

The AQUARIST AND PONDKEEPER

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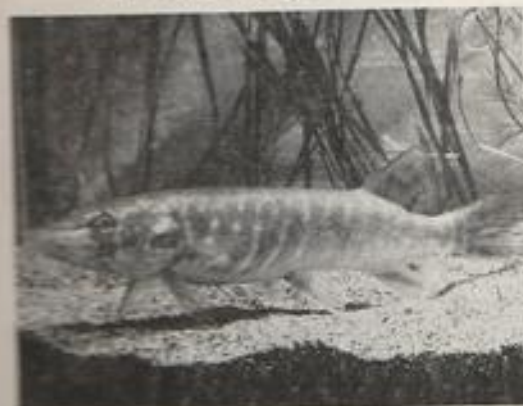


Photo: John Alexander
This is a pike. Its satisfied look and the bulge on its belly are mislead. But the full story began 25 minutes before this picture was taken, and the start of it all is shown on page 27.

May, 1952

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Editorial

AT a time when our daily news is seldom cheering, it has been specially pleasing to read the result of the fight of ordinary people, working-men like ourselves interested in fish life, for their rights to indulge their favourite pastime unhindered. They are the Derbyshire anglers involved last month in litigation concerning river pollution. After a hearing lasting 14 days injunctions were granted requiring British Celanese Ltd., Derby Corporation and the British Electricity Authority to stop adding polluting materials and discharging effluents at high temperatures into the Rivers Derwent and Trent.

Although the industrial wastes and foul sewage discharged into the Derwent had caused pollution in the river before the waters reached the Electricity Authority's pumping station, the plea of the B.E.A. that its usage of the water did not further contribute to pollution was not accepted. It was disclosed that the pumping station water returned to the river had been raised to a temperature above 1,000° F., and it was held that the heating effect on the river substantially aggravated pollution, particularly during summer.

Evidence from the angling association showed the tragic change which has occurred in the rivers during the past 15 years. Where once coarse fish and trout and even salmon had thrived, the waters were now black, putrid and nearly devoid of aquatic life. The offending works had been continually increasing their output through the years to the point where natural factors could no longer combat the pollution.

This is a story unfortunately all too frequently found in the histories of our streams and rivers; their future was beginning literally to appear black before the campaign conducted by the Anglers' Co-operative Association began. So far the Association has been successful in every case it has undertaken. Aquarists will desire to give the organisation every possible support in its fight for the natural amenities of our rivers.

Cross-breeding and Hybrid Fishes

by MARGERY G. ELWIN

IT is a very well known fact that, as a rule, animals will only breed with members of their own species. That is, indeed, one of the differences between a species and a variety or race. Hybrids do occasionally occur in nature but they are rare, and it is obvious that this must be so otherwise the species would never maintain its identity. Moreover, these hybrids are usually infertile sometimes in one sex, sometimes in both, and so leave no offspring.

Under artificial conditions, when an animal is deprived of the opportunity to mate with its own kind, it can sometimes be induced to mate with another species. This does not necessarily mean, however, that the union will prove fruitful, for unless the nature of the male and female germ cells is fairly similar they will probably be unable to unite and develop normally. It is obvious that the chances of success with closely-related species is likely to be greater than with those in which the relationship is more distant.

For some reason hybridisation seems to occur rather more readily among fishes than with other groups of animals and such crosses as roach x rudd, salmon x trout, bream x roach are not uncommon. The salmon x trout hybrids are deficient in vitality and the males never come to maturity, but the various Cyprinidae hybrids seem quite healthy. Many other interspecific hybrids not found in nature can be produced by hand spawning.

Field for Experiment

Among our tropical aquarium fishes the swordtail x platy cross is, of course, quite exceptional both in the ease with which it can be carried out and the degree of fertility of the hybrids, but many other hybrids have been recorded and no doubt many others could be produced with skilful handling. (It has already been announced that the platys and swordtails are now included within the same genus—*Xiphophorus*—EDITOR.)

This seems to me a profitable field for the experimentally minded aquarist. In the present state of knowledge it is impossible to predict with any degree of accuracy the results of such crosses, though, of course, one has some idea what to expect. With inter-varietal crosses, that is with crosses within the species between varieties which only differ in a few characters, the results are largely due to recombinations of characters and can therefore be largely predicted. Two distinct species will, however, differ in a host of characters and not only will we get recombinations but totally new and unexpected characters are also likely to arise.

We have seen this even with two species which seem fairly closely related, like the platy and the swordtail. You will remember that in the case of the cross between the swordtail and the platy with the insignificant "comet" mark in its tail there was a sudden development of intense and widespread black pigmentation on all extremities. From the point of view of the aquarist who wants to develop "new" strains species hybridisation has great possibilities. It will enormously increase the variety of forms at his disposal and will often result in the production of totally new characters.



Photo:

L. C. Mandeville

"Red variatus," obtained by crossing a red swordtail with a *Xiphophorus (platy) variatus* and then back-crossing one of the resulting females to a male *X. variatus*. The top male is bright crimson, heavily spotted with black; the male below is less heavily spotted and rather lighter in colour but with a brilliant red tail. Both fish have the bright orange dorsal fins characteristic of *X. variatus*.

Of course, this is only the first step. When an attractive type turns up it has then to be established as a strain and this is often not easy. Still the experimentally minded aquarist would probably soon lose interest if it was all plain sailing!

From a scientific point of view, also, such work is of great importance. Comparatively little is known about species hybrids in any group of animals and some of the results obtained rather upset the old theories of inheritance. For instance, a case of apparently purely maternal inheritance has been recorded in insects among the mosquitoes, in a cross between *Aedes aegypti* and *Aedes albopictus*. The offspring, though undoubtedly hybrid in origin, showed no trace of any of the paternal characters but were all exactly like the mother. Moreover, this is not a case of the paternal characters becoming recessive, for when the first generation was bred together the young produced were still of the maternal type, and even in later generations no mosquito showing any characters of the original paternal species appeared.

An Unusual Cross

I have had very similar results with a cross between a male *Heterandria formosa* (mosquito fish) and a female black-speckled mollie (*Mollienisia sphenops*). All the offspring, which were of both sexes, were exactly like the mother. The only possible differences were that they did not seem to grow quite as large as normal *M. sphenops*, but they were raised in a small aquarium and, as every aquarist knows, the size of the tank has a marked effect on the growth of young fish. The males matured while still rather small and I had the impression that they were rather more active and virile than

normal *M. gulosus* males which have been stunted by being kept too long in a small aquarium. But, again, this is only an impression and would have to be confirmed by further experiments. The interesting point is that, as in the mosquito cross, the next generation and the generation after that were still of the original maternal type. Moreover, one of the males was mated with a virgin guppy and the offspring from this mating were indistinguishable from normal guppies! This is another case of purely maternal inheritance and again the young were of both sexes.

One-way Crosses

At the time these results seemed so odd and contrary to current theory that, in spite of all evidence to the contrary, it seemed that there must somehow have been a "slip-up"—that the female fish were not in fact virgins, though we were sure ourselves that they had never been near any male of their own species. Now that there is a fully authenticated and carefully checked record of a very similar result with a species hybrid in mosquitoes, it seems that our observations probably were quite correct, though incredible, and we are now attempting to repeat the experiment.

Another observation that has been made with hybrids is that sometimes a cross can be made one way between the sexes but not the other. It is also known that the sex ratio is often seriously upset and that often many of the offspring are sterile. All information about hybrids is valuable as we really know very little about these interspecific crosses and such information may help us to understand more about the essential nature of heredity. The results obtained, however, are scientifically valueless unless they are very carefully checked and recorded at the time so that there is no doubt about their accuracy.

The production of species hybrids is not easy and you can only hope for success in a very small proportion of your experiments. Some people seem to think that fish are all very similar but actually, of course, they are as diverse as are the mammals. It would be as easy to cross a tiger and an elephant as a fighting fish and a swordtail! Naturally you can only attempt to cross fish with similar breeding habits and really only hope for success if they are reasonably closely related.

The problem is really two-fold. The first question is how to overcome the natural instincts of the fish which make them very disinclined to mate with any other species than their own. The second question is whether the sperm and ova of the two species will be compatible, i.e., whether they will unite and whether the egg so formed will develop successfully.

Techniques of Crossing

The chances of successful mating depend largely on the way the fish are handled. The normal mating instincts usually develop as the fish grows and matures in company with its kind. To ensure virginity it is, of course, essential to separate the sexes as they become distinguishable but this is really not enough. It is much better, where possible, to separate individuals from birth, or soon after, so that they never know their own species. They need not be isolated from all fish, only from their own species. Probably the best thing is to grow them up with members of the other species of the proposed cross. In this way one can hope to modify their instincts so that they will come to regard members of the other species as a normal mate.

Other points will suggest themselves. It may, for instance, sometimes be an advantage to use a rather large proportion of males when attempting to mate a female with another species. Where the two species are very different it may be a fully grown specimen of the smaller species could be mated with a young, mature, but not yet fully grown member of the larger species.

With regard to the second problem there is comparatively little we can do. The more closely related the two species the more likely, generally speaking, is the union to be successful, as the germ cells are more likely to be fairly similar in their nature. Always try the cross both ways, as one cross may succeed where the other will fail. Sometimes a female livebearer will become pregnant but the embryos will only partly develop and then die. It might be worth while persisting with such a mating. According to some schools of thought it seems possible that the presence of these partly developed embryos, particularly in a young fish, might modify the nature of the maternal tissues to such an extent that she might be able to carry a later batch through to maturity. This is one of the subjects about which as yet we have little knowledge and any reliable facts would be very valuable.

Michurin and Fishes?

When attempting crosses between rather distantly related species we might also, with advantage, take some tips from the work of Michurin, the great Russian plant breeder. His experience is certainly worth considering, since by the new methods he evolved he succeeded in producing some hundreds of new varieties of plants, most of which have proved valuable and are now grown on a large scale. Some of his methods, such as grafting, can, of course, only be applied to plants, but he made much use of hybridisation and it is in this connection that I think we can learn from him. He found, for instance, that it was often impossible to get hybrids directly from two species which were not closely related but that he could arrive at the desired result by steps. He would first cross near relatives and then cross the crosses. With skilful planning he could begin to approximate the natures of the plants he wished to cross in this way and, moreover, he always found that a hybrid was much less conservative in its nature than a straight species and would consequently show less resistance to crossing with another type.

It is impossible to say, in our present state of knowledge, how far this experience can be applied to animals, and, in particular, to our aquarium fishes, but, personally, I think it is well worth bearing in mind.

1. Find



Photo:

John Alexander

Pike meets carp. The pike is hungry and his close examination of his new tank-mate is not inspired by thoughts of future friendship. On the next page this story continues

IN THE Water Garden—by W. E. SHEWELL-COOPER

IN talking about enemies of water plants it may be thought that I am only referring to the plants that live in the water, but I do want to make the article broad enough to include plants which grow round about the pool, the margin plants so to speak, like the irises and spiraeas. In the latter case, it is important never to allow dead and dying foliage to remain at the base of plants. When there are trees about one of the problems may be that fallen leaves will accumulate and these can prove to be an attractive shelter for pests like slugs and wood lice. Take care therefore to rake off the leaves in the autumn and put them where they should be—on the compost heap—and from time to time go over the plants round about the pool and cut away the dead foliage. Once again this should be rotted down on the compost heap with a suitable accelerator like a fish fertiliser.

Decay in the Pond

A similar operation of course, is necessary in the pond or pool itself. Here fallen leaves can become a nuisance and so can other plant refuse. Some of the leaves of the lilies may die and decay and these will need removing. The same thing may happen to the foliage of other aquatic plants. Once again, one must emphasise that cleanliness and hygiene are the firm foundation of any serious attempt that must be made to prevent attacks of insect pests and diseases. Slugs and snails can be a great nuisance, and particularly the grey field slug, which loves feeding above ground and does the bulk of its work at night time. I have found many pool owners fail to recognise this pest because it doesn't leave slime behind on the foliage and so they imagine that the trouble cannot possibly be slug damage.

I have known these creatures climb right up to the tops of plants to eat the flower stems. I have seen them damage the leaves and during the process, they look as if they have been clawed all over. The black field slug on the other hand, always goes for the rhizomes and roots of plants and may cause plants to die for that reason. People have said that the best method of control is to go out at night time with a torch and a hat pin and to drop the slugs into a jam jar containing salt. I much however, prefer to use a bait consisting of breadcrumbs and powdered metaldehyde, and if little heaps about the size of an eggcup are put around the pool at two feet distances, hundreds of slugs can be caught in a night. Incidentally it pays to cover these little heaps with a tile or piece of slate to keep off the rain.

Water Insect Pests

Caddis flies have a nasty habit of attacking water lilies and I have known them go too for arum lilies that may be planted near pools in the south and south-west. It's the worms or larvae that do the damage as they can crawl all over the plants. The female flies usually lay their eggs in the early summer, either on the leaves or directly into the water. You can sometimes find these cylindrical masses covered with a kind of jelly. It isn't an easy pest to control but fortunately golden orfe will help tremendously in devouring the larvae and preventing the trouble being really serious. It is important never to allow vegetable matter to accumulate in the pool and some gardeners for this reason give a good clean out at this time of the year. If the tubular cases of caddis are seen attached to stems or leaves, these can be picked off and squashed between the fingers.

Another trouble is the water lily beetle, which feeds on the flowers and the leaves. It is dark brown and is fairly easy to see. The female lays eggs on the upper surfaces of the leaves and in a week or 10 days they hatch into equally

dark brown larvae or maggots which first of all feed by scaling off the surface tissue and later by cutting out quite large portions of the petals and leaves. Plants that are attacked are very badly disfigured and the worst of it is that the leaves often decay afterwards and go brown; then the plants look really terrible. Unfortunately, there are two broods in a year and I have found therefore all stages on the plants—that is to say the adults, the eggs, the pupa cases and the maggots—in mid-August.

If you have fishes in the pool or pond it pays to squirt water on to surface leaves so as to dislodge the beetles and give the fish a chance of eating them. The alternative when fishes are not present is to spray with nicotine, and I have had to do this in very severe infestations. The formula is $\frac{1}{2}$ ounce of nicotine to 10 gallons of water plus 2 ounces of a good detergent. Another method that can be adopted is to keep all the foliage under the water for two or three days and thus allow the fish to feed on the larvae or maggots. You have to use an iron bar or something like that for the purpose.

Aphid Attack

Aphides can damage many of the water plants such as the flowering rushes, duckweed, frogbit, water lily and so on. Experts have told me that the particular aphid which causes the trouble always over-winters on the plum and so it is advisable to see that all plum trees are sprayed with a 10 per cent. solution of a tar distillate wash in December. The aphides leave the plums or some other host plant for the lily pool in June as a rule. Spray with nicotine as advised in the case of the beetle; never use a Derris preparation of any sort, because this is deadly to fish. Some have given a routine spraying during the first week of June every year and this saves a lot of trouble.



2. Find, Fix



Photo:

John Alexander

The pike has made up its mind. The carp hopes that the slight withdrawal will be continued, but the villain reveals himself in the picture on page 30

A Visit to Dusseldorf Aquarium

by J. H. P. BRYMER

DUSSELDORF, the city and river port on the West-German coalfield where the River Dusselbach joins the Rhine, was subject to severe bombing and suffered for during the last war, and although many buildings are crumbling shells, the loss of life would have been much higher were it not for the numerous reinforced concrete air-raid shelters provided. One such shelter or "bunker" is situated about a mile and a half from the centre of the city and has been converted with considerable ingenuity into an aquarium-cum-museum. The bunker itself is an immense structure rising some 40 feet above the ground with walls three to four feet thick; it is now named the Lobbecke Museum and is well worth a visit.

The aquarium portion comprises nearly 200 tanks, and while it is of necessity less pretentious in proportions than the London Zoo, it has a very representative range of specimens—warm and cold water, both fresh and salt. During my visit in March this year I had time only to view briefly the tropical fresh-water section; the entrance fee of about sixpence was money well spent, to say the least of it. The individual tanks were built into the walls of the gallery and were tastefully laid out with almost every plant known in the tropical aquarium world. Almost every tank carried a soft green lighting effect obtained by means of a surface blanket of *Riccia*. Algae growth was conspicuous by its absence.

Range of Species

Most of the commoner species met with on the British small market were represented but these were of a magnitude seen only at shows in this country: among the scarcer species I noticed *Hemiodus semitaeniatus* (Kner)—a stream-dwelling characin from the Amazon delta which is coloured a shining silver and has a sharply bifurcated caudal fin, the lower lobe of which carries a dark stripe originating just forward of the anal fin on the centre of the side of the fish. Forward again of the start of this line is a prominent black "moustache" which makes this fish reminiscent of a sleek night aircraft!

Another beautiful characin was *Alestes longipinnis* (Günther) from tropical Africa. Its olive-brown colour, dusky silvery sides and the vivid orange flushes on dorsal and caudal fins immediately caught the eye: the specimens were 4½ ins. long at least. The genus *Alestes* differs from the other African characins in that the upper jaw contains 13 outer and eight inner teeth with thick bases and rigid bases—quite formidable dentition but not surprising when it is appreciated that their relatives in the same family are the ferocious tiger fishes (genus *Hydrocyon*). The genus *Alestes* contains species ranging in length from three inches to two feet.

A shoal of *Macropodus schreimulleri* (Ahl), each some four inches in diameter, provided an attractive sight and it was to look that I observed a single example of *Leporinus latidorsalis* (also from Brazil) swimming in the same tank. A fine specimen of *Protopterus assectens* (Owen)—a tropical African lungfish—was the cynosure of every eye in a class of biology students to whom a don was pointing out its



Photo:

W. S. Pitt

The butterfly fish (*Pantodon buchholzi*) at the water surface.

vestigial fins. I was the more interested in this fish when I read that it was the gift of the London Zoological Society.

Another oddity from Africa was *Mormyrus kanniana*. The mormyrids are exclusive to that continent and have remarkably small eyes and mouths. Their heads are covered with thick skin and their mouths are truncated and frequently turned downwards. Their narrow caudal peduncle terminates in a two lobed tail while their colouring throughout comprises various shades of copper or silver bronze. Mormyrids are bottom-feeders—on aquatic insects: their chief interest to the biologist, however, is their very large brain development compared to any other species of fish. It is believed that they are exceptionally sensitive to sound waves. They seldom exceed 24 inches in length.

Climbing fish were represented by both the familiar *Periophthalmus barbarus* (Linnaeus) from the brackish waters of Asia and from the Polynesian Islands and also by the Congo climbing fish *Ctenopoma kingdleyae* (Günther), which grows to about 7½ ins. in length. This fish is olive or brown in general colouring with a black spot on the base of its caudal fin. It is capable of living several hours out of water because of an accessory breathing mechanism situated adjacent to its gills.

Butterfly Shoal

A shoal of butterfly fish (*Pantodon buchholzi*, Peters) was almost overlooked since these fishes spend most of their leisure hours with their flat-topped heads and butterfly-like pectoral fins touching the surface of the water. Two rare South American species which I cannot recall having seen in any aquarium in this country were represented—*Naunostomus aripirangensis* and the Guiana knifefish, *Osteoglossum bicirrhosum*. There was also an example of *Plecostomus punctatus* which has a generally similar outline to *Plecostomus plecostomus* but with very much darker and heavier blotching.

Particularly striking were a number of mouth-breeding cichlids from South Africa—*Tilapia natalensis*—with dark blackish bodies and fins, the caudal and dorsal fins having a vivid orange ribbon edging. Another bizarre cichlid present was *Cichlasoma hallabroni*—a species which is very little known and on which the Editor would welcome any information from readers.

So much for a brief look round the tropical fresh-water fishes, but as I walked out of the Lobbecke Museum I noticed a fossil of a *Plesiosaurus*—found near Glastonbury, Somerset!

London Zoo Aquarium

some notes on exhibits

by L. R. BRIGHTWELL

FOR the last few years Sussex newspapers have loudly lamented the growing spider crab menace which, say local fishermen, is ruining the market, and promises to finish it. The writer has certainly seen plenty of *Maia squinado* tumble aboard Newhaven and Shoreham trawlers. But thrifty Cornwall, where this crab is even more abundant, makes no complaints. It sells the big claws at so much a pound (the crab if liberated grows another crop, though not so good, in due course) and also tins the beast, and puts a



Thornback spider crabs (*Maia squinado*) may measure as much as two feet across the leg span.

3. Find, Fix and Strike

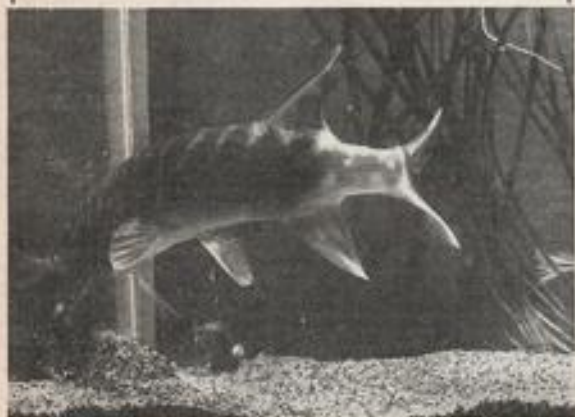


Photo:

John Alexander

The pike strikes—and misses. He lunges forward at great speed and the carp frantically attempts to bury itself in the gravel. Next scene page 32.

pretty picture of the "edible" crab on the tin to create confidence. If this were not done, the Englishman, perpetually snivelling about food shortages, would say he was being poisoned. All other nations eat *Maia ad lib*, and are the better for it.

Thornback Crabs

As a show beast the "thornback crab" leaves nothing to be desired. A dozen now installed in the Zoo's conger tank are the high-spot of the aquarium. A giant example measures two feet across the legs. The animal is continually "dressing up," and may so load itself with weed, sponges and corallines as to at last present the spectacle of a walking bush.

Strangely enough this crab's life-cycle has only been worked out in comparatively recent years, by Dr. Marie Lebour of Plymouth, and it has been only once known to cast its shell in captivity. This happened a year or two ago at the Plymouth Aquarium. The crab in question, a half-grown example, commenced to dress up a few minutes after struggling clear of the old armour and whilst yet soft and weak from the arduous labour of ecdysis.

Though specimens of from four to six inches across the shell are common enough, very young specimens are rather rare: there is no doubt a high infant mortality. The aquarist lucky enough to find a *Maia* baby is assured of a most entertaining pet—an easy-to-feed scavenger that labours the clock round at its fantastic toilet.

Make a Note of It!

YOU may have been a fish-keeping enthusiast for years, or you may be a complete novice, but in either case you will find the benefits of maintaining a good record of your experiences cannot be ignored. An ordinary note-book is all that you need—an elaborate diary is quite unnecessary. You should, however, have one book for each tank (unless you have a very large number of tanks, when you may prefer to keep one book for each kind of fish). If you only have one community tank, you may find it more convenient to have one book divided into sections.

Your entries can be as simple or as detailed as you please; only experience can show you how much information you require. Such subjects as the introduction of new fish, with details of their condition and behaviour; dates of spawning; rates of growth and any changes in appearance, etc., will all help to create a picture which can always be referred to later on. Reactions to changes in feeding are also worth noting.

Much useful data can be collected by the record-keeping amateur aquarist

There are other matters external to the tank which could also be jotted down. These include any queries to be raised at meetings of your local aquarist society; names and addresses of advertisers in *The Aquarist* whom you may wish to contact at a future date; opening hours of museums which contain aquaria in your own and the surrounding district; details from reviews of any books which might be obtained from your Public Library.

If you live in the country and can go *Daphnia*-hunting, take particular notice of the weather so that you can discover the most favourable conditions and time of day.

Of course, you will have to spend a certain amount of time entering your records—or you may be lucky enough to persuade your wife to do it for you—but whatever means you use, you will find that the information so collected is most useful.

M. J. Mason

THE AQUARIST

The Flag Cichlid (*Cichlasoma festivum*)

JACK HEMS

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

For these two reasons alone, it is not the sort of fish to recommend to the beginner in tropical fishkeeping. But given the right conditions, and cared for by someone used to cichlids and their strange moods, it will live for several years and make a most attractive pet for the decorative aquarist. It is a new arrival to the aquarium scene. It has certainly known to pioneer tropical aquarium keepers in Germany as long ago as 1908; and those interested in the history of our hobby will find plenty of references to it among the aquarium literature which has been published in the country and abroad during the last quarter of a century.

In shape, the fish resembles any one of the larger gouramis. That is, the body is flattened from side to side—slightly compressed, as some writers describe it—and its head tapers to a blunt point. It has, however, the typical wavy dorsal and anal fins of a cichlid, but its ventral fins are larger than those of the majority of the family, and terminate in the middle point.

Colour and Sexing

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

In adult fish, the male may be distinguished from the female by his larger and more pointed dorsal fin. Sometimes the dark markings are more definite than those of the female, but not always, and it is not wise to presume the sex of a young or an old fish by comparing coloration alone. When caught by a sudden bright light or pursuit with a net, the fish often becomes marbled all over with chocolate brown and dirty yellow. At a quick glance, the fish then looks rather like the rare Malayan gourami (*Sphaerichthys orbiculus*).

Although the flag cichlid, as the species is commonly called in America (it is sometimes called the pretty cichlid), will grow to a length of almost six inches, it seldom reaches this size unless it is kept in a very spacious aquarium, say, one holding about 30 gallons of water. At all times, however, it needs plenty of water—clear, well-oxygenated water with a markedly acid reaction. A temperature of between 70° and 85° F. should be maintained all the year round. Unlike some other cichlids from the warmer parts of South America, it cannot stand cold.

The cichlid fish, and always seems most uncomfortable when placed in other quarters with other species. If through lack of accommodation it has to be placed with other fishes—well, it might add, it is peaceful enough at most times to be housed with livebearers—do make sure that it gets

sufficient food, and is not driven away into the plants at mealtimes.

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

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

Not Ready Breeders

Besides plant life, rockwork should be provided for the fish to lurk behind when they grow tired of being gazed at by admiring humans. And like most cichlids, they like to play about and do their courting around the rockwork. (Any observant visitor to the seaside may notice that rocks have the same stimulating effect on many human beings, old and young. But that is another story.)

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

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

Rare Sight



Photo:

G. Timmerman

The *Vallisneria* plant on the left shows the rarely seen "male flower" of this species. On the right is an enlarged view of the pollen-containing capsule which comprises the "flower."

Air Bladder in Health and Disease

by T. L. DODGE

MOST aquarists have heard at one time or another of a fish's air bladder. Every aquarist of experience has also lost fish with "air bladder disease." Throughout the past winter I have studied this disease very carefully and perhaps the following experiences will be of help to aquarists having this problem on their hands.

The air or swim bladder is a long, hollow, semi-transparent organ, occupying an almost central position within the body of the fish. This bladder is distended with gas. In the case of dead fish the bladder is sometimes found to be almost entirely deflated. In some of the more highly developed fish, such as the veiltails, the air bladder, although being somewhat cramped and different in shape from that of the goldfish, is still centrally situated in the body.

Origin and Function

It originated as a kind of breathing organ but its principal function is to keep the body of the fish at the same specific gravity as the surrounding water and so enable the fish to maintain its equilibrium and remain at any level with the minimum amount of exertion. It is obvious that the pressure of water on the body is dependent on the depth at which it is submerged. Therefore, unless the quantity of gas in the bladder is varied the fish will be able to remain motionless only at one particular level; at any other only extensive muscular effort will enable it to move either up or down.

However, the amount of gas in the bladder can be considerably varied. Gas derives from the blood stream via the vascular rete in the inner lining. The power of changing

the volume is not a quick process and for aquarium or pond fish it does not need to be. With deep water fish it is of vital necessity.

Inflammation and Pressure

From the foregoing it is very understandable that digestive disorders can be the cause of air bladder trouble. My experiences showed two definite causes.

- (1) Inflammation of the bladder wall.
- (2) Pressure of some other internal organ.

The first is usually the result of chilling, the second improper feeding, causing constipation or inflation of the digestive system. The symptoms are inability to swim evenly or steadily, loss of appetite and acceleration of the rate of breathing.

The fish will be seen lying either on the bottom of the aquarium or just under the surface of the water. If it is a "sinker" it will make strenuous efforts to rise to the surface by the shortest route, overshoot the mark and jerk its nose out of the water. In returning it expels large air bubbles. One often sees the belly covered with blood-shot patches caused by constant resting on the bottom and shuffling along. If a "floaters" the sick fish makes equally strenuous efforts to reach the bottom and if successful becomes exhausted and rapidly floats helplessly to the surface. Often it is seen in an upside down position or reeling about as if intoxicated.

Prevention and Cure

Air bladder complaints are best prevented by administering a varied diet with a liberal proportion of live foods to prevent constipation, and avoiding sudden changes of temperature. For treatment the fish should be placed in a shallow container with water no more than three times the depth of the body. The temperature is to be kept as even as possible.

(1) Mix one drop of medicinal paraffin to two drops of fresh tap water. Administer through the mouth by means of a medicine dropper. Repeat treatment once a day for seven days.

(2) Dissolve one teaspoonful of Epsom salts to one pint of fresh tap water. Immerse the fish. It will make frantic and desperate efforts to escape and after a period of from one to five minutes will gradually cease its efforts and lie in a very exhausted condition. As the first mad gyrations are seen to decrease, gently move the fish through the water with your finger. If it fails to respond in an energetic manner remove the fish to the shallow container. As soon as recovery is evident feed with live food. (This second method is rather drastic but with it I have cured many, many fishes.)

4. Strike Again



Photo:

John Alexander

At the second strike the pike makes no mistake. Vicious jaws seize the carp, the force of the charge driving it into the gravel. Now page 36.

Change in the amount of gas in the air bladder of a fish responding to a change of swimming depth is not a rapid process. Sudden changes in depth of submersion can therefore be disastrous. A fish brought rapidly to the surface from a great depth has no time to adjust the quantity of gas in the air bladder; since the outside pressure is so greatly reduced in the ascent the gas expands enormously, blowing up the bladder of the fish and distending its body like a balloon. Not all fishes have air bladders. Among those lacking the organ are sharks, who have to exert continuous tail and fin movements to overcome their ever-present tendency to sink.

AQUARIST AT HOME:

Mrs. M. Hemming

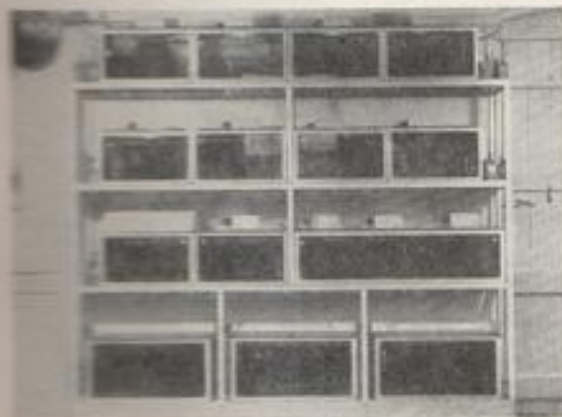
Introduced by JAS. STOTT

MOST of my interviews for this feature have been with aquarists who keep their tanks in fish houses or in rooms which are set aside for the purpose as fish rooms. This month, however, I would like to tell you about an aquarist, and what is more unusual, or should I say different, this time a lady aquarist, who keeps her tanks in, to quote her own words, the pleasant surroundings of a nicely furnished room or lounge. "Well, it is an interesting matter to keep two or three tanks in a living room—something unusual in that," I can imagine the reader thinking. With that remark or thought I would agree, but you see this lady aquarist keeps 22 tanks in her lounge, which, of course, is a different matter, and what is important is that they are installed in such a manner that they really look attractive as I think you will agree from what can be seen in the photographs which illustrate this article.

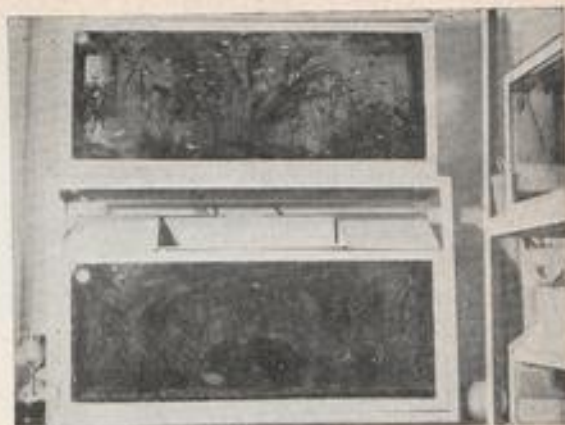
Tanks and Staging

The tanks range in size from 48 ins. by 12 ins. by 10 ins. down to 14 ins. by 8 ins. by 8 ins. In this range are several tanks 36 ins. by 15 ins. by 15 ins. which are used as stock tanks. The staging which takes the tanks is made up from angle-iron into attractive fixtures, extremely well constructed and finished in a glossy cream paint. The result is an installation of which Mrs. Mary Hemming of Fladbury, Wiltshire, may really feel proud. For several years Mrs. Hemming has kept and had an interest in fish, but only in a modest sort of way until just over 12 months ago when she launched out in a serious manner and has had considerable success since with her present outfit. At the moment she has some 64 different species and varieties. Breeding is successfully and regularly carried out with angelfish, flame fishes, schuberti, nigger, rosy, and tiger barbs, the three spot, dwarf and thick-lip gouramies and the mouthbrooder, green rivulus and several other species.

All the tanks are heated by electricity with immersion type heaters thermostatically controlled and artificial



Staging carrying the range of aquaria used for breeding and rearing.



Two large community stock tanks situated in a recess between fire-place and wall.

lighting is installed over each tank. This is, however, not used regularly, for the tanks receive a considerable amount of natural light during the day. The artificial light is brought into operation after sunset until about 10 p.m. If the day is dull then a few hours extra of artificial light is allowed. All the tanks are beautifully clear and the water in good condition.

Fladbury is an attractive country village and Mrs. Hemming obtains water for household purposes from a well. This water is, however, very hard, so a 150 gallon water tank was obtained for the purpose of holding rain water collected from the house roof by means of the troughing and piped to this tank. Over the end of the pipe is fixed a filter made from a nylon bag. To each bucketful of this rain water is added a little salt and then it is heated over a gas stove, but not actually boiled. Mrs. Hemming informs me that she finds this seems to suit every species of fish she has so far tried. The amount of salt used is one teaspoonful to each gallon of water.

Fry Rearing

When breeding the egg layers Mrs. Hemming always follows a definite procedure for feeding the fry. This is as follows. First Infusoria, then follows micro worm and on to brine shrimp. Now screened *Daphnia* and grindal worms; next comes white worms and *Tubifex*. This has been found most successful. Breeding is carried out on selective lines.

Mrs. Hemming is extremely fond of the twisted variety of *Vallisneria* and considerable quantities of this are used in all tanks. The plant life is in grand condition and growing strongly. This aquarist is a member of the comparatively new Worcester society, which started last October and at the time of writing this article had 45 members. From what I can hear from Mrs. Hemming they are all very keen on making their society a big success.

"AUTUMN DISEASE"

THE "Herbst Krankheit" or "autumn disease" of German fish stocks is said to resemble white spot disease in symptoms and course, and it is believed by some that this complaint is responsible for recent reports that there are two kinds of white spot disease.

Mr. R. O. B. List, secretary of the Federation of British Aquatic Societies, is anxious to obtain details about autumn disease and typical outbreaks of white spot, and asks aquarists who can help to write to him (31, Coronation Court, Willesden Lane, London, N.W.6).

Mealworms and Flies as Live Foods

by

Dr. J. L. CLOUDSLEY-THOMPSON

THE only way to ensure throughout the year a regular supply of a particular animal, for food or any other purpose, is to maintain a culture. When a "food animal" refuses to breed, or does not thrive in captivity, supplies fluctuate with the seasons and shortages inevitably follow. Such is the case with *Daphnia*. Infusoria and micro worms are easily cultured as food for very small fishes, but few animals other than insects readily breed in captivity, and yet provide suitable food for larger fishes, amphibians and reptiles.

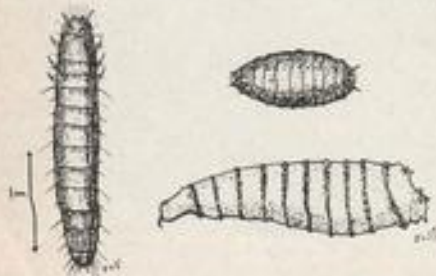
Mealworms

One of the easiest insects to maintain in a culture is the mealworm (*Tenebrio molitor*). All you need is a large biscuit tin with holes punched in the lid, and half-filled with bran or flour. A few mealworm beetles are introduced and soon breed, providing a regular supply of larvae which are particularly relished by lizards, etc. As the insects breed more quickly at higher temperatures, it is advisable to keep the tin in an airing cupboard, or some other warm place. Although the beetles can live for long periods in extremely dry surroundings, they do better if a moist pad of cotton-wool or felt lies on the bran. A large number of adults and larvae are always to be found clustered underneath this pad, and no time is wasted searching for them. If the pad is kept too wet however, so that the bran itself becomes damp, the culture is liable to become infested with microscopic Tyroglyphid mites. These will soon disappear if the bran is allowed to get thoroughly dry.

Maggots

Although they have a tough outer cuticle, blow-fly larvae are readily eaten by small lizards, newts and fishes. In summer all you need to do is to expose a lump of meat or fish—an odd plaice head will do—and within a day or two it will be swarming with fat maggots. These are particularly useful when the soil is dry and worms hard to come by. But to obtain maggots in winter, the flies must be cultured.

For this purpose you must construct a fly-cage. A suitable type is shown in the diagram. The dimensions must not be too small as flies fail to oviposit if they are too



Left: mealworm. Right: larva (above) and pupa (below) of the blowfly.

restricted and do not fly about enough. The cage is constructed with a wooden framework. The sides and back are of hardboard or plywood, but it is advisable to make the base of thicker material so that it can be scrubbed periodically. The front and top are sheets of glass fitting into grooves in the frame. The latter slides into position first, and cannot be moved until the glass front has been lifted out.

Two 15-watt bulbs provide light and heat, and the insects can be attended to, without fear of their escape, by means of the muslin sleeve. A knot should be tied in this when it is not in use. The flies are provided with water—a piece of moist cotton wool—and food in the form of sugar, etc. A piece of meat or fish lying on sand in a tongue-bowl or crystallising dish is provided for oviposition and development of the larvae. When these are fully grown, they burrow into the sand and pupate. Unpleasant smells can largely be avoided by using two crystallising dishes alternately, and storing the pupae in a cool place until more flies



An easily constructed fly breeding case lighted and heated by two low-wattage lamps.

are required for oviposition. Thus the number of adult flies and maggots can be kept within required limits. The method described above is particularly suitable for breeding blow-flies (*Calliphora erythrocephala*).

Hafez Method

House-fly maggots (*Musca domestica*) can be cultured most simply on cotton-wool soaked in diluted milk (three volumes milk to one volume water)—a method devised by Dr. M. Hafez. The flies feed on the milk and lay their eggs on the pad. The latter are then transferred to a two-pound jam jar containing a fresh milk pad, and tightly covered with a finely perforated tin lid. If kept at 27° C. (80° F.), fully-grown, healthy larvae are obtained in four or five days. At lower temperatures of course hatching and development take longer. The mature larvae usually collect and pupate at the upper, drier surface of the milk pad, which, by this time, has become blown up into a more or less spongy mass due to fermentation and the tunnelling of the larvae inside.

The emerging adult flies are transferred to the breeding cage to maintain the stock. The cotton-wool pad must be soaked only moderately to obtain the best results: excessive moisture may result in ovipositing flies being drowned, and may also check egg and larval development. Avoidance of excessive numbers of developing eggs in the milk pad prevents overcrowding of the hatching larvae.

The flour moth (*Ephesia kuehniella*) is another insect easily reared; no doubt many other insect species might usefully be cultured by aquarists to provide constant and abundant supplies of live food throughout the year.



A page for
the beginner
contributed
by

A. BOARDER

May is the most important month of the year for all breeders of coldwater fishes. If spawnings have not been obtained by the end of this month it will be necessary to make efforts to see that the fish make a start as soon as possible. Fry hatched about this time of the year have the best chance of growing on to healthy fish, for the days are so long that the fry are never very long without food and by the time the seasons change and the days shorten, the fry will be large enough to withstand the different conditions. If no spawnings occur naturally it is advisable to separate the sexes for a few days; when placed together see that the water is fresh and well charged with oxygen. Where fishes are being spawned in tanks under complete control it is sometimes advisable to change the male fish where no breeding has occurred. A fresh pairing may soon bring about the desired result.

Keep up the feeding with earthworms and any other type of live or meaty foods which you can obtain. It is often found that fish have spawned in an outdoor pond before the owner has been able to examine the plants for eggs, and in consequence many of the eggs may have been eaten before they can be removed. If your bunches of plants are fairly thick it is almost certain that some eggs will fall between them and be saved but they may not be apparent to the unpractised eye. Eggs will always show up more distinctly if the bunch of plants is raised from the water. They will come to no harm in a short period out of the water.

If you have already obtained an early spawning you may be looking for a second one. Over many years of breeding fishes I have found that most types of goldfish will spawn about every month from April to September. Spawnings which occur during the latter part of August will not thrive so well as the earlier ones; they can only be successfully reared by providing some extra warmth and light during the darker days of the winter. There is no need to separate the fishes after a spawning in the pond. The fishes will not spawn again until they are ready.

Beware of Overcrowding

Meanwhile it is important that you keep a close watch on the fry you already have. Providing that they have enough room there is not much likelihood of anything going wrong, but as soon as they become too crowded it is almost certain that you will have trouble with them. It is far easier to keep the fish healthy by providing sufficient space than to try to cure them from some illness caused by wrong conditions. It is sometimes noticeable that a few of the fry will be continually at the surface of the water in their tank. If they appear rather listless it is possible that they are not in their condition. Fry during the hours of daylight at least should be forever foraging about after food. The tiny amounts which they are able to take at a time means that they can keep going, browsing about among the water plants all day long, never seeming to rest. Those fry continually on the surface may never make healthy fish and are better destroyed, but why am I telling you this I do not

know, as I do not expect for one minute that you will do it! Each year I make a resolution that I will destroy all but the best shaped fantails in my spawnings as I know that with my limited space it is hopeless to try to rear them all, but I have never yet been able to bring myself to destroy these poor-shaped fishes. They generally litter up my tanks, taking space and food which should be given to the better fish, until they are found a home with a small boy. My ideal conditions for rearing fry would be to have a series of ponds about 10 feet long by four feet wide and having a depth of about six to nine inches. These ponds would be kept empty through the winter and in the early spring would be filled with screened pond water. Algae would be encouraged to form by withholding water plants and either one last year's youngster would be put in temporarily as a guard against mosquito larvae, etc., or the ponds would have to be covered. When the water was nice and green I would introduce the fry. I know that with only the minimum of attention, as long as there were not too many for the pond, the fry would thrive very well indeed. I must let this project remain a dream for the future but if you are able to do anything like this I am sure that you will rear far more healthy fry than if you attempt to do so in restricted quarters.

Parasitic Flukes

One of the most harmful pests which can attack your fry is the fluke *Gyrodactylus*. This pest is so tiny that you cannot see it without a strong magnifying glass, and if the tiny fry are badly attacked it is very difficult to effect a cure. The treatment necessary to kill the flukes may kill the fry. The symptoms are usually these:—fry become listless and remain at the surface of the water. They swim with a laboured movement and do not want to swim away from the top. They mouth at their food but do not seem able to take it. A white bloom appears on the fish and all the fins fold up. The belly becomes shrunken and at a later stage the fish appears almost all head. At a later stage of the trouble the fish may turn on its side and finally small blood streaks may appear on the body. The fish will eventually die unless early treatment is given but it is possible to cure the fishes as long as they are not left too long. This is not a sudden trouble which carries the fish off almost overnight. An affected fish can live for three or four weeks; this means that there is plenty of time to try to cure the patient.

This trouble can soon spread, especially where the fry are crowded. The fluke is like a tiny leech and can sometimes be seen with the aid of a strong magnifying glass moving on the edges of the fish. Being transparent it is almost imperceptible on the actual body of the fish. Flukes move about by a looper action and get their sustenance by sucking the juices from the fish. The best cure for fishes is to give them a bath in a solution of Dettol in water. A cubic centimetre of Dettol to a gallon of water will do, and the fish must only be left in for about 10 minutes. Fishes must not be left in whilst you go away from them: keep

5. After the Strike



Photo: John Alexander
No escape now. The unlucky carp is manoeuvred to a head-first introduction to the pike's stomach. Gills expand enormously to accommodate the victim. Finale on page 38.

Stepping Stones

(Continued from the preceding page)

them under constant observation. The smaller the fish the less time can it stand the treatment. It is a good plan to hold the affected fish in a net whilst it is immersed so that it can be instantly removed if in great distress. The fish will dart about for a time and pant, but do not remove it too soon. The fish must then be placed in a fresh tank and if you have one which is very green you will find that in all probability the patient will soon recover.

Where there are a number of fry in a tank which appear to be slightly affected you may put in a tablespoonful of sea salt to the gallon of water. I have known this prevent the spread of the trouble. This may all sound rather disheartening but if care is taken in the first place and no

fry are put into unsterilised tanks there is every likelihood that no trouble will occur. It is a good thing if possible to remove fry from their tank to a fresh one occasionally as they appear to benefit from this very much indeed.

Once the fish are large enough to take them easily you can give some water fleas. Do not feed on these exclusively but give a varied diet such as fine Bemax, sifted dried shrimp and some of the smaller types of tropical fish foods. All dried foods can be soaked for a time before being fed to fry. Any type of live foods can be shredded and given to the fish, and providing they are kept somewhere near 70° F. temperature they will thrive as long as they have plenty of surface space.

I had intended to deal with the sorting of the fry for show and stock purposes but have decided that this will be better left for a month, and so in my next article that will be the most important feature.

FRIENDS & FOES No. 2 Glass Worms (Phantom larvae)

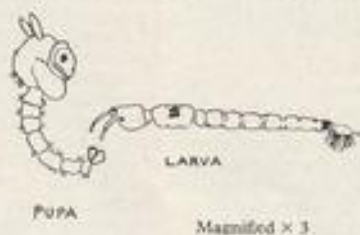
CHAOBORUS (CORETHRA)

PHYLUM—Arthropoda, from Greek *arthron*—joint and *poys*—joint.

CLASS—Hexapoda, from Greek—*hex*—six, and *poys*—foot.

It is the almost complete transparency of these creatures which gives them their popular name. The only plainly visible parts are the eyes and two pairs of small bean-shaped, air-filled, hydrostatic or balancing organs, which are situated one pair at each end of the larva's segmented body. These keep the animal in a horizontal position. It hatches from a mass of about 100 eggs—laid in a gelatinous disc on the surface of the water by a midge.

In some patches of water it is possible to catch thousands of larvae, while in others they are rarely seen. *Daphnia* pools are likely places, because *Daphnia*



is the favourite food of the glassworms. Each is equipped at its head end with a pair of antennae which are specially constructed to enable it to grasp and hold its prey. At the further end of its body it possesses a fringe of stiff bristle-like hairs which look rather like a comb. These are for assisting or arresting movement.

When the larva is fully grown (just

under half an inch) it pupates (changes into a pupa). This completely alters its appearance. As a pupa it hangs like a long-tailed comma from the surface of the water, obtaining atmospheric air by way of a pair of ear-like breathing tubes thrust through the surface film. Eventually the pupa case bursts open, and an adult midge emerges. This is harmless to human beings.

In all stages, from larva to imago (fly), the creatures are good, nourishing food for fishes large enough to swallow them. Only one word of caution is necessary. As the larvae are carnivorous it might be as well to exclude them from tanks in which very small fry are being raised, although to date no reports have been received of these being attacked.

C. E. C. Cole

THE AQUARIST

How to Make a Concrete Aquarium

by NICHOLAS BROWN

SIXTEEN years ago I was faced with the problem of keeping saltwater fish in a small suburban backyard where there was no room at all for a pond. The obvious solution was some form of tank, but neither an all-glass or a glass-fronted aquarium seemed likely to give good service to one of the size of tank I envisaged and the somewhat unusual site.

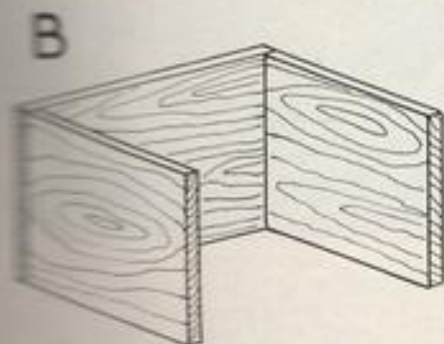
I finally decided on a pre-cast concrete tank with a glass front. Originally it was intended that this should rest on brackets built into the outside wall, but a few calculations regarding the weight of the filled tank soon showed that this idea was not feasible. Accordingly a plinth of suitable size on which the tank could stand was built from second-hand bricks.



The first tank was not a success. After it was cast in the manner described below I had a very satisfactory piece of concrete work, and I began to look round for plate glass of suitable size at a price I could afford. A few weeks later I began (rather sadly) a new aquarium to match the piece of glass I got! Moral—make sure of the glass first. I managed to get mine from a shop-fitters' scrap yard.

The Mould

The tank was cast in two moulds of 1 in. thick wood, but the dimensions of these would need to be adjusted according to the size of tank required. In the first mould (illustrated as A, but not to scale) the length and depth of the back on the mould were of the required outside length and depth of

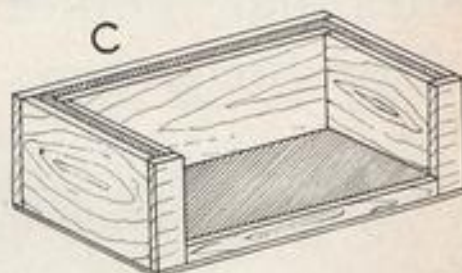


the tank. The sides (between the back and the inside face of the upright) were of the required outside width. The horizontal strip was 1 in. high and the verticals 3 ins. wide.

The outside measurements of the second mould (drawing B) were equivalent to the inside measurements of the finished tank. This mould could thus be stood inside the first so as to leave 1 in. between them at sides, back and bottom.

The Concrete

For the concrete, one part of cement, two of sand and four of small stones were mixed in the usual way, and to prevent concrete sticking to the mould, the woodwork was



lightly oiled. The bottom of the first mould was filled with well-rammed concrete to a depth of 1 in. (i.e. level with the top of the horizontal strip) and the second mould was stood on this concrete.

As a "key" some stout iron nails were stood upright in the concrete between the moulds, which were held together by temporary wooden strips across the corners. Concrete was then rammed down between the moulds to form the sides and back. Drawing C shows how the two moulds fit together, the rammed concrete being indicated by shading. At intervals steel nails were laid in the concrete as reinforcement, some of these being bent at right-angles for use on the corners. The cement was levelled off flush with the top of the moulds, and the whole was covered with damp sacking until the concrete had set, when the moulds were prised off.

The Glass

Four strips of teak wood were used to frame the glass. A slot into which the glass could fit was cut down the back edges of these, and the ends of each strip were cut across at 45 degrees so that they would meet neatly at the corners. The strips were put into place broadest face to the front,



being held along the bottom and uprights by screws running down into wooden plugs set in the concrete. The holes for these plugs were cut in the concrete with a brick-chisel, wooden plugs inserted, and a little cement run in round the wood to hold them firm. Drawing D shows one end of the type of wooden strip used.

The sheet glass was then put into place and made water-

tight with aquarium cement. The tank was man-handled on to its plinth and filled with water. It was then treated as if it were a cement pond, being constantly emptied, scrubbed and re-filled until it was considered safe to introduce the stock. A simple wooden cover kept dust and debris out of the tank—and reduced temptation for the neighbouring felines!

If forming part of a layout incorporating pot-plants, window boxes, etc., a tank made in the manner described can be recommended for the would-be keeper of outdoor coldwaters where space is limited.

READER'S RECORD:

Fishes that Wouldn't Stop Spawning

SOME time last year, about late September, I was given a breeding pair of blue gouramies. They each measured four inches but unfortunately the female had had her tail bitten away, giving a very odd appearance indeed. I asked the person who gave them to me how this came about, and it seemed that to escape the attentions of the male she would hide "ostrich" fashion behind the thermostat with her tail showing, whereupon her partner could ribbon it at will.

However, in spite of this misfortune they were such fine healthy fish, that I placed them in a tank 18 ins. by 10 ins. by 12 ins. thickly planted with *Vallisneria spiralis* and *E. densa*. Floating on the top was a heavy growth of *Riccia*. Also in the tank were about 20 guppies; I say about 20 because I don't believe anyone can say with any accuracy how many guppies they may have at any given moment!

Nest-building Begins

The gouramies, after exploring their new quarters, soon got down to the business of nest building, which was carried out only by the male; and in about 48 hours there was a good number of eggs in the nest. The male thereupon stood guard under them, apart from taking time off to bite at the part where his mate's tail should have been, because instead of hiding behind the thermostat, in my tank she pushed her head into a clump of *Vallisneria*, leaving her rear to its own devices. It was amusing to watch the attempts made by the guppies to obtain a change of diet, but all their efforts met with no success.

After leaving the tank alone for a day I transferred the gouramies into a tank 14 ins. by 8 ins. by 8 ins. planted with only two small pieces of *Vallisneria*, although it had a heavy growth of *Riccia*. Admittedly it was a small tank for such large fish, but it was the only one available at the time. On the night I placed the pair in the small tank, I floated a dish in the old tank with the complete nest inside it, thinking, "Well! I should have some fry out tomorrow," but on coming down the following day I found not gourami fry in the dish but two very fat and lazy guppies who had evidently managed a change of diet after all.

Path of True Love

But to return to the gouramies. For a fortnight all went well in the small tank, until in the third week the attacks on the tail started anew. At the end of the week another nest had been made and a very heavy spawning was observed, but due to the smallness of the tank I had to remove the female or I am convinced she would have been

killed, so vicious were the attacks made by the male, who now spent all his time fussing about the nest refusing even to eat, until the fry were darting about the tank.

He then started to take a little food, but he kept dashing back to keep his brood (about 200) together. On closer observation he was also seen to be eating the fry, so out he came and was put into the 18 ins. tank, whereupon the female set about him with gusto, flattening him on the sand and butting him on the side until he was forced to seek refuge in the plants; but, unlike his mate, no tail was protruding.

After about a week I placed the adult gouramies in a 38 ins. by 12 ins. by 12 ins. tank which already contained zebbras, danios, platys, swordtails, etc., where they settled down. In six weeks the female's tail had grown to nearly full size, as she was able to escape in this larger tank.

Housing Problem

By this time the fry had grown quite well but a very big snag arose; no one wanted 200 or so gouramies, so faced with a future housing shortage, I put them in the large tank, where the danios, etc., made short work of them. While transferring them I noticed a large bubble nest in the corner of the community tank and the male on guard beneath, and I thought "Oh! no, not again," but in a few days down came a cloud of fry—more than the last time. This time both parents guarded the young, keeping all the other occupants in one small corner until I fished them both out and back into a smaller tank. This action must have had the approval of all the other fishes in view of the fact that I had no need to feed them for a while.

The last chapter opens with the mixture as before: one day in the smaller tank and one tail missing off the female. By now I was desperate to find a home for the two of them, but I still could not get rid of gouramies, until one day the phone rang and a voice asked "Did I still have my pair of gouramies and if so did I want to part with them?" Needless to say they were delivered post haste in the same condition as I had received them, two fine specimens but only one tail between them.

Arthur Price-Canning

6. Mission Completed



Photo:

John Alexander

Nearly where we came in. The pike's gills will soon return to normal but the carp will be seen no more. For three days this pike's feeding problem is solved.

READERS' QUERIES ON COLDWATER FISHKEEPING

Pair, Trio—or Quartet?

I wish to breed common goldfish in tanks this year and am in doubt as to the pairing. Should I have one male and one female or two males to one female?

For breeding any type of goldfish in tanks I consider that only one male is the better plan. In a pond the presence of several males does, I think, tend to ensure that you get a vigorous spawning and that many eggs are fertilised. In a tank, however, this is quite unnecessary; any extra male may only serve to eat many eggs once they are laid. The one male can fertilise all the eggs which may be laid by your one female and in point of fact one male could fertilise all the eggs laid by thousands of females. This may sound very strange to you, but let us consider what happens during a spawning and then it will be realised that I have made no exaggeration.

The female fish carries the eggs or ova (produced by the "roe") and the male the milt (from the "soft roe"). A female fish may hold a few thousand eggs providing she is of a fair size and is healthy. The milt of the male contains hundreds of thousands of sperms which are so minute that thousands could be held in a drop as small as a pin's head. It can now be realised that when the male fish expels his milt there are released in the water hundreds of thousands, perhaps over a million sperms, each one capable of fertilising an egg. These sperms are propelled by whip-like tails and

answered by **A. BOARDER**

so the sperm is able to move around in the water in search of the female egg. They are in all probability attracted by some chemical around the egg.

For every male sperm which finds its way into an egg, many thousands perish. They can live in the water for a short period after ejection but it is probable that the majority of eggs are fertilised within a few minutes of the actual spawning. In a pond many sperms may go astray but in the enclosed space of a tank there should be no fear that the eggs will not be fertilised.

I have on my farm a low-lying meadow in which rises a spring. I have been told that by making a pond I could raise many goldfish. Is there a good market for the fish and would I be able to breed many on a commercial scale?

It is possible for you to succeed with breeding fish in such a pond but it is not quite as plain sailing as your informant suggests. Goldfish are not born gold-coloured but are bronze, like a common carp. They change to the desirable gold later in life, sometimes within a year and at others as long as three years. You would have difficulty in getting many of your fish to change colour quickly and would have to compete with imported fishes which have been bred in such places as Italy where the abundant sunshine has done much to encourage the colour change. Shubunkins normally change colour much earlier and these would be

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.

better for you than the ordinary goldfish. There are, however, other fishes with which you may have some success. You could breed golden tench and golden orfe. These would change colour quickly and there is a good market for these types. Fancy goldfish are no use to you as you would only produce a small quantity of decent fishes which would sell; all the remainder, very many perhaps, would be left on your hands.

If you decide to make a pond, try to construct it so that the water from the spring does not continually flow through it. It should be possible to empty your pond if necessary and refill with the spring water. Several ponds would serve your purpose much better, as it is possible to rear more fry if you are able to keep the parent fish away from the youngsters. You might also be able to purchase some trout eggs so that you could hatch them and rear the fish; for these there is a fair market. You would have to be in a position to provide plenty of food such as chopped liver for feeding the fry. Given a good season and with sufficient space you might be able to raise many fish but you have to consider that there are some pests which might prey on the fish if the ponds are in an exposed position. Among these are:—sea-gulls, kingfishers, herons, otters, snakes and perhaps cats. These pests should not deter you, as being a farmer you have enough experience to know how to deal with most of these.

Many experienced aquarists would give much to have your opportunities and so there is no reason why you should not succeed providing you start quietly and gradually increase stock. An ideal method would be for you to have several small ponds so that you could empty one each year and leave it fallow for a season. This would then ensure a more healthy condition for the rearing of fry.

I have a well-established pond and this year intend to breed extensively. Which of the following will make good containers for young fish: galvanised tanks, iron or tin tanks, enamelware, earthenware bowls, domestic baths, sinks or wooden tubs?

I have always found galvanised containers harmful to fish and plant life, but by painting them over with a thick coating of cement, one of cement to one part fine sand, used in a sloppy condition, an effective seal can be made. These tanks should be well washed out and seasoned before use. I have had many such tanks in use for many years with good results. Iron tanks could rust and then cause trouble but tin would be satisfactory as long as the tinning remained undamaged and effective.

Enamelware is quite good as long as the enamel does not chip off too much. Earthenware bowls are ideal. Domestic baths can be used if of the enamel type, but do not use galvanised ones unless treated as stated above. Sinks are splendid for fry or for the purpose of rearing *Daphnia* or water fleas for feeding the fry. Wooden water butts can be safe providing you know what has been in them before. Those which have contained anything of an oily nature would have to be burnt out before use and well seasoned. In "Stepping Stones" (January issue of *The Aquarist*), I described how I make my concrete hatching tanks. These are not very difficult once you make the mould and then you

could make as many as you require. They are quite cheap to make as well.

I have some runts which I took from my pond and kept in a cold garage all the winter. The water has frozen over sometimes. I now notice that some of the fish are lying on their sides at the bottom of the pond. Are they dead or are they hibernating?

Goldfishes do not hibernate. When the water becomes very cold they do become rather torpid and move about very little. I found this winter that although my ponds had a covering of thick ice the fantails would still eat a little porridge but they took it very quietly and all their movements were very slow. Your fish will probably move if touched. If dead and they did not come to the top they would soon become covered with a form of fungus. Your fish have probably had a chill and will only recover in slightly warmer water.

I have constructed a pond holding about 300 gallons of water and am troubled with frogs every spring. They produce large quantities of spawn and kill my goldfish. How can I get rid of the frogs and keep them out in future?

I do not quite understand your statement that the frogs kill your fish. Have you actually seen the frogs doing this or have you found dead fish and are surmising that the frogs are the cause? For the past 15 years many frogs have come to my pond to spawn and this year there must have been at least 50. In all those years I have never had one fish killed by frogs and my pond contains my prize strain of fantails. Once I found a male frog clasping a goldfish but this one was heavy with eggs and was not very active. I know that it is possible for a frog to kill a goldfish in this way but I do not think that it happens often. I encourage frogs in my pond as I make good use of the tadpoles for spring feeding. If you must get rid of them you will have to catch them with a net and then take them a considerable distance away or they will return. I do not know for certain but I should think that it would have to be well over a mile away. If you could put them in another pond there, it would help. You could also sell the frogs to a hospital or a zoo for experimental and for feeding purposes.

The only way you can keep frogs out is by completely covering the pond with fine mesh wire netting. An outward sloping shelf to the top of the pond would keep out such things as toads and newts but individual frogs could perhaps jump over.

The water plants in my tank go very pale and then brown in a short time after the tank has been set up. Can you give a reason for this?

Your plants are probably only un-rooted cuttings and as such cannot be expected to get established quickly. Why not try to get them to form roots before you put them into the tank? Many kinds will make roots if just left floating in a tank in very good light. Once a little root is formed the cutting can then be placed in a jar with some loam at the bottom. After this has become well rooted it can be carefully transplanted into the tank without removing all the loam adhering to the roots. The plantlet will then have a very good chance of becoming established. If cuttings are partly buried in the sand at the base of a tank they sometimes decay instead of rooting.

There must also be sufficient light over the tank so that the plants can keep green. If you are not getting sufficient natural light in the tank try to arrange a lamp over the water for a few hours a day. It is difficult to lay down a definite time for artificial lighting as so much depends on the amount of light which naturally enters the room. As a rule paleness of plants is caused by insufficient light. You will also find that the plants may not thrive for very long unless there are some fish in the tank. The one helps the other.

A young moor which I have been keeping with some shubunkins in a 24 ins. tank developed the following symptoms:—It appeared listless, lying on the bottom of the tank. After a day or two it was noticed that a brown discoloration and fraying at the edges of the tail had occurred. On the fourth day it was dead on the bottom of the tank and it had changed from black to brassy bronze. Could you please diagnose the disease?

It is impossible for me to say with any degree of certainty what was the matter with your fish. I am just a practical fish keeper and when answering queries I do like to be able to do so from my own actual experiences. I can only guess at the trouble and I do not like guesswork. You could hardly expect a doctor to tell you from many miles away from what your grandmother had died without seeing her! It would have been better if you had sent the fish for post-mortem examination to the address given in *The Aquarist*.

My guesses are that the fish may have had a chill in the first place and may have contracted fin-rot or fin-congestion. The fin fraying may also have been caused by flukes. The moor would almost surely change colour after death. Check up on all possibilities and you may be able to find the cause yourself and so prevent further trouble.

Is there an alternative method of fumigating a tank which has recently contained fish suffering from white spot, other than heat?

Remove the fish and add a teaspoonful of Dettol for each gallon of water. You could also use household ammonia, a fairly strong solution would do the trick.

As a new reader of "The Aquarist," I am writing to ask you for all the details for making a pond. What cement should I use? I have been told that ordinary builder's cement is of no use for this purpose.

It would take me too long to give you all the details required. I suggest that you send for *The Aquarist* booklet on "A Simple Pond." This explains all you require. As to the right cement, I use nothing but ordinary builder's cement. My last supply bore the label "Tunnel." With this I make my hatching tanks, and these, although not more than about half an inch thick, will hold water three days after having been made, and the outside remains quite dry. I have had some concrete tanks so made for many years and there is no trouble with them. Of course, all concrete should be well washed over before use. There is a form of cement sold which is stated to make the concrete waterproof but I find no trouble at all with the ordinary kind.

I have an eight-inch goldfish which has refused to eat for 10 days. She is very fat as though about to spawn, gasps at the surface and appears to be constipated. What is the matter with it?

The fish may have had a chill or is just suffering from old age. As fish get older they "feel" the weather the same as we do. It may, of course, be a bout of indigestion and a salt bath may help to put matters right. After the salt treatment tempt the fish with small pieces of earth-worm. This may help to improve things. The warmer weather may do the trick without anything else.

Post-Mortem Examination of Fishes:

W. Harold Cotton, F.Z.S., 39, Brook Lane,
King's Heath, Birmingham, 14.

Specimens should be sent direct to Mr. Cotton, with full particulars of circumstances, and a fee of 2/6.

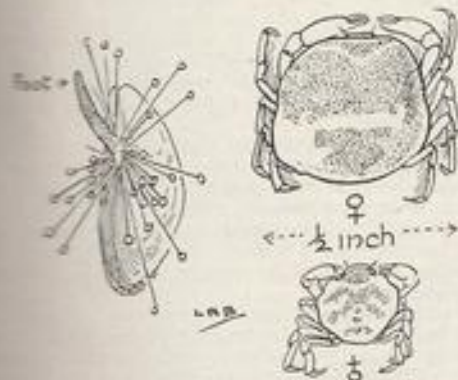
It is important that the following method of packing fish be adopted:—Wrap fish, very wet, and loosely in grease proof paper and then in wet cloth. Re-wrap in greaseproof or wax paper and pack around with cotton wool in tin box. Despatch as soon as possible after death, with brief history of aquarium or pond conditions.

Journal of a MARINE AQUARIUM

SINCE writing last about my sea-water tank, disaster has overtaken it. Though left in excellent hands (aeration maintained, dead and left-overs removed, etc.), a fortnight's absence found cloudy water and only one swimming shore crab. All this I now realise was my own fault—overstocking. To-day I am therefore keeping two small tanks, one much as though I were miles inland (the latter to be a guide to inland readers), the other taking full advantage of my cliff-edge eyrie—I change the water several times a week. In this tank are several *Metridium* sponges, plankton feeders, and any other less hardy beasts it is deemed to keep under observation. Two dog-fish eggs have been there since October, and the incubation period is deemed to be from six to nine months!

Tank number one is now reinstated. A single dead anemone can poison hundreds of gallons, but even so they are (as regards *Actinia*) wonderfully tough, and there is a record of some surviving in unfiltered, or topped-up water, and no food for four years. In stating that only one crab had survived, I overlooked another that had had all eight walking legs removed by a tank mate. That was some weeks ago and this crab, segregated in a small basin, feeds well though it has to be watched since if it falls upon its back it needs assistance to right itself. With an intensively murching diet (mostly raw mussel) it should moult, and then . . . what? The result ought to be interesting.

Talking of mussels, I find that these are admirable filters in a small tank, where they can be watched and a chance dead one removed. In big public aquaria they are often killed since in a mass, chance dead may soon do serious damage. For this reason Brighton Aquarium, in the days of its famous curators—Lord, Lee, Buckland, etc.—kept mussels in every tank, where they quickly cleared cloudy water, and a chance dead one could be at once detected and removed if not mopped up by crabs and other crustacea. The mussel well merits tank room in its own right. With its siphons showing it is far from unornamental, and it is most interesting to watch the long brown tongue-shaped foot moulding and affixing the long silk threads which anchor the mollusc. It is far from static, and one



On the left is a view of a mussel attached to the aquarium glass by its foot. Male and female pea crabs are drawn on the right.

by
L. R. BRIGHTWELL



of mine has lately crawled fully four inches up the glass front. The common anemone, it may be mentioned, can glide at the rate of about an inch in three hours.

The fishmonger's has ever been one of my happy hunting-grounds. From September to March, even June, one can count upon the big luscious mussels from North and South Holland. These make wonderful filters, and their shells often carry enormous acorn barnacles, nearly an inch across the base. Such provide a beautiful spectacle, raking the water with feathery, iridescent plumes, as T. Henry Huxley aptly put it—"kicking food into their stomachs."

Lately I saw crawl from between the half open valves of a mussel, a little fingernail-sized crab, rather prettily marked—rose pink on a cream ground. This was the male of the pea crab, *Pinnotheres*. For some days he disconsolately hung about waiting for his chance to creep into another mussel. I had forgotten the presence of some hermits, and one morning a few pea crab legs rewarded my negligence! The male pea crab is an active creature, migrating from mussel to mussel, calling upon its big, shapeless, feeble-limbed lady-loves.

The hermit is surely the most dissatisfied of living creatures; its borrowed home never pleases it for long. Last night my two little hermits, one in a winkle, the other in a basket-whelk shell, met. Winkle rushed at basket, caught him off his guard, dragged him forth and like lightning had swapped houses. The ousted one, accepting Hobson's choice, made do with the winkle shell, much too big for him. No. 1 meanwhile had regretted his rash action, and before one could say knife, had changed back to his original home. But crab No. 2 was far from cowed. There then ensued a typical hermit fight. The hermit does not slash or clutch with the sideways action of the true crabs or lobsters but pounds and hammers with straight-forward boxing blows, creating quite a din. At night the hermit tank always sounds as though a goblin smithy was working overtime. A serious fight always ends in one crab losing a great claw, and possibly a leg or two.

As I write, the shore presents a bleak spectacle. Life huddles into the most secluded pools, but a gale may pile the beach with uncountable riches torn up from the sea bed just beyond low tide (springs) limit. Lately amongst a bank of drift weed I found several small *Metridium*; sponges are abundant, and there are often masses of whelk ova larger than a man's head.

It is a curious anomaly, but so far I have not discovered a single local aquarist availing himself of the riches on his door-step. Yet not long ago when I conducted a party of inland aquarists to Black Rock, they went back laden, and afire to establish sea-water tanks. That is life—and how very human!

OUR READERS

Write—

Readers are invited to express their views and opinions on subjects of interest to aquarists. A selection from queries received will also be answered here. The Editor reserves the right to shorten letters when considered necessary and is not responsible for the opinions expressed by correspondents.



Society Meetings

WITH reference to the Editorial in the March issue of *The Aquarist*, the Hendon and District Aquatic Society has read with interest the remarks concerning inter-club meetings and also the article giving suggestions for filling meetings.

We meet every week and cannot find time to fit in our programme!—inter-club brains trusts and quizzes are rare because of congestion of other activities. We hold a sales night every month, a screen show, a table show and a lecture every month. No committee or breeding section business occupies this time but has its separate night, making an average of six meetings a month! Rare gaps are filled in with quizzes, brains trusts and like events. We have a monthly news sheet and are able to keep our member subscription to as little as 10s. a year and hold 70 meetings at a rent of £75.

In inter-club activities our members have been away to clubs from Glasgow to Portsmouth and are ready at any time to entertain any aquarist society to quizzes or table shows. We can and do put on an evening table show of 60 entries in separate tanks. If you like fish, Hendon will always welcome you.

B. CALROW (*Show Secretary*),
Hendon and District A.S.

International Federation

I HAVE noted the letter published in the April issue of *The Aquarist* with reference to the International Federation. I would take this opportunity of pointing out that the prospect of this is a very live one and that the preliminary steps on this project have already been taken.

Your correspondent appears to be of the opinion that there is a lack of interest and that this opinion is held by his American friends. This may well be so in view of the fact that the majority of countries have similar organisations such as ours who do represent the majority of societies in these countries, but this is not evident in the U.S.A.

National bodies and not individuals have the matter of an International Federation well in hand, and the choice of a rendezvous for the inaugural meeting is practically established. Thanks are due to the Dutch Federation, who will be hosts on this occasion, and the first responses indicate that the choice of venue is welcome to all concerned. As far as the necessary organisation is concerned this is also being taken care of and appears to be in the competent hands of those whose initiative and energy is of the highest calibre.

R. O. B. LIST (*Secretary*),
Federation of British Aquatic Societies.

Ageing Heaters

AS an electrical engineer of some 16 years' standing I would like to advance my theories concerning the letter by Mr. J. Sayers on ageing heaters (*The Aquarist*, April).

I would state that a heater which has been in use for a considerable time does not vary but very little from its stated wattage when new. Oxidisation only occurs when the element is exposed to the air and when the element becomes red hot. I have heaters which have become a dull red when in use in the aquarium but not the bright cherry red which causes the metal to oxidise on cooling.

Also to be taken into account is the fact that no fresh air enters the heater from the time of manufacture except, of course, when a new tube or something similar is fitted. Assuming the heater to be undisturbed then the element remains in a sealed atmosphere. Therefore I fail to see how the element can change to any considerable degree.

A. L. MYATT,
Birmingham, 15.

Poor Service

RATHER than risk losing all my stock by introducing diseased fish into my tanks I have to meet the further expense of purchasing fish from a private importer of tropical fishes who is reliable, and as far as I can see, has never had any disease in his tanks.

I go to this trouble because the following is typical of the type of shop in this area: shop floor—filthy; some 15 tanks on one wall of the shop—three or four in use for tropical fish and the water temperature 90° F. or over; tanks are covered with filth to a disgusting degree and there are no plants whatsoever; to look into them one has to scramble over piles of sacks of dog biscuits, etc., and peer round a stack of budgerigars; after all this the fish are found to be absolute rubbish and suffering from all manner of ailments.

In the middle of the floor is a concrete tank jammed with goldfishes, many dead and dying. On one occasion last year a dealer was seen to be taking tortoises from a large box and submerging them in a bucket of cold water ("to liven 'em up") and then heaping them in a small wire-netting enclosure on a concrete floor. This same dealer sells boiling tubes which fit very few, if any, thermostats for one shilling each.

Of course, this is not true of all our dealers but all have several faults which could be pointed out. I think that something could be done about this; aquarists should boycott dealers such as I have described.

R. A. CARTWRIGHT,
Dronfield, Nr. Sheffield.

News and Reviews

GERMANY

The March issue of the *Aquarier & Terrarierzeitung* contains an article on breeding the "cardinal fish" (*Tetraodon lineatus*), known to us by its less elegant name of white cloud mountain minnow.

The journal, *Aphyronomus australe*, is the subject of an article giving detailed instructions on how to breed it. A pair, one male and two females, should be kept in a small tank. Rainwater is most suitable, with some salt added at the rate of one teaspoonful to two gallons. The optimal water temperature is 70° to 75° F. White worm, *Tubifex* and green larvae should be fed. To enable the breeding fish to lay their adhesive eggs on "plants" that do not decay, "artificial" or bunches of nylon thread should be put into the breeding tank in preference to living plants. For hatching the eggs small tanks or shallow glass dishes are being used. It takes between 14 to 20 days before the eggs are hatched.

An aquarist describes his breeding experiences with *Gambusia holbrooki*. Up to 1,500 eggs were deposited by two of them but the eggs proved to be infertile. After repeated failures it was found that the supposed "pair" were actually two females. Eventually a real pair was obtained which spawned successfully, although the fishes were only about 2½ ins. long. Fully grown they reached a size of six to seven inches. The eggs were transferred into a small tank for rearing. A small amount of a 2 per cent. solution of methylene blue was added, enough to give the water a bluish tinge. The water was changed after five days. On the sixth day the fry were free swimming and newly hatched brine shrimps were fed.

Observations on the breeding of the river lamprey (*Lampetra fluviatilis*) seem to show that the holes at the bottom of the river where the lampreys deposit their eggs are being made not by single fish but by a communal effort of a whole group of lampreys. Groups of 25 to 30 lampreys were observed to build these holes, two or three individuals helping to remove stones that were too heavy for one fish to move alone. Further observations, however, will be necessary to confirm this most interesting finding.

The water mimosa, *Neptunia oleracea*, is being described as a possible aquarium plant. It is doubtful whether this plant will become very popular, as it requires high temperatures and plenty of sunlight and has a resting period during the winter.

Difficult stages of the life cycle of *Capillaria pterophylli*, the parasite of the angel fish, are shown. The eggs of this parasite can be found in large numbers in the intestine of angel fish. The full life cycle, however, is not yet known. An article headed "Camera and Aquarium" deals with the difficult problem of taking good pictures of aquarium fishes. The author condemns the use of glass plates to restrict the movements of the fishes. Judging from the striking "journal study" of an angel fish he seems to be most successful with his technique. Interested photographers should read this article in the original.

Further articles deal with amphibia in Ceylon, the leopard snake (*Elophis leopardina*), and with the devil's lake tiger salamander (*Ambystoma tigrinum diaboli*) from North Carolina and Canada. The habits of some tortoises and terrapins are charmingly presented by an author who had many years' experience in keeping these reptiles.

R. Heller

The AQUARIST Crossword

Compiled by J. LAUGHLAND



CLUES ACROSS

- Not a live-bearer (8)
- Nest (3)
- Ambass — (4)
- To drive (4)
- Egg-shaped (4)
- Youngster in swim bladder (3)
- Adult *Lepoccephalus* (3)
- The lair of golden orfe (3)
- For slide, ask side (4)
- Senility (3)
- T and 28 for water movement (4)
- Run for the marsh plant (4)
- Corydoras* (7)
- Opposite of alkaline (4)
- Decorator of cakes, not ponds (4)
- This fish is short of ideas (3)
- Dying (8)
- Kidney fat (4)
- " — Kapital" (Mars) (3)
- Floating leaf of aquatic plant (3)
- Long "arm" of water boatman (3)
- — O'Connor sounds like (4)
- Likewise in balsam (4)
- A great place for fishes (3)

CLUES DOWN

- Former name of *Egeria crista* (6, 6)
- Hammer nearly all gravel (5)
- In physiology a secreting organ (5)
- Little Leonard, less than 9 (3)
- The food in the egg (4)
- Beautiful British fish (4)
- Present name of 1 down (6, 6)
- Charge (3)
- fish, but not a flying fish! (7)
- Flies are not true at heart (3)
- A feature of zebra danios (6)
- We aquarists in this case (2)
- Suitings mostly weeds (6)
- Re a tea (anagram) (6)
- This Bank is a famous fishing ground (3)
- Can be detected in all scudians (1, 1, 1)
- Consisting of a pair (4)
- This fish is *Prionella riddellii* (1, 3)

PICK YOUR ANSWER

- Myriophyllum* is represented by about: (a) 10 species. (b) 20 species. (c) 30 species. (d) 40 species.
- Cardamine hirsuta* is indigenous to: (a) China and Japan. (b) India and Burma. (c) Paraguay and Uruguay. (d) Spain and Portugal.
- Mollinella latipunctata* was named by: (a) Cuvier and Valenciennes. (b) Lesueur. (c) Meek. (d) Regan.
- Cynolebias belotti* (the Argentine pearl fish) attains a length of about: (a) 1½ ins. (b) 3 ins. (c) 4½ ins. (d) 6 ins.
- "Nurse, it was I who discovered that leeches have red blood." were the last words of: (a) Cuvier. (b) Bloch. (c) Linné. (d) Pallas.
- The flowers of *Cabomba aquatica* are: (a) blue. (b) red. (c) white. (d) yellow.

Solutions on page 45

G. F. H.

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.

AFFILIATION of the **Aqua-Art Club, Southport** to the Federation of Northern Aquarium Societies is announced. Recent lectures given at meetings have dealt with fish feeding, rock formations and pond construction. The club has a junior section, which held a party and concert earlier this year.

AT an inter-club contest **Bethnal Green Aquatic Society** won by two points in excess of those gained by Dalston A.S. Angel fish breeding was the subject of a lecture given by Mr. Edgar Scotfin to the society and this lecturer also presented prize cards to the inter-club contest winners.

TWELVE monthly meetings have now been held by the **Birkenhead and District Aquarium and Herpetological Society** (meetings on the second Wednesday of each month, 7.30 p.m. at Rock Ferry Conservative Club Room, Bedford Road, Birkenhead) and the society has 20 members. Re-elected at the recent annual general meeting was the secretary, Miss P. E. Rankin (The Dell School House, Rock Ferry, Birkenhead).

DURING March two lectures at the evening meetings and a competitive display of fishes at a local trades exhibition were the main activities of the **Blackpool and Fylde Aquatic Society**. The first lecture was on breeding fighting fishes and the second dealt with livebearers.

CONDITIONING fish was the subject of Mr. E. W. Sharp's lecture to the **Bradford and District Aquarists' Society** in March. Mr. C. Graham also attended to speak on the work of the Federation of Northern Aquarium Societies. These events were followed by a "quiz" for members and a table show of characin fishes was well supported.

THE Bridlington and District Aquarists' Society held its first annual dinner and social in February this year. One of its members, Mr. F. Wardlaw, has given talks at evening meetings on pond life and its relation to fish feeding, and hints on breeding fish in aquaria.

NEW secretary of the **British Herpetological Society** is Mr. J. L. Menzies (address, c/o Zoological Society of London, Regent's Park, London, N.W.8). An outing for members of the society to visit the colony of marsh frogs at Romney Marsh is planned for Sunday, 18th May.

MEETING place of the **Bury Aquarists' Society** is now the Co-operative Hall, Knowsley Street, Bury. A table show of plants was held recently and following this was an auction of stock.

AFTER three month's existence the membership of the **Carlisle and District Aquarists' Society** stands at 47. Fortnightly meetings are held at the King's Head, Fisher Street, Carlisle. A film show is planned for a coming meeting.

THE first year of the **Catford Aquarium, Reptile and Pondkeepers' Society** was brought to a close with the annual general meeting in March. Officers of the society were re-elected and were able to report a year of steady progress, in which membership had

increased from 19 to 30. Three trophies are now possessed by the society and these will be presented at shows to be held during this year.

SINCE last month the monthly meetings of the **Chingford and District Aquarists' Society** have been held at Heathcote Secondary School, Chingford, and will continue to be held there on the first Tuesday of each month in the future.

SECOND round of the table shows for tropical egg-laying fishes was held last month by the **Clapham Aquarists' Society**. The secretary, Mr. A. J. Mayhew, 38, Rectory Grove, Clapham, S.W.4, would like to hear from new members in the Clapham area.

FREQUENT table shows and a club show open to the public last month have been staged by the **City of Salford Aquarist Society**. Mr. H. Walch, a member, is giving a series of lectures at evening meetings, which began in March.

TALKS given by members of the **Doncaster and District Aquarium Society** at meetings this year have included aspirator and wind-driven aerators and breeding various fishes, as subjects. A committee has been formed to organise the society's show to be held in June.

AT the recent annual general meeting of the **Dorking Aquarists' and Pondkeepers' Club**, election of officers to serve for 1952 was the first item on the agenda. Other business included future club activities and preparations for a table show in the near future. Secretary is Mr. P. H. Powell, 109, Fairfield Drive, Dorking, Surrey.

A DEMONSTRATION of aquarium glazing and a talk on rocks and compost were given by Mr. H. S. White, chairman of the **East London Aquarists' and Pondkeepers' Association** in March, and at the second meeting that month Mr. R. Johnson's talk on coldwater fish breeding was followed by a table show of cichlid and characin fishes. Last month a talk on breeding tropical egg-layers was heard by members. The Association is organising a joint meeting of East London and Essex societies to hear a lecture by Mr. George Bartmann, who is visiting this country from Germany this month.

VISITING lectures have proved that a new face with fresh ideas is the big attraction for meetings of the **Forest Hill and District Aquaria Society**. Recent talks have been on planarians and fancy goldfishes.

A FILM show of aquatic creatures was attended by 150 members and friends of the **Glasgow Northern Aquarium Society** in February last. In March the society held a social evening and an outing to the Bridge of Weir Trout Farm, an event of special interest as one of the films seen earlier was "The Development of the Trout."

FOLLOWING a talk on zebra fish breeding given to members of the **Gosport and Fareham Aquarists' Club** there was a discussion of the reasons for the prevalence of misshapen fishes of this species on the market. As part of a publicity campaign the club has set up a furnished aquarium in a local cinema. Three schools in the area now have tropical aquaria.

INTER-CLUB trophies were presented at the meeting of the **Greenwich and District Aquarists' Society**, at which members of the five clubs in the area organisation were also present. A film strip on aquaria was also shown. An annual exhibition is planned for July.

A WEST LONDON section of the **Guppy Breeders' Society** is now in existence and the secretary is Mr. A. P. Stanley, 7, Elm Grove Road, Haling, London, W.5. Those interested in joining the section are invited to write to Mr. Stanley for details.

LIVEBEARERS were judged by Mr. L. Heeson at the March table show arranged by the **Halifax and District Aquarists' Society**, at which meeting members decided to purchase a silver rose bowl as a club trophy to be competed for annually in furnished aquaria classes of the annual public show. Last month Mr. H. Loder spoke to the society on judging and showing fishes and a table show of fighters and other labyrinth fishes was held.

A FILM programme and table shows have been well attended events for the **Harrow Aquarists' Club** recently. The secretary, Mr. H. P. Harbour, 26, Abercorn Crescent, Harrow, Middlesex, will be pleased to welcome new members to the club's meetings at the Roweth Parish Hall, South Harrow.

MR. A. Boarder visited the **High Wycombe and District Aquarist Society** in March and gave a lecture on the maintenance and breeding of fancy goldfish. A film show has been arranged for the April meeting.

AT the annual general meeting of the **Hornchurch and District Aquarists' Society**, Mr. D. S. Stacey (1, New Place Gardens, Upminster, Essex), was elected secretary. Recent lectures to the society have been given by Mr. A. Moore and Mr. C. W. Creed.

GENERAL tropical fish-keeping and breeding was the subject of Mr. H. Goodman's lecture to members of the **Lyons Club Aquarist Section** last month. Secretary of the section is Mr. V. White, 51, Edensor Gardens, Chiswick, W.4.

FIRST meeting of the **Midsomer Norton District Aquarist Society** was attended by a large number of local aquarists and officers and a committee was elected. Fortnightly meetings are planned for the future.

THE Mitcham and District Aquarists' Club held the first of a series of table shows in March. A cup was awarded for the best livebearer exhibited and in addition to prize cards other winners gained points towards the shield competition. An outing was arranged for early this month.

AT the meeting of the **National Aquarists' Society**, held in March, members were entertained with a very interesting lecture by Mr. J. W. Lester of the London Zoo, who spoke on "Reptiles and Amphibians." Colour films were shown during the evening, and slides of a wide range of creatures. A live collection consisting of an alligator and two snakes brought along by the lecturer, were handled by members. At the conclusion of the meeting a question period was held and queries relating to tortoises, terrapins and vivarium inmates in general were put to Mr. Lester.

RESULTS of the **Nelson and District Aquarists' Society's** recent home aquaria competition were announced at the March meeting. A summary of the judging result was given by Mr. R. Metcalfe, and after this table show of labyrinth fishes was judged by Mr. K. Anness, a visitor from the Colne and District Aquarists' Society.

Notts "Bulletin"

A LECTURE, given by Mr. W. C. Clevland at the February meeting of the **Nottingham and District Aquarists' Society** is reported

THE AQUARI

in the society's Bulletin for March. The lecturer spoke on growing water plants. He discussed the relation between fish and plant and said that washed sea sand was the only "correct" material. Attention was not recommended to plants growing but good lighting is essential—old wire lamps being used for 10 hours daily, new lamps for a 36 ltr. aquarium). Mr. Wilkinson discussed several of the rarer plants and dealt with the differences between the marine *Chromolaena* species and tropical water plants.

"The Indian Aquarist"

In the February issue of the Bulletin of the Indian Society of India, C. W. Coates contributes some notes on keeping marine fishes in aquaria. The material of the aquarium is most important. Black asphaltum varnish (not white) has been used with success to cover the tank and also exposed cement. The varnish should be applied after six to eight months, washed with fresh water and painted again. Natural sea water is best to use and it must be kept running by a pump or by the use of a filter; the filter medium to use is crushed limestone or coral sand to keep the water alkaline in reaction. The author quoted three months as an average period in which the most desirable marine fishes can be kept in the home small seawater aquarium.

Platy Breeders' Association

The Platy Breeders' Association is planning to hold its first full-scale meeting some time during the period of the forthcoming National Aquarist Exhibition in London. A Bulletin of the association is being circulated among members for their comments and additions and it is hoped to make this a regular feature to provide material for a journal covering the association's activities. Membership is reported to be growing but new members are welcome from the ranks of the many aquarists who are interested and successful breeders, and enquiries are invited by the secretary, Mr. D. L. Cann, 44, Westham Drive, Pevensey Bay, Sussex.

Northern Federation A.G.M.

Forty delegates of member societies attended the annual general meeting of the Association of Northern Aquarist Societies held at Belle Vue, Manchester, last month. The Association has increased the number of its affiliated societies from 18 to 43 in little more than a year, a very good record. Dr. J. F. Wilkinson, president of the Federation, in his address reviewed the past year and referred to the year ahead the British Aquarists' Festival and beyond. He looked forward to anticipate the coming enthusiasm for the coming Festival in London. Dr. Wilkinson announced that the next year's annual Assembly of the Federation would be held in conjunction with the Festival. His remarks made concerning show success which, he stressed, were his personal views. The matter was the training of judges. Who, asked the president, is to decide who is to be a judge? He thought that a number of members who are themselves successful breeders is required for this purpose. Another matter which he viewed with interest was what appeared to be a growing interest in some aquarists on being offered prizes. Dr. Wilkinson expressed the view that such prizes were unnecessary and that other hobbies had been the cause of considerable features of amateur aquarists and award cards should be given instead of a show success. After the meeting was over hobby and not a business. He stressed aquarists giving assistance at the meeting of shows should not expect anything in return for their services; the benefit of the society was their benefit as well. Speaking at the annual Assembly the president stressed the danger that its provisions did not

British Aquarists' Festival, 1952

This event will be staged at Belle Vue, Manchester, by the Federation of Northern Aquarist Societies in collaboration with *The Aquarist* in October this year.

Show entries are invited from all aquarists and schedules and entry forms will soon be available from George W. Cooke, Esq., Spring Grove, Field Hill, Batley, Yorks.

The unique collection of trophies, first put up for competition last year, will again form the main prize attraction.

include private keepers of fish and asked that any cases of interference in this respect by local authorities should be reported to the Federation. The Federation's officers were re-elected: Dr. J. F. Wilkinson, president; Mr. G. T. Iles, secretary; Mr. C. Graham, treasurer. A meeting of the Show Committee followed the annual general meeting for approval of the show schedule, layout of the Festival Hall, etc.

Aquarist on Holiday

OPEN invitations to visit, for readers of *The Aquarist* who may be holidaying at or close by the following towns this summer, have kindly been sent from the addresses listed:—

Eastbourne

Mr. D. L. Cann (secretary to the Platy Breeders' Association), 44, Westham Drive, Pevensey Bay, Sussex (Tel.: Pev Bay 383).

London

Willenden and District Aquarists' Club meetings—second and fourth Wednesday evenings each month at the Court Restaurant, 74, High Street, Harlesden, N.W.10 (secretary, Mr. F. W. Keen).

Swansea

Swansea and District Aquarists' Society meetings—first Tuesday each month, 7 p.m. at Swansea Central Library (or phone secretary, Mr. W. Hal Jones, Swansea 4296—day; Swansea 57332—evenings).

Torquay

Torquay and District Aquatic and Pondkeepers' Society meetings at the Belgravia Club, St. Marychurch Road, Torquay on the following dates: 26th May; 13th, 23rd June; 11th, 28th July; 8th, 25th August; 12th, 22nd September; 10th, 27th October. Information will be supplied from the secretary, Mrs. H. R. Brooking, 25, Belgrave Road, Torquay.

Advance notices of events of particular interest to aquarists taking place in holiday towns are welcomed for publication by the Editor, and aquarists and societies in seaside and country towns willing to meet visiting aquarists are also requested to write.

New Societies

Kirkintilloch and District Aquarist Club: Secretary: J. M. Bain, 1, Highfield Road, Kirkintilloch, Glasgow. Meetings: Last Tuesday each month, 7.30 p.m., in the Miners' Institute Board Room, Townhead Street, Kirkintilloch.

Shepton Mallet and District Aquarist Society: Secretary: G. Harris, 5, Moulton Close, Shepton Mallet, Somerset. Meetings: First Monday each month.

Shrewsbury area aquarists interested in becoming members of a club to be formed there are asked to write to Mr. P. G. P. Beain, Park House, Wem, Shropshire.

Aquarist's Calendar

14th-18th May (amended dates): Edinburgh and East of Scotland Aquarium

Society's Premier Show, in the Waverley Market, Princes Street, Edinburgh.

16th May: British Herpetological Society (London Group) meeting "Snakes (Ophidia)", 7 p.m. at the meeting room of the Zoological Society of London, Regent's Park, London, N.W.8.

31st May: Wembley Aquarist Society Annual Cup Show, noon to 6 p.m.

2nd June: South-East Essex Junior Aquarists' Society's Exhibitions of tropical fishes, 11 a.m. to 9 p.m., at the Girl Guides' Hall, Electric Avenue, Westcliff. Admission 1s. adults, 6d. children.

5th-7th June: East London Aquarists' and Pondkeepers' Association Annual Show at St. Margaret's Hall, Ripple Road, Barking.

6th-7th June: Winchester City Aquarists' Second Annual Show at the Guildhall, Winchester.

12th-14th June: National Aquarists' Society Annual Exhibition in the Royal Horticultural Hall, London, S.W.1.

18th-21st June: Wembley and District Aquarium and Pool Association Annual Open Show at St. John's Hall, Crawford Avenue, Wembley.

19th-21st June: Swinton and District Aquarists' Society Annual Show. Full details from Mrs. I. M. Jowett, 6, Lawn Drive, Swinton.

23rd June: British Herpetological Society (London Group) meeting "Lizards (Lacertilla)", 7 p.m. in the Linnæan Society's Rooms, Burlington House, Piccadilly, London, W.1.

Entries Invited

Bethnal Green Aquatic Society. Third Annual Show, includes classes for furnished aquaria and fighting fish, open to all London societies. Entry forms from R. W. Hillard, Esq., 4, Evering Road, London, N.16. Date: 6th September (entries close 22nd August).

Blackpool and Fylde Aquatic Society. Open show of furnished aquaria. Details from G. Robinson, Esq., 17, Victoria Road, Poulton-le-Fylde, Blackpool. Date: 4th-11th August.

Bournemouth Aquarists' Club. Second Exhibition and Open Show. Details from R. Matley, Esq., Breezecland, Dean Swift Crescent, Parkstone, Dorset. Date: 12th-16th August.

Romford Aquarists' Society. Open Show, Schedule and entry forms from R. Alley, Esq., 13, Hayburn Way, Romford, Essex. Date: 28th-30th August.

Wembley and District Aquarium and Pool Association. Second Annual Open Show, 23 classes. Schedule from B. H. Gates, Esq., 40, Queens Court, Kenton Lane, Harrow, Middlesex. Date: 18th-21st June.

Crossword Solution

E	G	G	L	A	Y	E	R	E	F	T
L	A	L	A	O	U	R	C	E		
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