Saint. Furnished Coldwater Aquaria: 1, A. E. Brunton, Mr. T. Pearson. Characins: 1, S. Saint; 2, J. Bowyer; 3 and 4 J. Carter. (a) Mollies: 1, 2, 3, G. Kellelt; 4, G. Gale. (b) Swordtails: 1, 2, 3, 4, J. Carter; (c) Platys: 1, 2, 3, 4, J. Carter. Labyrinths: 1, B. A. Hodgson; 2 & 3, J. Bowyer; 4, G. Gale. Cichlids: 1, R. Adamson; 2, G. Kellelt; 3, B. A. Hodgson. Barbs: 1, R. Berthou; 2, R. Adamson; 3, and 4, J. Carter. Guppies: 1, 3, R. Berthou; 2, Mrs. Whittam. Any variety not previously classified: 1, G. Kellelt; 2, B. A. Hodgson; 3, A. E. Beard; 4, E. R. Haywood. Breeders—Egglayers: 1 and 3, B. A. Hodgson; 2, A. E. Brunton; 4, R. A. Goodin; Breeders: Livebearers: 1 and 2, G. Kellelt. Breeding Pairs: 1, B. A. Hodgson; 2, G. O. Kellelt; 3, J. Bowyer; 4, E. R. Haywood. Aquarium Plants: 1 and 2, G. Kellelt; 3 and 4, E. R. Haywood. Children's Class: 1, Steward Saint; 2, Jennifer Jones. Best Fish in Show:—Mr. G. Kellelt's, Velifera Mollie.



BRITISH AQUARISTS' FESTIVAL 1959

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