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Photo: A. Ward

A scene familiar to aquarist society members—"setting-up night." This picture was taken the night before the opening of Kingston A.S. Show this year

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Editorial

AWARENESS of being in a rut is, of course, a pre-requisite to successful withdrawal from it. First the realisation and second the effort. Aquarium shows have for so long now taken a set form in both organisation and presentation that the slight shock felt on hearing of the possibility of a new treatment may be evidence of the rut's existence. Since there is also some evidence that the present rut is not altogether a comfortable one, efforts made to alter the situation deserve special notice. Such an effort is, we think, being made by the Federation of Northern Aquarium Societies at their Autumn Assembly one-day show next month. This show schedule offers the member societies a great opportunity to experiment, an opportunity which it is hoped will be readily seized so that results can be assessed by aquarists in other areas.

By allowing exhibition of pairs of fishes in aquaria of a variety of sizes (up to three feet in length), in surroundings of plants, rocks and sand, the depressing effect of rows of bare and uniform tanks that has become a pattern should be obviated. More interesting and promising, it is possible for a society to group its exhibits—pairs of fishes in addition to furnished aquaria for judging as such—so as to form an attractive whole which will be judged as a class in its own right as well as in the classes of its component aquaria. Here is real scope for society ingenuity in staging and decorative display! The inter-society competition can be clearly brought out by this means, and for the visitor, aquarist or non-aquarist, this should bring considerable extra meaning to the show.

Another idea the F.N.A.S. is said to be developing is the encouragement of member society shows in the form of "elimination contests" to provide really first-class entries for a type of championship show arranged annually by the Federation. This, too, sounds like planning along refreshingly new lines. But that's for the future; for now, critical but interested attention is turning towards October's display.

A Method for Culturing Water Fleas

by WALTER BERTHOLDT

WE all know how important are *Daphnia* and *Cyclops* for a healthy development of our fishes. As with human beings who need "fresh food" rich in vitamins, so do our fishes require their live foods. Let us think of the conditions our tropicals find in their native haunts. There they are almost exclusively feeding on living foods such as mosquito larvae, water insects, worms and vegetable matter. My point of view has been always to give our fish in our tanks conditions as natural as possible, and one of them is live food.

How important this live food is I have seen during the last bitterly cold winter here in Germany. Ponds and lakes were heavily frozen for fully three months. The ice had reached a thickness of 20 inches and more, and it was finally almost impossible to keep a hole open in a pond for catching *Daphnia*. I was therefore more than happy that I had a *Daphnia* culture in my cellar which allowed me to feed my fishes two to three times a week. I have given special attention to home cultures of live food for many years and have now developed a good system which is working very well in practice.

In a galvanised tank of 65 gallons capacity and two galvanised iron containers of 12 gallons each, I raise enough *Daphnia* and *Cyclops* to feed 80 smaller characins and *Aphyosemion* species two or three times a week. Furthermore this plant was producing enough *Cyclops* nauplii to bring up about 40 pigmy sunfish (*Elassoma everglades*) last winter. Apart from these feeds of live food raised in my cellar plant I fed my fishes last winter on white worms, also produced at home, twice a week. Once a week only they had prepared food and every seventh day they had a fasting day.

The galvanised culture containers received two asphaltum coatings about three years ago to avoid metal contamination of the water. Before introducing the *Daphnia* I proceed as follows. The receptacles are filled with normal tap water. Then one handful of not too fresh but "seasoned" (nearly dried) cow or sheep manure to every 50 gallons is dropped in. At the same time I add one handful to every 50 gallons of well-dried aquatic plants or dried lettuce leaves. Then I allow the culture to ripen for about 10 days and finally put in one heaped tablespoon to 50 gallons of powdered yeast (brewer's or baker's yeast). Instead of powdered yeast you can, of course, also take fresh yeast. Suspend the yeast particles in a quart jar before introducing it into the *Daphnia* breeding receptacles.

In the meantime do not forget to stir the whole culture frequently. Then it is time to "seed" the culture with *Daphnia* or *Cyclops*, or both of them. A mistake that is made very often is to introduce too many *Daphnia*. *Daphnia* need a lot of oxygen. Therefore, I recommend flat receptacles with as large a surface of water as possible, to allow a maximum absorption of oxygen. If possible apply aeration, but this is not essential. Too many *Daphnia* introduced to a small tank suffer from lack of oxygen and die very quickly even if they are fed well. Then the water is polluted and contaminated within a very short time and the whole culture must be renewed, which causes a lot of work. Therefore be careful at the beginning. Rather put in too few than too many *Daphnia*. Later on you will find out by practice the *Daphnia* capacity of your tanks. It is a practical move to instal the culture receptacle in such a way that easy siphoning is possible.

After having introduced the *Daphnia* into the tank they soon begin to take up the finely suspended yeast. You can easily observe this by watching the *Daphnia*; their colour becomes exactly the same as that of the yeast. But they do not feed on yeast alone. They also eat Infusoria and bacteria. These are produced by the decomposition of the decaying dried aquatic plants and the cow or sheep manure, or, in brief, by the decomposition of organic substance. Also the yeast that is not taken up by the *Daphnia* nourishes bacteria and Infusoria.

Now the question arises, how often should we feed the *Daphnia* on yeast? This is quite easy. Feed them as soon as they have made the water "clear." After introducing a liquid yeast infusion into the culture tank you will find that the water adopts a turbid appearance. But after three days, or a week perhaps, depending on the quantity of *Daphnia*, the water is "eaten clear." And then it is time to feed again.

It is of the utmost importance to stir the culture in the tub, if possible once a day. Otherwise a part of the yeast will settle at the bottom and here it cannot be reached so easily by the *Daphnia*.

If no aeration is applied it is advisable to aerate and mix the water of the culture by filling a jug with water from the tank and pouring it back into the receptacle from a height.

Another first-class food for *Daphnia* is dried blood. But do not feed more than one ounce of it at a time to 50 gallons of culture medium. Do not repeat this dose until the slightly red water in the tub has been completely "eaten clear" by the *Daphnia*. Blood tends to produce harmful bacteria when it decomposes, therefore do not overdo it. I generally do not feed blood more than once a month. In the meantime I use yeast.

The water of the culture should always have a fresh smell. As soon as it becomes very turbid or even smelly, siphon off immediately part of the water and replenish with fresh water from the tap or from one of your tanks. From time to time siphon off one or two pails of culture water and fill up with fresh water, just as you do with your fish tanks. Once a year the culture should be completely renewed with fresh water.

The raising tub should not be placed in too dark a place. Of course, you can also raise *Daphnia* in outdoor ponds where another excellent food for *Daphnia* is provided—green water. The tiny algae contained in it are relished very much by them. Also prepared fish food can be sprinkled from time to time on the surface of the culture water. If possible introduce water snails. They help to keep the culture healthy and clear by eating surplus decomposing food. Furthermore they live on the decaying dried aquatic plants and their droppings produce additional Infusoria and bacteria.

When fed well and not in excess the culture will be well balanced after a month and then it will produce a good supply of *Daphnia* and *Cyclops* of its own accord. Once you have overcome the first difficulties you will find out that it is very easy to keep the stock going well and it will give you pleasure to watch it prospering. And it is so convenient to be able to go down into the cellar to catch a good meal for your fishes instead of losing several hours of useful time by getting your supply of *Daphnia* from a pond which is miles away from your home.

Ways of Reproduction in Fishes

by C. E. C. COLE

EVER since man first noticed the existence of fishes in rivers and seas he has been interested in the various methods adopted by them to perpetuate their kind. Faulty observation or the complete absence of any direct indication of spawning behaviour led him occasionally to propound theories or advance suggestions which were quite wide of the truth.

Thus, Oppian, a poet and early student of fish ways, expressed in verse his belief that when overcome with love and passion, the bodies of fishes came together and both exuded slime which mingled and was then swallowed by the female, inducing conception. It was he also who stated that the *Muraena* (a tropical fish with a long, eel-like body and no obvious fins), mated with land serpents, and no one of his time disagreed with him. The creature about which the most fantastic tales were told, however, was the eel (*Anguilla*). Everyone had a theory about the propagation of this creature, for no one ever discovered a specimen with ripe testes or ovaries. First, then, was the suggestion that eels were sexless.

Scrapings, Dew and Horse Hairs

"They scrape themselves on rocks," said one wiseacre, "and it is these scrapings that come to life."

This didn't seem reasonable to a second observer.

"No—it is the dew of May mornings that is responsible for their being," he solemnly asserted.

"Impossible," cried a third party. "When horse hairs fall upon the water surface they change into little eels."

"I don't agree," said theorist number four. "They emerge from the gills of fishes, or otherwise are spontaneously generated."

And there the matter rested until a Mr. Cairncross, in the second half of the nineteenth century, published a little book, in which he made the profound observation, based upon many years close "study" of the silver eel, and careful comparison of its structure with that of other "insects," that its progenitor was a tiny water beetle. Oddly enough the same belief was existent in Sardinia, where a member of the Dytiscidae was called the "Mother of the eels."

It was as late as 1904 before a Dr. Schmidt was able to draw the veil which hid the life history of the eel from our interested gaze. Of course the eel has sex organs, although they are not well developed when the fish leave their home rivers for the long journey to the salt water spawning grounds. A ripe female ovary may contain upwards of ten million eggs.

The ovaries of a female fish are the egg factory responsible for the production of countless eggs, which before becoming fishes have to be fertilised by the penetration of a spermatozoon from a male. The hard roe sold by the fishmonger is the ovary of the cod. Likewise the soft roe, so delicious on toast, is the testes of the herring. Hard roe, incidentally, is a nutritious food for those fishes which will eat it.

From the ovaries emerge a pair of ducts or thin-walled elastic tubes which guide the unfertilised eggs to the cloaca, in the vent of the female, and so into the water. Occasionally these oviducts are absent, in which case the eggs drop into the body cavity of the female, and pass out through pores in the body walls.

The majority of species scatter eggs indiscriminately in the water, and the male ejects milt in their vicinity. The spermatozoa find and penetrate the membranes of the eggs purely by chance. Marine fishes particularly are noted for congregating in tremendous shoals for spawning purposes, and often enough with them gather other species waiting to feast upon the eggs as they are released. The eggs themselves may float at or just under the surface of the water—pelagic eggs—or sink deeper and lie upon the ocean bed—demersal eggs.

Left to the mercy of wind and current, preyed upon by countless other creatures from the time they are first thrown until they hatch and are well on the way to maturity, mortality percentage is extremely high. It has been estimated, for instance, that only one cod reaches maturity for every million eggs thrown. And yet there always seems to be plenty of cod left.

It is a good thing for aquarists that mortality rate is nothing like so high among our aquarium fishes. Fortunate, too, are we, in that our spawning fishes do not die after a single spawning, exhausted by the prodigious efforts made

The muraena (Gymnothorax petelli), a fish once believed to mate with "land serpents"

to reach suitable environment. This is usually what happens to the eel and the male salmon.

Nature works in a very peculiar fashion with these two fishes. She makes the salmon come from salt water, and fight its way against rushing torrents of fresh water, deteriorating in condition all the time.

The converse applies with the eel, which goes down stream, leaving the fresh water for the salty deeps, never to return.

Selective Egg-layers

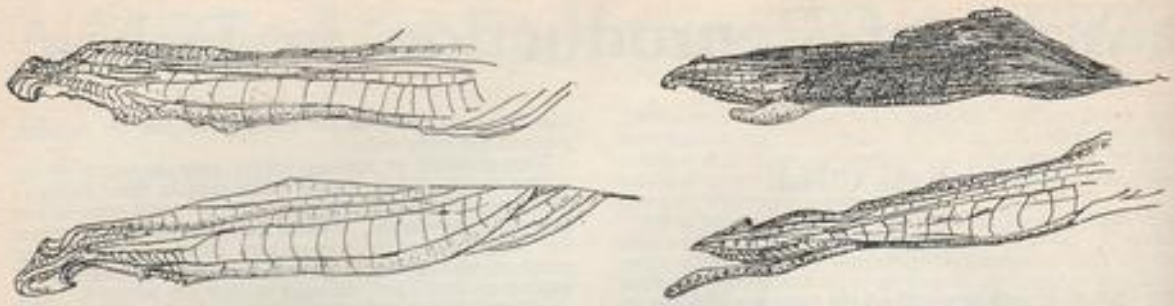
It is not every species of egg-laying fishes which scatter them indiscriminately, however. Some are equipped with special apparatus which enable them to place the eggs where they want them. Such a one is the angel fish, both sexes of which are provided with ovipositors—tubes which protrude from the vent at the appropriate time, and through which the eggs are guided to an exact spot to be fertilised by milt ejected from the male tube.

In the bitterling (*Rhodeus*), the female alone possesses such an organ, which in her case is quite long and flexible. Presumably this is to enable her to avoid frightening the pond mussel by too near an approach. If the mussel shut its valves she would be unable to release her eggs into the intake siphon and her kind would be doomed to extinction. It is a peculiar and interesting fact that it is only the sight of the pond mussel which excites the male bitterling and induces him to release milt. His spouse leaves him cold.

Probably the same applies to her. It may be the presence of a pond mussel which stimulates her egg laying.

Attempts to provide some protection for eggs and fry are not the prerogative of a single species, however.

Quite a number build nests—sometimes at the surface of the water, as do the labyrinths (fighters, gouramies, paradise,



Intromittent organs (gonopodia) of male livebearers. Left (top) platy; left (lower) swordtail; right (top) mollie; right (lower) guppy

etc.), and some on the bottom of the pond, stream or aquarium—the sticklebacks, etc. Others content themselves with scooping or blowing depressions in the sand—*Copeina guttata*. The lampreys (*Petromyzon marinus*) and lamperns (*P. fluviatilis*) remove pebbles from the sandy bottom by carrying them to a position below the site of the intended nest. The pebbles so excavated make a small barrier which helps to prevent the eggs being washed away. If one fish attempts to move a stone which proves too much for its unaided strength, its partner helps. The female then securely attaches herself to a rock, the male holds on to the top of her head, their bodies partly entwine, and vigorous movements ensue which result in the emission of fertilised eggs. The violent agitation of the water stirs up sandy particles from the river bottom, and these settle on the eggs and weight them down. The pond current adds its quota of silt and the eggs are buried. Here is another example of spawning which is so vigorous that the participants rarely recover.

The Egyptian mouthbreeder (*Haplochromis multicolor*) also lays eggs in a depression in the sand, but this is only a preliminary with her—a means of placing them all together for gathering up in her mouth, where they will remain until they hatch. *Tilapia macrocephala*, the large mouthbreeder, and the Ariidae (North and South American sea catfishes) also carry the eggs in their mouths, but in these cases the male fish is the porter.

A Brazilian river catfish (*Platystacus*) develops especially soft, spongy tissue on the undersurface of her body when breeding time approaches. When she has spawned she presses down upon her eggs, which sink into the tissue and remain attached to her for as long as necessary. After the eggs are hatched the tissue changes back to normal and is perfectly smooth and hard.

The male sea-horses (*Hippocampus*) and some of the pipe-fishes (Syngnathidae) are more intimately associated with their offspring than the females. They are literally left holding the baby, for the females place the eggs in pouches especially made for their reception upon the abdomens of their menfolk. Little wonder, then, that confusion arose as to the sex of "gravid" *Hippocampus*.

In many cases, however, eggs are fertilised while they remain in the oviducts of the female fishes. This is done in one of two ways. The sperms are emitted after penetration by the male organ, or find entry after being released into water in close proximity to the female vent.

The "live-bearers" so popular with most aquarists utilise both methods. I have frequently seen *Mollienisia* males making actual contact with the females and pushing them gently through the water with the impact. Yet in the *Xiphophorus* and *Lebistes* this does not appear necessary.

In all our aquarium livebearers the male organ—the gonopodium—is a modification of some of the rays of the anal fin, which form either a trough or a tube for the guidance of sperm bundles to the female oviducts. The organ can be moved through a considerable number of degrees to bring it in line for discharge. Males seem to be overloaded with sex-products, and are for ever seeking fresh conquests. The females ignore them completely, but the only virgins when a male is present are the immature youngsters. The fertilised eggs derive no nourishment from the mother fish, merely developing in the oviducts as the eggs of the mouth-breeders develop in the mouths of their carriers. Folded head to tail the fry are expelled after a week or two to fend for themselves.

Four-eyed Fish Mating

In some fishes with an intromittent organ, however, not only is direct contact by the males with the females essential, but the males must find the right type of females before results are assured. If aquarists kept these fishes with the idea of breeding them they would have more than the usual set of problems to overcome. Take, for example, the extraordinary *Anableps*—a river fish of Central and South America. Disregarding the most peculiar eyes, which are each divided into two parts, the upper for seeing out of and the lower for seeing under water, we find the male has a large, scaled, intromittent organ in place of the anal fin of the female. Further, we notice that in some fishes this organ is inclined to the left, and in others to the right, and that this position is fixed.

An examination of a female or two shows that their genital openings are covered by a scale which is free sometimes on the right edge and sometimes on the left, but never entirely free. In order to transfer milt to the female, a male with his organ inclined to the right must seek a female with her genital opening under the left free edge of the covering scale, and vice versa. The *Anableps* is not equipped with claspers with which to hold the female during copulation, but some species of fishes are.

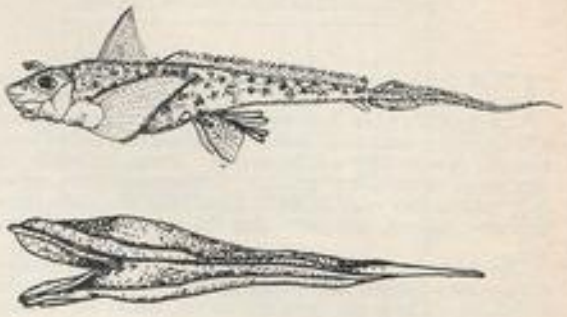
The rays all possess them, as do the sharks. The mixopterygia, as they are called, are inserted into the cloacal opening of the females, permitting the free entry of milt into the oviducts. In addition to the normal claspers, the rabbit, or rat-fish (*Chimaera monstrosa*), occasionally found in British waters, possesses supplementary claspers, which are retractable into pouches or grooves in the skin.

Anableps, the four-eyed fish, showing the intromittent organ

The one on the head is particularly interesting, being provided with various sharp, curved spines, capable of lacerating the skin. It could be used as a weapon of offence, like the spines of a stickleback, but there appears to be no evidence that it ever is. The *Chimaera* is such an extraordinary creature that perhaps I can be pardoned for concluding this article with a brief description of its appearance.

Its gills open to the water by a single aperture, and are covered by a flap of skin, like a soft operculum. The whole body of adults is devoid of scales, but on the claspers there are a number of tooth-like scales called denticles. Young *Chimaera* may show a double row of these along the back. The upper jaw is fused with the cranium and is utterly immovable. Two pairs of large flat teeth, studded with points in this jaw give the open mouth a rodent-like appearance. On the top of the head in the male *Chimaera* can be seen the frontal clasper in its groove. The dorsal fin consists of a short sail-like structure in front, and continues as a narrow growth along the whole length of the body, ending where the peculiar caudal begins. The pectoral fins of both sexes are very large and triangular in shape. Eggs are expelled by the female after internal fertilisation by the male, and these, too, are different from any others. Each is contained in a capsule, which is divided internally into separate chambers, each accommodating a different part of the embryo's body as it develops. A dagger-like projection of the capsule sinks into the mud and anchors the egg.

In case you feel, after reading the above, that, like the giraffe "there ain't no such animile," the person who first gave it its scientific name, called it *Chimaera* after a fictitious Grecian monster—a fire-breathing female, resembling a lion in the fore part, a goat in the middle, and a dragon behind, so possibly he thought also that although it existed it had no right to. *Chimaera monstrosa* is the largest species of its kind, growing up to three feet in length.



Chimaera (rabbit fish). Top drawing shows the frontal and pelvic claspers of the male fish and beneath it is an empty egg case of this species (not to scale)

Starvation can Occur in Community Tanks

by A. P. RAYNER, B.Sc.

IT is a noticeable fact that, amongst community tanks, a not inconsiderable number of losses are experienced amongst the smaller fish. It is to be understood that I am visualising the average 24 ins. by 12 ins. by 12 ins. tank containing, as is often the case, a pair of angels, a pair of platys, a pair of tetras (usually neons), a fighter, and a few guppies.

Observations carried out over the past year or so, in conjunction with my own tanks, have indicated that the losses referred to, which are usually attributed to the various ailments to which fish are prone, appear to be caused by malnutrition brought about by prolonged starvation; even though considerable quantities of various foods, both live and dry, have been introduced into the tanks.

This, at first sight, may seem surprising, for we are all well aware that the food we put into our tanks does not remain uneaten for more than a few moments, especially in the case of live foods. However, if a careful watch is maintained during the period within which the food is being eaten, it will be observed that some of the smaller fish do not receive their fair share of the food; whereas fish like the angels immediately ensure that they have the lion's share.

This is especially noticeable in the case of the Siamese fighter, who, nine times out of ten, appears to miss his lunch. The reason is a direct result of the fighter's natural instincts to study and ponder over his food for a few minutes, prior to eating. Consequently by the time the fish has made up his mind to eat, the prospective lunch is a happy memory of another fish. It will also be noticed that the neons do not receive much food at any one feeding time.

It is of interest to note that out of a quartet of four X-ray fish in a community tank, containing three angels, three made no progress whatsoever, whereas the remaining fish developed into a very fine specimen. It was observed that the healthy fish was quite fearless and would readily defend itself against attempted attacks from the angels, whilst the remaining three X-ray fish were of a very nervous disposition in comparison with their fellows. Upon removing the X-ray fish from the community tank to a separate tank, all of them became healthy fish after a few weeks.

In my opinion, as based upon observations very briefly indicated above, much care must be exercised before introducing fish into a community tank.

The mere fact that various fish do not fight with each other is not the only factor to be considered when stocking a community tank. The feeding habits of the various fish must be carefully considered. The very slow feeders should not be mixed with those who literally gorge themselves, for example, angels, gouramies, large swordtails and similarly sized fishes.

I would suggest that when a single community tank is desired, a choice should be made between the larger fish and the smaller fish, and also between the rapid eaters and the slow eaters.

If the desire for some of each cannot be withstood, I would suggest that a careful watch is maintained in respect of the small fish, more especially those which are inclined to be nervous, and if needs be, the latter should, if possible, be given an opportunity of feeding on their own.

Alternatively the small and/or nervous fish should be segregated at intervals for a few days' convalescence.

Aphyosemion sjvestedti—a new Species Bred

by Dr. G. CUST

(Dewsbury and District Aquarist Society)

THIS fish is a native of West Africa and is one of the newer *Aphyosemion* for British aquarists. In November, 1953, when I obtained three pairs of the fish from a West Riding dealer, the males were about two inches long, with the females only a little smaller. From the beginning they were of excellent quality. In January, 1954, when fully grown, they were 2½ ins to 3 ins. long, the males more brightly coloured, and possessing the familiar lyre-shaped tail.

The colouring of these fish is vivid, the back predominantly orange brown, this orange brown extending into the dorsal fin. The lower jaws, gill covers, flanks and underside of the male fish is a dark royal blue, and there are numerous tiny red spots on the sides. The upper and lower edges of the tail fin (male only) have a thick, dark red line running parallel with the margins of the fin, with a thinner blue line nearer the edge of the fin. A similar line is present on the upper edge of the dorsal fin, and on the lower edge of the ventral fin. The females are less colourful, a generalised orange brown. They are a lively, sturdy fish and spend much time swimming around on the bottom of the tank. The female seems liable to the development of dropsy, the fish swelling in a few days to the thickness of a middle finger.

Breeding Details

The fish were kept together in a 24 ins. by 12 ins. by 12 ins. tank with a water depth of four inches. The bottom of the tank was covered with a one-inch layer of silver sand. I placed two handfuls of boiled peat fibre on top of this, and planted a few *Cryptocoryne beckerti* and some sea moss to give some decorative effect. Silver sand was used because, unlike gravel, it does not affect water pH. Most aquarium gravels tend to bring the pH reading over to the alkaline side. Lighting was one 25 watt bulb for 14 hours each day. These fish do not care for bright light. Temperature: 71 °F. dropping two to three degrees at night. The water was from a moorland stream, very soft and acid, and a level tablespoonful of cooking salt was added to the four inches of water in the tank. pH reading over four months varied from 4.6 to 5.

The fish were fed with live food only: chopped earthworm was the predominant food, *Tubifex* and whiteworm being given occasionally. The fish were fed twice daily; *Daphnia* were offered to the fish but were only taken slowly and obviously not well liked. Mosquito larva were given when obtainable and were taken greedily.

After about six weeks the males began to colour up, the under-side of the head and body "blushing" a dark royal blue. They began jousting amongst themselves: two males would manoeuvre side by side and then charge each other, one fish eventually capitulating and then being chased away by the victor. The females usually hovered around the outskirts of these fights as if waiting to see who would win. Occasionally two males would grip each other by their lower jaws, refuse to let go, and a tug-of-war would ensue. On one occasion such an "embrace" lasted for twenty minutes, until the fight was broken up by disturbing the surface of the water with a finger.

About three to four days after the beginning of this courting period the fish began to spawn. A male and female would lie side by side and slowly wriggle, and one egg would be laid. The eggs were usually laid in the peat on the bottom of the tank, and occasionally in the sea moss. After an egg was laid the fish would swim away and resume spawning later.

I then isolated the best pair and put them together in an 18 ins. by 12 ins. by 9 ins. breeding tank set up in the same way as the original tank. I let these fish spawn over a period of 10 days and then put them back into the community tank. About every two days during the spawning period I removed all the eggs I could see, and the peat to which they were attached, and put them into jam jars. These were floated in the community tank. Then began the long wait.

Sixty Days Incubation

The first eggs were removed from the breeding tank on 17th January, 1954. They were large eggs, one-sixteenth inch in diameter, and easily seen with the naked eye. They were completely clear on a microscopic examination, and no evidence of an embryo could be seen. After 16 days' incubation a black spot could be seen, off centre in each egg, with the naked eye. This was the first indication that the eggs were fertile. An occasional egg developed fungus, and I added sufficient methylene blue to colour the water in the jar. This did not stop the development of the fungus on the affected eggs, but the fungus did not spread on to any other eggs. The eggs which developed fungus did not show an embryonic spot and were therefore probably infertile. In another jar, in which some eggs developed fungus, I did not add methylene blue to the water. In this case also the fungus did not spread to the normal eggs. After 30 days of incubation the eggs could be seen developing further, three dots could be seen with the naked eye and on further magnification of the developing embryo, developing eyes could easily be seen. The first egg hatched on the 17th March, after an incubation of 60 days at a temperature of 71° F., and was closely followed by five others. Further fish hatched out over the next month.

The young fish were about twice the size of fighter fry and for the first 10 days were kept in an eight-inch diameter Pyrex basin floated in a tank. They were fed with Infusoria for one day and then given brine shrimp, newly hatched *Daphnia* and micro worm. They fed very well and had doubled in size within seven days, and were one inch long when three weeks old. At six weeks old the fish were easily sexable and about 1¼ ins. long. When three weeks old the fish were taking shredded earthworm and chopped white worm and no further difficulties were encountered. As I write this article further eggs from later spawnings are hatching and I trust these will be reared successfully.

Brine Shrimps Without Shells

by G. F. POWELL

HAVING visited various aquarists, I have noticed what a lot of trouble it seems to be for most of them to obtain even a small quantity of that valuable fish food, brine shrimp (*Artemia salina*).

I should, therefore, like to describe the simple method which I use, by which I can guarantee to have enough perfectly clean, shell-free brine shrimps, to feed three batches of young fry per day, from one quart of water.

I float a round fish bowl in one of my fish tanks—heat 75°—80°F. Into this I put two pints of clear tank water and add two tablespoonsful of common kitchen salt. Next I arrange an aerator in the water which will give a slight trace of bubbles. Into the prepared salt water I place as many brine shrimp eggs as will fill the cap of the glass phial containing the eggs.

Twelve Hours' Hatching

After twelve hours the water is thick with hatched brine shrimps, the empty shells floating on top. They have even hatched in eight hours. To obtain shrimps for fish food without the accompanying shells, which seem to be the chief "bugbear," I take a piece of aerator tubing, a jam jar and a piece of fine white cotton material—such as an old handkerchief.

I place the material over the top of the jam-jar, forming a slight depression in the middle and siphon the shrimps into it; gently moving the siphon pipe among the cloud of shrimps in the hatching bowl. All one has to do now is to rinse off the shrimps from the material into breeding tanks.

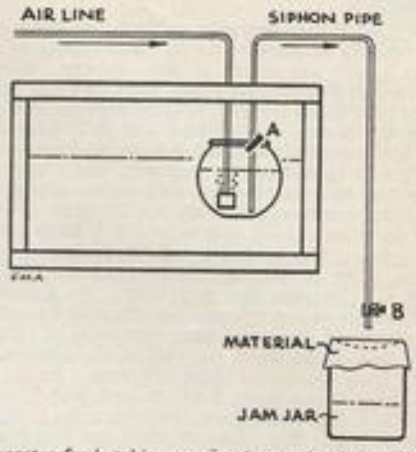
For those who are not too good at siphoning and who do not appreciate a mouthful of newly hatched brine shrimps, if the siphoning tube is first clipped on to the side of the hatching bowl (A) and an aerator clamp placed on the outer end of the tube (B), the tube having been previously filled with water, the clamp will act as a tap and one can have brine shrimps for days on end without going to any more trouble, except by replacing water siphoned off and re-charging the bowl with a fresh batch of eggs as required.

When there accumulates a large proportion of egg shells —usually after about a fortnight—I recharge with salt water, after rinsing the bowl well. On occasion I have had shrimps half an inch long. Apparently these were some that had dodged the siphon many times.

Practical Points

I have made many experiments in hatching these brine shrimps and the following observations may be of use:—

1. While I have found the shrimps hatch better in pure sea water, the difference in yield is not so great as to warrant the bother of collecting the sea water.
2. I find it is better to use old tank water than that fresh from the tap. Presumably the resident Infusoria feed the brine shrimps.
3. The hatching of these shrimps is easily trebled by the use of gentle aeration. This is the most important point I have noted.



Apparatus for hatching eggs and removing brine shrimps

4. For the big breeder it would obviously pay to have a separate tank with thermostat and heater, set up specially for the brine shrimps, with larger quantities of water and eggs.
5. I have never yet found by using this method of obtaining brine shrimps that I have had the trouble from the salt concentration in my breeding tanks referred to in various printed articles. If I did I should just take the simple precaution of siphoning a small quantity of the bottom water from my breeding tanks and replacing it with fresh.

South African Aquarium

THE South African Association for Marine Biological Research have recently issued a pamphlet giving details of plans for a new public aquarium to be built at Durban. £15,000 has been granted by the City's fathers towards the cost, and this sum, together with public subscription funds promised locally, will be ample to ensure the completion of the aquarium. It is hoped that the foundation stone will be laid some time during the Centenary period of the City of Durban, celebrated from June to August this year.

An up-to-date biological research station is to be erected in conjunction with the aquarium and it will be provided with modern equipment to enable research and study of fresh and saltwater fishes with an especial emphasis on food fishes. The Marine Parade site chosen for the project overlooks the Indian Ocean; a large number of furnished-type aquaria are planned and one unusual feature will be a large shark pool. The combined Aquarium and Research Station has been adopted by Durban as a permanent memorial of that City's centenary and the authorities responsible must be congratulated on this far-sighted action; there is every expectation that the work which will be carried out in the laboratories will add appreciably to the knowledge of aquatic life in that region and so eventually aid the peoples of South Africa by a valuable scientific contribution towards their now rapidly diminishing food resources.

R.W.

In the Water Garden in SEPTEMBER

by Astilbes

I WONDER if it is generally realised that many of the water plants which give us so much pleasure in our garden ponds are native to this country. When on holiday or out and about near ponds and rivers it is quite an interesting task to look for fresh subjects for your own pond. Providing the plants so collected are well washed and searched for unwanted pests there is no reason why these collected plants should not do well with you. You are at least sure that such specimens would thrive in your pond better than any exotic types which you bought.

One of the plants I have in mind which is fairly common is the bog bean (*Menyanthes trifoliata*), a close-up of the flower being show on this page. As the name implies it is a bog plant and does not like deep water. As a pond-side subject, however, it is a splendid specimen and rarely fails to give plenty of flowers. The rootstock is somewhat similar to that of the water iris and so the plants can be increased by the division of these rhizomes. At the actual edge of a pond, in rich loam, it will do best, and the smooth green foliage makes a fine show, apart from the pretty pink and white flowers. Providing the plant has plenty of root room it will soon cover quite a large area, but should it be necessary to confine it to smaller quarters it is an easy thing to do so by planting in large pots which can be anchored to the side of the pond so that the soil level is just above that of the water.

From now on it is essential that the pond has some special attention at least once a week to see that all dead flowers are removed from the water plants, especially from the lilies. The attention to this will help considerably to see that too much decaying vegetation does not remain in the pond for the winter. If a quantity of blanket weed is seen on the stems of the water plants as much as possible should be removed. No doubt much of this will have disappeared by now but if some is pulled off there may be little more growth from now on. The underwater plants should have some attention as such plants as *Lagarosiphon* can get very dense and overgrow a large portion of the pond. Where any duck weed (*Lemna*) has been allowed to grow on the pond as a temporary shading it should be controlled or the whole top of the water can be covered in a couple of weeks. This small plant will form seeds which will sink to the bottom of the pond and grow in the following spring. The ivy-leaved type, *Lemna trisulca*, is a very good one where surface vegetation is needed for surface spawning fishes, but as it appears to float just below the surface it is not as attractive as either *Lemna gibba* or *L. minor* which have bright green tiny leaves always on the surface.

Should you have any *Ceratophyllum demersum*, known commonly as hornwort, it will be noticed that as autumn approaches this plant gradually sinks from near the surface to the bottom, where it contracts considerably and forms short hard horn-like whorls which go through the winter in this resting state. In the spring this plant will once again send out its green whorls and make the grand spawnng medium so much appreciated by most fish breeders as a safe receptacle for goldfish eggs.

Where any of the larger growing water plants have encroached too much on the more tender specimens it is necessary to dig out some of the root-stocks and lessen the mass. Such plants as the flowering rush, *Butomus umbellatus*, when given plenty of room can make huge specimens. When in Warwickshire recently I came across a little used canal which had a huge clump of this grand rush growing at the opposite side to the towing path. The large umbels of flowers were very handsome indeed but it is a pity that except in large ponds it is likely to become a nuisance by getting too large. I have tried to keep this plant in check in a small pond by planting it in a flower pot but although it did keep it from straying too much the lovely flowers were not produced after the first year. The sight of this plant and many others growing in the canal made a happy picture, and even if the thought that so much heavy traffic from the over-crowded roads could be transferred there brought home to me sorry realisations, these canals could be used to a greater extent if the problem was tackled the right way.

Photo: Laurence E. Perkins

Flower of the bog bean (Menyanthes trifoliata)

Cacti in the Fish-house

IF cacti are kept for some time in any one position it is possible that dust may settle on them. This is not good for the healthy growth of the plants and also it looks bad. On a bright day the plants can be removed from the fish-house and given a good spraying with clean rain water. If these plants are sprayed often with fresh tap water, which is rather hard, some of the spines may become partially covered with a deposit of lime, and they will lose their attractive colour. Allow most of the water to dry from the plants before they are returned to the house, as too much water must never be allowed to remain around the roots. Although cacti can go for very long periods without water they cannot grow without it. On the other hand nothing is more likely to kill the plants than if the soil is almost always wet. If there is one thing these plants detest it is wet feet.

AQUARIST'S Notebook——

by
RAYMOND YATES

NEWCOMERS to the hobby do not always realise that all tropicals cannot be kept together as peaceful members of a fish community. It is possible, on occasion, to keep unsuitable types together for a time, but sooner or later there will be trouble, and to the aquarist trouble means loss. It is wiser, therefore, to take the advice of those who know and not to tempt Providence. Many beginners buy *Panchax* varieties and take them back to the dealer the next day, sadder and wiser, and in a wider sense others risk cichlids in community tanks.

There are many cichlids and all of them are bad risks, insofar as one can never tell the state of their tempers. It is true that some members of this family are very docile in general, as for instance, angels, *S. discus*, *A. ramirezi*, most firemouths and *C. festivum*, and it is rare for these fish to cause trouble unless there is a wide difference in size. Very small (young) cichlids, about one inch long, get by very well in a community tank (except jewel fish) but larger than this size is asking for trouble, depending on the size of the smallest fish you keep in your community tank.

I have made some experiments over a long period with various cichlids and find that they are all unreliable, insofar as they will be docile for weeks and then turn savage overnight for no obvious reason. Even keeping only females together is no help, as displays of bad temper occur just the same. Fast-swimming fish are unharmed and quite unafraid when with big cichlids, probably because cichlids have no turn of speed worth mentioning. I find giant danios get on very well, as also do the majority of the fast tetras, whilst at the other end of the scale *Corydoras* are not molested in any way. In fact, *Corydoras* are deliberately rude to cichlids a dozen times their size, and push them out of the way when food is in the offing. Possibly they dimly realise that they are too tough for the cichlids to annoy; be that as it may the cichlids never bother *Corydoras*. If swordtails are put in the tank it is a very different story. These fish seem to know they are in danger and usually hang motionless at the surface, in the darkest corner they can find in an effort to avoid detection.

Cichlids do not make sudden rushes like their English relative, the perch, but swim slowly in the direction of the fish to be attacked and then make a sudden snap at its side from about a distance of half-an-inch. Swordtails seem petrified by this method but at the last second jump forward and usually escape the first half-dozen attacks. Cichlids never tire, however, and relentlessly carry on the war with the inevitable end. Large *C. severum* can be very nasty, whilst the brown acara is a thorough pest with weaker fish. Paradise fish are not molested if large. Weaker cichlids eventually go to the wall, no matter how large, and in this respect large angels should not be kept with similar sized cichlids of other types. The angel is very helpless and sooner or later this fact is discovered by the other fish and he is badly bullied. I recently had a six-inch angel with every ray of the dorsal and tail fin split from top to bottom and also badly bruised sides, the result of vicious bullying from large *C. severum*. I rescued the fish and gave it a five-gallon tank to itself, adding one teaspoonful of acriflavine and four similar quantities of sea salt. Recovery was rapid although the fish was off feeding. Fin regeneration does not seem to be affected by lack of protein in diet.

Zebra cichlids are a source of trouble as they alarm the other fish by rapid dashes up and down the tank; cheap as they are they can be a bad investment. Dwarf cichlids are not as peaceful as some would have us believe. *A. ramirezi* is very well mannered but others are bullies which savagely attack even large fish which venture too near to the part of their tank which they consider their own. The worst of these are *Nannacara* and *A. agassizi* when they feel in the mood. All in all cichlids are best kept to themselves with the exception of angels and *A. ramirezi*. *Symphysodon discus* are reported to ignore even guppies, but we lack much information on this fish, which seems to be the nearest relation to the angel in shape, habits and manners.

* * *

A lieutenant in the Fleet Air Arm who is also an enthusiastic aquarist, found himself recently in Norfolk, Virginia, in the course of duty. For a long week-end leave he hitch-hiked (by plane) to Miami, Florida, and on arrival he got in touch, by telephone, with one of the largest fish farms in the district. When he explained matters they met him with a car and showed him round. It seems to have been a wonderful experience. Most of the fish were out-of-doors in concrete tanks varying between 6 ft. by 4 ft. and 20 ft. by 12 ft. There were some beautiful fish of many kinds, all in vast numbers. There were two large pits outside in the grounds where livebearers were bred. One of these was full of huge sailfin black mollies and it did his eyes good to see them. Egglayers were spawned inside but reared outside. Perhaps other aquarist service men in this locality could follow this example. He seems to have enjoyed his leave in a very practical way.

* * *

It has been common knowledge for a long time that money is much "tighter" now than a year or two ago, that the sellers' market is over and that buyers not only think twice, but half-a-dozen times before buying. This is also true of the aquatic trade and dealers everywhere have experienced a considerable falling off in trade compared with the last few years. We have, of course, no yardstick with which to measure, as before the war the hobby was but a shadow of what it is now, and after the war the hobby experienced a boom such as nobody could have foreseen. It is probable that things are now levelling off and by next year we shall be able to estimate the true state of the hobby in the country. Fish prices have fallen somewhat with the demand, and with the fact that novelty fish of a year or two ago are now commonplace.

The aquarist often wonders what prices are paid for fish in other countries, and recently a friend of mine had good neons offered to him in Germany at the equivalent of 1s. 8d. each. In Belgium, prices seem lower than in this country. We have available the comparative prices in U.S.A., which may be of interest. In the main these are mostly more expensive than what is asked in England but there are a few surprises. It should be remembered that the rate of exchange of the dollar is against us. For all practical purposes one dollar is to-day worth about 7s. 6d. in sterling.

The following is a guide to current U.S.A. prices for popular tropicals translated into our currency. For 7s. 6d. each one can buy half beaks, orange chromides, firemouths, *C. severum*, kissing gourami, Australian rainbows, *Badis* and *Callichthys*. For 9s. each there are neons, glowlights, *A. pulcher*, scissortails, leeri, lemon tetras, hatchets, *Corydoras* and kuhli loach. At 11s. each the range includes *H. ulrey*, harelquins, *C. festivum*, *A. ramirezi*, Jack Dempsey, dwarf gouramies, pencils and blind cave fish. The cheapest fish are danios and blue gouramies, rice fish, black line tetras, X rays; and in the 5s. range one can get *Barbus*

everetti, *B. shuberti*, *B. oligolepis*, cherry barbs, rosy barbs and niggers, paradise, glass fish, brown acaras, bloodfins, red-tailed tetras, beacons and white clouds. The more expensive fish are rather interesting, prices being, *Rivulus* and *Astronotus* 22s. per pair, lyretails and *A. agassizi* 38s. a pair, *Panchax chaperi* and *playfairi* 26s. a pair, *A. lineatus* 30s. a pair, Malayan angels 65s. each, wasp goby and *H. rhodostomus* 15s. each, *Metynnis*, *Anastomus anastomus* 22s. each, *Betta* 22s. a pair, *Leporinus* £2 each, penguins 15s. each, butterfly fish 45s. each, scats 55s. each, angels from 3s. 6d. to 16 guineas a pair, and *Symphysodon discus* fish £17 each. Most livebearers are sold in pairs, not singly, the price varying with quality, size and rarity.

* * *

As one who has been in dozens of headquarters of aquarist clubs in various parts of the country, I find that these generally follow much the same pattern. In the main clubs have the use of a room at a local café or public house, some use rooms belonging to some church or trade organisation, and a small minority use rooms coming under the jurisdiction of the local education authority. It is not an easy matter to obtain a good headquarters for meetings which is reasonably cheap, well lighted and heated, centrally situated and at the same time clean, attractive and comfortable, and the result is that the standard varies. I have been in club rooms which were practically palaces, others in cellars and one which was little more than a hay loft. A good club can function anywhere, but it helps a great deal if the surroundings are congenial. One source of good headquarters which is largely overlooked is the political club. Every town has two or three political clubs and these all have rooms which are generally just the thing for aquarist meetings.

These rooms are rarely booked by outsiders except possibly on Saturdays, so that they are mostly available when wanted by a fish club. In addition most political clubs are not too well off to-day, and are only too pleased to hire out rooms at very low charges indeed. Most of these clubs have a bar, and some are even prepared to make no charge for the room provided the aquarists use the bar. Where this is done the members are usually signed in as members of the political club for the evening only and are thus entitled to use the bar, but junior members can still attend meetings as they do not go into the room where the bar is situated. Clubs which have their headquarters in hotels or other licensed premises cannot have junior members at their meetings, which is bad for the hobby, whereas at the political club there is no bar to juniors. Clubs which are contemplating a change of venue for their meetings this winter might well consider the possibilities of the political clubs in their locality. One small snag might be mentioned —during election periods the political club usually wants all its rooms for committee work, etc., but as this happens only once a year in May (for local elections), and very rarely for general elections, it need cause no dislocation as a special visit could be arranged to coincide with the period when the rooms are politically in use.

* * *

Hydra are a nuisance, not so much because of their danger to fry as the fact that they make a tank look unclean. What visiting aquarist can forbear to say, "Surely, you've not got *Hydra* in the tank?" and so on, with tongue in cheek. Numerous ideas for getting rid of them have been suggested from time to time, such as putting blue gouramies into the tank to eat them, removing the fish and raising the temperature to 120° F. and, best of all, adding ammonium sulphate to the tank water in the proportion of five grains to the gallon. In this event leave the fish in, and wait. After about four days the *Hydra* will simply fade away. It should be remembered that the chemical must be the pure stuff, obtained from the chemist for a few coppers. The fertiliser sold for garden purposes as ammonium sulphate in 7 lb. bags would be too risky. However, I came upon another method the other day. This was at a famous breeding establishment where I noticed a number of tanks each containing one solitary paradise fish. Commenting on this, I was told each tank was full of *Hydra* but that the paradise cleared it all if given nothing else to eat. The idea of one fish per tank meant that the fish had no time to be making passes at other fish, which is the way paradise seem to spend their time.

* * *

About a year ago I drew the attention of readers to the new set of stamps issued by Mozambique, consisting of 24 stamps each depicting a different fish of the locality. Mint this set cost £5, but only 35s. for a set of used specimens. Since then some more sets of fish stamps have appeared, issued by the Spanish Colonies. These are long stamps and are beautifully engraved. A set of six in mint condition can be purchased from dealers for one shilling so that any aquarist's son can add them to his collection. It is surprising that fish have figured so little on postage stamps, as mammals, birds and even insects have been quite popular subjects. Perhaps the best known fish stamps are the Newfoundland cod and the Japanese trout. There have been isolated instances of a single stamp being issued portraying a fish but sets have been conspicuous by their absence. Perhaps fish are now about to come into their own in the world of philately.

* * *

The public has now become quite used to the naval frogmen idea from the film and magazine aspect and it is no surprise to find that one local authority (Scarborough) is to loan these suits out this summer for visitors. Scarborough is already known to aquarists as the home of the floating aquarium in the holiday ship "Hispaniola." Some time ago I came across an advertisement in an angling paper offering frogmen suits for sale (about £2) . . . the wording of the advertisement went on to say, "These will make admirable waders."

Aquatic Agonies

"You've got a fortune in that tank!"
"Ah, they're grand for feeding sea anemones!"

A page for the beginner contributed by

A. BOARDER

SEPTEMBER should see all the plant life in the tank and pond in a thriving condition, but be sure to see that some of the extra strongly growing underwater plants are thinned out now and again. I dealt with the growing of water plants last month and now intend to deal with the raising of fry and the subsequent feeding until the youngsters get to such an age that they can be given ordinary adult fish food. Without doubt the vital times in the life of a young fish are between the ages of two days and two months. Before this time they are able to exist on the yolk sac with which they are born and no feeding on your part is necessary. After two months of age, providing you have fed the fry well and they have plenty of space, it is possible to give them all the usual foods with little more trouble or worry.

For fry up to eight or ten days of age I consider that Infusoria is the best food, but from then on they need something more meaty, and this is the time when so many fry go wrong because of insufficient of the right kinds of foods. If it is possible to go from Infusoria on to micro worms after the first week it will be a grand food for about another week. Then if Grindal worms or mashed white worms are used this will take the fish on for another week. For a follow-on, chopped or mashed white worm can be used and mashed small earthworms can be added to the diet. Small *Daphnia* (water fleas) can be given from about three weeks of age, but see that the fry are large enough to be able to take the fleas or these are likely to take too much oxygen from the water and may eat many small rotifers, etc., in the water which should have gone to the fry.

Once the fry are a month old they can be given chopped white worm and introduced to slightly larger foods, such as mosquito larvae and larger *Daphnia*. All this is quite easy providing you are able to get an almost unlimited supply of live foods. What are your chances of rearing fry if you are unable to obtain most of these live foods? Well, I have been carrying out experiments along these lines this season in the hope that I may be able to help those aquarists who although very keen are unable through various circumstances to obtain enough live foods. I think that I have proved that it is quite possible to rear fairly large numbers of fancy goldfish fry by using many foods other than live. My experiments were made with the fry of fantail goldfish and so far they have given quite good results.

The fry were hatched in concrete tanks, about 24 ins. by 12 ins. by 9 ins., and were given some slight extra warmth in a garden frame. Hatchings took place in about four to five days and many fry were obtained. No food was given for a time but each day after the second from hatching the water was examined under a microscope and as long as plenty of Infusoria was seen nothing extra in the way of food was added. I found that sufficient Infusoria had formed in nearly all the hatching tanks for the fry for some days, and in fact where I had placed decaying grass in special tanks I found less Infusoria than in the fry tanks. It is always strange, though, how tanks can vary; although apparently under exactly the same conditions one tank will have plenty of life in it whilst another tank beside it will have scarcely any.

I found that by changing some of the water I could keep up a good supply of Infusoria in most of the eight tanks I was using for the experiment. There is no doubt that the number of infertile eggs decaying causes the formation of some Infusoria, and also leaves from the spawning medium starting to decay through having no roots helps matters. The first artificial food I used was dried egg powder. This I find better than the actual yolk of a hard boiled egg, as it is of such fine consistency that it floats on the surface of the water and so it can be seen if any is not eaten. When can this dried egg be given? I have found that normally growing fry can eat this when four days old but I think it is unwise to give it before they are at least six days old, and then only providing the temperature of the water is in the region of 70° F. I find that if the fry take this food when too young or when the water is not warm enough it has a tendency to cause the fish to float on the surface, and if they appear to over-feed with it they may die. I found that only very small quantities were necessary, as the fry were almost always able to find some Infusoria, but the little extra dried egg gave them something to keep them going all day. Even a few minutes after a small portion had been dropped on the top of the water the yellow could be seen quite plainly in the bellies of the fry.

This gave a ready indication as to the amount of food the fry were able to take. It was, of course, noticeable that as long as the water was warm the fish fed better and were able to digest the food much more quickly. The next dried food to add to the egg powder was very fine Bemax and ground shrimp. I mixed some Bemax and dried shrimp and put it through an ordinary household mincer three times. This was then sifted twice so that the fine which went through a sieve made with a piece of silk stocking was just right for the fry, whilst the larger was saved for the fish when older. The dust which goes through the stocking is ideal, as it too will float on the surface and then the fry can be seen taking it quite easily. If ordinary packet foods are sifted in a similar manner it is a great advantage, as not only can the fine food be used for the fry but the larger fishes will be able to clear up all their larger food without there being large amounts of dust-like foods left to pollute the base of the tank.

So far I have been able to rear fry to over two months of age without any live foods at all except for the initial first Infusoria in the hatching tanks. The fry are quite plump in body and appear to be in very good fettle. I am sure that many of the deep bodied fancy goldfish can have the shape of the body changed by feeding with too much live food at the expense of some dry or starchy foods. A wholly live diet can cause a fish's body to become elongated, at least this is noticeable in the case of fantails and veiltails. From two months of age young goldfish should be capable of feeding on any of the usual fish foods and so I hope that I have been able to prove to some aquarists that it is quite possible to rear fry on artificial foods. It must be realised, however, that the fry have been able to obtain much vegetable matter at most times by browsing around the sides of the tank or on the water plants.

The Platy

(Xiphophorus maculatus)

ORDER:—Microcyprini, from Greek *mikros*—small, and Greek *kyprinos*—a kind of carp.
FAMILY:—Poecillidae—from Greek *poikilos*—many coloured.
SPECIES:—*Xiphophorus maculatus*, from Greek *xiphos*—sword and Greek *phoreus*—a bearer or carrier, plus Latin *maculosus*—full of spots. (Old name: *Platypoecilus maculatus*).

THE "platy" is a fish known to aquarists throughout the world and enjoys a widespread popularity. Of medium size, peaceable disposition, and of many different colour patterns, all of which will inter-breed, it can be relied upon to provide its owners with regular broods of baby fishes throughout the 12 months of the year. The original wild platys, native to Mexico, were drab, uninteresting creatures apart from their cheerful, chunky shape, yet all the modern exotic specimens were evolved from them through accident or design—an outstanding example of what can be achieved through curiousity to see what would happen if certain fishes were bred together.

After many years careful selective breeding various colour varieties have become true breeding. In other words a male mated to a female of the same pure colour strain will produce offspring which are identical in colour with their parents. Sometimes, however, the female will be of a less intense coloration than the male. This is frequently found to be the case in the red platy. Often by standing a little away from the aquarium, it is possible to pick the sexes of the offspring by the different shades of red. Good red platys are hard to obtain. There are plenty of so-called reds which are actually a dingy orange hue or rapidly pale towards the abdomen. To breed from such specimens is postponing by many years the production of consistently good stock. Other extremely popular colour patterns are the black, the yellow or golden, and the Berlin.

The Federation of British Aquatic Societies have approved and published a list of standards for platys in their little booklet *Show Standards for Cultivated Fishes*. I have yet to see a fish which approaches anywhere near the shape of the line drawing in this booklet, but those aquarists intending to breed for show purposes would do well to

Photo: G. Timmerman

Young wagtail platys

♀

♂

study the requirements closely. They can then assess their own stock, see what they are lacking, and plan accordingly. A description of more colour patterns than I have mentioned is also given.

When breeding to establish or improve the recognised colour patterns it is of first importance to rigorously segregate the different coloured fishes. They may be dissimilar in hue, but they are all platys, and will interbreed freely. One false move, and development will be halted for months. The offspring will frequently *look* the same as their parents, but when mated among themselves the sins of their fathers or mothers are at once apparent in the appearance of new and weird colour combinations. If the intention is to produce something new, then go ahead—it can never be said that we have reached the limit in desirable fish of this species.

Wagtail Platy

Equalling, if not excelling, the red platy in popularity is the wagtail platy, originated by Dr. Myron Gordon, the celebrated fish geneticist, whose visit to this country last year created such great interest. An aquarium-bred golden female was mated with a wild male bearing the so-called comet stippling. When the female gave birth all the offspring had wagtail markings—the rays of every fin were jet black, but the bodies remained grey. To anyone seeing only the offspring and not the parents it would seem that mated together these new platys would produce only fry like themselves. But in their invisible make-up they carried the potentiality of their mother. When mated they gave birth to one in seven youngsters bearing the body colour of their grandmother, plus the wagtail fins of both their parents—a really spectacular development. Since the first golden wagtails, there has been established a strain of red wagtails, much fancied by many aquarists.

Some two or three years ago, serious consideration was being given to the formation of a platy-specialist association—a very laudable project and one from which the hobby stood to benefit considerably. Somehow the idea seems to have faded out—perhaps the influx of many new and exciting species of fishes diverted attention from the qualities of the humble platy. I remember, too, that soon after the war, 1946, the scientific section of a well-known society tried hard to interest its members in experimental work with the platy, but this too faded out from lack of support.

I said in the opening paragraph of this article that these fishes can be relied upon to produce regular broods of young throughout the year. This is quite definitely a fact, yet many owners have reported difficulty in keeping them healthy or getting them to breed satisfactorily and have

(*Please turn to page* 128)

Gaseous Embolism

by N. E. PERKINS

ALTHOUGH this is fairly well known among experienced breeders, there are probably many people who would be more than a little surprised to find their fish floating head downwards and unable to drag their tails from the water surface. The cause is at once evident, the tail being full of small and, sometimes, quite large bubbles of gas. It generally occurs during the warmer months of the year when the water is very green with abundant microscopic plant-life, and it is the copious quantity of oxygen given out by these organisms which is responsible for the condition.

When observed it must be attended to at once since any delay can lead to serious damage to the fins and provide ingress for disease, although the damage itself can be quite considerable as the illustration shows. I have recently run into a patch of this kind of trouble, which does not in the least surprise me, for the quantity of fish being maintained in a comparatively small volume of water is quite staggering and it is this which is largely responsible for the trouble. With adequate sunshine, together with the high release of carbon dioxide from the fish, we have the necessary factors for a great increase in plant life.

The pond, which is 9 ft. 6 ins. by 7 ft. 6 ins. by 4 ft. 6 ins. deep, contains large hi-gois, golden orfe, golden tench, dace, gudgeon, numerous large shubunkins, golden rudd, mirror carp, and, in a divided section, some 20 veiltails and a moor. It may well be asked: why the quantity? Well, as is well known to readers of *The Aquarist*, my brother is a keen fish-photographer, and from time to time additions have been made for his purposes, usually comprising small fish. As these have grown, and more have been added, the position has reached saturation point with the obvious results.

Photos: Laurence E. Perkins

Serious damage to the tail of a veiltail goldfish arising from bursting of gas bubbles within it

Veiltail goldfish viewed from above, showing bubbles in tail and dorsal fin. Removal of a fish at this stage from a pond will usually end the trouble and prevent further damage

Treatment

Now, concerning treatment: this is quite simple, since it relies upon the lowering of the gas-content of the water, and for this a good hosing, which breaks up the water surface will usually prove sufficient. Any fish which are damaged must, of course, be removed since they may so easily become diseased in the pond. In my case, of course, this remedy will be so short-lived as to prove practically worthless and I shall have no alternative but to drastically reduce the numbers. Now, it is worth noticing that although there is always a seasonal greenness of the water, constant greenness during the summer months can be caused by overcrowding the fish, although it can also be caused, of course, by overfeeding with dried food. For anyone like myself the problem merely creates additional interest but for those desiring to eliminate as much trouble as possible, the answer is: limit the number of fish to a minimum.

Should such conditions arise it will be found that the long finned varieties show distress much sooner than the ordinary types and with the fish illustrated this was, indeed, the case, for they had been in the pond only two days when photographed. At this time the more normal-shaped types were showing no such signs of trouble. The damaged specimen had, by some means or other, managed to keep itself below the water-surface (with the probable result of causing sufficient pressure to burst the bubbles) and it was not until it surfaced some four hours after the other had been removed that it was possible to lift it out.

It is quite impossible, of course, to breed fish under these conditions but since I am only seriously interested in the veiltails, which are bred in aquaria and maintained in a separate part of the pond, that question does not arise.

Golden Rudd

by A. BOARDER

Photo: Laurence E. Perkins

Golden rudd

THE golden rudd is classified as a cultivated fish and is consequently included in the Federation Handbook. This fish is a great favourite with pond and aquarium keepers. In the pond its fine red colouring and quick actions make it a splendid addition to any group of fishes. When young it can be kept in a fair-sized tank and makes a good shoal fish for the furnished aquarium.

The rudd is somewhat similar to the roach in general appearance but has redder fins and the dorsal fin commences farther back than that of the roach. The dorsal fin of the rudd should start well behind the pelvics. For those who are of an enquiring nature—the rudd has two rows of the pharyngeal teeth whilst there is only one row in the roach. Usually the rudd is deeper in the body than the roach, but as the roach can be a very variable species, especially those from different districts, this point is not always too exact a distinction.

An omnivorous feeder, the rudd will take most types of food given to ordinary pond fish such as the goldfish varieties. In a well-established, fair-sized pond it will probably find all the food it requires from the water plants, snails, larvae, and flies which alight on the water. Like many other fish the rudd will take small worms and gentles and some will soon become tame if fed occasionally at the same spot in the pond with these tit-bits. They spawn in late April and May and prefer shallow water. The eggs are small and adhesive, rather similar to those of goldfish. From the many types I have seen I am inclined to think that there are many hybrids of the rudd and roach in native waters, in fact in some lakes many of these may be found. There is one very good point in favour of the keeping of rudd; it does not appear nearly as liable to attack by fungus as its near relative the roach.

For show purposes the rudd should be not less than four inches in body length. For the furnished aquarium this can be ignored. The body should be evenly scaled and the upper curve of the back should be regularly arched. The lower curve cuts away sharply from the vent making a thin waist at the tail junction.

The eye is large and bright orange-red. The dorsal fin, starting well back as already described, is high and pointed in front with the upper edge concave. The caudal fin should be deep and well spread with good forking and pointed lobes. The pectoral fins are long and pointed with the rear edge straight. The pelvic fins are broad but pointed. The anal fin is rather similar in shape to that of the dorsal.

It will be found that most fishes comply with these requirements fairly well as this fish has not been altered from its natural shape like the goldfish varieties. The features which are likely to attract the notice of the judge are the bright red colour and lively condition. It is useless showing one of these fishes unless it is in perfect condition. Any partial folding of fins or the lack of a few scales would be an almost sure cause for down-pointing by the judge.

For the averaged sized tank, 24 ins. by 12 ins. by 12 ins., the rudd will do very well as long as it does not exceed four inches overall. When it grows above this it is better to place it in a pond and replace with a smaller fish in the tank.

The Platy

(*Continued from page* 126)

resorted to experimenting with pH. This should not be necessary. If the water is alkaline—even as high as pH8 or over, it is suitable. Most tap waters seem to err on the side of hardness—certainly the M.W.B. and South Essex water companies' do, yet I have had, and have seen, many magnificent specimens raised in the water provided by these companies. Clear water seems to be necessary, with a temperature range of from 72°-78° F. Most important, it must be borne in mind that platys are partly vegetable eaters—herbivorous. They appreciate liberal helpings of live food, certainly, but are likely to suffer if unable to obtain a goodly proportion of fresh green vegetables. I recommend the provision of an ample cover of duckweed in all aquaria where platys are kept. The hanging roots will furnish the best of food for them, and at the same time provide a playground and hiding place for the baby fishes.

Incidentally, for those readers who like a "community" tank of different coloured fishes, and who are at the same time admirers of the platy and have only limited space, I make the following suggestion. Set up and plant your tank in the usual way, but stock it with different varieties of platys—all of one sex. If, in addition, the fishes are matched in size, the resultant effect will be singularly pleasing. The fishes can be all males, but as most females in this species are not only as colourful but also a little bigger than the males they make a better display. And if all the females are gravid, and well fed, stock will increase enormously.

The males can be kept in a smaller tank, or borrowed from a fellow aquarist or club member. Only one precaution is necessary, and that is to make sure that the young are removed from the tank before they are sexually mature, and sorted, if desired, into their various colour groups.

It may strike some of you as a good idea to set up a tank of mixed colour patterns and include a number of both sexes in it, just to see what happens. Rest assured a lot *will* happen, but you will be unable to tell which parents were responsible for which youngsters, so your efforts will largely be wasted, and impossible of duplication. Far better, if you adopt the "just to see" method of procedure, to take a definite male and a definite female and cross them, making notes of the results right from the start. Then, and only then, will you begin to know what to expect in certain eventualities. This is fascinating work, there are plenty of surprises in it, and who knows—your name may go down in the history of the hobby as the man (or woman) who started a fresh strain of beautifully coloured platys!

OUR EXPERTS' ANSWERS TO READERS' QUERIES

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

When I washed a bunch of *Riccia* taken from my tropical aquarium in a bowl of clean water, a number of small, flat worms wriggled out of it. They were brown on the topside and pale-coloured on the underside. They measured about a quarter of an inch long. Can you tell me what these worms were, and are they dangerous to have in an aquarium?

It is likely that the small "worms" you found in your *Riccia* were either small leeches or planarians. These do not do any harm to half-grown or mature fish, but they can do damage to the eggs of fish. But there is no need to worry about a few leeches in an aquarium. So long as you keep the bottom clean, and remove all decaying matter as soon as it is noticed, you will keep them well under control.

My pair of blue acaras have spawned twice within the last eight days, but on both occasions they have eaten the eggs. Please can you tell me what I should do to prevent the eggs from being eaten?

Cichlids are temperamental fish, and the aquarist can never predict how they are going to behave in an aquarium. A pair may eat their eggs on several occasions before finally settling down to raise a family. Sometimes spawning cichlids resent being spied on, and it is a good idea to cover the front glass of the aquarium with a sheet of tissue paper, or brown paper with a tiny hole cut in it so that the fish can be watched without their being aware of it. If a pair keep eating their eggs, then the best thing to do is to remove them after spawning to another aquarium. See that the eggs are shaded from a strong light, and keep the water circulating around them by providing artificial aeration. When the eggs hatch out, make sure that the fry are kept well supplied with Infusoria for the first few days, after which larger food should be introduced such as micro worms, brine shrimps and small *Daphnia*.

Can you tell me what is the matter with my nigger barbs: when they are not swimming up and down the aquarium, they assume a head-down position among the plants or in corners of the aquarium? Have they contracted some disease?

Most of the small, striped barbs have the habit of assuming a head-down position when they are not swimming about after other fish, or seeking food. It is nothing to worry about. But if they seem to be experiencing some difficulty in maintaining their balance in the water, then the best thing to do is to raise the temperature of the water, say, by five degrees, and keep it constant until the fish show signs of improvement. For when fish swim jerkily, and find it difficult to keep the head or tail in a horizontal position, it is usually a sign that they have been subjected to a sudden drop in the temperature of the water. Chills often upset the functioning of a fish's air-bladder. Bad cases are incurable, and fish with serious derangement of the air-bladder are best put out of their misery. We must point out, however, that a few species of fish normally swim in a head-down or tail-down position. But it is easy to distinguish between a normal swimming position and that brought about by disease.

I have a large community aquarium and have just noticed small white spots on the bodies and fins of some of the fish. I have been told my fish have "white spot" disease. Is there anything I can do to eradicate this disease without having to empty the water away, remove the plants, and transfer the fish to another aquarium?

Yes. Keep the bottom of the aquarium well siphoned, and raise the temperature of the water five or more degrees above normal. Keep the temperature high for several days; in other words, do not reduce it until the spots have completely disappeared. If the disease does not seem to clear up, add some methylene blue to the water. A two-and-a-half per cent. solution may be obtained from any large chemist's shop. Add the "blue" drop by drop until the water is definitely tinged with it. It will discolour the sand, and darken the foliage of the plants, but the effect will wear off in a day or two. While treatment for this disease is being given, see that the fish are given live or meaty food rather than dried food from a packet. A word of warning: all nets, dip-tubes and the like used in an aquarium infected with white spot should be dipped in a basin containing "Dettol" or a similar germicide, and rinsed out in clean water before being used in the aquarium again. The reason why disease so often lingers in an aquarium is because aquarists reintroduce it on equipment which has been used in the aquarium during early stages of the disease.

My black mollies have a white to greyish patch on the mouths. Do you think they have contracted mouth fungus?

Mollies often look pale around the mouth. This is caused by lack of dark pigmentation, and is not an indication of disease. Mouth fungus is a horrible disease, and fish which have it cannot eat properly, cannot close their mouths, and the mouth seems full of what looks like dirty cotton-wool. It is a difficult disease to cure. Mild cases can often be cleared up by bathing the mouth with a salt-water solution.

Sometime ago I bought a pair of zebra fish. The female was much larger than the male, and she chased him about all day long and never permitted him to take food or swim in open water. One day I found him dried up on the floor. I presume that to escape from the female, he had jumped through a small aperture in the cover glass. I then placed the female zebra fish with some other fishes, but she persisted in chasing after them and worrying them. Are zebra fish always like this?—that is, vicious bullies?

Zebra fish are not spiteful by nature. But they are extremely active fish and love to chase other fish just for the sheer joy of dashing about in the water. When a number of them are kept together, they will swim after one another, and when the leader turns they all turn. To breed them, however, you should endeavour to pair them up according to size. A very small male placed with a large female often gets chased about until he dies of sheer exhaustion. If you have several small males, it is a good idea to place them with

Photo: Laurence E. Perkins

A lively group of zebra fish

a large female. They will then combine forces and drive the female in and out of the plant life. During the chase, she will scatter her eggs. After spawning is over, remove the parent fish to another aquarium.

I have heard the view expressed that *Cryptocoryne* plants are immune from attacks by water-snails. Is there any truth in this statement?

There is no truth in this statement. Snails prefer to eat some plants first, and leave others alone until hunger forces them to tackle the less-relished greenfood. In a tank planted with *Ceratopteris*, *Vallisneria*, and *Cryptocoryne*, the snails will nibble holes in the leaves of the plants in that order: first, the soft ferns, then the slightly tougher *Vallisneria*, and lastly, the *Cryptocoryne*.

I have been in the habit of catching house-flies and feeding them to my larger "tropicals." Do you think any harm would befall my fish if I fed flies stupefied after coming into contact with a D.D.T. card?

Flies which have been in contact with D.D.T. should be kept out of the aquarium. In fact, all so-called pests which have been killed or stupefied by chemical action should not be fed to fish.

Would my tropical fish die if I left them in an unheated aquarium for two or three days? The fish I have are rosy barbs and zebra fish.

If your fish have been used to a fairly low temperature for several months, and the temperature outdoors remains warm enough to keep the temperature of the room in which the aquarium stands at about 70 degrees or above, then we think your fish should remain quite healthy until your return. But make sure that the door of the room is closed when you leave the house, and pad the sides of the aquarium with several thicknesses of newspaper to help conserve the heat. If the aquarium does not get a good top light, leave the side of the aquarium facing the source of the light unpadded.

I have a quart-size Thermos jar which has a tightly fitting cork and screw cap. Would this jar prove suitable for carrying fish to shows and from dealers' shops?

Your Thermos jar should prove quite suitable for carrying fish to and from shows and dealers. We presume the mouth of the jar is large enough to admit fish without any difficulty? Large fish may often be bruised and given a bad shock when they are emptied out of a net through a narrow opening.

COLDWATER FISHKEEPING QUERIES *answered by* A. BOARDER

I have recently raised the sides of my garden pond and am now wondering how I can make the fresh concrete safe for the fishes. Can I use any chemical for neutralising the lime?

I do not like recommending the use of chemicals, partly because I am not a chemist and do not know enough about the subject. The safest plan will be for you to scrub and well rub with a cloth all the new concrete to remove as much lime as possible. Then paint this with water glass, silicate of soda, which should seal in any extra lime. Allow to dry before raising the level of the water.

I have a 36-inch tank containing golden orfe, etc., but there appears to be other creatures about whose presence I am concerned. Sometimes the glass appears to be covered with a white powder-like substance which on closer examination is made up of myriads of tiny moving objects. Also other round things which are sometimes seen attached to the fins of the fish. Then there is a small, white, hair-like creature which progresses on the glass with a leech-like movement. What are the pests and the cure?

Your tank is suffering from the after effects of overfeeding. The white powder-like objects are Infusoria, probably *Paramoecium*. These will thrive where there is decaying vegetation or foodstuffs. The spherical objects appear to be fish lice (*Argulus*) and the leech-like creatures may be small leeches or else flukes. The tank has got into a bad state and I suggest a thorough clean out. See that no fish lice remain on the fish. Give them all a bath in Dettol, a teaspoonful to the gallon, but do not leave the fish in for more than about a minute. Any lice should leave the fish as soon as immersed in the solution. Cleanse the tank and plants and when set up again do not give any more food than can be eaten in a few minutes.

Would the use of an aerator increase the number of fish which I could keep in a tank?

Yes, but with what object? An overcrowded tank never looks well and the fish would not thrive and grow. Besides the question of getting sufficient oxygen there is also the fact that all fish require space and without it they will not be happy and continue in good health.

I have been troubled with cats, which take my goldfish from my garden pond. I have tried almost everything and wonder if I can use a form of electric fencing against them; can you advise please?

I do not see why you should not try this method. After all it works splendidly for controlling pigs and cattle. The idea is to have a special wire supported on sticks by insulators. The wire is fed from a transformer which cuts the electricity voltage down very low. When an animal touches the wire it receives a slight sting which, although not enough to do any harm, will keep it from coming near again. I think that perhaps you have in mind the question of the possibility of suggestions of cruelty but I do not think that you need to worry on that score. If any cruelty was involved the R.S.P.C.A. would have taken action long ago. It may be as well if I give the general definition of cruelty as far as the law is concerned. This is stated to be the infliction of unnecessary pain or suffering to a domestic animal. I know that there are always people who are ready to make allegations of cruelty at the slightest suggestion and to interfere with harmless hobbies of many. Many readers who served in the Forces during one of the wars no doubt suffered much "unnecessary pain or suffering" but I do not remember the aforesaid people rushing to protest on their behalf. A firm which supplies farmers would be able to give you further information on the electric fencing.

I have purchased a tank, 10 ins. by 8 ins. by 8 ins. and have stocked it with various small goldfish and a catfish. Now my trouble is that after a few days the water goes a brown colour and gives off a smell. I know that this is not normal and wonder if you can tell me where I have gone wrong?

It is, I am afraid, the usual sequel to being penny wise and pound foolish. The smaller the tank under 24 ins. by 12 ins. by 12 ins., the more difficult it is to keep in good order. This is especially so when the tank is overcrowded and the fish are fed too much. The water smells because of decaying uneaten food which the fish cannot eat because there is not enough oxygen or too much foul gas in the water. The tank will only hold three inches of fish comfortably and any more than this will mean trouble with a capital "T." The art of knowing when to feed fishes and how much to give at a time is the most important feature in successful fishkeeping and until this is learnt you will have many failures. Fish do not need to be fed every time they

come to the front of a tank and sufficient food should only be given to be cleared up in a few minutes. When offering food only give the smallest portion at first and unless this is readily taken no more must be added.

I have several tanks which contain fish and snails. Recently I discovered some tiny white worm-like creatures on the snails. I have lost a few fish which appeared to have red patches on them. I also have some things which swim about in the water like a fish with bladder trouble. What are they and what can I do to get rid of them?

The white creatures are probably flukes and these may have been responsible for the death of your fishes. The longer I keep fishes the more am I convinced that snails are often the culprits as far as the introduction of flukes into a tank is concerned. I used to be bothered with flukes when I had snails in my tanks but since the removal of every one, I have seen no more trouble. Many aquarists may say that they have snails and no flukes but that will never convince me that much of the fluke trouble cannot be avoided by keeping snails from the tank. From your description your tanks seem to be in a very foul state and I should empty and thoroughly disinfect them and make a fresh start. The creatures which appear to swim like a fish with bladder trouble sound to me like fish lice (*Argulus*). These can attach themselves to a fish and, by sucking its juices, inflict a nasty wound. The pests can have been introduced into the tank with *Tubifex* or *Daphnia*. Flukes can be killed with the Dettol treatment so often recommended and the tank can be disinfected when empty with household ammonia.

I have found in my tank a creature like a shrimp which appears to hate the light. I have sketched one in this letter and wonder if you can recognise it and whether it can be returned to the tank?

The creature which you so ably sketched is *Asellus*, or the water louse. I had no difficulty in recognising it. These water lice, not to be confused with fish-lice, are very good scavengers in a tank, working mostly at night clearing up any uneaten food. Large fish will eat them if they can catch them. I have had no evidence that they would harm fish fry but I would not have any in a tank of small fry if I could help it. When in doubt I always play for safety.

Can you please tell me the cause of tail-rot, what the symptoms are and how to cure it?

Tail rot is a disease in which the first signs are usually ragged edges to the tail fin and later on some blood streaks can be seen. Often those fishes with large, flowing fins are the ones attacked. Naturally the blood flow is not as generous to these parts and so they are liable to attack. The disease can be cured by placing the fish in a solution of one tablespoonful of sea-salt to a gallon of water. Leave the fish in this for a few days but out of the sun. If the water smells badly it must be changed. When the cure is effected the water should be gradually brought back to almost normal by the addition of fresh water.

With reference to the use of coal in an aquarium—would coke dust be as good for the purpose?

I certainly would not put coke dust in a tank. You could easily do more harm than good. I can keep the water of my tanks clear without using coal and I am sure you could if you work along the correct lines. You say your water has a film of scum on it. This is generally caused by rotting food or other matter in the tank and can be cleared off by drawing a sheet of paper quickly along the surface. Try a different food and do go easy with it.

I have a golden carp which is now too big for the tank. I wish to put it out into the pond but wondered if it could be harmed by lime in a newly made pond.

The fish could certainly be harmed by placing it into a freshly constructed pond unless most of the free lime had been removed. The pond should be filled and emptied three or four times and given a good scrub each time. You can easily test the water for lime by placing a drop of water on a piece of pH indicator paper. If the paper gives a colour indicating a high pH figure there is too much lime present. Naturally the smaller the volume of water in proportion to the amount of concrete surface there is the more free lime will be present in the water.

I have a tank end on to a window. What size lamp should be used over it and how long should it be left on?

Your tank, 18 ins. by 15 ins. by 12 ins. can have a 60 watt bulb for illumination but the time it has to be kept on will depend on the weather. Usually a tank in a window position will get enough daylight during the longer days. You can put the light on occasionally for effect, say at mealtimes or now and again in the evenings. During dull days the lamp will have to be on longer. You can only find out the exact light requirements by experimenting and being guided by plant growth.

I have installed a tank 24 ins. by 12 ins. by 12 ins. and I have 24 plants and six fish, total length nine inches. The fish seem to be short of air as they are always swimming at the surface. What is the trouble?

It is possible that you put your fishes into the tank too soon. Freshly planted vegetation cannot give off oxygen and help to keep the water pure. It would have been much better to have waited until the plants were well rooted and making fresh growth before introducing the fish. Also, if you started feeding immediately this may have caused the trouble. Change the water and then withhold all food for a day or so and things may go right.

Photo: Laurence E. Perkins

My pond has developed masses of blanket weed in it. How can I get rid of this?

The season when blanket weed thrives is now passing, but to help the growth of other water plants when the weed first appears it is necessary to remove it regularly. If you take a stick and break it roughly the jagged end can be pushed into the blanket weed mass and twisted round in it so that most of the weed can be pulled out on the stick. If this job is done properly once a week you will soon find that better growth of water plants soon chokes out remaining weed.

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

Our "Buyers' Guide"

I MUST thank you and your journal for its "Buyers' Guide," which has put me in touch with a really first-class Exeter dealer. I had found difficulty in starting aquarium-keeping in this part of the country after removing from London but now, thanks to *The Aquarist* and the great help given by my dealer I have been able to establish another set of tanks. The discovery of the aquarium store was like a tonic to me—the shop is in a good area of the town and for selection of fish and cleanliness one would need to go a long way to better it.

A. E. HARRISON,
Tiverton, Devon.

Mercurochrome

CONCERNING Mr. Raymond Yates' note on mercurochrome in a recent issue, I wish to make the following comments. It is not now a trade name but an "official" substance, since it is described in the latest edition of the British Pharmacopcia Codex in a monograph. Its old name was mercurochrome 202.

The above-mentioned work states that it is a weak antiseptic of poor penetration. However, its actions are enhanced when it is used in acid media, the great disadvantage being that under such conditions mercuric salts precipitate. Thus, in very acid aquaria, too great a quantity can have disastrous results by mercury poisoning, whilst in alkaline water it is probably useless. These remarks are, to me, logical conclusions, as I have been fortunate in never having white spot among my fish, but should an outbreak occur most certainly will I give mercurochrome a trial!

D. CALLAM,
Bridport, Dorset.

DURING the past three years Raymond Yates has contributed several articles to your paper advocating the use of quinine hydrochloride as a cure for white spot. I found his advice very confusing because he was not consistent about the dose. My own experience supports his statement that heat treatment alone is not a complete cure. On the other hand, the indications are that his remedy is a greater hazard than the disease, and is responsible for many losses in my tanks without effecting a cure.

I was surprised to read in your June issue that he finds two drops of 2 per cent. mercurochrome solution per gallon will clear white spot in four days. Am I to understand from this that he has now come to the conclusion that mercurochrome is a better cure than the quinine? I imagine the answer will be in the affirmative in the light of his experience described in the January, 1952, issue of *The Aquarist*.

J. M. SKINNER,
Wakefield, Yorks.

Cruelty

AT the last meeting of the Midland Association of Aquarists' Societies, consideration was given to a letter from the Coventry Pool and Aquaria Society, concerning the conditions under which fishes are kept by certain traders. This letter dealt particularly with the market at Birmingham where the fishes were displayed in such crowded conditions that they were in an upright position, unable to swim, the bottom of the tank covered with the dead or dying. Investigation showed that this was no isolated instance, but a regular practice, which should be stopped. It was pointed out in discussion that cases of this kind are to be found throughout the country, and that while the Association would take all possible steps to combat such appalling practices in its area, it was desirable to call the attention of aquarists as a whole to the situation.

The delegates requested me, as President, to ask you to give some publicity to the question in your columns, and to ask the co-operation of the Federation of British Aquatic Societies which I have the honour also to serve. On behalf of both these great organisations, therefore, I wish earnestly to request that aquarists everywhere should be vigilant against the unnecessary suffering of fishes in the interests of profit. In such cases a protest to the trader will very often be sufficient, but where cruelty is persistent in the face of such protests a complaint should be laid before the local authority issuing licences under the Pet Animals Act.

Fishes are conscious creatures, sensitive to pain; their lack of fur or feathers should not deprive them of proper care and attention. This plea is made, however, not so much from the animals' viewpoint as from the humanitarian. Cruelty to creatures in his power is degrading and undignified for man, and until it is eradicated it is an impediment to his progress.

A. FRASER-BRUNNER,
Richmond, Surrey.

Temperatures

SEVERAL times correspondents have asked about temperature variations in tropical aquaria, so perhaps my own observations may be of interest. I kept tropicals indoors for about two years, and had several outbreaks of white spot and cases of fishes dying from wasting. Nine months ago I moved all my fish to a converted greenhouse in the garden, heated when necessary by oil burners.

During the period when it is hot by day and cold at night the temperature in the tanks varies as much as 20° F. in 24 hours, and at other times by 15 degrees, in a range from 70 degrees at night to 90° F. by day. Larger fishes such as angels, rosy barbs, blue and thick-lipped gouramies, have doubled their sizes in this time, and the angels in particular are much more lively and active.

In the nine months I have had no white spot and no losses from wasting; my only losses were one bloodfin and one dwarf gourami, both from dropsy. In the presence of these large temperature variations I have successfully bred albino swordtails, Siamese fighting fish, flame fish and bloodfins. In case anyone imagines I have only the hardier species, I would point out that my stock includes tiger barbs, swordtails, neons, harlequins, angels, gouramies, flames, bloodfins, salmon discus, black widows, *Panchax*, etc., all in perfect health. The temperature variations appear to have benefited my fishes rather than the contrary, perhaps because a variation is more approaching to conditions in the fishes' natural environment.

W. SPREADBOROUGH,
Richmond, Surrey.

Mr. A. H. Boughton

MANY aquarists, particularly "old-timers," will learn with regret of the recent death of Mr. Ambrose H. Boughton, who, between the two world wars, played a considerable part in developing aquarium-keeping in this country. He will, perhaps, be best remembered in connection with the Artistic Aquaria Co., one of the earliest businesses devoted solely to the hobby, but he was first and foremost an enthusiast, and his enterprise was simply a means of pursuing his interest in aquarium-keeping. The little shop in Chelsea was less a commercial centre than a meeting-place for enthusiasts, and special attention was given to the importation of novelties which interested the specialist rather than the public at large. Ambrose Boughton spent a good deal of time organising shows in the halcyon days of the British Aquarists' Association, and lectured to societies up and down the country. He was later a member of the Fish Culturists' Circle, which played a leading role in the hobby until the beginning of the last war. The presence of this tall, spare man with the keen eyes and humorous mouth, and a huge fund of aquarium lore, gave distinction to any gathering. In recent years he had played a less active part in the public life of the hobby, but retained a connection through his business interests. He was a leading figure in the Aquatic Traders' Association, and only a few days before his death he attended an Assembly of the Federation of British Aquatic Societies to put the views of the trade before delegates of the clubs. A. F.-B.

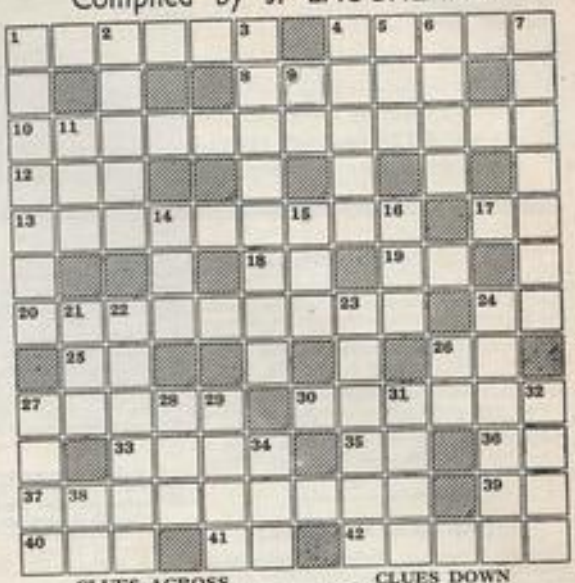
Memorial Trophy

THOSE among us who benefited from the friendship and knowledge of A. H. Boughton in the past would not wish his pioneer spirit to pass into oblivion, and it is now proposed to institute a challenge trophy in his memory. For this purpose all who wish to do him honour are invited to send a contribution addressed to me, care of this Journal. It is hoped that sufficient funds will be raised for the provision of something distinctive that will arouse keen competition among aquarists far into the future, and so keep green the memory of our old friend A. H. Boughton.

A. FRASER-BRUNNER.

The AQUARIST Crossword

Compiled by J. LAUGHLAND



CLUES ACROSS

1 Do these features preserve the fishes' balance? (6)
4 Embryo egg-cell of a plant (5)
10 Bloody weapon leads to end of a tropical fish (3, 9)
12 The prefix you see (3)
13 Valuable fish food, serve shredded (9)
17 Vim of the gouramies (2)
18 Alternatively a middle cut of the dory (2)
19 An era started the adders (1, 1)
20 Suitable heating for goldfish (9)
24 Opposed to alcoholic beverages (1, 1)
25 Lesser water violet? (2)
26 Ego of the smelt (2)
27 The doctor fish (5)
30 Related through males only (useful word for line breeders) (6)
33 This decapitated snail should be hit on the head (4)
35 See 38 (2)
36 Painter of *Rasbora*, perhaps (1, 1)
37 Net tan roe (anagram) for beautiful fish (4, 5)
39 Not direct current (1, 1)
40 Mecca of plant lovers (3)
41 Little angel? (2)
42 Liquid mud (5)

CLUES DOWN

1 Snake (7)
2 Viper (5)
3 Lizard with rudimentary legs (8)
4 A number of genera with many points in common (5)
5 Briefly, an animal doctor (3)
6 Mineral alkali found in dried up lakes (4)
7 Burbot (3, 4)
9 — of the Chaldees (2)
11 Age of viscera (3)
14 Usual source of tank water (3)
15 — *pro nobis* (3)
16 Miss West, of course (3)
21 Is she never in? (3)
22 *Phoxinus phoxinus* (6)
23 These carnivores should not be loose; but loosely speaking they are beautiful barbs (6)
24 Neons or black-lined, for instance (6)
26 Half a mate is undoubtedly a mate and a mater (2)
28 Necessary equipment for the pondhunter and the sardine catch (3)
29 Blows (4)
31 To temper by heat (4)
32 The leech loses its head for every single one (4)
34 I'll let you see the answer (3)
38 What the eel said after losing a pound (2)

PICK YOUR ANSWER

1. The generic name *Pantodon* means: (a) All teeth. (b) Big mouth. (c) Large fins. (d) Many scales.
2. Which is the largest of the following species? (a) *Corydoras aeneus*. (b) *Corydoras macropterus*. (c) *Corydoras nattereri*. (d) *Corydoras punctatus*.
3. *Gambusia punctata* is native to: (a) Cuba. (b) Honduras. (c) Texas. (d) Venezuela.
4. The popular name of *Cremobrycon spilurus* is: (a) Blue tetra. (b) Platinum tetra. (c) Silver tetra. (d) Yellow tetra.
5. The genus *Hottonia* (water violet) contains: (a) 2 species. (b) 4 species. (c) 8 species. (d) 16 species.
6. Which of these plants flowers under water? (a) *Bacopa*. (b) *Calomba*. (c) *Najas*. (d) *Proserpinaca*.

G. F. H.

(Solutions on page 135)

News from AQUARISTS' SOCIETIES

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

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

F.N.A.S. Assembly

ALTHOUGH no large scale national show was planned by the Federation of Northern Aquarium Societies this year a keen contest between member societies is to be held in conjunction with the Federation's Autumn Assembly on 3rd October. Only four classes are being staged, with excellent trophies and plaques offered in each. One unique class offers societies a chance to show their skill in presenting their furnished aquaria and other entries as a complete exhibit, each society thus having a chance to put on a small show of its own. The event takes place at Belle Vue, Manchester.

Aquarist's Calendar

2nd-4th September: **Stoke Newington and District Aquaria Society** annual show at the Library Hall, Church Street, Stoke Newington. For entries write to Mr. E. G. Gatehouse, 115, Bouverie Road, London, N.16.

3rd-4th September: **Walthamstow and District Aquarists' Society** annual show Details from show secretary Mr. J. Browning, 28, Sperling Road, Tottenham, London, N.17.

4th September: **High Wycombe and District Aquarist Society** show in conjunction with the High Wycombe and District Show. Details and schedules from show secretary Mr. R. Adkin, 7, East Drive, Totteridge, High Wycombe, Bucks.

9th-11th September: **Peterborough and District Aquarists' Society** annual open show at Boroughbury Church Hall, Russell Street, Peterborough. Entry forms and schedules from Mrs. Y. Stockdale, 2, Home Place, Eastgate, Peterborough.

10th-11th September: **Bethnal Green Aquatic Society** fifth annual show, with six open classes for club furnished aquaria. Venue: Men's Institute, Bethnal Green. Show schedules from Mr. W. A. Richardson, 16, Whitman House, Roman Road, London, E.2.

10th-11th September: **Chingford and District Amateur Aquarists' Society** show. Details from secretary Mr. R. Macfadzean, 46, Nevin Drive, Chingford, London, E.4.

11th September: **Federation of British Aquatic Societies** General Assembly, 2.30 p.m., at Friends' House, Euston Road, London, N.W.1.

11th-12th September: **Willesden and District Aquarists' Club** show as part of Willesden Borough Show.

16th-18th September: **Banbury and District Aquaria Society** fifth annual show (open to radius of 25 miles). Details from secretary Mr. R. A. Butler, 225, Warwick Road, Banbury, Oxon.

17th September: **British Herpetological Society** (London Group) meeting, "Young Animals," 7 p.m. at the Linnean Society's Rooms, Burlington House, Piccadilly, London, W.1.

18th September: **Lambeth Aquarists' Society** annual show at St. Luke's Hall, West Norwood.

22nd-25th September: **Kettering and District Aquarist Society** annual open show at the Co-operative and Labour Institute, Kettering. Schedules and entry forms from show secretary Mr. S. D. Simons, 52, Church Street, Burton Latimer, Kettering, Northants.

23rd-25th September: **Rotherham and District Aquarist Society** exhibition of fishes and reptiles at Temperance Hall, Wellgate, Rotherham

30th September-2nd October: **Three Counties Aquaria Show** (22 open classes) at City of Oxford Town Hall, Oxford. Entry forms and schedules from show secretary, Mr. V. H. Lewin, 21, Halliday Hill, Oxford.

2nd October—for three weeks: **Redhill and District Aquarist Society** show of furnished tropical and coldwater aquaria at the Odeon Cinema, Redhill.

3rd October: **Federation of Northern Aquarium Societies** Autumn Assembly and Show, at Belle Vue Gardens, Manchester. Show open to the public.

The "High Wycombe Trophy," for annual award for best fish in the show, is offered in the Three Counties Aquaria Show in Oxford at the end of this month

Photo: A. Ward

Trophies displayed at the show put on by Kingston A.S. recently. Best fish in the show (Barbus shuberti) was entered by Mr. Harry Seacombe, a society member

Photo: Marcus, Weymouth

Nearly 6,000 people paid to see this display by Weymouth A.S. in July, providing sufficient funds for a new collection of exhibition tanks and stands for future use

8th-9th October: **Altrincham Aquarist Association** first open show. Details from secretary Mr. D. Malam, Holly Bank, Grove Lane, Hale, Cheshire.

22nd-23rd October: **North Birmingham Pond and Aquarium Society** open show at the Alexander Sports Ground, Perry Barr, Birmingham. Schedules and entry forms from show secretary Mr. F. Rooke, 240, Newtown Row, Aston, Birmingham 6.

27th-30th October: **Oldham and District Aquarist Society** fourth annual show (open) at Iraakip League Hall, Clegg Street, Oldham. Schedules from secretary Mrs. Vera Tripp, 187, King Street, Oldham.

28th-30th October: **Gloucester and Cheltenham Aquarists' Society** third annual members' show at Empire Hall, Cheltenham.

29th-30th October: **Lancashire Aquarist Breeders' Society** annual open show at Spinners' Hall, Bolton, Lancs. Schedules from Mr. A. Morgan, 363, Wigan Road, Bolton.

For your show—printed gummed labels of fish names and award labels for aquaria are available from *The Aquarist* **at small cost.**

Crossword Solution

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

PICK YOUR ANSWER (Solution)

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

Photo: H. V. Lacey

Diversion from the fishes at the Bath A.S. Show was provided for this young visitor by an Indian python on show

Bulletin Review

"Kettering News"

Kettering & District Aquarist Society have been issuing a modest news sheet since October, 1953, under the capable management of Mr. J. Sharp. The May number reported that a tropical aquarium has now been installed in the children's ward at the local hospital and a very fair arrangement is announced for servicing this aquarium. A rota has been prepared so that at least two members visit the hospital once a week in order to give any necessary attention. Applications for bulletin exchanges should be addressed to the Editor at 70, Queen Street, Kettering, Northants.

"Corby Quarterly Magazine"

An account of a visit to the local water purification plant was a feature of the April issue of the official bulletin of the Corby and District Aquarists' Society. Members present were interested to see *Daphnia* and *Cyclops* in a sample of the water before filtering and chemical treatment and learnt many new facts about the element which is so often taken for granted by a large majority of the community; the average daily consumption per head of population in that district is about 35 gallons and the cost works out at approximately 6d. per ton delivered to the door! The magazine, a neat, 16 pages duplicated production enclosed within an excellent reproduction of the most original club badge, is jointly edited by Messrs. R. Dicks and D. Atkins and contains many other articles, including one on breeding the zebra danio and observations on keeping a tench in a tropical aquarium. Those interested in corresponding with this club should contact the Editors at 363, Willowbrook Road, Corby, Northants.

"Southport Bulletin"

The official publication of the Southport and District Aquarium Society is now well in its second year and the present issue consists of eight duplicated pages with a pleasing green printed cover and printed inset giving details of the society. The March number included a contribution from Mr. A. P. Negus of the Aquarium Society of New South Wales giving a concise and simple explanation of the phenomenon of osmosis and its effect on fishes. The April bulletin reported the Annual General Meeting of the society when the Secretary, Mr. G. Briant, spoke of the difficulty experienced during 1953 in obtaining lecturers; in spite of many enquiries only one speaker had been able to address a meeting of the club and many of the people to whom he had written had not even replied to the enquiry. More recent articles in the bulletin include an introductory series on marine life, an interesting "how to do it" article on making sterilised Infusoria cultures and information on freshwater snails. Editor T. Paine, of 20, Hawkshead Street, Southport, will be pleased to receive enquiries regarding bulletin exchanges with other societies.

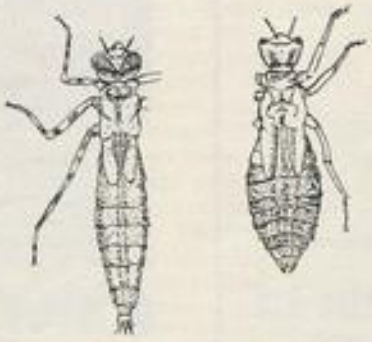
R.W.

FRIENDS & FOES No. 28

Dragon Flies *(contd.)*

BOTH the larvae of the long-bodied and short-bodied species of dragonflies are extremely small when newly hatched, and it is in this young stage that they can easily be introduced with catches of live food into tropical and coldwater indoor aquaria. It is also true that when introduced so young, the majority of fishes will polish them off with the other live food. Here the short-bodied larvae, which conceal themselves in the debris at the bottom of the tank, stand the greatest chance of survival.

Both kinds undergo frequent moults as they grow—the moulted skins being complete in every detail. As the wing cases of the fly begin to develop the larvae become known as nymphs. Throughout their underwater existence they are equipped with a formidable "grab" with which to seize their prey, at first consisting of *Daphnia*, *Cyclops*, and the like, and later, of baby fishes. The "grab" is actually a modified third lip, which when unextended, covers the lower half of the face like a mask.



Nymphs of Aeshna cyanea (left) and Libellula depressa (right). The adults were pictured last month

Oxygen is extracted from the water direct—the larvae are independent of the supply above the water surface. Gills are provided inside the end of the abdomen, and the pumping action of these can easily be observed. If agitated, or in a hurry, water can be expelled from the gills with such a force that the larva or nymph is literally jet-propelled through the water. There are about 30 species of British dragonflies, all of them extremely beautiful and interesting creatures.

C. E. C. Cole