

The AQUARIST AND PONDKEEPER

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The Editor accepts no responsibility for views expressed by contributors.



Photo:

Laurence E. Perkins

Goldfish variety without a dorsal fin—the lionhead goldfish. An article describing this fish is on page 181

Editorial

A FEW months ago in a South Wales paper appeared a letter from one signing as "Bird Watcher." "Bird Watcher" had visited the Cardiff Aquaria Show and had some remarks to make concerning the "craze" of keeping fish in heated aquaria, including the assertion that this practice is cruel. Staunch Welsh aquarists rallied quickly in the correspondence columns to point out just where "Bird Watcher" was in error, and like the birds when the north winds do blow, "B.W." put his (or her) head under his (or her) wing, poor thing.

We were not really surprised to see one small feathery outburst against fish-keeping, for people develop the oddest antagonisms, but last month we had the feeling that an anti-campaign must truly be under way when in our favourite newspaper was printed an essay by one who is appalled to see fish "imprisoned in aquaria" and who has, as he says, "pondered on the sad lot of these creatures, shut up in their vitreous showcases . . ." This attack included a minor offensive, directed we believe at breeders: "What riles me more is the practice of keeping fish because of a heinous curiosity in their private affairs." Well, well!

Search your fish-houses you piscine gaolers. Do you not see the guppies pining for the wide open spaces, can you longer ignore the ceaseless quest of those neons for a way out of their dungeon dank? And, oh, cruel and (almost) unmentionable, were your prying eyes so self-deceiving that you could have mistaken modest characin blushes for breeding behaviour flushes? But stay, what would critics have us do—send our fish back to the tropics, back to the jungle streams which so many strains have not known for countless generations, or are we to indulge in a wholesale euthanasia for the little sufferers?

Doubtless we shall have the answer from the Society for the Abolition of Fish-keeping before long, so until then we can only advise aquarists to carry on their cruel pursuits. We at least know what will go in our empty tanks when the time comes—surely there are ways of shrinking cranks to the required size?



*A page for
the beginner
contributed*

by

A. BOARDER

LAST month I gave some advice on starting up with tropical fish and will now deal with a few of the fish which may be bred by beginners. Not that many beginners do not succeed at breeding some of the more difficult types—I know that often they are able to beat the old hands at their own game! Sometimes the particular and peculiar conditions necessary for a spawning are obtained by accident, and often aquarists are unable to repeat the first success. So many things can have a bearing on the actual spawning or hatching that the exact point which may have made all the difference is overlooked. Undoubtedly the livebearers are the easiest for the novice, as there is no danger of eggs being eaten whilst they are developing. Most aquarists begin with the guppy and platy and I suppose that there are very few tropical breeders who did not start with them.

Start with Youngsters

Where many beginners go wrong is that they can not control their patience, and instead of buying young fishes and then growing them on healthily, they feel that they must get adult fishes to commence breeding right away. Then after a short period their fish die and they become disheartened. It must be remembered that most tropical fishes do not normally live very long and two to three years is about all that can be expected of them. The warmer they are kept over 70° F. the sooner will their life end. They move about, feed and breed at such a rate that they soon wear themselves out.

Another point where some fail is that they do not appreciate the fact that a fish such as a female guppy is not of very much use after she has had over four separate broods, and so if the female they buy has already had a number of broods she may well be on her way out. With all the livebearers it must be realised that the female does need some seclusion near the time for the birth of her young. So many aquarists allow the pregnant female to remain in the community tank to be pestered by all and sundry, whereas it would be much safer, and also more comfortable for the fish, to remove her to a separate tank when the young are well advanced. If another tank is out of the question then it may be possible to place a large jar in the tank or partition off a small part.

When dealing with egg-layers such as the barbs, danios, fighters and characins it is essential that the fishes are spawned in a separate tank, as many eggs will otherwise be eaten. I do know that in some cases it is possible to breed egg-layers in a mixed tank, as I remember many years ago I bred zebra fish in a community tank which at the time contained guppies, platys, mollies, rosy barbs and gouramies. The zebra fish lay eggs which do not adhere to the plants but drop to the bottom as soon as laid and fertilised. My plan to collect some of the eggs was to place a small plastic bowl on the bottom of the tank with a small piece of perforated zinc over the top. On top of this I placed some willow moss. The male zebras chased the females through and through the willow moss and the eggs, when laid, fell through the

vegetation into the bowl. Twice a day I emptied the bowl into a small part of the tank partitioned off with glass and after a few days I could see the fry swimming around near the surface. By this means I was able to rear many fry.

If a different tank is used for spawning the egg-layers it means that many more fry are sure to be hatched. The best method with most of the egg-layers is to prepare a tank some time before it is needed so that the water has a chance to settle and become somewhat matured. Everything should be spotlessly clean at the start and no water snails must be in the tank—these may be introduced by accident when putting the plants in. With some of the more difficult types of tropicals it is almost impossible to lay down hard and fast rules for breeding, for example, the neon tetra, for what is quite successful with some breeders is a failure with others. The water can vary a great deal from district to district, and other conditions can also affect the issue. The actual position of the spawning tank, not only with regards to temperature but also lighting as well can make all the difference. Some do best in good light whilst others do well in semi-shade. Many kinds breed best in slightly acid water and often the addition of a little salt will encourage some kinds to spawn.

Egg-layer Breeding

The main point, of course, with all these egg-layers is to see that the fish are not only very healthy but well fed in addition. Plenty of live foods such as *Daphnia*, white worm and chopped garden worm should be given to prospective breeders. Very many of the less easy types may be bred by first separating the sexes for a few days before placing them together in the spawning tank.

It will be found that most of the egg-layers will do quite well with water no more than nine inches deep. This is not the case however with the labyrinth fishes such as gouramies and fighters. These are all "bubble nest builders" and when the eggs are laid the male usually follows them down, collecting the eggs as they fall and then blowing them into the nest. Some males do not worry much over those eggs which reach the bottom and so it can be seen that the deeper the tank the more time will the fish have to catch the eggs. Many females will scout around over the bottom of the tank searching for eggs and then will place them in the nest. One of my female paradise fish was an expert at finding eggs from all the seemingly inaccessible places.

With those types of tropical egg-layers which do nothing towards the hatching of the eggs once they are laid it is usually advisable to take the parents away once they are laid—otherwise many or all can be eaten. On the other hand the males of some types will continue to pay attention to the eggs for some time, and in such cases it is better to leave one parent with the eggs. Such fishes are the nest builders and the cichlids. There is one very important point which is generally lost sight of; that is that very many of the so-called difficult tropicals could be bred providing that it

(Continued on opposite page)

The Nigger Barb

(*Barbus nigrofasciatus*)

ORDER:—Ostariophysi, from Greek *ostarion*—a little bone, and Greek *physa*—a bladder.

FAMILY:—Cyprinidae, from Greek *kyprinos*—a kind of carp.

SPECIES:—*Barbus nigrofasciatus*, from Latin *barbatus*—bearded, Latin *niger*—black or dark, and Latin *fasciatus*—banded.

MORE years ago than I care to remember I stood, a disappointed man, looking at the first "nigger barb" I had ever seen. It was just a drab, uninteresting creature, of no merit in my opinion, and yet I had heard such glowing accounts of its beauty from more experienced aquarists.

Later on, at the same exhibition, I stood gazing in rapture at one of the inhabitants of a beautifully furnished aquarium. The fore-part of this extremely lively little fish was a glowing reddish-purple. Its dorsal fin and the back half of its trunk was overlaid with intense black pigment in several broad bands. Through the coloration gleamed flashes of silver as the light caught the large, mirror-like scales. Without any question it was the best fish in the show. And the species? Why—a "nigger barb," of course. The first specimen was in a small show tank, unplanted and unbacked. Never before had I seen such an example of colour fading under show conditions. If ever there was an illustration for the need of planted show tanks that was it.

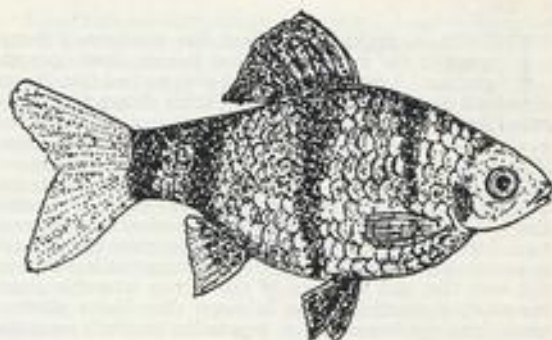
Sexing

Only the male fish develop the gorgeous reddish-purple coloration—the female is just a pleasant, dark barred, gleaming-scaled, and active little fish. Both sexes attain a maximum size of just over two inches.

These fish are native to the coastal fresh waters of Ceylon, where, we are informed, they were caught whilst sheltering under shady banks. The arrival in this country of several specimens created quite a sensation, and they were hailed as outstanding examples of beauty. Their simple breeding requirements were soon mastered, and for many years now, aquarists have been largely independent of fresh importations. During World War II, they largely disappeared from our ken, but are back now in ever increasing numbers.

Temperature tolerance is good—anything from 65°-85° F. seems to suit them, although at the lower temperature they may become a little torpid, and at over 80° pay frequent visits to the water surface. Feeding, too, presents little difficulty. They relish live foods whenever these are given, but will readily partake of almost any of the proprietary dry foods. For first-class condition, however, particularly when endeavouring to bring them into breeding trim, feed plentifully with *Daphnia*, chopped earthworm, *Tubifex* (live) and mosquito larvae or pupae. Raise the temperature to a minimum of 75° F. and maintain it for a week or two.

If the female comes into condition before the male she may chase him around a little in an endeavour to stimulate his interest in her. Usually, however, there is little need to do this—he needs no urging, but pursues her ardently, butting her with his snout whenever he catches up with her. As she dodges among the clumps of feathery plants with which the spawning tank should be thickly planted she sheds her eggs, which, being semi-adhesive, remain where they alight upon the plants or sand. Spawning over, the fishes



should be removed to ensure they do not consume the result of their labours.

At a temperature of from 75° to 80° F. the eggs hatch in from two and a half to three days. The tiny, transparent fry are difficult to see, and hang suspended from the plants for a time until they have absorbed their egg sacs. They occasionally wriggle or swim in an unbalanced, fluttering way to the front of the aquarium—probably attracted by the light. Once the air bladder is expanded, however, they assume the horizontal without effort, and move freely about the aquarium.

Water rich in floating algae, or small infusorians, are the best first foods, but if neither of these are available, the fry will make do, and grow, on a mixed diet of powdered egg, powdered dried milk, and powdered fish food. Little and often should be the way with such foods. Too much will result quite often in the production of pollution, through the decomposition of uneaten particles.

Follow up these first foods with larger live foods such as *Cyclops* nauplii, *Daphnia* (new hatched), micro worms, newly hatched brine shrimp and gnat larvae. The great advantage of feeding such foods as these lies in the fact that, apart from micro worms and shrimp, the unconsumed food lives on in its natural environment for a time, and may, in fact, perform a useful job of scavenging until it is eventually eaten.

Spread out the fry among as many tanks as you have available. It cannot be too often stressed that space is of primary importance if rapid growth and robust fish are to be raised.

Stepping Stones

(Continued from the preceding page)

was possible to place the breeding pairs in a large well-planted tank, where there was sufficient space not only for the parents to move around but also for hiding places for the young fry when they hatch. I have known many fish reared in the tank with the parents when plenty of space has been provided.

I suppose that it will never be possible to bring home to beginners how much this space question means. I do not know why it is but as soon as a beginner gets a tank he feels that he must immediately fill it up with as many and varied types of fishes as he can. If he would only realise that to keep three small fishes in a 24 ins. by 12 ins. by 12 ins. tank will be far easier than trying to keep twice the number or more; the fish would be far more healthy, less trouble, and have room to grow and perhaps breed. In my opinion space is as important as feeding and warmth, if not more so.

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

THERE is, perhaps, no plant that produces a better mass of the most lovely blue flowers than does the gentian. I was not surprised a bit to find that Queen Elizabeth the Queen Mother loved these dainty plants and asked her head gardener, Mr. E. Stuart, to put down a bed of *Gentiana sino-ornata* close by the drawing-room window. The border was made up with horticultural sedge peat and turf in equal parts and Mr. Stuart was very careful to put in no lime at all. When the compost was in position, some fine leaf mould was forked in at half a bucketful to the yard run. Incidentally the whole of the compost was put through a quarter-inch riddle first and Mr. Stuart told me that he felt sure that this was one of the secrets why the plants bloom so successfully. At Balmoral they had a glorious show from the beginning of September onwards until the frosts came.

Climate makes a great deal of difference in the way gentians should be cultivated. For instance, plants will grow in the drier conditions in the east of Scotland that will not be at all happy in the west of England. Furthermore, each group of plants must be treated singly, because all groups have their likes and dislikes. Most of the easy-to-grow species, however, like perfect drainage, complete exposure to air and sun, coupled with plenty of moisture during the growing season. Lime must definitely be omitted, except in the cases of one or two species that are known to require it. Thus, if you have a chalky soil in your garden, you must do as Mr. Stuart did, and that is to make up a special bed.

The relatives of *Gentiana sino-ornata* are *G. farreri*, *G. prolata*, *G. veitchiorum* and *G. hexaphylla*. All of them may be treated in a similar manner. There is one exception perhaps, and that concerns those who live in the south of England. The plants do not like to have full sun mid-day during the summer, and therefore they would appreciate being planted where a branch of some shrub will throw some shade over them for an hour or two when it is really hot.

Without Special Soil

There are some gentians that will do in almost any soil. I refer for instance to *Gentiana lutea*, *G. purpurea* and *G. punctata*. They will grow in any good soil providing it is well drained, but they have got to be left in position for a number of years if they are going to get established and flower well. I was taken to task by a nurseryman for suggesting a few months ago that alpine plants should be raised from seed, so I am not going to suggest it this time. With gentians, however, the great secret is to see that the seed is absolutely fresh and so you must sow the moment of harvesting, and that means, doesn't it, that you can not make a successful start by buying-in seed. You have got to buy plants and then, if you like, try and increase by saving your own seeds.

Let us talk about some of the species we have mentioned and see what further information is available about them. I will try and deal with them in alphabetical order. *Gentiana farreri* was found in Tibet in 1914. It bears huge, upturned trumpets of a really fierce, luminous Cambridge blue. In the south it will flower in August, forming a rosette from which many branching shoots will spread. The leaves are bright green, narrow and long. It is a hardy type and will grow in most soils which are free from lime. It likes plenty of moisture below during the growing season.

Gentiana hexaphylla was discovered much earlier, i.e. in 1894, but it flowered in the Royal Botanic Gardens, Edinburgh, the same time as *farreri*. The leaves are small and are arranged in whorls of six. The flowers are funnel-



Photo:

Pond in a sunken garden

H. Joel

shaped, being pale blue and having six broad blue bands on the outside; there are greenish markings between. The shoots may be six inches in length, at the end of which a solitary flower will be borne. We first see the blooms at the end of July. The plants are usually at their best in Essex during the whole of August.

Gentiana lutea is not very choosy. Give it deep soil, a spot where it can grow in full sun, and lots of moisture during the growing season. It is the tallest gentian I know well, and may grow three feet tall. I am told that in parts of Asia it may grow five feet high. It is, of course, the yellow-flowered species and blooms during July and August. It is very stately and beautiful and is, of course, the species from which we get the gentian root which is used in commerce.

Gentiana prolata comes from the Buhthan and was not flowered in this country until 1917. It is one of the neatest species to grow and the shoots never grow longer than about six inches. The flowers are blue and have some of the typical purplish bands on the outside with creamy white strips in between. It likes plenty of sun and like the other varieties I mention insists on ample supply of water from below during the growing season. It does not look as beautiful on the ground, because the flowers are smaller and they do not open well, with the result that you do not see the perfection of the bloom. It is, however, an extremely free flowerer.

Gentiana punctata has to be propagated by seed because it is almost impossible to divide the roots. It is a species that seems to put up with lime in the soil, providing it is allowed to grow in full sun. It produces a very long tap root as a rule and may send up stems two feet tall. Ordinarily they are about 12 inches long and at the top many flowers will be clustered. These are quite stalkless. The corolla is yellow and is spotted all over with dark purple. *Gentiana purpurea* comes from Europe and, as its name suggests, the flowers are a purplish red but yellow within. The plants are usually at their best during July and August. It is not difficult to grow, providing the soil is lime free.

Gentiana sino-ornata we have already dealt with, and so it only leaves *G. veitchiorum*, which comes from west China. This is the stiffest and most compact grower of them all. The flowers are a deep royal blue and on the outside are five broad greenish-yellow bands. The plant blooms in August and it is not at all fussy as to soil—but please, no lime.

Aquarium and Pond Goldfish Varieties

II. Lionhead Goldfish

THE lionhead goldfish is an unusual type of fancy fish as it is without a dorsal fin. This gives it a grotesque appearance and not all aquarists take kindly to this fish. Both a scaled type and a calico type are recognised by the Federation. Most lionheads seen since the war have been of the scaled type, and I think that this hardy strain is better for most aquarists than the calico type, which is not as a rule quite as hardy in an outdoor pond.

The body of the lionhead should be as for the veiltail, but the tail or caudal fin resembles that of the fantail except that it is completely divided and deeply forked. As stated before the fish must show no sign of a dorsal fin. The head should carry the hood similar to the oranda. The pectoral fins are broad and pointed and half the length of the depth of the body. The pelvic fins are similar to the pectoral in shape. The anal fins must be paired and half as long as the pectoral fins and of a similar shape.

The colour of the scaled lionhead is a rich warm red, but many are seen with a fair amount of silver markings. There is no rule in the standards handbook which signifies that points should be deducted for a variegated fish but as it is generally harder to breed an all-gold fish than a partly coloured one, most judges would down-point slightly a fish which was not the self red so sought after. The calico lionhead is coloured as for the calico fantail, that is, a blue ground mottled with violet, red and brown, with an all-over speckling of black.

Faults of Lionheads

I have seen several fairly good lionheads at the shows but most have a body too shallow and similar to that of the fantail. The fish have mostly shown a good hood, which, of course, gets most points of all features. For show purposes it is essential that the hood should be well developed as 28 points are allotted to the head (which includes the hood), and 20 points for the body. The caudal fin or tail can get 20 points while the pelvic and pectorals get two each. The anal fins get four points. Colour can receive 10 points, and there are four for condition and 10 for deportment. The above points are for the scaled type; the calico gets 15 points for colour made up by deducting one from the head, and two each from the body and caudal-fin pointings.

The breeding and rearing of this type should follow the usual rules for fancy goldfish breeding. A good strain must be used and the formation of the hood is a feature which must be particularly bred for. This hood does not form on a very young fish although the time taken for it to form depends a great deal on the strain. Most youngsters develop the hood at about two years of age. The fact that the fish has no dorsal fin does not mean that it can be shown as a lionhead. I saw one at a recent show, a well-grown fish without a dorsal fin but at the time showing no sign of a hood. The owner did not think it fair that the fish had been passed over when judged but, as I pointed out later on, this particular fish might never form a hood.

Post-Mortem Examination of Fishes:

W. Harold Cotton, F.R.M.S., F.Z.S., 39, Brook Lane, King's Heath, Birmingham, 14. (Phone: Highbury 1693)

Specimens should be sent direct to Mr. Cotton with full particulars of circumstances, and a fee of 3s.

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 grease proof 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.

Lionheads are fairly hardy, especially the scaled ones, and could be kept in an outdoor pond throughout the winter, at least in the southern part of the country. Among the fry of lionheads very many types may be found and very few may come up to show standards. They are a little more easy to cull than say, fantails, as a fish with a dorsal fin can be easily spotted and thrown out at an early date.

The food should contain a good percentage of starchy matter such as oatmeal or Bemax. This does tend to assist the deep body to develop, but, of course, if the strain does not produce many deep-bodied fish it is impossible to get a deep body with feeding alone. The tendency for depth must be there and then it can be improved with the right kind of food.

Many lionheads, when in good condition, show white spots on the hood which may appear to some people similar to fungus. There is nothing to worry over however if these signs are shown. The hood is a group of malformed cells, perhaps of a cancerous nature, and the white shown is, in my opinion, an excess of mucus released by the malformed cells.

A. Boarder

TAPPING OR SCRATCHING ON THE GLASS DOES THIS TO A FISH!



IF YOU SEE THE MAD HATTER AS A SCRATCHER OR TAPPER STOP HIM!

A poster designed by Mr. L. R. Brightwell which is proving to have more success in public exhibitions of aquaria than do more formal and direct notices to tank tappers.

Make a Splash!

by C. G. ASHDOWN

WE all know that aquarists do sometimes forsake the hobby, but we also know that once a man joins a club the chances of his giving up are drastically reduced. We know the reason. Fellow club members help him over teething troubles, and arouse the competitive spirit; and so much more can be achieved as a club than as an individual. Every club grows by keeping its existing members, and attracting new ones, and publicity helps to do both. Members are pleased to see their club's name in print, for it shows that they belong to a club which is well known and enterprising. As to new members, there is no other way so efficient as club publicity.

Since all clubs inevitably lose a few members each year, publicity is not only advisable, but vital. There are many ways of achieving publicity, but the first step is to appoint a capable person to be responsible for keeping the local newspapers advised of club activities. If you report your meetings in the local papers, you will soon get your club known; and although reporting is easy there are one or two points to bear in mind.

All editors receive more material than they can use, and being human they naturally reject contributions requiring revision, in favour of those which are more or less ready for press, so first study the make-up of your local papers. Count how many words they use in a news item of average length. It is often little things that count; for example, one of our local papers prefers September 1st, another uses September 1; the one likes 13½-year-old, the other 13½-years-old. Take note of the number of letters and spaces in a headline, and how many to the sub-heading, if any; also find out the district covered by each paper.

All items for newspapers must have either news value, local appeal, or humour; and when writing your reports, your guiding principles must be: first, will it benefit the club? Second, will it interest the reader? Do not overlook any local connections your speakers may have, or any comments made of local interest.

Be careful with names, for to a local paper names are often as important as news. Check the spelling, and whether it is Miss or Mrs. Most of the readers of any local newspaper are women, and women are the gossip-mongers, the news spreaders, your club's most co-operative advertising agents. Give the ladies something to talk about, and news of your club will surge through the community as irresistible as the common cold.

By now you will be wondering what a press write-up looks like, and the following is typical.

BREAK THE ICE But Not With a Hammer

That a hole should be made in the ice of a frozen pond was the advice of Mr. J. Weir, F.Z.S., at Island Aquarist Society's Friday meeting, but not with a hammer. The noise could be harmful to the fish, and Mr. Weir said the best way was to fill a watering can with hot water, and stand it on the ice.

Purpose of the hole is to admit air and light, not—as you might think—for feeding the fish; for the colder their water, the less fish eat, and even at 40 degrees it is possible for them to go through the winter without food.

Over-feeding your fish, at any time of the year, is harmful; and, according to Mr. Weir, it is responsible for one half of fish deaths. Uneaten food gives off obnoxious gases, and fouls the water.

You will see that the reporter did not try to cover the whole lecture: only two points—the frozen pond and over-feeding—have been selected. Notice that the speaker's full initials, name, and status, are quoted, and look at the eye-catching headline. Your headline has two functions. It introduces the paragraph, and it must attract attention. Experiments show that the eye can see only four words at a time, and it is a fact that the best headlines have only two or three words. You can use titles from popular films, books, or songs; or compose something calculated to arouse curiosity, as in the above example.

If you cannot write a snappy paragraph first time, try writing down what you want to say in everyday talk; then go over it word by word, weeding out unnecessary adjectives, substituting more vivid phrases, and rearranging sentences so as to minimise the length. Simplify any technical phrases. If your reports interest aquarists alone, they probably will not interest the editor.

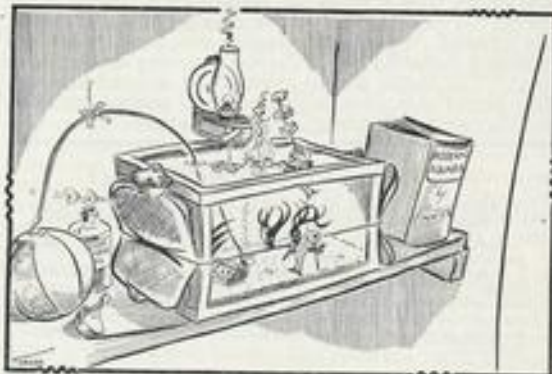
One method is to list the various points you think worthy of mention in order of importance. Now headline the most important, compose a sub-heading for the second item, and write your report mentioning each point in turn. An advantage of this treatment is that it is easy for the editor to reduce the length if necessary. He can cut off as much as he likes from the end, and still retain the most important items. You may have observed that many press reports are written in this fashion, starting with the bride and bridegroom, and finishing with some second cousin twice removed.

When you are ready to submit, write a short letter to the editor, telling him how popular your club is proving, and the districts from which members are culled (which should coincide with the area covered by the paper). Point out how your hobby is spreading, and suggest that his readers would be interested in the doings of the local aquarists' society. Send him a specimen write-up, and do let him have your contributions as soon as possible after each meeting. Papers published on Fridays, for instance, usually close for press first post Thursday.

As publicity secretary you must keep abreast of club history, and policy, and members' lives as aquarists. Some members have intrinsic news value, for example, public speakers, doctors, tradesmen, and schoolmasters, and you should keep an ever watchful eye on these people. They are known to the public, and are splendid "copy."

Apart from reporting lectures and other regular club activities, news about members (such as awards in competitions, and adventures while collecting native specimens) is admirable publicity matter. A symposium can be tried occasionally. To do this you take something of local interest, and gather views on it from as many members as possible.

(Please turn to page 184)



AQUARIST AT HOME:

Mr. C. A. Blake (ROCHDALE)

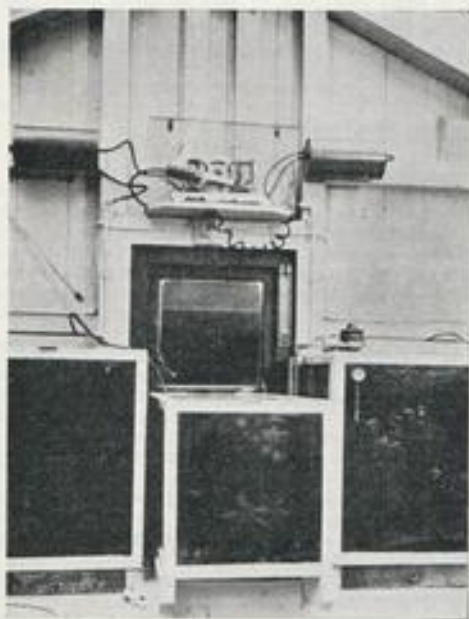
Interviewed and photographed

by JAS. STOTT

DESPITE the dull, inclement weather on the morning I visited Mr. C. A. Blake, who is a member of the Rochdale Aquarists' Society, the cheery disposition of this aquarist and his warm hospitality quickly dispelled the effect of grey skies threatening an early storm. Once inside his clean, attractive fish house, bright with fluorescent lighting, the outside gloom was soon forgotten.

Mr. Blake had been interested in fish for several years and had seen many fish houses before he actually started practical fish keeping two years ago and, therefore, he had formed some very definite ideas about the design a fish house should take when he commenced to construct one of his own. It is obvious as one looks around his establishment that his ideas were based on keen observation of details.

Having a length of 9 feet and 8 feet wide, the fish house is somewhat square in appearance, which seems unusual when one first enters, but the general lay-out of equipment inside goes so well with this shape that one quickly becomes accustomed to it. The height to the ridge is 8 feet 6 inches, falling to 6 feet 6 inches at the eaves. It is extremely well

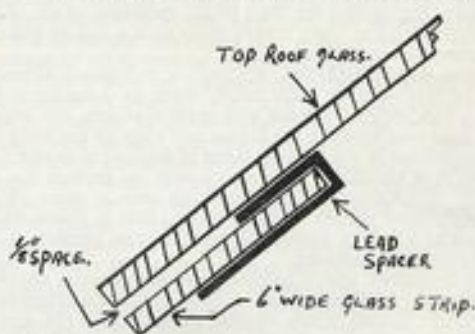


Neatly disposed air pump and air reservoirs on wall-shelf of Mr. Blake's fish house. Perspex panels below the tanks permit viewing of gas jets



built, constructed of wood with a double-glazed roof providing top lighting. There is practically no side light because the three windows are quite small. It is part of the design of the glass-paned roof which forms one of the interesting features in the construction of this fish house, but more about that later. The upper or outer layer of glass is quarter-inch wire rough plate, which diffuses the light to a certain extent, and the inner or lower panes are glazed with ordinary clear plate glass.

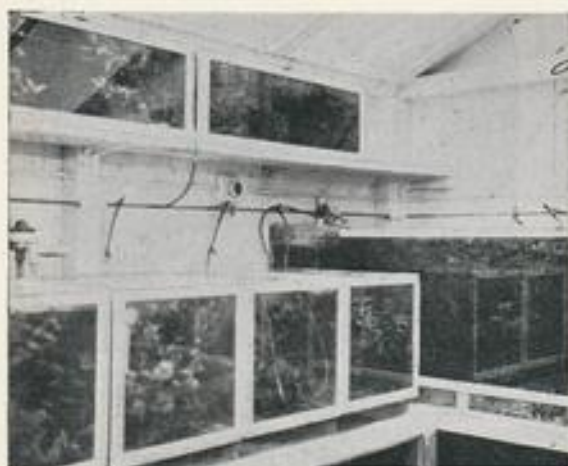
Wood is used for the staging, the upper part of which forms the box-like structure for the base heating. Gas is used for this purpose and controlled by two gas thermostats. Asbestos panelling is fitted under the burners and the narrow front panels are of perspex, thus providing easy inspection of the burners. One thermostat controls the line of breeding tanks whilst the other operates with the stock tanks. To avoid water contact with the brass sensitive tubes of the



Sectional diagram showing roof pane arrangement

thermostats in the two control tanks, a glass tube, looking like a large test tube, is fitted over each brass section. The length of each glass tube is, of course, long enough to clear the water surface in these tanks. Mr. Blake informed me that he found the thermostats quite good and, so far, had experienced no operational trouble with them.

The interesting feature previously mentioned about the design of the glass-paned roof is an idea of Mr. Blake's to overcome the effects of condensation. This is a trouble often associated with the double glass roof in a tropical fish house. Strips of glass, six inches wide, are fitted along the inner edge of the upper panes where they overlap the eaves of the fish house. Narrow strips of lead are used as spacers to provide one-eighth of an inch space between the glass strips and the roof panes. This not only allows a gentle air circulation across the inner surface of the top roof glasses which tends to discourage condensation but also permits



free drainage of moisture when, under extreme conditions, condensation does occur.

A built-in air supply consists of quarter-inch bore copper tubing with small nipples situated at intervals along the length from which the air is taken through rubber tubes to the diffusers in each tank. The air is forced along this system of tubing by means of an electrically operated twin-piston pump and the flow is maintained at a steady pressure by means of two reservoirs, one to each supply line.

At the time of my visit Mr. Blake had approximately 600 fishes in his tanks, consisting of 21 different species. He is, however, particularly interested in two species, tiger barbs and dwarf cichlids (*Apistogramma ramirezi*), and both are bred extensively. All the tanks in the breeding section are heavily planted because Mr. Blake is a firm believer in the idea that good plant growth indicates healthy conditions, so that it therefore offers some guide to the general conditions for the fry. Since starting, this aquarist has kept 34 different species and, of these, 20 species have so far been successfully bred.

The gas thermostat is seen on the extreme left of this picture showing part of the fish house breeding section

Saving Livebearer Fry

ONE of the first things to study if you want to raise a family of livebearers is the plant life. For the sort of plants you grow in your aquarium can make all the difference between success and failure. The moment livebearer fry are born they dart to the floor of the aquarium. There they cower in the brown concealing sediment until, a short while later, they soar like tiny translucent or dark arrows to the surface for their initial mouthful of air. After this upward flight, they instinctively seek a hiding place in top-growing vegetation.

Plants with flat-bladed, upstanding foliage—*Vallisneria*, for example—do not offer much cover to defenceless fry. Larger fish, especially those with pointed snouts, can usually nose their way between the leaves and snap up the baby fish as they shrink in the vertical lanes of foliage; so it stands to reason that the most satisfactory way to protect the fry against molestation is by cultivating one or more of the bushy-foliaged species of water plants; that is, plants which will act as a barrier against all but the most persistent and strong-bodied predators.

Myriophyllum and *Ceratophyllum* are among the best plants to use for this purpose. Both species have bristle or needle-like foliage (thick or thin according to the species employed) which grows in whorls round the branching stem. If the foliage of such plants is disturbed, the baby fish will always withdraw more deeply into the maze of greenery. But—and here the beginner must take note—it is little or no use introducing two or three stems of a bushy-leaved plant into a small aquarium and expecting to save lots of fry. Plenty of plant life is needed. In a tank measuring 18 ins. by 10 ins. by 10 ins. you will need at least two dozen well-grown stems; these should always be planted on the side of the aquarium facing the light (or, in the case of an artificially illuminated aquarium, nearest the source of the light), for newly born fry are attracted by a bright light.

Another excellent plant to use in a breeding tank is the fine-leaved willow moss (*Fountinalis gracilis*). This adaptable native species (it will flourish in warm water as well as cold water) forms long tresses of light-green to pale-olive foliage. In this jungle of submerged vegetation, livebearer fry can usually find plenty of safe hiding places and small organisms on which to feed for the first few days of their existence.

Strictly speaking, a breeding tank for livebearers should

always have shallow water, say, not deeper than six or seven inches. Shallow water gives fry a better chance of escape if they are suddenly spotted in open water. Besides rooted or anchored plants, plants which grow in a floating state are an added refinement; those with hairy roots hanging down in the water are more useful than those which just ornament the surface like green confetti.

Two of the most lasting plants to introduce into a breeding tank are *Salvinia* and floating fern. Given a good natural light, or several hours of electric light every day, they will survive and even multiply during an English winter, which is more than can be said of many other floating plants well known to the tropical aquarium keeper.

Jack Hems

Make a Splash!

(Continued from page 182)

These are then written up, being sure to quote names and to use those views which amaze or amuse. You might try such topics as the beauty of local gardens, aquaria as room decorations (consult members' wives on this one), or the hobby's suitability to children. From time to time you can contribute simple hints and tips. These can purport to come from the society, or you can write something like the following:—

"Mr. P. Pebble, a member of Island Aquarist Society, has revealed why his family always picnics near ponds or streams. It is to allow him to pull a clump of water-plants out of the stream, hang it over a plastic sheet, and gather the small freshwater shrimps which come tumbling out. Mr. Pebble says this shrimp is an excellent live-food, highly prized by his pet fishes."

Note that Mr. Pebble does not advise the public how to feed their fishes—they do not like advice—he "reveals" something. People always pay more attention if they think they are being let in on some trick-of-the-trade.

Make the most of any outings arranged by the club. Remember that fish hatcheries, for instance, are outside the ken of the layman, and therefore of interest. But you are not confined to the local press, and periodically you should support the club news features in the monthly journals. A mention in the news feature of *The Aquarist* is of great value in giving your society prestige in the aquarist world.

An Aquarist Visits Holland

by L. R. BRIGHTWELL

As anyone might expect glancing at a large-scale map of Holland, this small but so well ordered and courageous country is a veritable aquarist's paradise. "Trops"—outside the two wonderful zoos—do not seem to have taken that feverish hold upon the popular imagination which obtains here, or in America. But can you wonder with such a riot of cold freshwater life on almost everybody's doorstep? I do not know what *Hydrophilus* commands here—a pretty penny no doubt—but you can dip it up out of any one of Holland's twice ten thousand irrigation ditches.

Not a yard is wasted in this almost too well ordered and quite desperately clean country. And then there are the floating fish-shops, to be found on all the really big canals. "Do you want a nice tench or carp—or say a pike, a good frying pike—and you are, how many?" Four in family, and here it is, netted in a moment from a "cradle," one of a score ranged round the floating shop. In a minute it is killed, cleaned, scaled, washed and done up in a neat parcel. "Pay at the desk please." Holland has kept this country in cels since the days of Queen Elizabeth I and probably long before.

But here I want to sing the praises of the two great public aquaria, and especially that of Rotterdam. Now Rotterdam Zoo, ever subject to the most loving care—for the Dutch are great animal lovers—was razed to the ground during the last war, and I believe that the full story of that tragedy would make even an ex-Nazi shudder. But the undaunted Dutch have reincarnated it on a site some miles from the late tragedy, in an area pleasantly named "The Happy Village."

The Happy Village

Though occupying a relatively small plot, that genius for economy shown in utilising every foot of farmland is here exhibited to the same advantage. Blijdorp, The Happy Village, in an admirably produced little guide book, apologises rather unnecessarily for the absence of a "real aquarium"—but hastens to add: "In the meantime we keep a lot of interesting fish species in small aquariums exposed in the Great Hall, sweet as well as salt-water fishes, tropical and sub-tropical." They do indeed.

The Great Hall is a gigantic chamber, adaptable for dancing or concerts, and it gives on to very fine tropical plant and bird houses, a *Victoria regia* pool and a reptiliary stocked with all the scaly riches of the Dutch East Indies. The make-do aquarium runs to several scores of beautifully staged and labelled tanks arranged in a series of large bays. Ingenious chumming-in displays black mollies and *Amphiprion* with all sorts of anemones, and the fishy wealth of the canals is expressed in truly huge pike, carp, eels and many other species. Incidentally Holland has little to learn about fish dishes, and there are some real gastronomic triumphs (including kangaroo-tail soup) in the most beautiful zoo restaurant I have yet seen. One mural decoration is a 15 foot high waterfall cascading behind a screen of palms and sub-tropical creepers.

Amsterdam Zoo, founded only 10 years after London, was spared the full havoc of war and its big aquarium or water-palace, opened in 1882, is as good as ever. Every fish, salt



"And how many in family?"

or freshwater, known to Holland is displayed in immense tanks set in deep bays, and labelled pictorially and descriptively in a way that leaves nothing to be desired. More, one may see many larval forms nearby in a big theatre featuring a micro-projector—an aid to knowledge which, I suggest, might well be introduced into every zoo. The only projector I know of, publicly used in this country, is that at the Haslemere Educational Museum, and to see and hear a juvenile audience absorbing its delights should fire the ambition of every curator worthy of the title.

It is hard to pick out high spots in Amsterdam's aquarium, but perhaps the most arresting tank is one containing a giant salmon, flashing its silver sides above a bed of huge anemones, with spotted dog-fish and ponderous edible crabs making their more leisurely ways amongst the gorgeous polyps. As for the feeding of the many thousand inmates, Holland has little need to fall back on such make-do's as dried shrimp and shredded horse liver. You can see many of the live foods on the micro-projector (Micro-Wereld) where a never failing star turn is our old friend *Cyclops*.

Talking of *Cyclops*, this old and famous zoo, with "Natura Artis Magistra" for its slogan, has a quite uncanny flair for educational showmanship. In the excellently appointed Natural History Museum attached I met *Cyclops* again, though not as an aquatic exhibit. It appears that the ancient Greeks first conceived the idea of *Cyclops*, the one-eyed, by seeing the skull of the Indian elephant. That great fossa in the frontal region (the "saucer of life" to big-game hunters) they interpreted as a huge eye-socket. So came into being that race of mythical giants who, with Polyphemus at their head, held Ulysses and his followers captive in a cave. To get this point well home, the museum authorities had mounted alongside the skull of an Indian elephant a really horrifying waxwork head of the late Polyphemus, bearing a most unfriendly expression and with teeth worthy of a barracuda. As for the eye, all too faithfully rendered in glass . . . but there, I am strongly allergic to monstrosities, and just before lunch too! Really, it was a relief to meet that jerky little copepod we all know, clean and wholesome on the screen in Micro-Wereld.

If you go to Holland, do not miss Amsterdam's Micro-Wereld. But unless an ardent teratologist, I should dodge that bust of Polyphemus!

Making Sure that Fish Keep Alive

by W. L. MANDEVILLE

WHEN the human being has a choice to make, whether that choice be a life partner, a suite of furniture, or a house in which to put both, the deciding factors are "desirable characteristics." When the Guppy Breeders' Society, the Federation of British Aquatic Societies, or the Goldfish Society issue their Show Standards, these again are based on desirable characteristics, but whilst some of the standards may cause mild controversy among the experts, and whilst your own choice of fish may be decided by colour, shape, or price, there can be no controversy over the most desirable characteristics of all—that the fish shall be alive and swimming—and to enable these desirable characteristics to continue as long as possible is the intention of this series of articles.

Whenever we accept the responsibility of caring for any living creature the first question invariably is "How do I feed it?" but this puts too much emphasis on the solids. Nourishment is a better term, and sustenance probably the best, for sustenance includes the solids, the liquids, the gases, temperature, light and periods of dormancy, all of which are essential if life is to continue, and an understanding of these six essentials will prevent many casualties.

Taken in order of brevity: light can be dealt with quite briefly for fishes do not need much of it. So long as there is sufficient light for a fish to fix its location, which it does by the downward view of the bottom of pool or tank, and the surface reflection of the same. Fish can correct a vitamin deficiency by basking in sunlight, the ultra-violet rays activating certain substances beneath the skin, but in the tropical tank this is usually catered for in the fishes' diet. An increase in light over the normal amount is one of the stimuli used by breeders, as this causes a surge of hormones in adult fishes with a consequent urge to reproduce, resulting in the early morning spawnings of pool fishes.

Light and Perception

Many other activities, often associated with light and vision, such as locating food, avoiding collision, and dodging that net of yours, are controlled by the sensitivity to vibration of the nerve cells along the lateral line. This line is indicated most clearly by the line of red along the sides of the green swordtail (*Xiphophorus helleri*). The "radar system" of all fishes is situated there and very efficient it is; a tap on the glass is recorded like a thunderclap.

In decorative aquaria, or the tank activated by plants, the amount of light is determined by the requirements of the plants and is very much greater than the light needed by fishes, but plants also provide the shade, so that satisfactory provision can be made for both fishes and plants. Where artificial light only is used to activate the plants, a tank from two feet up to three feet in length, and not exceeding 15 inches in depth, is adequately lighted by two 60 watt lamps applied for ten hours per day but, when possible, artificial light should be augmented by some daylight, and then the hours of artificial light can be reduced, but not the brilliance of it.

When considering temperature, vague terms such as "coldwater fishes" and "tropical fishes" must be accepted

with reserve. Few fishes like cold water; some can tolerate it for short periods, but "tolerate" is the operative word. The range of temperature required by fishes is decided by their structure. The varieties of goldfish have a fairly thick coating of mucus, a digestive ability to store fats, and a comparatively large heart, which enables them to withstand temperatures as low as 30° F. and a long period of dormancy, almost of suspended animation. One of the deciding factors of the temperature tolerance of a fish is its heart. This organ has no fixed rate of beat, as is common in mammals and warm-blooded creatures, but is accelerated as temperatures rise, and slows up as they fall, and at too low a temperature it stops altogether. This fact alone should indicate the seriousness of inflicting sudden changes of temperature upon fishes which have no temperature of their own, but are dependant for temperature on the fluid in which they live. Sudden change causes shock to every organ.

Dangers of High Temperatures

Tropical enthusiasts are apt to over-accelerate the heart by too high temperatures; this causes the blood fluids to circulate faster than the gills can thoroughly oxygenate, with a consequent build-up of toxins and ultimate casualty. Also, although this increase in living-speed can be catered for by additional food, and plentiful oxygen, little can be done to increase the output of the excretory products, and again, the resulting toxins kill the fish. All equipment should be considered as providing protection from the lower ranges of temperature: not as providing high temperatures. So-called chill in tropicals can be cured in a week, but fishes that have been subjected to high temperatures will be scary and nervous for months. Protection from low temperatures becomes very important when stock, such as veiltails, orandas, moors, etc., are being dealt with for, whilst selective breeding produces those lovely fins that are the joy of the fancy goldfish enthusiasts, selective breeding does not enlarge the heart to cater for the extended circulation to those same fins, and as low temperatures slow up the circulation, it is obvious that fin congestion is more certain than it would be if the conformation of the fish was normal.

Change of temperature as a pre-breeding stimulus is commonplace among breeders of fish, but this change should not always be upwards. A drop in temperature of two or three degrees is often more stimulating than a rise of the same amount, and whilst at the moment we are only concerned with the effect of temperature on the fish, the fact that less and less oxygen is available in water as temperatures rise, should emphasise the difficulty of activating a fish to breed by raising the temperature, which at the same time denudes it of the oxygen needed to maintain that activity. Whether breeding or not, all fishes benefit from gradual changes of light and temperature. Avoid a monotonous constancy of either: the variations in our own living conditions are not accidental but necessary.

The great value of plants in pool or tank is this provision of gradual change; swinging our water through a few degrees on the pH scale from acid to alkaline, giving out the necessary addition of oxygen when activated by light, providing additional carbon dioxide during the hours of darkness to induce satisfactory dormancy, changing and using the excretory products from the fish, and generally producing what is known as the "balanced aquarium." It is a simple matter to provide fish with sufficient oxygen: a

(Please turn to page 190)

Hearing Organs in the Amphibia

by Dr. EDWARD ELKAN

OUR previous study of amphibian skin (*The Aquarist*, XVI, pp. 164-166, 1951) and in particular that of the "lateral line organs" leads our interest very naturally in the direction of the amphibian organs of hearing, for these represent evolutionarily the highly specialised development of some of the head skin receptors of fish.

Basically, whether we consider eyes, ears or receptors of touch, the picture is always similar: some nerve endings, situated on or near the surface, respond either to light, to the vibrations of air or to those of water currents. The disturbance of some extremely sensitive chemical equilibrium set up in the nerve endings is transmitted, via nerve fibres, to a particular part or "centre" of the brain. Thus the cause of the disturbance makes itself known to the animal as "light," "sound," or "mechanical impact." The efficient reception of these messages is of the utmost importance to the performance and safety of the individual and it should cause us no surprise to see that in those species who have survived in the struggle for existence, the sensory receptors have become very complicated indeed.

What "nature"—if we may be allowed to personify natural development for the sake of argument—has done to enable an animal like the frog to hear, is in many ways not unlike what the telephone and wireless industry has done in designing pickups and microphones; but it is amazing to consider that what we can do with steel, copper, quartz crystals and the most efficient insulating materials, can also be done with living substance and in a medium, soaked with electrolytes, where insulation in the electrical sense is impossible.

We do not know what advantage the early amphibians



Fig. 2 The skinned head of the common frog renders the tympanic membrane clearly visible; it adheres to the skull by the tympanic ring, which is cartilaginous



Fig. 1 In the circular centre area of the dark triangle along the side of the head of the common frog the skin is modified to form the tympanic membrane or ear drum

gained in forsaking the water to live on dry land. If it was an abundance of catchable insects which could be heard long before they could be seen, a suitable improvement of the ear would obviously have been of great advantage. A land animal, equipped with the ears of a fish would find itself nearly deaf. Fish, though they react to water vibrations, are not geared to the reception of sounds from their natural surroundings and the construction of their ears is much simpler than that of the higher vertebrates.

To be able to hear at all, an animal must be equipped to register very slight but very fast vibrations of the medium, be it water or air, in which it lives. The human ear reacts to vibrations between 16 (lowest note) to 25,000 (highest note) per second. Very primitive animals do not differentiate between sound and touch. Their only receptor organs are groups of elongated cells (neuromasts), each one equipped with a sensory hair, sunk in a cup-shaped depression of the skin. Vibration of the water moves the hair and as soon as the chain reaction thus set up reaches the brain or central control ganglion, the reception of that particular "event" is complete. The more numerous and diverse nervous receptors an animal has the higher his degree of consciousness. If, by some catastrophe, every receptor or every reception centre is put out of action, the animal does not necessarily die but it becomes unconscious. At the rate at which such centres recover, consciousness may return, but with the destruction of ears or eyes some part of it may be lost for ever.

The frog which plays such a dominant part in schoolroom dissection and in the physiologist's laboratory should be one of the most familiar animals to us all. Yet I wonder what answers we might get if we asked the next best person: "Has a frog ears?" or "Can a frog hear?" The answer should, of course, be in the affirmative. Keep a frog in a cage and introduce a buzzing fly in a little paper box. The hungrier the frog the most unmistakably will he show his interest, even if he cannot see the prey. He will speedily turn about to face the direction from which the sound comes. The flies he is accustomed to buzz about in the grass and can be snapped up as soon as they come within reach of his eyes and his tongue. His vision, however, is not as good as his



Fig. 3. Oblique illumination of the head of the edible frog shows up the golden pigment over the ear drum

hearing. Even at short range he often misses, and even the fattest bluebottle means nothing to him unless it moves. His hearing, however, is acute enough; where then are his ears?

Figure 1 presents a close-up side view of the head of the ordinary grass frog (*Rana temporaria*). Behind the eye a large black triangle replaces the otherwise brown-green skin. Very close observation of this area with the aid of a magnifier shows that the forward, wider part of this triangle includes a circular structure the centre of which is marked off, very faintly, on the surface. If a dead frog is skinned the black triangle adheres to the skin but the circular area which represents the frog's ear drum (tympanic membrane) adheres firmly to its underlying structure, the tympanic ring, which, in turn, is fixed to the side of the skull (Figure 2). Analogous structures can be seen in other species of *Rana* (figure 3) or *Bufo* (figure 4) though in the toad the ear drum is rather difficult to see.

Remembering the old acoustic gramophone sound-boxes we are again struck by the similarity in design: a thin membrane, firmly held at the edge by an unelastic ring and a lever, which in the case of the acoustic gramophone carried the needle, attached to the centre. But what is attached to the ear drum of the frog? If you have ever undertaken the



Fig. 4. The ear drum of the common toad is inconspicuous and hardly visible without a magnifying lens

arduous task of assembling a frog's skeleton, you will know the answer. When all the minute fragile bones have been identified and put together the skeleton seems complete and yet two very small rod-like pieces remain. These are the "columellae" (*columella*, from the latin *columna*, a little column) which, analogous to the "hammer, anvil and stirrup" of the human middle ear, serve the frog as sound conductors. At their outer end they are attached to the centre of the ear drum; their inner end fits into the opening of a cavity of that part of the skull (the otic bone) which houses the inner or nervous part of the organ of hearing.

The columellae do not, like gramophone needles, pick up the sound; they conduct the vibrations of the ear-drum inwards across the tympanic cavity (figure 5). To understand the importance of this cavity it must be considered that a thin membrane, exposed at its outer side to the open air, can only vibrate freely if the air at its inner surface can follow these vibrations equally freely. If the air space behind the ear drum were closed, pressure would result from any movement in, and suction from any movement outwards. In fact, the membrane would resist instead of following air vibrations. Not only must there be an air-



Fig. 5. Skeleton of the marsh frog (*Rana ridibunda*) showing the columella, a minute bone connecting the ear drum with the inner ear

filled space behind the tympanic membrane, this space must also have free communication with the outer air so as to allow any difference in pressure inside and outside the ear drum to even itself out at once.

Close observation of the ear-drum in a live frog shows the working of this mechanism very well. The frog does not breathe by expanding and contracting his chest as we do, but by expansion and contraction of his mouth cavity. The up-and-down motion of the floor of the mouth can easily be observed. The mouth itself remains closed; air is drawn in and expelled through the nostrils. Observation of the tympanic membrane while the frog is breathing shows that the peripheral part bulges each time the floor of the mouth goes up and is drawn inwards as soon as the frog inhales. The central part of the membrane which is fixed by the columella, cannot move.

We can conclude from the simultaneous movements of the tympanic membrane and the floor of the mouth that between the two cavities there must be a communicating channel. In fact, each tympanic cavity is connected to the mouth by a relatively wide canal, the Eustachian tube. The openings of these can be seen (figure 9) either after removal of the tympanic membrane or, at the other end of the tube,

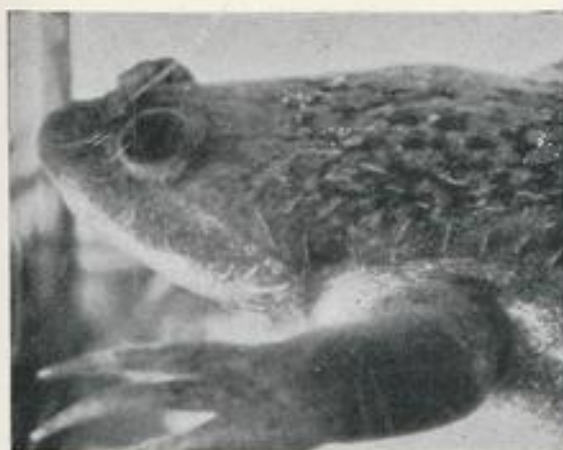


Fig. 6 No outward feature indicating the existence of an ear is shown by the clawed toad *Xenopus* but the numerous "lateral line" sensory strips are clearly seen

on both sides of the roof of the mouth. The bony part of these channels can also be seen in the skulls of frogs.

Anatomical details, however, vary with the species. In *Rana* the two Eustachian tubes open separately on the right and left into the roof of the mouth. In the South African clawed toad the two tubes join in the middle before communicating with the mouth through one medial aperture. Other interesting differences exist between this toad (*Xenopus*) and other frogs. While in all species of *Rana* and *Bufo* (frogs and toads) the tympanic membrane can—although sometimes with difficulty—be seen from the outside (figures 1, 3 and 4) no vestige of such a structure can be seen in the intact *Xenopus* (figure 6). Even the skinned head (figure 7) shows no structures suggesting an ear and only after removing a mass of fatty tissue at the side of the head, behind the joint of the lower jaw, can we see the structure which serves *Xenopus* as an acoustic membrane. Only in this case we do not see a membrane at all but an elliptic, shell-like cartilaginous structure (the extrastapedial cartilage) (figure 8). This is firmly attached, by the tympanic ring, to the rest of the skull and cannot vibrate as freely as the ear-drum of terrestrial frogs.

Considering that *Xenopus* is an entirely aquatic animal



Fig. 8 Only after removing fat below the head skin of *Xenopus* is the "extrastapedial cartilage" revealed. The white columella is just visible through the cartilage



Fig. 7 Even after the removal of skin from the head of *Xenopus* the presence of an ear cannot be discovered

and that the physical principles just outlined do not apply to him, we should not expect him to have an air-filled tympanic cavity or a Eustachian tube. Yet he has both, for he is an air-breather and he keeps his mouth permanently filled with air. But while his tympanic cavity and his Eustachian tubes look similar to those of other frogs, the columellae look very different indeed. Their outer half lies flat and half-buried in the wall of the extrastapedial cartilage. The inner or posterior half projects outside the tympanic cavity and bends to reach the window in the otic bone (figures 9 and 10). If it is allowed to draw any conclusions from the construction of an organ to its performance, it would seem that the hearing of *Xenopus* must be much inferior to that of terrestrial frogs.

Hearing in the accepted sense is probably as unimportant to him as it is to fish. Every wave motion of the water that reaches him is picked up by some of the neuromasts distributed all over his trunk. What need then has he to listen to the rapid air vibrations which we call "sound?" Yet, if this

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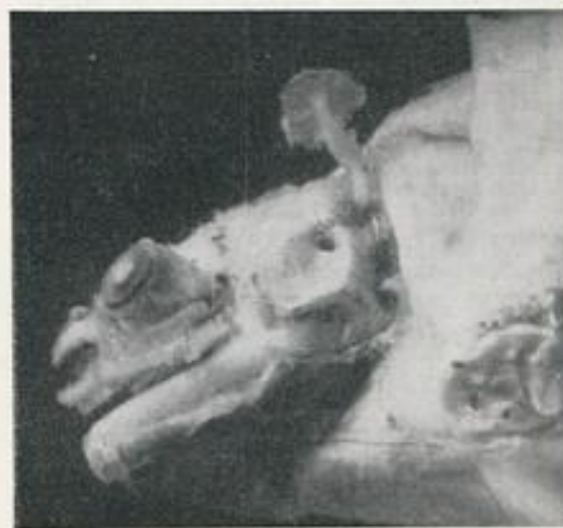


Fig. 9 Further dissection of *Xenopus* to detach the extrastapedial cartilage from the skull. The columella adheres to it. The black spot is the Eustachian tube opening

is so, why has he, why have the fish, developed ears at all? Organs which are of no use to a species usually disappear but the ears have remained, even in the aquatic vertebrates. It is, unfortunately, very difficult to ascertain what a fish or a *Xenopus* "feels" and what he "hears" or whether to them there is indeed any difference between these two sensations. It may well be that the differentiation between these two sensations evolves only very gradually and does not become well established until the water is forsaken for the dry land and the air.

The remaining "inner" part of the frog's ear is so incredibly complicated and in its essentials so similar to that of higher vertebrates that I feel reluctant to discuss it here. Interested readers may look at the May, 1953, issue of *Discovery* (p. 136) where the latest views on the mechanics of hearing are mentioned. It may here suffice to say that, like our own, the frog's inner ear serves not as a perceptor of sound only but also as an organ of equilibrium by means of the three semi-circular canals. Sound vibrations which reach the lymphatic fluid that fills the inner ear are picked up by a wide range of nerve fibres each of which responds apparently to a different wavelength. The exact nature of this process is not known yet.

Transformed into nervous impulses, electro-chemical changes travel along the fibres of the acoustic nerve and reach the frog's brain, thereby enabling him to do the best he can in the circumstances. If it took him as long to react to a buzzing fly as it took you, dear reader, to read this paper,



Fig. 10 Skull of *Xenopus* showing the curved columella, very different from that of the common frog. It connects the extrastapelial cartilage with the inner ear

he would never catch it. Fortunately, natural reflexes work very much faster and very much more efficiently than we can describe them.

Coal in Aquaria

LETTERS published in *The Aquarist* during the past year on the beneficial effect of coal in aquaria prompted me to experiment. I have two 24-inch coldwater aquaria on a stand and I arranged several lumps of coal as "rockwork" in the lower tank and awaited results. The lower tank was chosen because I was experiencing a little difficulty in keeping the water in this one clear, although it received exactly the same treatment as the one above it. Now, not only has the water in it remained clear for over four months but the plants have never been healthier nor the fish livelier.

Visitors who had previously expressed admiration of the attractive appearance of the two tanks now asked why I had put coal in the bottom tank, and the usual expression of admiration was forgotten. The answer, obviously, was camouflage, and after considering several methods I finally decided to paint the coal with deep cream "Snowcem" water-proof cement paint. Following carefully the makers' instructions I gave two coats to each piece of coal and when they had dried properly I then soaked the pieces for 72 hours, changing the water three times to dispose of any free lime.

The painted coal was then replaced in the tank with the fish and, after a fortnight, it became covered with algae so that it looked quite natural and matched perfectly the light brown compost. Once again my tanks are being admired and no one has yet suspected that my rocks were delivered by the coalman. This suggests that those who find suitable pieces of natural rockwork hard to come by can use coal and cover it with "Snowcem."

I have written to the technical department of the makers of "Snowcem" and have been assured that provided all work is "cured" to dispose of free lime the fish will be unaffected in tropical aquaria as well as coldwater ones. Those who intend carrying out this method of aquarium decoration should first of all select suitably shaped pieces of coal and, when these have been thoroughly scrubbed, place them on a

piece of cardboard cut to the size of the tank bottom. On this, experiment with various arrangements of the pieces to find the most attractive one.

The selected pieces are then painted buff colour for those to go with dark composts, one at a time, and put back into place on the cardboard. In order to reduce the amount of free lime to remove and to allow the aquarium water to contact the coal, the bottoms of the pieces should not be painted. For tropical aquaria it will be advisable to soak the coal after painting for a little longer than I did for coldwater use.

R. T. Jones

Making Sure that Fish Keep Alive

(continued from page 186)

satisfactory volume of water with a good surface area and moderate depth will do this, but this makes no provision for the equally important carbon dioxide, which without plants is constant day and night, coming from the fishes alone.

There is too great a tendency to consider this restraining gas as a noxious poison, yet without it, all living matter would burn up in a very short time. When active plants are associated with active fishes, a surplus of oxygen is provided during the hours of light; this surplus of oxygen clears up much of the debris from plants, and excreta from fish, and also sustains a host of Protozoa and aerobic bacteria which are all necessary to the biologically active tank or pool. As the light declines, so the increase in carbon dioxide occurs, inducing a period of dormancy to plants and fish which is quite as important as the previous period of activity. The replacement of used tissue and the growth of new tissue are both encouraged by satisfactory dormancy.

This mention of tissues brings us to our next important point, for having reviewed light, temperature, and the gases, all important activators of our fishes, our next step must be to consider the sustainer of that activity—food and feeding.

(To be continued next month.)

COLDWATER FISHKEEPING QUERIES *answered by A. BOARDER*

I have recently noticed movement among the compost at the base of my tank. I find there are dozens of small objects about a hair's thickness with one end in the sand and the other waving about. I have cleared the fish out and am waiting for your advice. What can I do?

The small objects in your compost are *Tubifex* worms and they are very good food for fishes. That they have not all been eaten up is probably because you are feeding too much. At the approach of a fish the worms withdraw into the compost and reappear after a short interval. If the fish are hungry they will wait for the worms to extend and then pounce on them before they can escape. They may have been introduced into the tank with some form of live food or on water plants. The worms increase by laying eggs in the form of a small capsule and reproduce rather quickly. If you replace the fish and do not feed them for at least a week the worms will soon be eaten; in any case they will do more good than harm. Aquarists are often advised not to feed freshly caught *Tubifex*, but this does not apply to those in a tank; many caught in mud have been feeding on sewage or other muck and this has to be cleared from the worms before they are a safe food for fish.

My concrete pond (about 10 feet by 8 feet by 2 feet deep), based with loam and gravel, has become overcrowded with plant life. Should I try to clear this out before it dies naturally or would this treatment be too drastic?

Your pond has become overgrown with plants because you have supplied the loam which causes this luxuriant growth. I do not consider loam necessary in a pond the size of yours. The plants are better set in large pots so that some control can be given. Do not try to remove too much of the plants at one go. Tie a large knife to a long stick and saw through the lower stems of the *Elodea* and *Myriophyllum*. The stems will then float up to the surface, when they can be raked out. Only deal with about a third of the plants at a time and after a fortnight you can remove a similar amount. Plenty of plant life is very good in the pond but it can be overdone as when fish cannot be seen and some kinds become entangled in it.

Last autumn I constructed an informal pond which holds about 1,200 gallons. I now find that it loses about two inches in two days. Is this a normal loss in the warm weather? I cannot find a leak but have treated the whole of the bottom with "Snowcem." If you consider there is a leak shall I cover the inside with a mixture of concrete with a waterproofing agent added? When do you advise the work should be done, late autumn or early spring?

It appears that you have a leak in the pond. Normal loss through evaporation should not be as much as yours. Often heavy dews help to compensate the daily losses, but birds drinking by day or animals such as hedgehogs at night, will lower the level a little. You can soon find out if there is a slight crack. On a fine day empty the pond completely. As the concrete dries out you will see any hair cracks quite plainly as they remain damp when the other surface is dry. Slightly open these out and dry with a blow lamp. Force in a bitumastic compound and see that it does not spread out over an area on the sides of the crack. This should make a good seal. "Snowcem" is not meant for underwater treatment but for outside use. If no cracks are in evidence the mix for the original concrete was bad. If there were any lumps of soft sand in the mix a leak could be caused.

I never use any form of waterproofing with my concrete, but I will guarantee to make concrete troughs (with three parts sand and one part ordinary cement) with the sides of the trough only a quarter of an inch in thickness, which hold water so well that the outside would remain quite dry even though the water level was within a quarter of an inch of the top. Should you have to float over the whole of the inside of your pond, do this with three parts clean, fairly

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.

sharp sand to one part fresh cement. Mix thoroughly until all is of one colour and add tap water until the mix is fairly sloppy. Float this all over the pond as quickly as possible, either with a trowel or a large brush. Spray now and then to prevent too rapid a drying and the pond should be ready after a good wash out.

I have bred a batch of red ramshorn snails in an indoor tank and should like to know if they are suitable for a garden pool. If so would they winter there?

The snails could be placed in the pond and many would go through the winter providing the pond was not too tiny and had a good growth of water plants in it. I have heard of natural ponds which contain red snails and so there is every chance that yours would be safe.

Two of my goldfish in an outdoor pond have imperfect tails. Is this due to tail rot or can healthy fishes have improper shaped tails? Is tail rot contagious?

From your sketch it seems that the fish has a split tail. If the tail has been damaged the split can soon join up again and no trace of the damage may be seen. In tail rot the ends of the tail rot away altogether. Tail rot is a form of fungus infection and can be passed on to other fish, but healthy fish do not easily contract the disease unless their mucous covering has been broken.

I would be very grateful if you could give me some advice on how to feed my three fish—a small tench, golden rudd and a roach.

All three fish will take some forms of dried foods; a good mixture as sold by good makers would be satisfactory. Tench are very fond of crushed water snails and most live foods such as *Daphnia*, *Tubifex*, white worms and garden worms. Rudd and roach will also take any live foods small enough for them to manage. If garden worms are too large for them you can shred the worms to a smaller size.

I intend to breed goldfish in tanks in a shed in my garden. Please advise me as fully as you can on several points: the size of the breeding tanks; the question of light. Should the tanks be heated? Should I have windows in my shed on the sides or roof? Should the breeding tanks be at the sides? Can I keep the breeding fish in unheated and unlighted tanks and transfer them to breeding tanks for spawning?

When you build your shed for breeding it is essential that plenty of windows are provided. If it gets too warm you can always screen a window or two but you cannot provide the necessary light and air in hot weather unless the windows are there. I advise you to make large concrete tanks to be sunk partly into the ground at each side of the shed. They can run the length of it and be about two feet wide and a foot deep. Slots can be made at intervals so that fishes can be separated from each other. You will not need any heat for the parent fish but I advise you to have spawning and hatching tanks of about 24 ins. by 12 ins. by 12 ins. which can be heated to about 70° F. The breeding and hatching tanks can be near the windows as the morning sun will help matters. It is well to have tanks for spawning and different ones for hatching and rearing. These latter need not be deeper than nine inches. Try to have running water if possible, as a small drip into the rearing tanks will help to keep the water moving and aerated. I have dealt fairly fully with the breeding and rearing of goldfish in several

issues of *The Aquarist*, in "Stepping Stones," and I suggest that you look up these articles.

I have been successful at breeding goldfish, shubunkins and comets but cannot get golden orfe to breed. Do they require special weeds to spawn on or do they only spawn in very deep water?

Golden orfe will spawn when they are of a good size, say over a foot long. They spawn somewhat similarly to goldfish and will do so in shallow water on the roots of willow or similar substances. Unless there are plenty of shallow parts to the pond the fry may not be able to escape being eaten by the older fish which, as you know, are very fast swimmers and feed ravenously.

I have three fairly large orandas in an indoor pool; can I put them out in a pond where they could be covered if necessary in very cold weather?

Orandas are fairly hardy as long as they have not been bred under tropical conditions. As long as you are able to give some protection in very severe weather they should be all right. Try to acclimatise them gradually to the cooler water.

I have been trying to get a pair of decent orandas and have only been able to get quotations from dealers. As much as £25 was asked for a pair and prices were reduced according to the size of the fish until £4 10s. was asked for a single fish with a body length of an inch. These prices appear exorbitant to me, an amateur, and I would like to know your views on the subject.

Of course we have here the perfect example of the law of supply and demand. If no one paid these high prices for the fish the owners would have to reduce the price if they wanted to sell, but as long as someone can afford to pay such prices and fishes are scarce I do not see how the prices are to be lowered. If buyers could band together as the dealers do they could soon force prices down, but the main trouble is that good fishes of most of the fancy types are in short supply, and anyone who has bred them knows that for every fish of a saleable quality there will be 20 others not worth a shilling.

If you had a very good fish, perhaps a prizewinner, you would not want to part with it for a small sum. I am sure that if you knew the difficulty of breeding good fish in large numbers you would appreciate their value far more. You can look at it in another light. Say you paid £10 for a pair of orandas and bred 100 fish from them. Some would be good, others not so good, but if you averaged £1 each for the youngsters you would not be doing too badly. Some aquarists look at the problem from this point of view. If an ordinary goldfish is worth a shilling then surely a very good oranda is worth a few pounds. I always advise that it is better to buy some fry when small from a recognised breeder and take a chance. If they are bred from a good strain they can be good, but if not they are almost sure to breed some better ones in time.

I do not like recommending any special breeder but you can always watch for the names of the winners with the particular type you wish to breed. I realise that the prices asked are very high but I myself am often offered what I consider to be ridiculously high prices for fish. When more good ones are bred we shall soon get lower prices.

I have two pools for goldfish in my garden. A few weeks ago several water irises were uprooted and found about 10 yards from the pond. The fish seemed all right. A few days ago several more plants were uprooted and several minnows dead. I suspect rats; how can I protect the pond from them?

It is very difficult for me to decide what has uprooted the plants. I cannot think that rats would be able to do this to growing water irises. Cats or dogs might do it, also such large birds as crows and rooks. I doubt if it was a heron as this would have cleared most of the fish from the pond. The whole set up seems a mystery to me and without further

information I am unable to suggest a cure. If you can keep watch you may be able to find the culprit. If rats are to blame you can try trapping them; a good bait is a kipper head.

I am looking after a friend's fish whilst she is on holiday. The goldfish have their "sails" down and do not look happy. I have taken a piece of coloured rock out of the tank but the room smells strongly of moth balls. Can this be the trouble?

It is rather difficult to try to discover what is the matter with the fish from these details. There is no doubt at all that as soon as a goldfish lowers its dorsal fin it is unhappy. I know of no surer sign of a fish in trouble. Healthy fish almost always keep this fin extended. The rock in the tank may have caused the trouble and I do not like artificially coloured rockwork at all in any tank. On the other hand the fish may have been over-fed and/or over-crowded, these faults are the reason for many failures. I should empty all the water out of the tank and give the fish a fresh start. Do not be in a hurry to start feeding. A sick fish cannot feed and any food given only makes matters worse by fouling the water.

I have a black moor which cannot seem to swim properly, rising to the surface a lot or sinking unnaturally to the bottom. Can you suggest a cure?

The moor (there is no need to use the title "black") is suffering from swim bladder trouble. Some types of short bodied fancy goldfish are rather prone to this complaint. Sometimes it is hereditary, when it is almost impossible to cure, but sometimes it is brought on by indigestion or a chill. Where swim bladder trouble develops as the result of some derangement it is not too difficult to cure. The fish should be placed in shallow water which should be warmed up to at least 65° F. Feed sparingly at first and then on live foods only. Plenty of chopped earthworms will sometimes do the trick if no dried food is given for a time.

I shall be glad of your advice on water lilies. Mine have flowered well for eight years but this year they appear to have gone rusty on the stems and have not flowered. Is this a disease?

The plants may be diseased or they may have become overcrowded and are starving themselves out. Many lilies grow at a fast rate when first planted but after a few years, if they are not divided up and re-planted they may lose strength and fail. Lilies are rather like some of the plants in a herbaceous border—they wear themselves out in a few years if left to their own resources. I advise that the lilies be re-planted. Discard the old hard centres and use only the younger outside pieces of root-stock. You do not say whether there are any fish in the pond. Water lilies benefit from the presence of the fish as their droppings act as manure.

Should I remove dead or dying water lily leaves or should they be allowed to die down to benefit the roots for next year?

I advise you to remove as many as possible of the dying leaves, also flower stems. These pollute the water considerably, especially in a small pond. You can see a kind of oil on the water above and near a decaying leaf. There should be enough other foods for the lilies in the pond without depending on the decaying leaves for manure.

Can you tell me of any society which specialises in coldwater fishes other than types of goldfish?

I do not know of any society which specialises solely on coldwater fishes other than goldfish. You would probably find that in most societies there are one or two members who keep such fish and where this is the case it is often possible to get a small group formed within the club to study particular points concerning these fish. I find that as a rule there are not many members of a club sufficiently interested to be able to get a specialist society running.

AQUARIST'S Notebook



by
RAYMOND YATES

DURING the last few months a few specimens of the rare and expensive pompadour fish (*Symphysodon discus*) have been imported. Whilst being shown over the fish-house of Mr. J. Taylor, of Portsmouth, I noticed three full-sized discus fish in a rather small aquarium. They were undoubtedly in excellent condition and the show-piece of a wonderful collection. Mr. Taylor mentioned that the most important thing to know about this fish was what they had been used to eating as, contrary to general opinion, he found they would not touch *Tubifex*. Young guppies also were ignored and it was some time before he discovered that their sole gastronomical interest was white worm.

The tank in which they lived was very well planted and I remarked on such dense planting of a tank containing such large fish. Mr. Taylor explained that they show the typical pugnacious temperament of most cichlids and these attacks are not so harmless as those indulged in by angel fish. Discus fish seem to always attack the eye, frequently with fatal results, and it is for this reason that plant shelter in depth is provided. Few cichlids bear much resemblance to the angel but *Symphysodon* cannot be mistaken—he looks like a large angel and acts like one. They are not scary fish, however, and if a pencil or a finger is held under water they will thoroughly enjoy having a fight with their owner, who is usually the first to tire of the sport. The eye of this fish is not so clear as the angel's and tends to a slight misty effect, but this is not very obvious.

Another fish kept by Mr. Taylor in rather large numbers is *Plecostomus plecostomus*. This spiny catfish is nature's answer to the problem of how to get rid of algae; the way these fish can clean up a tank inches deep in algae has to be seen to be believed.

It is a wise policy to leave fish alone and to disturb them as little as possible. However, there are times when fish have to be caught and it is surprising the difficulties the hobbyist encounters in such a simple operation as this. Nets should never be small, in fact, I always think that most fanciers start with small nets and learn from bitter experience in time that large nets give the best results. Green-tinted nets are not so obvious as the spotless white variety and are probably not so easily seen by the fish, but they should be well washed before use as the green dye used by some makers is anything but fast. In the main there are three ways of catching your fish—1, by using two nets, a method favoured by most dealers; 2, by trying to trap the fish against the front glass; and 3, by trying to catch the fish against the surface. There is, of course, no best way. Methods used for one tank or one variety of fish will not do for another and only experience teaches the best method for each set of circumstances.

Some fish are easily caught, in particular, the Siamese fighter and the paradise fish, although all the labyrinth fish offer little difficulty. We are more concerned with those which are difficult to catch, which includes most of the characins, large swordtails and mollies, the giant danio and a very tricky customer, the Kuhl's loach (*Acanthophetalus semicinctus*). In my experience the hardest fish of all to catch is the adult molly in a well-planted tank. This fish seems to realise that it is the object of the hunt and does not waste its time and energy in dashing from end to end but cunningly finds the most inaccessible spot in the tank and hides there until danger has gone. The molly will now come out and swim round again but lift the net again and the fish will immediately return to its "hide-out" and will repeat this process time and time again over many days.

With all difficult fish the best method is to suddenly turn on the tank lights after they have been in darkness several hours—it is usually easy to make a capture this way and saves disturbing a planted tank too much. Where a fish must be caught it can be worn down by chasing it from end to end without pause. Like most wild animals fish have little stamina for a long chase and are soon exhausted and caught, but it is hard on both the tank set-up and the fish. It is remarkable how the other fish in a tank seem to know when they are not in danger and move quietly out of the way when the net moves in their direction. Angel fish are very excitable and where these are in a tank care should be taken to disturb them as little as possible when catching other specimens. All nets after use should be sterilised, a habit which is well worth cultivating.

Some time ago I had approximately 30 red-eyed red and a similar number of green swordtails, all about a week old, when I discovered a large female red-eyed red about to produce another brood. Having nowhere else suitable I placed her in the tank with the young fish, first taking the precaution of putting in masses of water plants of one sort or another. I reasoned that the young fish were now old enough and experienced enough to keep out of danger with the added protection of the tangled plant masses. To make assurance doubly sure I gave the large female very heavy feedings but, as events turned out, I could have saved myself the trouble. Within two days all the young red-eyed reds had been caught and eaten, although the normal green youngsters were untouched. Worse was to follow because the female delivered her brood in the early morning and devoured the lot before mere humans were out and about. Young albinos seem very tender and particularly tasty and fall a much easier prey to their relatives than the more normal coloured fish of this species.

On those occasions when the more usual forms of live food are not immediately available it is still possible to feed the fish with quite a satisfactory diet from your own table. The adult size fish will relish tinned meats or chopped ham, boiled ham, tongue (I find harlequins are very partial to tongue), raw meat, raw fish, tinned crab or lobster. Tinned fish, such as tuna, is very acceptable and this breaks up rather finely and thus suits the smaller and more tiny-mouthed fishes. Of course, raw liver is excellent, if available; it should be washed to remove blood, but frozen liver is of little use as it is very difficult to chop this up to a size suitable for the fish. Cod roe is very acceptable but do not give the fish too much of this at once. Every day I give my fish dried *Daphnia*, of which they never tire, and I find this a very useful standby.

A few years ago it was the exception rather than the rule for a dealer to offer tropicals for sale singly; they were always offered at so much a pair. Nowadays this has quite died out and almost everywhere fish are sold singly and priced singly. Some enterprising dealers offer quite appreciable reductions for half-a-dozen or a dozen fish and this is surely an idea which will spread. Even so, most hobbyists still buy fish in pairs, although with the great

majority of fish it is impossible to sex them, more particularly if they are young and undersized. Sooner or later one of the "pair" dies and the aquarist is left with a single specimen.

With few exceptions single fish do not hold the attraction in a tank which pairs or groups hold, and it is really much wiser to buy four or six fish at a time than a doubtful pair. Where several fish of the same type are kept losses are not so worrying and deceased fish are hardly missed. Single fish in community tanks often exhibit queer love affairs when, for some strange reason they begin to show a liking for another type of fish entirely. I can call to mind at least two instances of these odd associations—white clouds striving to be friendly with neons and in the latter instance, penguins forcing their affections on giant danios of similar size.

Clubs, in general, find a certain amount of difficulty in obtaining suitable lecturers and a secretary's life is not a happy one, at least in this respect. There are many reasons why this should be so. Of course, there are not enough good lecturers to go round anyway, and distance from their homes makes many chary of accepting invitations at any distance. If the lecturer has no car his main concern is getting home, which means a reasonably early departure, yet most clubs make it the exception rather than the rule, to start before 8 p.m. Promptness in starting is almost unknown. Then again, many clubs begin with club business and the like which means that the speaker will be even later in opening his talk. Some secretaries fail to give detailed instructions as to the exact whereabouts of their headquarters and it is surprising how difficult some meeting rooms are to find. A few secretaries leave all arrangements until the last moment, and in cases where the lecturer has been booked months in advance, fail to send a reminder a few days before the talk is due.

It is true that some lecturers ignore requests for their services, or reply very belatedly when the poor secretary has abandoned all hope of hearing from them. There is also the occasional lecturer who fails to turn up at all, or who sends his regrets at the very last moment. One can sympathise with those cases where unavoidable circumstances prevent the lecturer from attending, but not all failures to show up are unavoidable. However, unreliable speakers, like unsatisfactory clubs, soon become known and are passed over. Speakers like to answer questions because the more questions there are the more interesting the talk has proved.

Nevertheless, some clubs harbour a "smart Alec" type who delights in asking trick questions for no other reason than an attempt to score off the speaker. Fortunately they are few and far between but they give a club a bad name. As a general rule this club nuisance has never given a talk himself, even to the members of his own club, for the simple reason that he is incapable of so doing.

In the main good speakers are not prepared to talk on any or every topic, but prefer a definite subject of their own choosing. The sort of speaker who is quite prepared to speak anywhere, at any time, on any subject, usually has little real knowledge apart from what he has read up in aquatic literature and memorised.

This year the firemouth cichlid (*Cichlasoma meeki*) appears to have become very popular indeed and small specimens are both easy to obtain and quite inexpensive. They are not such bullies as some of their family and get along quite well with other fish of similar size. The vivid colouring of this fish is its most outstanding feature and this is seen to best advantage when the tank is furnished with light grey rockwork, a surface mat of floating plants and not too strong a light. Firemouths exposed to bright illumination fail to show that depth of throat colour which is so much desired.

The present vogue for china ornaments in the form of animals or pets has included one or two varieties of fish. These are rather expensive but are certainly very attractive. Among others a leaping trout and a full-sized angel fish are outstanding. For some time flights of birds in diminishing sizes for wall adornment have been popular. It is now possible to obtain sets of angel fish at various sizes, qualities and price. Although prices are high these fish last for ever, and they are certainly here to stay.

Some time ago I heard of an instance where a club had issued small posters to advertise a forthcoming show. These were intended for display in show windows and the like but, unfortunately, an enthusiastic club member affixed one of these to railway property. In due course the secretary of the club received a bill from the railway offices for £8. In the end this matter was settled amicably but the club officials were put to considerable trouble and probably no little worry. The moral of this is that club officials should take care to impress on members the snags in advertising on private property without having first obtained permission.

FRIENDS & FOES No. 20

CORIXA

PHYLUM:—Arthropoda, from Greek *arthron*—joint, and *podos*—foot.

CLASS:—Hexapoda, from Greek *hex*—and *podos*—foot.

THESE little creatures, which range in size from one-sixth of an inch to just over half-an-inch, are often confused with the Notonectae, discussed in the last two articles of this series. Indeed, at a quick glance, there are certain resemblances, but when examined more closely various marked differences become apparent.

Firstly, no *Corixa*, and there are over 30 species, ever swims on its back. Secondly, the boat-shaped body of the back-swimmer bears a single pair of "oars"—the third pair of legs, whereas



the *Corixa* has two pairs—the second and third pair of legs, although only one of these two pairs is used to "row" it through the water.

Thirdly, the proboscis of the *Corixa* is short, and not used for sucking juices from its prey, which consists of vegetable organisms extracted from the

Water Boatmen

muddy bottom of pond, stream, or aquarium.

Eggs are smaller than a pin's head, creamy white and turnip-shaped. They are laid singly and attached to aquatic (submerged) vegetation.

At no stage of their development do *Corixa* form any sort of a menace to even the most delicate and smallest of fish fry. Extremely active, they spend a large part of their time banging their hard heads against the sides of any container in which they are placed. The noise of the impact can often be heard as much as 15 feet away, but the creatures appear to suffer no harm from indulging in this queer habit.

C. E. C. Cole

THE AQUARIST

OUR READERS

Write—

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



Aquarium Stand Conversion

SOME time ago I purchased an upright three-tier metal stand, upon which I placed two 24 ins. by 12 ins. by 12 ins. and one 24 ins. by 15 ins. by 12 ins. tanks. It irritated me however, to have to stand on a chair to attend to the top tank, and likewise to kneel on the floor to look at and attend to the bottom tank.

I therefore tried laying the stand on its side: I found it could be made level and firm by placing wooden battens underneath. The tanks I placed in the horizontal positions as in the photograph. Not only is the effect far more impressive, but the tanks are much easier to service.

The shades are made of wood and can be completely removed individually by withdrawing a two-pin lighting plug from the main line cord, attached to a wooden batten which runs along the entire back of the tanks. The angle-iron frame of the tanks I have hidden by one inch wooden picture-frame beading, which is secured with Bostik. This enhances the appearance and gives the impression of three framed pictures.

Finally, the void spaces within the framework of the metal stand I have filled in by constructing cupboards for the housing of the many bits and pieces connected with this fascinating hobby. The total cost of this conversion did not amount to more than pound or two and the set-up is quite solid and safe.

H. L. NALTY,
Bromley, Kent.



December, 1953

Brown Acara Breeding

I WAS very pleased to see the sound, balanced article on the brown acara by "Pisces" in the October, 1953 issue. However, during the course of the filming of the breeding habits of the brown acara I made certain observations which I have not so far seen in print, hence I feel that they might be worth recording.

I have come to the conclusion that sexing fully grown adults from external characters is almost impossible. Specimens of brown acara are hard to come by but after considerable difficulties and delay I found an aquarist (Mr. Haymes of Notts.) who loaned me his adult mated pair. These two fish were absolutely identical as regards shape and colour and both of them showed equally long pointed fins. But for the assurance of Mr. Haymes that they were a true pair I should have thought, from my experience with other cichlids, that they were both males.

However, when the six youngsters from this pair, which I had kept back for myself, were about eight months old there was no difficulty whatsoever in sexing them. The fins of the males were obviously larger, longer and more pointed than those of the females, as is true of most cichlids. These differences became very well marked when the fish reached one year of age. But now as time goes on I find that it is becoming harder to distinguish the sexes, as the fins of the females are elongating and becoming acute. Thus it seems (though I would not like to be dogmatic about this as only a very small number of closely related specimens have been observed) that sexing young adults is easy but exactly the reverse is true about fully grown specimens.

Another point which caused me considerable anxiety at the time, from the film-making point of view, was the fact that Mr. Haymes' adult pair showed no pre-mating activity such as fighting, kissing, tail-slapping, etc. (I spawned them three times that year). The pre-mating scenes in my film were recorded only when the youngsters which I had kept back were about nine months old. The intensity of the performance, particularly the "kiss," can only be fully realised by those who have bred the larger cichlids. Though I think that my film captures some of the highlights, drama and tension of this wonderful spectacle, it could not hope to compete with the real thing, which can go on for hours on end. A single kiss may last for as long as 18 minutes and at the end of the day their lips are bruised, swollen and slightly fungused. I sincerely hope that more aquarists will keep and breed the larger cichlids, and see this marvellous performance in real life.

Having had numerous spawnings from these youngsters I find that these mated pairs have now settled down to a quiet married life with their selected mates and indulge

little or not at all in kissing or fighting before mating. Much has been written about how cichlids will fight to protect their eggs and young. To my annoyance, however, (because I would have liked to photograph this) my brown acaras showed no fight when I had to move the eggs and young out of their tank periodically for taking close-up shots. They retired rather rapidly and watched from a safe distance my antics and carried on as if nothing had happened when I returned the youngsters to their tank. Even half a dozen photofloods partially immersed in the tank for some of the shots did not unduly upset them once they had got used to the idea!

DR. F. N. GHADIALLY,
Sheffield.

Cheap Filter

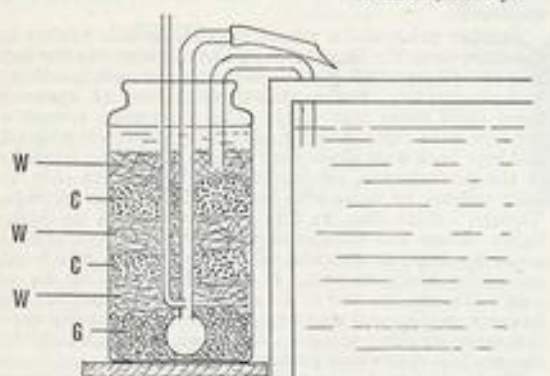
RECENTLY I went to see a friend of mine and saw that he had an outside filter which was a good deal larger than the corner filters which I had seen. Upon looking for prices of these filters I found that they were rather expensive so I started to think of a way in which to make one.

First I bought an ordinary water lift. To the end of this I fitted a pierced table tennis ball as described in your December, 1952 issue. Then I found a large glass jar—a preserving jar. Inside this I fixed the water lift, by means of a rubber sucker. Then I fitted a rubber extension to the part of the water lift through which the water flows to make sure the water went right into the tank.

The next thing to do was to fill the jar with filtering materials. First I placed a layer of coarse gravel on the bottom of it just covering the table tennis ball. Then I put a layer of glass wool on top of this. Then a layer of carbon, glass wool, carbon and so on, until the jar was three-quarters full. All that was now needed was a small siphon, which can be made from glass tubing, and the filter was ready to be fixed up.

I fixed a shelf by the side of the tank on which the filter could stand. Then the siphon was started and the jar filled up. Next the water lift was set in motion and the water ran out quite freely without any stones, pieces of carbon or glass wool in it, thanks to the table tennis ball. This is a very good and cheap filter costing only a fraction of a bought one.

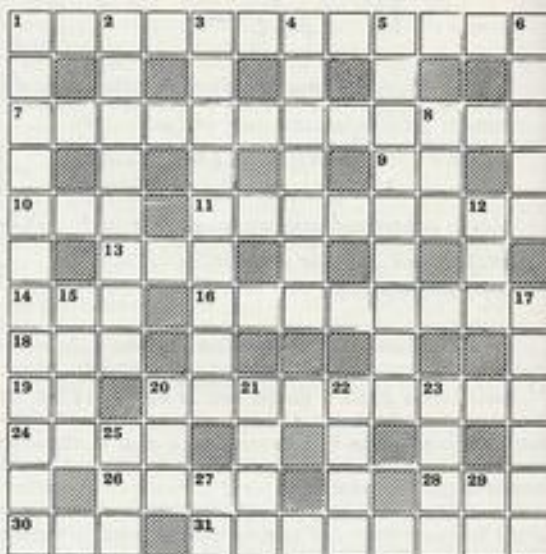
"REGULAR READER,"
Belmont, Surrey.



G: coarse gravel. W: glass wool. C: carbon. See letter "Cheap Filter"

The AQUARIST Crossword

Compiled by J. LAUGHLAND



CLUES ACROSS

- Probably the best conditioning food for fishes (8,4).
- *cinkele* or angel (12)
- This means you! (2)
- Measure of electrical resistance (3)
- Are these lizards the bright boys of their class? (8)
- Uproar in a dogfish school (3)
- Whale (3)
- Variety of trout (8)
- Look! It sounds as if there should be fish (3)
- Thanks for half a tail (2)
- Convoying (9)
- Ides (4)
- In *ricklebacks* this month begins (4)
- This dish could be fish, fruit, flesh or fowl (3)
- Bring forth young (3)
- Sea squirt (8)

CLUES DOWN

- Fish louse, for instance (12)
- Bog plant commonly mis-called bulrush (8)
- The transfusion of liquid through a membrane (9)
- Sea-urchin (7)
- Isaac Walton's name for a cunning fish (4, 5)
- Mother writes an afterthought for a childish complaint (5)
- Suitable name for a pet lionhead (3)
- Fish eggs (3)
- Raise fry, perhaps (4)
- A covering, especially the inner coat of a seed (6)
- Scots eyes or poetic evening (3)
- Felines to most, scavengers to aquarists (4)
- Rain upsets the Indian princess (4)
- Sounds more like a school of young devil fish than an African regiment (4)
- A tail is a caudal this; finishing starts it (3)
- Elodea densa* finishes in a state (1, 1)
- The end of aquaria is a termination covering all aspects (2)

PICK YOUR ANSWER

- Parulovella acis* (the needle fish) is referred to the family: (a) Bunocephalidae. (b) Doradidae. (c) Loricariidae. (d) Pimelodidae.
- The trivial name *collypterus*, as in *Barbus collypterus*, suggests that the fish has: (a) Beautiful fins. (b) Large eyes. (c) Long barbels. (d) Small scales.
- The scientific name of the red-bellied dace is: (a) *Chela hypophthalmus*. (b) *Chrosomus erythrogaster*. (c) *Nostropis hypsilepterus*. (d) *Osteochilus vittatus*.
- The caudal fin of the tiger platy is: (a) Light blue. (b) Bright green. (c) Bright red. (d) Light yellow.
- The popular name of *Eriocaulon* is: (a) Bridewort. (b) Masterwort. (c) Mudwort. (d) Pipewort.
- The flower of *Basella monnina* is: (a) Blue. (b) Red. (c) White. (d) Yellow.

(Solution on page 197)

G. F. H.

MEETING place of the **Worthing and District Aquarists' Society** has been transferred to the Club Room, Warwick Hotel, Worthing, where meetings are held on the second and fourth Tuesdays of each month at 8 p.m. Lectures planned for next month are Pond Life (Mr. A. Sharp) and Breeding (Mr. L. G. Fuller).

ENTRIES in **Worcester and District Aquarist Society's** first annual table show of tropical fishes numbered 55. Mr. S. Prior judged the five classes and awarded the challenge cup for the best fish in the show to Mr. C. R. Brazner's angel fish.

RECENT speakers attending meetings of **Southampton and District Aquarists' Society** have included Mr. T. Bartlett and Mr. J. Carroll. Mr. Carroll judged a table show of characin and labyrinth fishes and spoke on problems of judges. The sixth hospital tank to be maintained by the society in Southampton has been installed in the New Hospital Chest Clinic.

UNUSUAL aquarium fish was the title of a talk given by Mr. T. Whalley to members of the **Southport and District Aquarium Society**, and this was followed by a display of coldwater fish varieties by a society member, Mr. W. Cook.

LAST month members of the **Plymouth Aquarists' Society** were conducted round the aquarium and laboratories of Plymouth Marine Biological Station after an invitation from Dr. D. P. Wilson, the curator. The Society staged a table show of guppies, judged by Mr. C. Coslett, who afterwards spoke about the fish show.

NOVEL idea for the November meeting of the **Leicester Aquarist Society** was interviewing members. Interviewer was Mr. S. B. Scargill, who questioned six members about their fish houses and ponds. At the previous meeting a film "Coral Wonderland," produced by the Australian News Bureau, was shown.

AT a competition to select the best bred fish of the year held by the **Southern Amateur Aquarists**, first award (Richardson Cup) was gained by bescon fish (Mr. R. Coldman), second by red-finned tetra (Mr. C. Keen), and third by Mr. T. Braby's Siamese fighter. The cups are to be presented this month at the society's annual social.

THE annual show of the **Lancashire Aquarist Society** attracted 167 entries, some from Bristol and Birmingham. Over 600 members of the public saw the exhibits, which were judged by Messrs. N. Brown and T. Whalley. Outstanding fishes in the breeders' classes were orange chromides bred by Mr. A. Cottam (Blackburn) and lyretails bred by Mr. T. Shaw (Manchester), who also won the award for the best exhibit with a breeding pair of *Metyusis schreini*.

ABOUT 100 members and friends of the **Willenden and District Aquarists' Club** heard Wing-Commander A. Marsack's descriptions of his travels in Burma, Malaya, Siam, Borneo and North Africa, searching for tropical fish. The speaker described his surprise at finding specimens of harlequin fishes living and breeding in a river at a water temperature of 50° F. He also told of an unnecessary 400-mile journey from Singapore he made to find archer fish, only to meet these fish on his return in the brackish water of the river mouth. Wing-Commander Marsack showed many beautiful colour slides of jungle scenery, exotic orchids, flowers and "close-ups" of reptiles.

MR. E. J. DRUCE used a micro-projector to illustrate his talk on freshwater biology given to **Shirley and South Birmingham Aquarists' Society** last month. Members were able to see a *Hydra* catching and devouring a water flea. At the previous meeting Mr. H. Cadwallader spoke about aquarium electrical apparatus, giving some hints and tips for members' use at the same time.

ASSISTANCE for club funds was the design behind a "bring and buy sale" arranged by the **Bournemouth Aquarists' Club** last month.



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.

A table show was also held for danios, live-bearers and goldfish.

ELEVEN tropical and coldwater aquaria were set up by members of **Sheppey Aquarist Society** in November for display at the local chrysanthemum society's show. Considerable local interest was attracted by the exhibit.

OVER 8,000 people attended the show staged by the **Paisley Aquarist Society** this year. Among aquaria exhibits there were reptiles (displayed by Mr. D. O. Carr) and a marine aquarium with sea horses was a special attraction. Hardboard facings for the more than one hundred tanks used obscured the tubular steel stands and focused attention on the glass fronts of the aquaria.

THE speaker at the November meeting of the **National Aquarists' Society** was Mr. G. P. Hervey, who took as his subject the scientific aspect of breeding. This month the society's new vice-president, Mr. W. C. Cleveland, will speak about "Questions I have been asked—and their answers."

Free Posters

FREE display posters are offered to recognised organisations of all kinds by Messrs. Spratt's Patents Ltd., 41-47, Bow Road, London, E.3. Up to one hundred posters will be sent on application to this firm. The poster has a space approximately 16 ins. by 15 ins. suitable for overprinting details of club shows, meetings, exhibitions, etc., for publicity purposes.

New Societies

Bristol Tropical Fish Club. Secretary: Mr. W. E. Ridler, 9, Friendship Road, Knowle, Bristol 4. Meetings: Third Thursday each month at The Old Duke, King Street, Bristol.

Corby and District Aquarists' Society. Secretary: Mr. L. S. Relf, 92a, Rockingham Road, Corby, Northants. Meetings: First and third Tuesday each month, 7.30 p.m., at The Mission Hall, High Street, Corby, Northants.

Dover Aquarists' Society. Secretary: Mr. J. A. Willson, 18, Beach Street, Dover.

Greenock Academy Aquarist Society. Secretary: Mr. D. Brown, Greenock Academy, Nelson Street, Greenock, Renfrewshire, Scotland.

Inverness and District Aquarist Society. Secretary: Mr. J. A. Mackintosh, 20, Dochfour Drive, Inverness, Scotland.

Lowestoft Aquarist Society. Secretary: Mr. G. Howbiter, 132a, Bevan Street, Lowestoft, Suffolk. Meetings: Monthly, at Esplanade Hotel, Lowestoft.

Netherfield Aquarists' Club. Secretary: Mr. H. F. Woodlatt, 69, Langdale Road, Bakersfield Est., Nottingham. Meetings: First and third Mondays each month, 8 p.m., at Netherfield Constitutional Club, Kenrich Street.

Skipton and District Aquarist Society. Secretary: Mr. F. Cherry, 88, High Street, Skipton, Yorks.

Wanstead and Woodford, London area aquarists are invited to communicate with Mr. J. L. Procter, 13, George Lane, South Woodford, London, E.18, who is forming a society there.

Yeovil and District Aquarists' Society. Secretary: Mr. D. H. Silver, 24, Seaton Road,

Yeovil, Somerset. Meetings: First Thursday each month, 7.30 p.m. at Adam Dairy, Middle Street, Yeovil, Somerset.

Secretary Changes

CHANGES of secretaries and addresses have been reported from the following societies:

Bath Aquarists' Society (Mr. and Mrs. F. L. Edwards, 19, Kensington, Bath); **Canford Aquarium, Reptile and Pondkeepers' Society** (Mr. W. B. Iles, 8, Derrick Avenue, Sanderstead, Surrey); **Colindale Aquarist Society** (Mr. G. F. Smith, 19, The Ridgeway, Kingsbury, London, N.W.9); **Friends Aquarist Society** (Mrs. Ivy Bakewell, 43, Upland Road, Dulwich, London, S.E.22); **Guest, Keen and Nettlefolds Ltd. Pond and Aquarium Society** (Mr. A. Harris, Pond and Aquarium Society, Atlas Works, Darlaston, South Staffs.); **Hendon and District Aquatic Society** (Mr. P. Marriott, 127, Church Drive, Kingsbury, London, N.W.9); **Hollington Aquarist Society** (Mrs. M. Button, 22, Stockleigh Road, St. Leonards-on-Sea, Sussex); **Hornchurch and District Aquarium Society** (Mr. A. Brooks, 116, Suttons Avenue, Hornchurch, Essex); **Hull and District Pond and Aquarium Society** (Mr. A. T. Rimmington, 51, East Park Avenue, Hull); **Loughborough Aquarists' Society** (Mr. T. A. Smith, 38, Derby Square, Loughborough, Leics.); **Oxford Aquaria Society** (Mr. V. H. Lewin, 21, Halliday Hill, Oxford); **Scarborough Aquarists' Society "Scalare"** (Mr. C. J. Cox, 30, James Street, Scarborough); **South London Aquarists** (Mr. R. H. Dew, 29, Dorien Road, Raynes Park, London, S.W.20).

Aquarist's Calendar

12th December: **Federation of British Aquatic Societies** general assembly, 2.30 p.m. at Friends House, Euston Road, London, N.W.1.

21st-28th December: **Plymouth Aquarist Society** display of aquaria at Plymouth School-boys' Exhibition, Hyde Park School, Plymouth.

Crossword Solution

S	H	R	E	D	D	E	D	W	O	R	M
I	E	I	C	I	U						
P	T	E	R	O	P	H	Y	L	L	U	M
H	D	S	I	Y	E	P					
O	H	M	O	N	I	T	O	R	S		
N	A	D	O	U	R	O					
O	R	C	S	I	S	C	O	W	E	T	
S	E	E	I	U	E						
T	A	E	S	C	O	R	T	I	N	G	
O	R	F	E	A	A	M	M				
M	I	N	S	T	N	P	I	E			
E	A	N	A	S	C	I	D	I	A	N	

PICK YOUR ANSWER (Solution)

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

A Gift

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Could fill a whole issue of *Aquarist* with eulogies from fanciers of the marvellous value of my plants, and the unsurpassable qualities of 'Elite,' but I don't get enough profit to pay for this, alas!

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- Plecostomus plecostomus** (Spiny Arm'd Catfish) 20/- each
- Corydoras julli** (Leopard Catfish) . . . 20/- ..
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- Barbus mahecola** (Mahécola Barbs) . . 7/6 ..

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