

The Aquarist

and Pondkeeper

SEPTEMBER 1966



MONTHLY
Vol. XXXI No. 6

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OUR COVER

Snakeskin gourami (*Trichogaster pectoralis*). One of the larger anabantids and one of the most peacefully disposed.

VOL. XXXI No. 6

1966

The common bream

by B. FRY

THIS member of the family *Cyprinidae* is widely distributed over most of Europe with the exception of the countries south of the Alps and Pyrenees. It is common in central and eastern England and Ireland, but is absent from Cornwall, Devon, Somerset, Dorset, western Wales and northern Scotland.

Sluggish waters over a thick layer of mud are its favourite haunts. Moving sedately over the bottom—it usually swims in shoals—it feeds on small crustaceans, tiny molluscs, worms, and a varied assortment of larvae. It has a taste also for greenfood, and now and then nibbles at the tender growths of *najas*, *potamogeton*, *callitriche* and the like. Occasionally it will rise to the surface to snatch down an insect or, perhaps, bask for a while in the sun. Most of its feeding appears to be done at sunset or after.

The main characteristics of the common bream, scientifically referred to as *Abramis brama*, and not to be confused with the silver bream (*Blicca bjoerkna*), a smaller and different fish altogether, are a deep, compressed body, an anal fin that extends from just behind the vent to the tail, and a short-based and pointed dorsal fin. In the former there are three unbranched and twenty-three to twenty-eight branched soft rays; in the latter three unbranched and nine branched soft rays. The ventral and pectoral fins are of normal proportions, but the lower lobe of the forked caudal fin is appreciably longer than the upper lobe. The head and eyes are small; so is the barbless and toothless mouth. The lower jaw is slightly shorter than the upper jaw.

The general colour of *A. brama* is dark blue-grey on the back shading to leaden silver, reflecting brassy to bronzy

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After a hair-raising test trip through the bush on what he laughingly termed "an average road," but which was only discernable from the remainder of the forest by the comparative scarcity of trees, a few pounds changed hands and I was a car owner. Early next morning, taking my net, collecting traps, carrying bottles and armed with a map and compass, I set off into the "bundu" for the first time. Leaving the car when the track became impossible, I started out on foot and quickly found the physical features, so representative of thousands of square miles of this part of Africa, to be rather monotonous. Typically, it consisted of moderate to dense deciduous bush growing in the red-orange lateritic soils, the only distinctive features being the gigantic earth mounds constructed by colonies of termites, the larger ones approaching the height and bulk of a detached two-storey house.

After walking for approximately three hours on a course which the map indicated should lead to the river Kafue, I came across an African village. I tried to describe what I wanted to the only male adult in sight. Since at that early stage I hadn't even acquired the smattering of Cibemba language that I eventually picked up, I had to resort to signs and diagrams drawn in the sand with a stick. Had I known then that the African includes all fishes too small to eat by the generic term "Kaseaga," not differentiating between species or even families, I would have saved my breath and time and walked on. Anyway, eventually tiring of me and my cave-type drawings, and showing unusually bad manners for a bush African, he wandered away muttering to himself what was probably the Bemba version of "Mad dogs and Englishmen . . ."

Just before mid-day, the ground began to fall steeply away and I soon reached the edge of the great Kafue. The following is a list of the different fishes which I found in the rivers, tributary streams and the dambos of this area. The reader may disagree with some of my identifications, but these were painstakingly made using the best of the literature then available (see bibliography), and in view of the somewhat confused state of nomenclature and classification still existing with regard to the fishes of the area, represents the best I was able to do.

Barbs

Apart from the Cichlids, this genus has more species than any other freshwater genus in Africa. All the smaller "suitable for aquaria" types seem to have a definite spawning period just before the rains in September/October when general activity and colour particularly are heightened. Despite frequent attempts I never succeeded in spawning any of the fish collected and possibly some external stimulus

in addition to increased temperature is needed, e.g., addition of rain water and fierce aeration.

Barbus afrovernayi

Not particularly attractively marked, the back is greeny-brown lightening to silver on the underside. There is a large oval patch on the caudal peduncle with its longest diameter equal to that of the eye. There are no barbels.

Barbus eutenis

A well-marked and handsome little fish; the only specimen I ever caught grew to about 47 mm. in a 24 x 12 x 12 in. tank though one caught by a Mr. Mortimer was 106 mm. from the tip of the snout to the middle rays of the tail fin. An olive colour dorsally, shading to silver on the belly, a single dark line extends from the tail to the tip of the snout.

Barbus multilineatus

A pretty little fish which was very difficult to catch on account of its weed-loving nature. However, a dozen or so sweeps through a thick bed of "Hippo grass" (*Vossia caespitosa*) would usually produce a specimen or two. Strongly resembling the Chequer Barb (*Barbus oligolepis*) in size, shape and deportment, the colour overall is orange with colourless fins. Four parallel horizontal bars run from the eye to the tail. The largest specimen I caught was 38 mm., and I don't think they would reach even this in the aquarium. This species swims at all depths and is very active.

Barbus bariloides

This I regard without doubt as being the most likely fish to become popular with the aquarist. It probably embraces also the species described by Hans Frey in his "Dictionary of Tropical Fishes" as *Barbus fasciatus*. I never found these little scavenging barbs in large rivers, but often in well aerated smallish streams. In this habitat they tended to avoid the weed-grown edges and swam on sandy bottoms in mid-stream. Both sexes are a gorgeous red-orange, blending in beautifully with the red, sandy streams they frequented. During the breeding season when the fish make their way up into the slower moving, shallow waters of the dambos (low lying swampy areas), their colour can only be described as scarlet overall with vertical black bars and metallic blue sheen when viewed in certain lights. I successfully kept three of these fish in my tank for over two years and, once acclimatised to the lower oxygen level, they quickly settled down to a life of constant action in the bottom third of the tank. I personally believe that they are equally effective at scavenging as are the *Corydoras* species and they are certainly far more attractive. My largest specimen grew to 54 mm. in a



Barbus lineomaculatus (seven spot barb)

2 ft. tank, but some I saw in their natural surrounds must have been 70-80 mm. long.

Barbus lineomaculatus

This species is very common as one would expect since its range extends from East Africa through Central Africa down to the Transvaal. An olive coloration shades to silver ventrally. The side is marked by a row of black shapes varying from circular to oval. Although much hardier than *Barbus bariloides* it has neither the bright colour nor the scavenging ability of that species. My largest specimen caught was 73 mm., but those in toy tanks never exceeded 62 mm.

Aplocheilichthys Top Minnows

Aplocheilichthys moeruensis

Whilst not nearly as attractive as some *Aphyoseion* species from West Africa or the gaudy *Neohelostoma* from East Africa, they have, never the less, a delicate beauty of their own. The body is grey, but when seen in reflected light, it reveals a cobalt blue sheen with mother-of-pearl tints. The fins are usually colourless but I caught some specimens from a stream near Broken Hill in which the males had a pink-brown speckling in the vertical fins.

Aplocheilichthys katangae

A slightly chunkier bodied fish than *Aplocheilichthys moeruensis*, the only specimen I caught in three years searching was 32 mm. long, and had a black zig-zag stripe down the side from below the dorsal fin to the tail. The eye was a magnificent sapphire blue, whilst the dorsal, tail and anal fins were flecked with very dark blue spots. The specimen was taken in a fine mesh wire trap baited with

bread and suspended just below the surface of the waters of an isolated dambo about 10 miles S.W. of Luanshya. It was a great disappointment that I failed to find any more specimens as I am certain this hardy little top-minnow would become extremely popular in the United Kingdom.

Cichlidae

This is a very large family and the term used by all Rhodesian anglers to cover fishes of this family i.e. Bream, is an obvious misnomer since this fish belongs to the Perch order. Cichlids are very intelligent, adaptable and, because of the considerable parental care shown, have a phenomenal breeding capacity. These last two factors result in the world-wide popularity of the genus *Tilapia*, and particularly *Tilapia macrochir*, *Tilapia mossambica*, *Tilapia nilotopliana* etc. as subjects ideal for intensive fish farming in the Tropics (see recent *Aquarist* article).

Tilapia sparrmanii

Named for Anders Sparrman who sailed round the world with Captain Cook this is one of the most attractive and certainly one of the hardiest cichlids I collected. Found in all types of habitat from swift flowing rivulets to near stagnant bays and dambos, I found specimens in quite small bodies of water, the temperature of which fell to 52°F-55°F at night in June/July and rose to 75°F-78°F by 2 p.m. This serves to illustrate their wide temperature range tolerance. Fairly strongly compressed laterally, the normal colouring is fawnish-green with several broad vertical black bands on the body very much like *Cichlasoma fasciatum*. The dorsal fin has a red outer edge and on the soft rays a round black spot, which, unlike other members of the genus, it retains throughout its life. Unfortunately, the species is an active plant destroyer, needing a large proportion of vegetable matter in its diet. My pair obliged me by spawning once in rainwater recording 1°DH and pH 6.3 at a temperature fluctuating between 74°F and 78°F. The fish is a substratum spawner, the male excavating several holes in the gravel before the female chose one to suit her. I counted approximately 60 eggs, but unfortunately never raised any fry. The fish spawned the day before I was due to go on leave to Mozambique (to look for *Neohelostoma* species which I didn't find) and despite explicit instructions, my houseboy, John, lost all the fry. As I said earlier the African regards all fish too small to eat as being beneath contempt. Both sexes become very peculiar coloured during the spawning period (which may occur 6-7 times during the year) the male becoming almost black ventrally.

Haplochromis philander

I think this specimen must be the commonest dwarf 'beem' if not the commonest of any cichlid in Zambia. I found them in all sizes from fry up to 6 cm. long, in all habitats from small streams to dams, farm ponds, marshes and the shallow margins of large rivers like the Kafue. The species is a female mouthbreeder. There is noticeable sexual dimorphism, the female being a silvery-grey with faint dark vertical and horizontal bands. During the spawning period the male is a striking blue-green colour, and at this time is even more pugnacious than usual. Like its more northerly cousin *Haplochromis multispinus*, this species can become very belligerent, and though it is small, attractive, intelligent, and can easily be bred in the aquarium, these waslike tendencies will probably prevent it from ever being imported to Europe. I found them very tolerant of different water conditions and temperatures, with colossal appetites for anything living and small enough to be eaten—baby guppies being especially relished.

Anabantidae

These fish, generally referred to as the Labyrinth fishes, need no explanatory introduction and the family includes the Siamese Fighting Fish (*Betta splendens*) and Gouramis of Asia. Regrettably the only genus found in Zambia is of a vicious nature and has very subdued colouring.

Ctenopoma multispinnis

Although the check list of Zambian fishes said that this species was widespread and found in streams, marshes, flooded dambos and even temporary marshes, I didn't locate my first specimen until nearly the end of my tour—and even that was a stroke of luck! I was driving down a dirt road not far from the Katanga border north of Mufulira when I saw two native children fishing with a cane, some thread and a bent pin, in an almost dry marsh on the edge of a stream. I didn't see what they could possibly be fishing for and decided to wait. After about half an hour they had a "bite" and pulled out a fish for which I immediately gave them a "tickety" (3d. bit) each. I recognised the fish from its elongated dun-brown marbled body and dorsal fin running nearly half-way along the dorsal surface. The edge of the gill plate is serrated and is used to pull the fish over dry land to a new pond or stream when the one it inhabits becomes too dry. During these amphibious trips the fish uses the labyrinthine accessory breathing organ for respiratory purposes. The fish I had bought was 94 mm. long and was markedly predatory in habit—eating daphnia, bloodworms, tubifex worms and young

guppies. Since I never found another specimen, I was unable to attempt the breeding of the fish and neither was I able to find a record of breeding habits elsewhere and so I am still ignorant as to the method of breeding, i.e. whether a bubble nest is built in the typical manner of the Asian Anabantids. Anyhow, on account of its predatory habits, causing it to be safe only with large fish, and its lack of bright colours, I do not think it is likely to become popular with the fish-keeping public of Europe and America. Before leaving this species it is worth re-telling the legend which my houseboy recounted on seeing this fish. The story, which is now held to ridicule as the African becomes more civilised, interprets the sudden appearance of these fish on land during their inter-pond jaunts following a rainfall, as being their punishment for having incurred the wrath of the rain god (many years ago) for some forgotten reason. As a result they are believed to be sucked out of their pond by a whirlwind, carried several miles and then dropped unceremoniously onto terra firma.

In July 1964 I completed my three year tour and I finally had to say goodbye to many good friends of all races leaving behind a thriving aquarists' society of which I had the honour of being first chairman.

At present I am teaching in a boys' secondary school in Sussex and, as you might imagine, I lost no time in forming a school Society to keep and study tropical fish. We now have fourteen tanks, our latest addition being 48 in. by 12 in. by 15 in. in which we hope to breed *Symphysodon discus*. The boys of the Society have raised over £60 by their own efforts and we hope to be able to purchase our six breeding stock *Discus* in the near future. An ambitious plan—yes, but I hope to report in these pages shortly that we have been successful in breeding this, perhaps the most difficult cichlid of all.

Bibliography:

- (1) Hans Frey, "Dictionary of Tropical Fishes".
- (2) P. B. N. Jackson, "The Fishes of Northern Rhodesia".
- (3) Hawkins G. J. and Mortimer M. A. E. "Shore Notes on Fish Farming in Rhodesia".



Ctenopoma multispinnis

Continued from last month's article on

The garden pond

by A. Boarder

Breeding goldfish

IN my previous article I dealt with the actual spawning of the goldfish in the pond and suggested that the safest way to ensure plenty of fry hatching out is to gather the eggs and place them in a container for development. If the method of encouraging the fishes to spawn on bunches of weed tied near the side of the pond has been carried out, it is probable that there will be some eggs left in the pond. These will hatch out later than those removed to a warmer place. It is also probable that many of these eggs will not be seen by the pondkeeper and neither will any fry which hatch out later on. Unless there is a dense mass of water plants many of the eggs left in the pond will be eaten by the parent fishes or the fry will be when they hatch.

The bunches of weed with the eggs attached which have been put in separate containers can be warmed up either by a small heater or by placing a piece of glass over the tank to attract any sun heat. The time taken for the eggs to hatch depends on the temperature of the water. I often read that the eggs will hatch in a given time, say four days, but it is quite impossible to give any definite time as it depends on whether the water has been warmed up artificially or by plenty of sunshine. An ideal temperature to aim at is 75°F., as this should bring about a three- to four-day hatching. A temperature of 80°F., may give a hatching in three days but as the water is warmer the oxygen content will be lessened to the detriment of the eggs and fry when hatched.

A lower temperature will mean that the eggs take so much longer to hatch. Below 60°F., it is probable that hatching will take over a week, perhaps ten days. It is probable that the temperature in the hatching tank will vary somewhat but this is no cause for alarm; a slightly varying warmth need not make much difference to the hatch as long as the temperature is not allowed to drop low for long periods.

If a temperature of about 75°F., has been maintained it will be possible to see the eyes of the fry in the eggs after two whole days. During the third day with the aid of a magnifying glass the alevin can be seen to move around inside the egg. The infertile eggs will soon go white and fuzzy, and after two days it may appear to the pondkeeper that there are no fertile eggs at all as these do not show up very clearly, being almost transparent. The white eggs show up so clearly that they are the only ones visible to the casual observer. Patience must be shown and it is quite possible that many fry will hatch out safely in their own time.

Whilst the hatching is going on it is important to make sure that the water in the hatching tank keeps in good condition. An aerator can be used but it should not be too violent. If the water keeps a good clear colour and has no unpleasant smell, all should be well. If no aerator is used

it is a good plan to allow some fresh water to lightly break the surface of the tank water every day, and this can be done from a watering can with a fine rose. This breaks up any film on the surface and does tend to freshen up and oxygenate the water.

When the fry hatch out it is possible to see them occasionally dart across the tank to hang motionless on a piece of weed or the side of the tank. I am sure that there are few true aquarists who will not get a thrill at seeing the first fry moving in the tank. After very many years experience of breeding fishes I still get a very warm satisfaction when I see even a few fry in the tank.

A fairly quick hatch is always to be recommended, that is with warm water, as there may be several types of pests present in among the weeds which could prey on the eggs. One of the commoner ones will be the water snail. These snails can eat many eggs and so should never be allowed to occupy the hatching tank under any circumstances. Any other pests such as water boatmen, larvae of water beetle and dragon-flies will also do a lot of damage, if not to the eggs then to the fry when they hatch out.

Some of the larvae of the gnats and midges which inhabit the water plants can also eat the eggs and so the sooner the fry get from the eggs the more certain it is that the eggs will not be eaten whilst the fry are still inside.

When the fry hatch they are supplied with a small yolk sac which sustains them for a short time. While there is still food in this, the fry do not feed but when it has been consumed some extra food must be given. The fry are very tiny when first hatched and appear as two small black eye on a thin thread. They can therefore eat only minute matter and this is usually a form of water life known as infusoria. This infusoria can be cultivated in many ways which have been described in this magazine many times but it is possible to rear the fry without having to make any such culture. Tubed liquid fry food can be obtained and this is quite adequate for rearing fry and it is no trouble to add a little each day while the fry are small.

When the eggs are placed in the hatching tank it is a good plan to allow a few drops of the liquid fry food to enter the water as it will be noticed that this encourages the formation of infusoria which will be in the tank in readiness for the fry when they start to seek food. The beginner may wonder how to tell when the fry are ready for their first food. This is quite simple as whilst they are absorbing the yolk sac they will remain fairly motionless, but once they have used up the initial food they will swim about searching for

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The International Guppy and Killiefish Show

Manchester, 11th and 12th June

LANCASHIRE is noted for many things; from the famous dish "hot pot" to the Beatles but it also boasts many aquarist organisations, some local and some world-wide. Coming under the latter category is the Headquarters Group of the Fancy Guppy Association.

Breeding fancy guppies is rather like eating nuts; one finds it very difficult once one has started to stop and the proof of this was when the F.G.A., in conjunction with the British Killiefish Association, held a two-day show recently.

Now the term "International" is often prostituted these days and the break-down of the entries proves that some shows are no more international than the Donkey Derby is a "Classic" race but this was not the case here. Fish arrived from all over the globe and most of the Sections of the Association were well and truly represented.

Over four hundred entries finally made the bench, some personally entered but a large number arriving by plane and train made a breathtaking sight.

From the rare albino to red, blue, green, all the colours of the spectrum made a picture long to be remembered by those who witnessed it, so many were the colours, including the rare leopard (called by our American fishkeepers *leopard*) albino guppy, that it was like sliding down a rainbow.

The venue was the Territorial Drill Hall at Ardwick Green less than a mile from the centre of Manchester, easily accessible by road and rail, and visitors to the show (over seven hundred non fishy types) came from all over these islands; some keen types from Glasgow and London even booked hotel accommodation for the show.

The judging was performed by Frank Partington on behalf of the B.K.A. and Tom Hallert, Brian Hawkins, Jim Kelly and Ken Rigby and one representative of the latter was in the person of Marion Spencer for the F.G.A. Their summing up of the standard was very good. One point to note was the increased "short tail" varieties growing or rare on guppy benches these days.

Among such a high standard of fish shown it is difficult to pick out the outstanding ones but two in particular spring to mind: the team of female guppies from George Goodall of London and the magnificent lyretail entered by

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Top—Left to right Arthur Goodall, Jim Kelly and George Goodall
The British Killiefish Association stand
The Fancy Guppy Association stand

The Junior Aquarist

A-creeping up on a pussy-cat

by F. Wilmet

MOST pondkeepers, sooner or later, come up against the cat menace. One hears of different devices such as building a coping round the pond of sufficient height to ensure that the fishes are out of pussy's reach or contriving a very shallow area of water all round the pool for the same purpose. But in some cases pondkeepers, all unwittingly, lure their unfortunate pets to their death by having (for instance) a crazy-paving path round the pond which overhangs the water by an inch or two. Under a hot sun fishes often find this arrangement attractive, a fact which seems to be well understood by marauding felines.

Perhaps I have been lucky, but in nearly thirty years of pondkeeping I have had personal experience of only one really dedicated fish-catcher. This in spite of the fact that for several years, in addition to our own cat, there was one next-door on one side, and three on the other. None of them, to the best of my knowledge, even attempted to catch a fish.



My particular fish-catching cat commenced to operate during the last war when, as some readers will remember, good sized goldfish of any type were in short supply. Whether the cat made a special set at the largest fishes, or whether they being older and lazier were more easily caught I don't know. The fact remained that in one week I found four of my best fishes close to the pond, none actually eaten but all badly mauled and either dead or dying.

One Sunday I had a free day and decided to keep a sharp look-out. Immediately after lunch I went and looked out of the back door and there was the culprit—a very ordinary-looking tabby, but frozen in intense concentration at the edge of the pond.

Its back was towards me and seizing a broom which was handy I commenced to creep up on the fish-catcher, hoping to get within a few yards so that by banging the broom on the ground and by shouting I might give it a thorough fright. Actually, so oblivious was the cat to everything but its fall purpose that I was able to get close enough to give it a prod with the hairs of the broom.

Like lightning it leaped over the corner of the pond and streaked off down the garden, and although I frequently saw this particular cat around the neighbourhood for several years (it lived about 200 yards away) I never saw it in the vicinity of my pond again. I often thought afterwards that without realising it at the time I had used an effective psychological method of attack on cats by playing this feline hunter at its own game.

Toads as pets

by H. Gilpin

THE common toad, *Bufo bufo*, like its relative the common frog, is rapidly becoming a rare animal in this country. This is unfortunate, as apart from forming an important food supply of many species of native birds, reptiles and mammals, these amphibians perform a useful function in controlling the incidence of insect pests. They are entirely harmless and, with the exception of constituting a minor nuisance in ornamental fish ponds during the breeding season when the tendency of the males to grab anything moving leads them to bring about the death of the occasional large goldfish, have no black spots upon their characters.

It is true that many people dislike toads, their dislike being based upon misunderstanding and lingering superstition—historically *Bufo* has long been associated with witchcraft and the black arts—and coloured no doubt by the animal's somewhat grotesque appearance. Yet it is in this very unorthodoxy of configuration that much of the animal's charm lies. The protruding eyes with their fiery irises split by transverse black pupils, the enormous mouth, toothed only in the upper jaw to circumvent the evasive tactics of some struggling earthworm, the dry mottled skin with its profusion of warty outgrowths—these characteristics may not be regarded as assets by admirers of gay colours and conventional shapes but they are not without their fascination.

Toads, moreover, are excellent subjects for the vivarium. Less active and infinitely more phlegmatic than frogs, they do not make frantic efforts to reach the wide open spaces when one raises the lid of their artificial home. Their usual response when disturbed unexpectedly is to hug themselves tightly to the ground, swallow air until they blow up like miniature balloons, and fix the intruder with a steady malevolent glare. When these terror tactics fail the toad deflates and relapses into its normal condition of placidity.

We keep our present pair in an angle-iron and glass aquarium eighteen inches by fourteen inches by twelve inches deep, covered with a lid, one half of glass and the other of perforated zinc sheet. A shallow 'pond' eight inches by five inches occupies one corner whilst in another a miniature rockery is arranged in such a way as to provide a darkened shelter into which the animals can retire from public view. The remainder of the floospace is covered with pebbles and flat stones laid on gravel with here and there small succulent plants and cushions of damp moss. This area is kept permanently moist but not wet.

The animals have done well in this environment and have grown considerably in the two years since they were first



introduced. They rapidly became tame, the female especially so. If placed on a table, after a short period of reflection to adapt herself to the change in surroundings, she will, if tempted with a mealworm, take the larva from one's fingers and gulp it down with every indication of satisfaction.

Toads are not difficult to feed but will only eat live food. Our specimens prefer blowflies to almost anything else but will not touch dead ones. To provide them with a supply of these insects we keep a small dish in a secluded and reasonably dry part of the aquarium filled with blowfly pupae. These develop rapidly at normal room temperature and as the flies emerge they are quickly munched down, stalked and captured by the toads. The *medus operosus* is interesting to watch. As long as the fly remains still the toad ignores it but when it begins to move the nearest toad, its eyes rigidly fixed on the insect, slowly stretches its hind legs, one limb at a time, and moves imperceptibly forward until it is about two inches distant from its unsuspecting victim. Then, quicker than the eye can follow, its tongue flicks out and the fly disappears. The same procedure is followed with larger insects. Occasionally as a change in diet we offer adult locusts to the toads. The locusts are almost two and a half inches in length with large wings and long, hard hind legs. The first time we put one into the vivarium it was with little expectation that even the larger female toad would be able to cope with it. To our surprise she did not hesitate but quickly captured the insect with her tongue and with the help of both fore feet stuffed it into her mouth. Each toad will consume half a dozen to eight blowflies at a sitting but a single adult locust is a meal in itself.

Besides winged insects the toads are supplied with occasional mealworms, gentles, small slugs and moderately sized earthworms, all of which they seem to regard as welcome additions to the menu. The latter two creatures, however, are rarely taken immediately but disappear overnight, sometimes after an interval of several days.

Last spring this pair made an unsuccessful attempt to breed. They paired and the female deposited a considerable quantity of spawn in her minute pond but none of the eggs hatched. This was almost certainly due to the inadequate depth of water. Most probably in a container large enough to hold a reasonably large water supply fertile eggs could have been obtained.

We have found toads to be extremely tolerant to the surrounding temperature. Our pair are kept at a fairly constant 60°F. Specimens which have lived at various times at liberty in the garden have, as one would expect, survived the vagaries of the English climate with equanimity whilst one large female has lived since early last summer in a

heated greenhouse which has been converted into an aviary for tropical birds. The greenhouse is furnished with a fairly large pool, fed with running water, and contains a considerable number of plants. The temperature on occasion during the summer varied between 50°F. at night and 80°F. at mid-day. Under these unlikely conditions she has flourished exceedingly and grown fat.

Although they lack the warm, furry appeal of small mammals, toads make excellent pets. They are easy to accommodate and cater for and suffer no inconvenience if left to their own devices for several days at a time.

Readers' letter

Pen Friend Please

PLEASE could you find me a pen friend (boy or girl) aged 11, who likes tropical fish, geography and stamps.
GAVIN MCCULL (10),
1 Coneygar Road, Hartford, Hunts.

Water life pests and friends

by Bill Simms

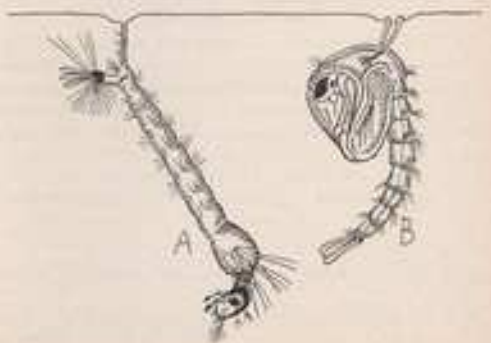
The Common Gnat

MOSQUITO or gnat larvae are often collected as fish food and very good they are for some of the larger fishes. Advantage has been taken of this by those who wish to stamp out malaria—which is carried by one species of mosquito. All stretches of water capable of holding fish, even if tiny, are stocked with fish, and in this way the mosquito is reduced in numbers.

The female lays 200 or more eggs on the water surface and these first hatch into the long larvae shown at A in the drawing. They hang upside down from the water surface so that their rear-end breathing tubes may pierce the surface film and thus draw in air. Hairs at the other end wait food into the mouth parts.

When fully grown the larva pupates, and becomes a comma-like object (sketch B) which also hangs at the water surface though it sometimes sinks and rises again.

It is not generally realized that all female gnats have to suck blood to enable their eggs to develop properly and this is why we are pestered by them so often. The gnat, in its larval form at least, is a good fishes' friend and we should not grudge the little drop of blood to mature the eggs.



our readers



write

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

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

Points Worth Thinking About

IN the article on the Water Measurer in the July issue it states that, "unlike the Pond Skater it never ventures below the surface". This is quite wrong as the pond skater never enters the water or breaks the surface film. I have watched these creatures for many years and have never seen one do so. If one tries with a net to catch a skater in an outside tank, it will jump about in a frenzy to escape but will never enter the water but will sooner jump right from the tank.

My attention has been drawn to the price of some fish foods. Surely the aquarists are being taken for a ride? They are being asked £2.5.6 and £2.5.0 a lb., for some packet food. This is ridiculous as one can buy rump steak at 10s. per lb., and many fish foods are made from offal or matter which is not for human consumption. It is certainly time aquarists took a stand against these charges or is it a case for the prices and incomes board?

I remain, your faithfully,
A. BOARDER.

Aquarium Frames

WITH reference to Mr. Bowman's account of delays which he has encountered in receipt of aquaria frames, from dealers advertising regularly in *The Aquarist*, may I state that I received a four foot frame from one of these firms (Hockney Engineers of Leeds) in exactly eight days.

(MISS) SUSAN LAX,
North Shields, Northumberland.

Crustacean parasites of fishes—an appeal for specimens

IN two recent issues of the *Aquarist and Pondkeeper* there have been references to "Anchor Worms" (*Lernae*).

Although one suspects that the animals mentioned in the May issue were in fact leeches it is possible that those mentioned in March were indeed Anchor Worms which, although very different from the familiar crabs, shrimp and *Daphnia* are, like them, crustaceans. The curious form of the adult animal is related to its parasitic way of life.

The references were of particular interest as, to the best of my knowledge, this parasite has never been recorded in Britain. If the aquarists in question, or any other aquarist or pondkeeper whose fishes may become afflicted with this parasite, would be good enough to send me specimens I should be most grateful. The animal can sometimes, but not always, be pulled from the host intact, and may be preserved in methylated spirits or formalin.

Specimens of any other crustacean parasites—such as *Argulus*—would also be much appreciated.

G. FRYEN,
Freshwater Biological Association,
Westmoreland.

What is the Name of this Plant?

I HAVE recently purchased a plant for my tropical aquarium, yet a search through my reference books and back numbers of my *Aquarist* magazines refuses any information about it.

The leaves are spear-shaped and are about 3 in. in length from tip to base, the base being the main stem of the plant. The leaves show a definite centre-line and are arranged in pairs, each pair at right angles to pair below. The distinctive feature of the plant is, however, the colour—the whole plant being a rich shade of red.

Could you identify this plant and its requirements, please.

G. NORRIS,
Wolverhampton.

Not Impressed

BEING in N. Wales on holiday recently, I thought it would be worthwhile paying a visit to Llannerch Zoo Park, having been impressed by descriptions and arguments about it in *The Aquarist*. Naturally, I was mainly attracted to the Aquarium and I must say I was greatly disappointed with the presentation and variety of fish therein.

I have seen far better displays in pet shops for nothing, and as for the rest of the three-shillingworth, menageries with travelling circus's have more to offer!

S. HARDY,
Workington, Cumberland.

P.S.—It may cover 200 acres but could all be accommodated between the entrance gate and the tiny flamingo pool. Very disappointed!

Great Fish!

AQUARISTS in the Southend area must be the keenest in the world, for in the *Southend Standard* the following advertisement appeared:

"Tropical fish tank, 25 ft. by 16 ft. by 12 ft., complete with stand, fish, plants, heater—£4. Southend. . ."

The mind boggles at such a magnificent aquarium at such a bargain price. One wonders what sort of fish are included in the set up, presumably they would need live-food in the form of a dozen or so Jack Dempseys a day!

P. F. CARON,
P.R.O.,
Southend, Leigh and District
Aquarist Society.

With Thanks

I WISH to thank you for publishing my letter, about correspondents in England or other foreign countries, in *The Aquarist*. It has had, and still has, a fantastic result. I have already received letters from Middlesex, Durham, Yvelines (France), Birmingham, London and Brussels. Among my new correspondents there are pupils of Grammar Schools, head nurses in animal hospitals (London Zoo) and a metallurgical trainee. Again I will thank you and I am considering taking a subscription for *The Aquarist*.

De Groodt, K.,
De Witte Street 19,
Berchem/Antwerp,
Belgium.

Aquarium Frames

WE were very concerned to read in your "Our Readers Write" letters of the service, or rather the lack thereof, given to Mr. W. Bowman regarding the supply of aquaria frames.

We have built up a reputation for quality and promptness and supply several large wholesalers as well as retailers.

We have never advertised because our products have sold themselves. We shall be pleased to supply Mr.

Bowman and anyone else with frames, etc., within 10 days of receipt of order.

M. J. PEPPER,
Stanton Mill Yard,
Bath Lane, Mansfield,
Notts.

Speed is the Answer

IN reference to the letter on "Terrapins and Guppies" in the July issue, I have kept a terrapin with seven fish for eighteen months and not once (except for one slow fish never found) have I had any missing or injured. The secret is this: If you keep a terrapin with fish make sure they are fast. He lives in a moderate temperature of 74-75°F.

T. MARTIN,
London, E.6.

Thank-you all

MANY thanks to all the Aquarists who answered my letter which appeared in the *Aquarist and Pondkeeper* of the May issue. I like to thank them all with this letter and that I had appreciated their Newsletters and Magazines which I received from them. And that I cannot answer all the big number of letters I had received.

I hope that when we will be organized they will receive from us later on.

I would like to thank the *Aquarist and Pondkeeper* Magazine for publishing my letters. I would also like to thank the committee of The Hendon and District Aquatic Society for their great help to me and for also sending me a copy of their Society rules which no other club had done yet.

Yours faithfully,
JOSEPH J. MELL,
"Pat House",
St. Julien's, Malta.

Continued from page 112.

The International Guppy and Killiefish Show

Mr. Stubbs from Czec. The colours on the females gave rise to the usual comment that hormones or chemicals had been used but I can assure readers this was not the case and that the fish were the product of keen attention to good breeding practice, a cross between a red delta male and a half black female. Proof, once again, that good fish can still be produced without the use of external stimuli.

One highlight of the non-competitive exhibits was the impressive display staged by the Stockport Sub-Aqua Club who pictorially described the A to Z of underwater diving, the centre of the exhibit occupied by a large rubber boat surrounded by the different equipment used and needed by these underwater enthusiasts.

Useful plants for the aquarium

Nomaphila stricta



SO closely does *Nomaphila stricta* resemble *Hygrophila polysperma*, that it is sold under the name of Giant *Hygrophila*. This botanically incorrect name may be excused for the reasons that the plant closely resembles *Hygrophila* in a giant form, and that both *Nomaphila* and *Hygrophila* belong to the same plant family, *Acanthaceae*.

Nomaphila stricta is a most decorative subject for the tropical aquarium, having large bright green leaves about 3 in. to 4 in. in length, and about 1 in. wide. Leaves are borne on a petiole (stalk) which can be up to several inches in length. As the plant gets older, its stem thickens and becomes rather woody. As the plant roots very easily from the nodes, fresh cuttings can easily be rooted. The part left in the gravel, after its top has been removed as a cutting, will sprout several side shoots, making an attractive bushy plant.

Giant *Hygrophila*, if grown out of water in humid conditions, produces smaller leaves with a darker colour, reddish in tone. Under such conditions the plant will often produce its small blue flowers. Of course, to the

aquarium keeper, the plant will be grown under water. This is a plant which thrives in fairly hard water. In fact, I have found the plant to disintegrate in soft water. My own plants, I find, thrive in water of hardness 7°DH and pH 7.5. *Nomaphila stricta* likes a fair amount of light, mine receiving five hours of strong artificial illumination each day. An interesting feature of the plant is the fact that its leaves fold upwards into a closed position during the hours of darkness. The plant is quite a fast grower, and due to the large size which it can reach, should be kept near the rear of the aquarium. Snails are the main problem for the plant as they are fond of the foliage as food. They can soon destroy an attractive display.

Coming mainly from Indonesia and Malaya, *Nomaphila stricta* likes a fair amount of heat, about 80°F. I have found to be best. Few other plants give such an attractive and lasting display for a cost of about two shillings. If your aquarium water is on the hard side, and your tank does not contain many snails, the plant is well worth a try.

by B. Whiteside

Lobelia cardinalis



If you're an aquarist with an interest in gardening, you may know the half hardy, perennial, herbaceous garden plant which produces tall spires of delightful scarlet red flowers, and is named *Lobelia cardinalis*. But do you know the attractive aquarium plant of the same name? Unfortunately this plant, suitable for the tropical aquarium, is not nearly as popular as it deserves to be. Perhaps this is in part due to its not having a common name, but more probably it is due to the fact that it is stocked by very few dealers. In fact I know of only one large specialist firm which sells this plant.

Lobelia cardinalis belongs to the plant family Campanulaceae, and is placed in the genus *Lobelia*. The plant looks rather like Giant *Hygrophila* in leaf form, but the leaves are much more rounded at their tips and are more robust. Leaf petioles are about 1 in. long, and the lamina of the leaf is 1 in.-2 in. long, and about $\frac{1}{2}$ in. broad; colour is a pale green.

This plant is quite easy to grow and can withstand a

variety of conditions. I have seen very good plants grown under the following conditions: gravel, crushed granite chippings (no calcium carbonate); water temperature 76°F., with pH 7.4 and hardness level 8°DH. Lighting, for the 30 in. x 12 in. x 15 in. aquarium was 65 watts (tungsten bulbs) used for 9 hours per day, and the tank received about 2 hours of natural sunshine. A bottom corner filter was used in the tank which was sparsely populated with fish. No extra feeding was supplied to the plants in the tank, but *Lobelia cardinalis* benefits from such feeding possibly supplied by pressing a tablet of a certain brand of aquarium plant fertilizer into the gravel, near the plant's roots.

The plant can grow very tall, right out of the water, and benefits from having its growing tip pinched out to encourage side branching. It may be propagated from stem cuttings taken beneath a node, with the lower leaves removed before planting. Costing about 1s. 0d. each, plants are suitable for water which is not very soft.

OUR EXPERTS' ANSWERS TO TROPICAL FISH-KEEPING QUERIES

Is it possible to breed the wasp goby (*Brachygnathus viviparus*) in the tropical aquarium?

If you mean in a small tank to itself, the answer is yes. But the wasp goby is not a ready-spawner. The eggs are deposited under or among flat stones and take about 4-5 days to hatch out. The fry need the usual tiny live food to begin with.

I have read somewhere that to get rid of algae you must (a) reduce the light entering the aquarium, and (b) have plenty of aerating plants growing in the aquarium to compete for the nutrients (nitrogen, potash, etc.) in the water. Please tell me how the aquarium keeper, plagued with algae, can follow this advice; for surely a poor light will inhibit the growth of higher plant life and, in fact, lead to its rapid decay?

If a tank is properly (adequately) planted to start with, algal growths will make little headway unless other factors favourable to their development (alkaline water and a bottom rich in faecal matter, for instance) are present; for as the higher plants spread so will the shade. Given time, then, the plants will win the battle for existence and the algae will take a back seat, so to speak, or die right down. Rampant growers such as *Eloidea densa* introduced into a sparsely planted tank will soon soften the light entering the top and sides and absorb lots of the nutrients in the water through their roots and foliage.

I have some fish that resemble *Rasbora heterompha* in general shape and coloration, but are less sturdy in build and rather diaphanous-looking on the lower sides. Can you help me to identify them?

In all probability the fish you have is *Rasbora hengeli*. This species from Sumatra is a comparatively new introduction to the hobby. It is easy to keep in soft, slightly acid water at a temperature of about 75°F (24°C).

I have been informed that there is a *hartmannia*-like aquatic fern suited to growing in the tropical aquarium. Please tell me the name of this fern and from which dealer would I most likely obtain it?

The fern you refer to is *Microsorium pteropus*. It is said to be indigenous to bogs and swamps in tropical south-east Asia. We suggest you get in touch with Shirley Aquatics Ltd., Monkspath, Shirley, Solihull, Nr. Birmingham.

Does compost serve any useful purpose in a tank used exclusively for breeding egg-scatterers?

The purpose of compost in a breeding tank is to make the sexually awakened fish feel more at home. For some fish introduced into a tank with a plain glass bottom become so disturbed by the reflections off the floor that they lose all interest in family raising and will not regain their composure until they are returned to their original tank.

A few days ago I bought two loaches called *Betta lohachata*. Please give me what useful information you can about this lively species.

B. lohachata is commonly known as the gandak loach. It is native to northern India and Pakistan and is said to exceed 6 in. in length in its natural state. It attains only about half this size in captivity. It will eat dried, live and shredded flesh food and can stand a temperature down to about 68°F (20°C). It was first introduced to tropical fish keepers about ten years ago.

The sand that shows along the front of my tank has turned black. Please tell me the reason for this.

Usually the planting medium turns black when too much uneaten food has been left to decay on the bottom. Do not leave the black sand to spread pollution to surrounding areas. Spoon it out as soon as possible and replace it with fresh compost.

Many queries from readers of "The Aquarist" are answered by post each month, all aspects of the fancy 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.



Comb tails

Recently I acquired a pair of comb tails (*Helostoma temminckii*). Please can you give me some information about their breeding habits and the care of the newly-hatched young?

The male of this species does not spend much time or energy in blowing a bubble nest, and the buoyant eggs released by the female usually float singly or in clusters about the surface. The fry break free from the eggs and become free-swimming within five days, and during this time the male guards them jealously. It is best, therefore, to remove the female to another tank before she is bitten or killed to death. The newly hatched fry are quite large and are able to swallow tiny *Daphnia*, cyclops, micro worms and so on right away.

I have just installed a bottom filter that sends up bubbles from a vertical tube. Will these bubbles of oxygen breaking among the surface plants do anything to deter my dwarf gouramis from spawning? My tank measures 18 in. by 12 in. by 12 in.

The gouramis will not be deterred from spawning by normal aeration, but we do suggest that you turn the supply of air down (or off) while eggs and/or fry are in the nest.

Is it wise to place a pair of *Aplotheltes lineatus* in a community tank?

A. lineatus, or the striped panchax, is neither aggressive nor a fin-nipper, but it has a hearty appetite and a large mouth and in its larger sizes it will not think twice about swallowing easily manoeuvrable fishes much smaller than itself. We have kept this interesting species with large platys, full-grown oregon tetras, and the like, and experienced no trouble at all.

COLDWATER FISH-KEEPING QUERIES answered by A. BOARDER

I am repeatedly losing goldfish from my pond through water beetles. I am just about to purchase some more fish and would like to know what to do to get rid of the water beetles.

I suggest that you do not buy small goldfish. I do not think that the beetles would attack large fish. The difficulty is that the beetles are strong fliers and often come to the pond at night. It is possible that there is a natural pond near you where these breed. The best way to cope with them is to go to the pond at night with a torch and a net. Approach very quietly and you will see the beetles at the surface, when they can be caught easily and destroyed. They have to come to the surface to breathe occasionally at all times but at night they seem quieter and stay at the top longer.

I have a tank 18 in. by 8 in. by 8 in. How many goldfish will it hold? I intend having an inlet and outlet to run in fresh water. I intend putting the tank in the window of my workshop and to breed fish there to sell. Is it possible to breed goldfish in this tank?

Your tank will hold less than 6 inches of fish and would be quite unsuitable for breeding purposes. You need a tank at least 24 in. by 12 in. by 12 in. and then you would want other tanks of the same size for every 12 fishes to get them to selling size. Do not imagine that you can breed goldfish under your conditions to be able to make any money at it. Even very experienced aquarists would not be able to make anything out of breeding goldfish in this country at the present time. One cannot compete with imports from countries where there is a better climate. Breed for pleasure, if you can, by all means, as it is very interesting to do, but give up any hopes of making your fortune at the game.

I have garden ponds constructed 3 years ago. Water is circulated through the ponds by an electric pump. Once a week I change a quantity of the water and do this very slowly to avoid changing the temperature too much. A week ago I changed some of the water as usual and the fishes (goldfish, shubunkins, golden orfe and tench) appeared all right. On looking at the pond in the evening of the same day I found 17 dead and floating on the surface. None of the tench survived. I had the water tested and there was no trace of poison. I had the electrical fittings examined and they were all correct. What could have been the cause of the loss of the fish?

As you had been carrying out the same procedure for some years it is certain that the fresh water caused the trouble. In the first place it is quite unnecessary to change the water so often in a pond, especially as you have it circulating. The fishes obviously died through asphyxiation. The only thing I can think of under the circumstances is that the water supply had been over-charged with chlorine. This is put into the water to kill bacteria etc. and sometimes when the water is fresh from the tap this chlorine can be smelt quite strongly. Most of this chlorine leaves the water once it is exposed to the air. The only other cause could be that the fresh water running into the pond stirred up some of the muck at the bottom. This could have been charged with foul gases due to decomposition of vegetation, and these gases could have suffocated the fish. As there was no trace of poisonous metals in the water the possibility of copper poisoning can be ruled out.

I recently bought three goldfish as company for one I already had. One of the new ones had a white piece on its tail like wool. What is this?

The tail could have been damaged by a fish louse and then fungus developed at that spot. Give the fish the usual salt bath for a few days and all should be well. There is no need to give a goldfish others for company, they appear to know no difference whether they are alone or otherwise.

My tank of goldfish with plenty of vegetation has become smothered with a short flannel weed. What is the cause?

The Algae may have been encouraged by too much light but it could also have been encouraged by over-feeding. Try the following idea and see if it works. Stop all artificial feeding for a fortnight. The fishes will then eat much of the unwanted Algae and the tank will look cleaner than it has for some time. It is amazing how goldfish can clean up a tank if left for a couple of weeks unattended.

I noted in a recent issue of "The Aquarist," that you implied that death of the fish could have been due to copper poisoning. Could you please tell me more about this as last year I lost all the fish in my pond which has water circulating through a one inch copper pipe?

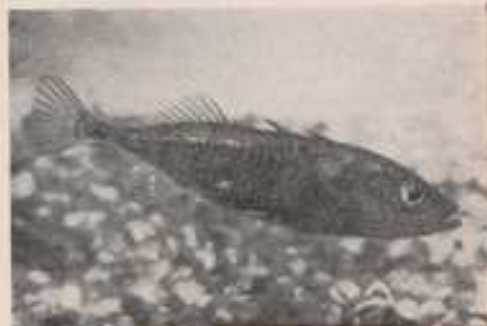
I do not know what else I can say about copper poisoning fishes. I have stated repeatedly in this journal that a fifth part copper to a million parts water is capable of killing some fishes. I have had plenty of instances reported to me where copper coming into contact with the water has caused the death of all the fishes. You can take it from me that copper in any form can kill goldfish and so should never be used in ponds or tanks.

How can water weeds be controlled in a stretch of water of about half acre in extent?

This is a problem if there are any fishes in the water. The plant life, whether it is ordinary underwater oxygenating type or blanket weed can only be killed by using substances which would be fatal to fishes. If there are fishes in the water you can only use grapple hooks on rope to drag out the unwanted weed. If no water lilies are present you could cut the weed with chain type cutters worked from side to side by two people. The floating weed could then be dragged out. If there are no fishes in the water then some copper sulphate crystals could be placed in a bag and dragged about in the water. This would have to be repeated several times, but this could kill any inhabitants of the water too.

Please give me some advice on keeping Sticklebacks?

These fishes should have plenty of space and I recommend a 24 x 12 x 12 in. tank for half a dozen fishes. Only have one male fish as otherwise there could be trouble in the breeding season when the male makes a nest and gets the females to lay their eggs therein. These fishes prefer a live food diet but can be encouraged to take most other fish foods. Remember that they do not grow large and do not eat as much as a goldfish, which was growing well, could eat.



Stickleback

The common bream

by B. Fry

tints, on the flanks. The underparts are creamy to ivory yellow. The unpaired fins are of the same colour as the upper part of the body; the paired fins incline to greenish or reddish brown. The eye has a black pupil and a golden iris.

Late spring and early summer is the time for spawning. During their short season of love (sexual maturity is reached in the fish's fourth year), the sexes are not difficult to tell apart for the male develops raised white pimples (tubercles) on his head and lower fins, and the female grows fatter on the sides. The two sexes congregate in the weedy shallows where, splashing and dashing about, egg-laying takes place. The yellowish eggs are adhesive and stick to the plants. After spawning is over (more than 100,000 eggs may be deposited by a large female) the parent fish, sobered down, return to their former shadowy haunts.

The eggs hatch in about a week to a fortnight, and the fry spend the first few months of their lives among or within easy reach of the dense tangles or thickets of submerged plants where they were born and where they never want for a supply of food. But as they increase in size, they vacate the shallows for deeper water.

Young (small) common bream caught in a net settle down well in a spacious coldwater aquarium furnished with bunches of some good aerating plant such as *Elodea densa* anchored in a bottom covering of well-washed sharp sand. Better still (with regard to the fish's proper development and comfort in the future), accommodation in a roomy garden pond is recommended.

In its natural state, this species is a shy fish that at the slightest vibration or unusual shadow will make itself scarce—often under cover of a cloud of mud which it will stir up to mask its movements. But in the aquarium it will soon become tame enough to stay around and accept dried or live food or meaty tit-bits dropped from its owner's fingers.

Up to about the end of the fifteenth century, the common bream, like the common carp, was frequently seen on the Englishman's table. But with the development of our sea-fisheries and the increasing ease with which the less insipid-tasting saltwater fish caught off our shores could be carried to the towns, most freshwater fishes, which, though nutritious, need to be dressed up with various herbs and sauces to give them a pleasing flavour, lost their popularity and only on the Continent at the present time are they considered worthy—as worthy they are—of the chef's or ordinary housewife's attention.

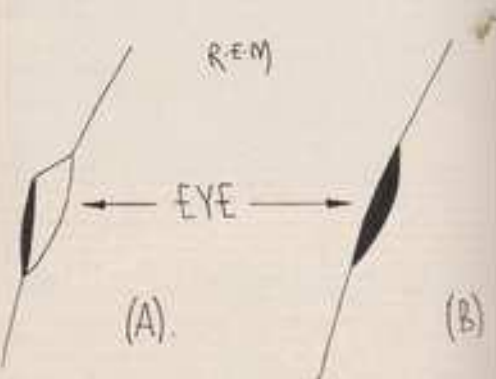
Fish diseases (28) Early Symptoms

by R. E. Macdonald

A PART from the symptoms that show when a disease becomes established in a fish, there are certain early warning signs that may be observed before the disease actually breaks and that can forewarn the observant aquarist of approaching trouble, for example:—

A fish that continuously swims with folded fins or refuses food indicates that something is wrong.

A fish that is healthy will show good colours. If there is a loss of colour there is reasonable cause to assume that the fish is distressed in some way. A prolonged discoloration, say for 24 hours or more, should be taken as a symptom of illness.



(A) Eye of healthy fish. (B) Eye of sick fish. When both fins are turned slightly on their side.

The eyes are a good indication as to the condition of a fish for the eyes of a healthy fish are raised just a little above the surface of the head. If they sink into the sockets it can be taken for granted that the fish is in poor health.

A good way in which to ascertain the degree of health in a fish is to hold the fish whilst it is still in the water and turn it slightly on its side. If the fish is healthy the eyes will remain in the normal vertical position and will not share the movement of the body. If the fish is ill, the eye will turn with the body and the pupil will be seen from above.

Once it has been established that a fish is sick a thorough investigation should be carried out to determine the exact nature of the complaint and the appropriate action taken to either isolate or cure the fish.

Continued from page 114

Fish breeding in the pond

by A. Boarder

food. From this time on as long as the temperature of the water remains about or just over 70°F., the fry will feed well and although they cannot take much food at a time they require very frequent amounts of food.

A few drops of the liquid food must be given every day or if there are many fry in the tank more should be given, but only at intervals. The cooler the water the longer will the fry take to digest their food and so need less of it, but the ideal method of rearing is to ensure that the fry are always very active and feeding for most of the day.

It is a good plan to remove all the fry from the hatching tank as soon as they are free swimming and large enough to see. My reason for this is that it is possible that there may be some pests in the water which hatched out with the fry. One of the worst is the tadpole of the newt. If there were any newts in the breeding pond it is probable that some eggs were laid in the water plants and these will hatch out with the fish fry. When they are newly hatched they are very sluggish but after about a week they grow quickly and can eat the fry.

To sort the fry from pests I get another tank of water ready. Do not use fresh tap water for this as it contains chloride of lime and can harm the fry. I like to use matured water at about the same temperature as that in the hatching tank. I then use a small, white-lined saucepan and take up a quantity of the water with the fry. Carefully run out most of the water and then watch as the fry go over the top of the pan into the fresh tank. Any newt tadpoles will be seen as lighter coloured creatures which rush around and then remain motionless on the bottom of the pan. Another pest which will be seen is the larvae of the small nymph type of dragon-fly. These should be caught and destroyed as should any others seen. Having sorted out all the fry from the first tank you may be fairly sure that there will be no further trouble unless you introduce more with freshwater plants. I like to have some plants in the tank with the fry but I always make sure that the plants are well sterilised before putting them in with the fry.

As the fry grow they can have larger types of food. Live food is always better if possible and white worms shredded up fine make a good after-liquid food. Then garden worms (small ones) can be shredded and so by gradually increasing the sizes of the food and making sure that the fry are not overcrowded there should be little trouble with rearing. Remember that the water can become foul with constant feeding and so a gradual change every few days to fresh water is advisable, even if only some of the water is changed.

My next article will deal with the subsequent feeding and rearing of the youngsters.

Insect individualists *Nepa cinerea*

by F. Wilmot

THE Water Scorpion (*Nepa cinerea*) is so-called mainly because of the shape and action of its front legs which, used in a similar way to forceps, remind one of the real scorpion. But the Water Scorpion's tail, although maybe rather alarming in appearance to the uninitiated, is quite harmless and is, in fact, used as a breathing tube.

Because of its brownish colour and also its shape, *Nepa* can easily be taken for a dead leaf, particularly as it usually rests on submerged aquatic plants or partially hidden on the muddy bottom of the pond. Although common enough in nearly all localities and easily caught because of its slow movements, it is not so well known as might be expected. In fact this insect moves about so slowly that were it not for



its quickness in seizing its prey with its forcep-like front legs it could only save itself from starvation by becoming a scavenger, or by managing to adapt itself to a vegetarian diet.

In common with that surface-film dweller, the extraordinarily thin and slow-moving Water Measurer (*Hydrometra*), it seems that only the lack of nourishing matter in *Nepa*'s body saves it from being devoured by other carnivorous insects.

Growing out from the tip of its abdomen the Water Scorpion has a long breathing tube which it can separate into two parts down the length of the tube at will. When it wants to fill up with air, as it were, *Nepa* quickly joins up the two parts and pushes the tip of the tube through the surface-film. It can then stay right below the surface of the water for quite long periods especially during cold weather, when it becomes even slower at moving around than usual which has the effect of conserving its air supply.

Continued on page 127

Breeding—*anabantids*

by M. J. PARRY

THE *Anabantidae* genus, known also as the "labyrinth fishes," is represented in the aquarium by many popular species, ranging in size from the dainty and petite dwarf gourami (*Coleina lalia*) to the giant gourami (*Ophromemus gourami*), a species which attains a length of some 24 inches!

The family is unique in that many of its members possess an auxiliary breathing organ known as the "labyrinth" (situated within the gill cavity) in which air can be stored. Such an organ enables them to utilize atmospheric oxygen in addition to that absorbed through the gills in the normal respiratory processes common to all fish, whether tropical or coldwater, freshwater or marine.

The family is also unique in its breeding habits which are described below. In giving details of such procedures I have greatly generalised and minor differences are to be found dependent upon the species bred.

Although certain species are not averse to breeding in the "community tank" (a typical example being the three-spot gourami, *Trichogaster trichopterus*), it will be found a wise policy to separate the chosen pair to isolated aquariums where they should be conditioned for a period of 10-14 days on lavish amounts of *daphnia*, white worm (sparsely), *tubifex*, shredded earthworm, etc. Sexes are generally identified by both the plumper appearance of the female over the slimmer male, and the nozing of the fishes' dorsal fin, which in the male is extended to form a point whilst the female's is much shorter and rounded.

The breeding tank with preferable minimum dimensions of 36 in. by 12 in. by 12 in. should be set up to include acid to neutral water pH 6.8-7.00. It should be sparsely planted with anchored bushy plants such as hornwort, *nitella*, *elodea densa*, etc. and be maintained at a temperature of 80°F. (27°C.). This temperature is a critical factor in the breeding of anabantids as if kept above the quoted figure the bubbles of the "nest" will burst too quickly, and if below this there is not enough extra incentive for the fishes to spawn. Water level should not exceed 6 ins. in depth.

The plump female should be introduced into the breeding tank, followed a little later by the male. Eventually, the male will begin to build his "bubble nest," assisted by the female. This action cannot be mistaken as the fish continually rise to the surface of the water to gulp in air and together move under the "bubble nest" to release their saliva-coated "bubbles" which stick to form a compact "nest," sometimes as much as 4 ins. across.

Upon completion of this venture the male vigorously drives the female around the aquarium until, when exhausted, both come to rest underneath the "nest." There, in a quick action, he turns the female completely upside down, wrapping himself around her and squeezing out the

eggs which float up and into the "bubble-nest." This action takes place several times until approximately 200-600 eggs have been deposited. Upon termination of spawning the female should be removed to prevent her from any further possible damage on the part of the amorous male. The latter may safely be left in charge of his offspring as he proves to be a perfect parent, free from any cannibalistic tendencies. He should, however, be removed at the time of the fry becoming free-swimming, usually 96 hours after spawning.

Feeding for the first few weeks should consist of the smallest fry foods, egg-yolk, infusoria or alternatively a substitute for infusoria an example of which is "Liquifry." This, in due course and dependent upon the rate of growth, should be followed by newly-hatched brine shrimp, micro-worm, finely sifted *daphnia*, etc., before moving on to the foods suitable for fully-grown fishes. Under good conditions a length of 1 inch is attainable within 8-12 weeks.

At about the third week of growth a critical stage in the development of anabantid species will be met. At this time the "labyrinth" commences its formation, the result being a great loss of fry through draughts, low water temperature, etc. In order to cut losses to a minimum it will be found an excellent idea to employ a tightly fitting glass cover over the aquarium.



Snakekin gourami

Book Review

'Aquarium Hygiene', by Dr. Hellmuth Wachtel, translated by Gwynne Vevers and published by Studio Vista Limited at 10s. 6d.

THIS paperback, with 62 pages, is written by an expert in soil research and plant nutrition. The aim of the book is to let the amateur aquarist know just what is going on in the biological and chemical processes in his aquaria, and how he may adjust these to the benefit of his fishes and plants. Although the book has set out to present the material in a simple form, with many of its scientific terms defined, I would think that some knowledge of chemistry would help the average aquarist to more fully benefit from the book.

In the first section of the book, the author defines what is meant by hygiene and shows its relevance to the aquarium keeper. Factors which fish and plants would experience in their natural habitat are discussed, as are the attempts which the aquarist can make to emulate these in the home aquarium. The second section in this work concerns the things which are normally found in water. These include plant and animal life as well as inorganic salts and organic matter. The different types of natural waters which are found are scientifically defined by Dr. Wachtel and the interaction of minute plant and animal life, with their effect upon types of water, are discussed. A useful list of the effects of decomposition in the aquarium are given. This includes mention of how different types of fish react to the products of such decomposition and their resulting changes in the confines of the aquarium, with its very limited volume of water. The controversial question of the "balanced" aquarium is expounded upon, and the author states that such an aquarium does not occur by accident, but by the actions of the aquarist. Water plants and their importance in the aquarium are also noted.

The third section of "Aquarium Hygiene" deals with aids towards maintaining hygienic conditions in the fish tank. It begins with an account of the necessity to change some of the water in the aquarium at certain intervals, thus agreeing with the recent trend towards the abolition of the idea that aquarium water which has been in use for a few years is superior to newer water. Following on is an account of the substances needed by aquarium plants for balanced growth, and of the sources from which plants grown in aquaria can obtain these necessities. Methods of how plants take in their food are also discussed. This section is particularly interesting and also deals with the question of using loam or peat under aquarium gravel. It should help some aquarists who have been wondering about this question to make a decision. Suitable types of aquarium gravel are also discussed.

What type of filtration should one use in the fish tank? A large amount of space is devoted to this question and a wide variety of types of filter and filtration media are examined. Uses of peat and exchange resins for filtration

are some of the media covered. The author gives his design for an "aquarium purification plant" which should interest a number of advanced aquarists. A discussion of an algal filter should lead some fish keepers to reconsider their views on the algae, which are usually considered to be the scourge of the aquarist. The removal of harmful nitrates from aquaria, using the pot plant *Monstera*, about which I wrote an article in *The Aquarist* a year or two ago, is an interesting facet of this original part of the book.

Aeration? This question is also dealt with fully, especially with the use of ozone, another recent addition to the aquarists' armoury. Lighting is given a brief survey.

Section four and section five deal briefly with decorations for aquaria, and with aquatic plants, showing how these may contribute to hygiene in the aquarium. The following section is about food hygiene and includes the introduction of harmful pests with both live and dried foods. Frozen live foods are highly thought of by Dr. Wachtel, but their use in Britain must be very limited at present. The psychological hygiene of frozen foods is an interesting aspect of this part of the paperback. For the fish breeder, section seven includes a useful account of hygiene in the breeding tank and should be useful to the person who tries his hand at raising his own young fish. The book concludes with thirteen points which should be borne in mind by the aquarist who would like to keep his aquarium plants and fishes under the most hygienic and suitable conditions.

I would recommend this paperback to the keen aquarist who wants to keep his fish under the best possible conditions. The book is practical in its outlook and does not, as the title suggested to me, give lists of chemicals for treating pests or diseases in aquaria. Such information can be found in any general comprehensive book on fish keeping. The book is well illustrated with fourteen simple though useful drawings, and has an attractive colour photograph on the cover. For the aquarist interested in a novel approach to aquarium hygiene, the book is well worth the price of 10s. 6d.

Continued from page 121

Insect Individualists (cont.)

The Water Scorpion's leg action is still that of a land creature and it has to crawl as best it can to the surface to breathe, instead of swimming. Another curious thing about this insect is that the part of its body which is covered by its wings is quite brightly coloured in red and black—but *Nepa* never exposes this colouring as it cannot now fly!

These are the kind of puzzles that crop up time and again as regards aquatic insects, and they make one wonder just how long ago it was that some species forsook the land for the water.

OBITUARY

Norman E. Perkins

WITH the passing of Norman Perkins in May 1966 the hobby of coldwater fishkeeping lost one of its most staunch supporters.

From early boyhood he took a keen and active interest in natural history, while his particular fascination with aquatic life was formed during his schooldays so that he was never without fish around him from then onwards. He read widely and it was perhaps his early appreciation of the value of the written word that eventually constrained him to write for the aquatic press himself where his attention to detail and his powers of elucidation were valuable assets.

Coldwater fish were his great love, especially the goldfish varieties, and it was natural that he should become a member of the Goldfish Society of Great Britain, which he did soon after the last war. At that time he was active in the breeding and exhibiting of veiltails, but when original strains began to filter in from China and Japan he obtained, and quickly became interested in, the Celestials, which he bred and reared in his garden pond. He was, of course, a pioneer in that his fishkeeping was not made easy for him by modern inventions and techniques. For many years he

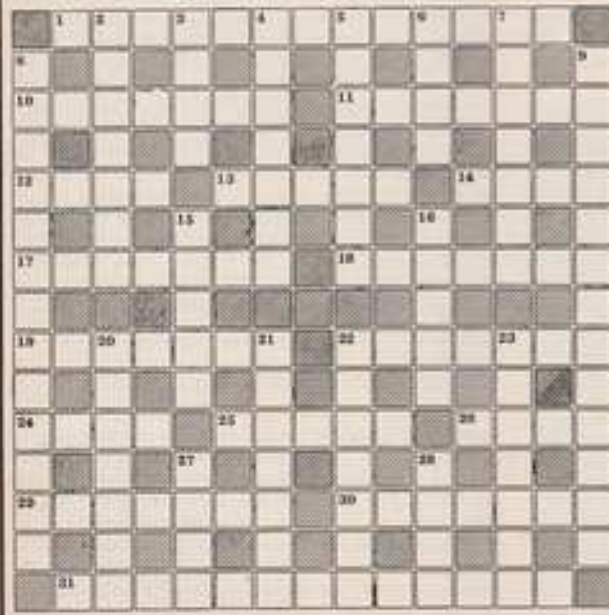
lived in an upstairs flat and had to adapt his efforts to those cramped conditions, but in due course he had one room set aside for his hobby, this room being filled with large tanks, while the tiny garden was almost completely occupied by the pond which he constructed within an Anderson shelter excavation. Nevertheless he remained a regular contributor to the aquatic periodicals during this difficult time.

At length he fulfilled his ambition of obtaining a house of his own with a piece of ground on which he aimed to create "a picture from living material"—to quote his own words. This project absorbed his time and interest to the detriment of his literary contributions, but now his water garden, so painstakingly planned and executed, remains as an epitaph to his love of living things and his complete enjoyment of the simple and natural life.

We older aquarists, who gained so much of our experience during the post-war years and in the coldwater side of fishkeeping, will long remember Norman Perkins and his valuable support of the hobby.

T. HOREMAN.

The AQUARIST Crossword Compiled by L. BRADLEY



CLUES ACROSS

1. *Buddhistic* *crustacean* *major* (5, 8).
10. Miss nothing so strange to have the property of mixing (7).
11. Stand alone surrounded by water (7).
12. Remember that I'm leaving 25 acres and getting one thousand (4).
13. The doctor goes in front of the hill to get his car (7).
14. Found in the picture-palace (4).
17. The young blossom out here, probably in beds (7).
18. Teach two points about a gold coin (7).
19. Sir, tell about the lattice work (7).
22. Shake like a fish with abscesses (7).
24. Buffon (4).
25. See 12 across (5).
26. One hundred lie about parasites (4).
29. Tell how a sailor ran back to 3 down (7).
30. Is this common garden bird cold? (4, 3).
31. A man gets rusty? No but changes into a cutfish (6, 7).

CLUES DOWN

3. Median-social worker (7).
5. Turn the seat about until it faces this direction (4).
4. His M.P. retains the happenings throughout centuries (7).
5. Fit associated with charades (7).
6. Of the current month (4).
7. ——— Mosambico (7).
6. Aquarium in which all the fish live together peacefully (9, 4).
9. Although found in small quantities they are essential for a healthy 8 down (5, 6).
15. Cey from which water can be drawn (5).
16. Striped slipper? (5).
20. Officer of the British Royal Household (7).
21. The animals who cause pride to take a fall amidships (7).
22. Throwing it provides a game for the children (7).
23. Bristle (sing.) (7).
27. Throw out the company of actors (4).
28. Suspended (4).

Solution on page 130

THE July activities of the Gosport and District A.S. included a talk by Mr. Hunt of Portsmouth, on the life that exists in ponds and streams. The speaker brought with him many live specimens, and as these were handed round for inspection the members were enlightened on their value as either a food or enemy of the fish population. Mr. Budden, one of the members, gave a short film show in aid of an aquarium, and as the quality was excellent it is hoped he can find the opportunity to produce many more. There is now a 4 ft. community tank set up at the headquarters which provides further interest at club meetings. Results of the monthly table show were: 1. Mr. Stevens (Ruby Eels); 2. Mrs. Purman (Yellow Trout); 3. Mrs. Purman (Blue Trout); 4. Mr. Taylor (Trout).

AT the annual general meeting of the Eford & District Aquarists' & Pondkeepers' Society the following officers were elected to serve in the forthcoming year: President: Mr. V. Price; Vice-President: Mr. L. Jarvis; Mr. J. Scott; Chairman: Mr. A. Stobbing; Vice-Chairman: Mr. J. Sanders; Secretary: Mr. R. Rasth; Assistant Secretary: Mr. V. Price; Treasurer: Mr. M. Brill; Assistant Treasurer: Mr. Smith; Show Secretary: Mr. H. Berger; Press & Social Secretary: Mr. L. Smith; Librarian: Mr. K. Ellis; Committee Members: Mrs. Koth, Mr. Hartman, Mr. Sengston, Assistant: Mr. Dixon, Mr. Hartley. Reports from the Secretary, Treasurer, and Show Secretary indicated that the Society had a successful year, with a small increase in membership.

Highlights of the year were the awards given to members and by the Society to open shows, and the participation in the Exhibition held in April at Strathgairn, Elford, put on by the Arts and Crafts Section of the Radcliffe Arts Council. The results of the Society's June Table Show were: Goldwater Fish: 1. Goldfish, Mr. Berger; 2. Shubunkin, Mr. Cook; 3. Black Moor, Mr. Berger. Tropical Fish: 1. Guppy, Mr. Hartman; 2. Guppy, Mr. Brill; 3. Guppy, Mr. Brill; 4. Shiner Catfish, Mr. Hartman. Breeding Pairs: 1. (Thailand) Guppy, Mr. Brill; 2. (Rooy Barb), Mr. Hartman; 3. (Egyptian Moustache), Mr. Williams; 4. (Fossil) Guppy, Mr. Hartman. A raffle was held for three pairs of fish - Redfin Shark won by Mr. Sampson (presented by Mr. Price). Shubunkin won by Mr. Price (presented by Mr. Berger). Egyptian Moustache won by Mr. Sanders (presented by Mr. Robinson).

The Show Secretary reported that the Club were placed first and second in the Furnished Aquarium Section at the Dagenham Town Show and that Mr. Berger and Mr. Dixon were very successful with their goldwater fish and plants, respectively. Anyone interested in tablekeeping will be welcome at future meetings. Further information available from the Secretary: Mr. R. Rasth, 13 Downfold Road, Dagenham.

AT the August meeting of the Alreborough and District A.S. a lecture on Commercial Fish Breeding was given by Mr. K. Barraclough of Bradford. This talk covered various aspects including estimated cost and different lay-outs for breeding quantities of fish regularly.

The monthly table show results were as follows: Specified Class: 1. Mrs. Hobbs; 2. Mr. Hampton; 3. M. Lancaster, A.O.V. Class: 1 and 3. Mr. Hampton; 2. Mr. Helm. Novice Class: 1 and 3. Mr. Whitley; 2. Mr. Trason. Junior Class: 1 and 3. Miss L. Hampton; 2. Master Kirby. Best Fish of the Month: Miss L. Hampton.

As a change from their usual topics the lecture at the monthly meeting in July of the Stone (Staffs.) A.S. was on "Reptiles and Amphibians" and was given by Mr. D. Lucas of the Leamington A.S. His talk was confined to those reptiles which can be easily kept by the average aquarist, such as frogs, toads, terrapins, lizards, snakes and alligators. Winners at the annual closed table show were as follows: Livestones: Mr. J. Harvey; Danos and Budoers: Mr. T. Payne; Touchpans: Mr. K. J. Harvey; Arabians: Mrs. K. J. Harvey; Buths: Mr. T. Payne

Catfish: Mr. J. Brough; Characins: Mr. T. Payne; Catfish and Loach: Mr. K. J. Harvey; A.O.V.: Mr. J. Brough.

THE newly-founded Rochdale Tropical Breeders' Association met at 113 Halifax Road, Rochdale. Further details can be obtained from Mr. A. D. Mellings, 301 Halifax Road, Rochdale.

THE monthly table show of the Bradford & District A.S. for Goldwater was won by Mr. L. Booth with five and second places, Mrs. Firth with five and second places. Mrs. Firth show were: 1. Mr. Stevens (Ruby Eels); 2. Mrs. Purman (Yellow Trout); 3. Mrs. Purman (Blue Trout); 4. Mr. Taylor (Trout).

ENTRIES for the Hull A.S. Show were up in last year and the results were as follows: Pairs: 1. P. Shepherdson; 2. Mrs. Lee; 3. Mr. W. Barvley (Hull); Gals and Loaches: 1. Mr. Snodder (Swillington); 2. Mr. Anderson (Hull); 3. Mr. Glover (Swillington); Guppies: 1. Mr. Shepherdson (Hull); 2 and 3. Mr. A. Douglas (Hull); Livestones: 1 and 2. Mr. Stables (Swillington); 3. Master M. Douglas (Hull); Ras. Dan. Min.: 1. Mr. Carr (Bradford); 2. Mrs. Chapman (Hull); 3. Mr. Shepherdson (Hull); Barbets: 1, 2 and 3. Mrs. Firth (Bradford); Catfish (Larvae): 1. Mrs. Lee (Hull); 2. Mr. Hall (Hull); 3. Master G. Jacobs (Hull); Catfish (Adult): 1 and 3. Mr. Cottingham (Hull); 2. Mrs. Firth (Bradford); Characins: 1. Mrs. Chapman (Hull); 2. Mr. Secretary (Independent Exhibition); 3. Mr. Carr (Bradford); Fishes: 1. Mr. Pascock (Hull); 2. Mr. Skinn (Thorne); 3. Master M. Douglas (Hull); Anabantids: 1. Mrs. Lee (Hull); 2. Mr. Skinn (Thorne); 3. Mr. Carr (Huddersfield); Breeders Livestones: 1. Mr. Beverley (Hull); 2. Mr. Glover (Swillington); 3. Mr. Chapman; 3. Mr. Poole (Hull); 3. Mrs. Lee (Hull); Engineering Touchpans: 1. Mr. Cottrell (Tadcaster); 2. Mr. Snodder (Swillington); 3. Mrs. Lee (Hull); A.O.V.: 1. Mr. Cottingham (Hull); 2. Mr. Coates (Hull); 3. Mr. Carr (Bradford); Furnished Jar: 1. Mr. Snodder (Swillington); 2. Mrs. Storey (Hull); 3. Mrs. Chapman (Hull); Hull A.S. Furnished Aquaria. Members only (Senior Members): 1. Master M. Rasth; 2. Miss L. Pascock; 3. Master G. Jacobs, Senior; 1 and 3. Mrs. E. Chapman; 2. Mr. S. Cable, Best Fish - in Show: Mr. Cottrell, Tadcaster (Apollonius Striped).

AT a recent meeting of the North Warwickshire A.S. members were given a very interesting talk by fellow-member Mr. Albert Skinner, on the art of breeding Angels and how to bring the fry to adult size. Mr. Skinner is a well-known fish breeder and one can always find ample evidence to back up his claims in his fish house at his home.

Mr. Len Malt, the Club Secretary, gave an enlightening talk on the best ways of preparing mackerel fish for show at the forthcoming M.A.P.S. show. The Club voted for this show was also finalized and members were keen that the Club put on another good show. In the past four years the Club had come first three times and second once.

THE speaker at the August meeting of the Newport A.S. was Mr. John Burgele, who gave a most interesting and enjoyable lecture on "Fish Foods and Feeding". In addition a table show was held for two classes: (a) Swordtails, and (b) Breeders' Egg-layers or Livestones. The judge was Mr. C. W. Lamm, F.B.A.S., who announced the results as follows: Swordtails: 1. Mr. T. G. Wall; 2 and 3. Mr. L. J. Bannerman; Breeders' Class: 1. Mr. P. G. James; 2. Mr. L. J. Bannerman; 3. Mr. B. J. Mann.

It was with regret that the meeting accepted the resignation from the Committee of Mr. Paul Williams, due to increasing pressure of work. On the proposal of Mr. Terry Wall, seconded by Mrs. M. Burgess, Mr. Colin Lewis was duly

elected to fill the vacancy. The Society meets on the first Tuesday of each month at the R.A.O.B. Club, Hawdock Street, Snow Hill, Newport, Miss.

SECRETARY CHANGES

Leamington & District A.S. (Mrs. S. D. Underwood, 22 Wexley Road, Leamington Spa); Nottingham Tropical Fishkeepers (Mrs. R. J. Scrimshaw, 30 Avebury Close, Gibton Estate, Nottingham); Stockport A.S. (Mr. C. Purley, 59 Dinsbury Road, Norris Bank, Stockport).

THE Show results of Portsmouth, Bury and Kennerly societies have been immediately held over until October issue.

AQUARISTS' CALENDAR

17th September: Newport A.S. Fourth Annual Open Show, Shakespeare Street, Methodist Church Hall, Newport. Details from Show Secretary, Mr. M. J. Pury, 45, Western Drive, Gabaia, Cardiff.

18th September: Stockport A.S. First Open Show, Elizabeth Railway Social Club, Edgely Road, Stockport. Secretary, C. Purley, 54, Dinsbury Road, Norris Bank, Stockport.

24th September: Cambridge and District A.S. Second Annual Show, Tracey Hall, Cockburn Street, Hill Road, Cambridge.

28th September: Kingston & District Aquarist Society Annual Open Show. Secretary, Miss P. Greenhall, 30, Girth Close, Morden, Surrey.

10th October: East London Aquarists' and Pondkeepers' Association Annual Show, Kippax Road School, Barking, Essex. Schedule from Miss, P. Harris, Show Secretary, 98, Leitch Road, East Ham, London, E.8.

10th October: Stone A.S. Second Open Show, Walton Community Centre, Stone, Staffs. Schedule from Mr. K. J. Harvey, 64, St. Vincent Road, Stone, Staffs.

20th-26th October: British Aquarists' Festival, Belle Vue Gardens, Manchester. Full details available later.

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Nymphaea
-- --stellata
-- --lanceolata
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64, King's Road, Reading
Telephone: Reading 53632
E.C.D. Wednesday. R. C.T.P.A.A.

CHESHIRE

Grassby, Joe., F.R.H.S.
"The Glen" Fisheries, Mobberley, Nr. Knutsford
Tel.: Mobberley 3272 W. C.T.P.A.A. R.&A.

CORNWALL

Marine Facilities Ltd.
Commercial Buildings,
Custom House Quay, Falmouth
Telephone: Falmouth 88
E.C.D. Tuesday (in winter only) WR. T. P. AA.

DEVON

Plymouth Tropicals
North Hill Nurseries, Tavistock Road, Plymouth
Telephone: Plymouth 62663
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DORSET

Noah's Ark Aquarium
Swanney Car Park, Weymouth
Telephone: Weymouth 3038
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WR. T. P. AA.

DURHAM

The Fish Bowl
Burdon Road, Sunderland
Telephone: Sunderland 71026
E.C.D. Wednesday (All day), WR. C.T.P.A.A. R.&A.
Metcalf, G. R.
187, Northgate (near Minor's Garage)
(On original A.1 road) Darlington
Telephone: Darlington 5991
E.C.D. Wednesday. R. C.T.P.A.A. R.&A.

ESSEX

Goodmayes Aquaria
70 Grove Road, Chadwell Heath
Telephone: Goodmayes 2594
E.C.D. Thursday. R. C.T.P.A.A.
Skilton, C. J., Aquarist
139, Galleywood Road,
Chelmsford
Telephone: Chelmsford 56876
E.C.D. All Day Saturday. W. C.T.P.A.A.
Stan's Aquarium
466, Southchurch Road, Southend-on-Sea
Telephone: Southend 67859
E.C.D. Wednesday R. C.T.P.A.A. R.&A.

GLOUCESTERSHIRE

Cheltenham Aquatics (Prop. Mr. B. R. James)
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Telephone: Cheltenham 24949
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Arundel Aviaries & Fisheries (Taylors)
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Bridgemary Pet Stores
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Telephone: Fareham 4781
E.C.D. Wednesday. R. C.T.P.A.A.
Wingate Zoological Supplies
7, Market Street, Winchester
Telephone: Winchester 2406
E.C.D. Thursday. R. C.T.P.A.A. R.&A.

KENT

Gillingham Pet & Aquatic Centre
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125, Canterbury Street, Gillingham.
Telephone: Medway 52049
E.C.D. Wednesday R. C.T.P.A.A.
Kingsfisheries Aquarium
138, Croydon Road, Beckenham
Telephone: Beckenham 3716
E.C.D. Wednesday (all day). R. C.T.P.A.A.
Sherwood Pet Stores
(Proprietors, Fairbairns Aquaria, Ltd.),
252, Sherwood Park Avenue, Sidcup
Telephone: Bexley Heath 7217
E.C.D. Thursday. R. C.T.P.A.A. R.&A.

LANGASHIRE

Horaby's
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Manchester, 16
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Chiswick Aquaria
136, Chiswick High Road,
London W.4
Telephone: Chiswick 6549 WR. C.T.P.A.A. R.&A.

Owen Reid's, Aquarium Dept.
12, Spring Bridge Road, Ealing Broadway, W.5
Telephone: Ealing 3259
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NORTHAMPTONSHIRE

The Aquarium
192, Wellingborough Road,
Northampton
Telephone: Northampton 34610
E.C.D. Thursday. R. C.T.P.A.A. R.&A.

The Pet Shop
120, Kettering Road,
Northampton
Telephone: Northampton 38841
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OXFORDSHIRE

The Goldfish Bowl
9, East Avenue, Cowley Road,
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Telephone: Oxford 41825
E.C.D. Thursday. W.R. C.T.P.

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Wolverhampton Aquatics
147, Horseley Field, Wolverhampton
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P. N. Greening
176, Blackness Road, Dundee, Co. Angus
Telephone: Dundee 66409
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