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AND PONDKEEPER

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Photo: Lawrence E. Perkins

Unusual East African puffer fish recently arrived at London Aquarium is Diodon hystrix. Ten inches in length, it has "quills" nearly an inch long which erect when the puffer inflates. The "quills" and queer eyes together endow this fish with an "owl and pussy-cat" appearance

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Editorial

THIS month is a good time to give some thought to the vexed topic of algae. To most aquarists these primitive plant life forms are a curse that give most trouble during early summer months, turning aquarium glasses green or choking ponds with tangled threads. The summer abundance of the growths, seen in natural waters as well, points to at least two promoting factors: raised water temperatures and increased light intensity. Observation tends to give the leading role to the second of these factors, but clearly the extent to which algae develop is affected by other factors in addition.

Here is a situation where much controversy can develop when advice on reducing aquarium algae is being offered. A reader has recently sent us a list of juxtaposed quotations from aquarium literature which provides at first sight a hopeless confusion of recommendations. Differences in advice occur because no single simple statement can take into account all the variable factors found in different aquaria or ponds with varying water supplies, different floral and faunal contents, and at different periods of the summer season, to say nothing of habit variations in the numerous types of algae which are encountered. For example, green algae are dependent on good lighting, yet after an initial early summer proliferation in natural waters they often go into a decline during high summer when light intensity is at its greatest. This may be (it would be incautious to say that it is) the explanation of apparent contradictions found in statements 1, to prevent algal growth avoid bright illumination and 2, to cure algal infestation greatly increase the lighting.

If the water under consideration contained algae and fishes alone there would be less of a problem. Green algae certainly will not flourish in weak light, but then neither will aquarium plants. Give enough light to satisfy the plants and the algae have at least one of their requirements. A whole host of circumstances will then determine whether or not a rampant growth will develop, and these render generalisations very misleading.

In the Water Garden in MAY

by Astilbes

Photo: Laurence E. Perkins

Pickerel weed (Pontederia cordata) growing in a thick clump—showing the spreading habit of this plant in a pond

DURING this month any division of water plants can be attended to, as growth will be at the maximum, so enabling the plants to become well established. Most water plants will get too large for the average pond in three or four years and many pond-keepers fail to realise this when first planting the pond. Almost everyone wants to see their newly made pond looking as if it had been made for years in a short space of time, and instead of waiting until the plants have had a chance to grow they try to fill up the pond with too many plants in the beginning. Then after a year or two the water cannot be seen for plants. I have seen ponds only three years old which have so many leaves covering the surface that it has been quite impossible to see any water. Nothing looks worse than this; one might as well not make a pond at all if the water is not visible.

As I stated in last month's article the rate of growth of the water plants will depend almost entirely on the amount of nourishment available in the pond. Plants in special pots can be restricted in growth whereas those planted directly into a soil base will soon get out of hand in anything but a very large pond. Where some of the plants have become so large that their leaves encroach over too much of the surface, drastic steps must be taken to reduce this excess growth. When water lilies start throwing up many leaves in tight masses above the level of the water it is a sure sign that they are becoming overcrowded and require pruning. The same applies to many other popular water plants.

Be Ruthless with Lilies

Few pondkeepers can bring themselves to be rather ruthless with their lilies, but yet this is the only thing to do to save the pond from losing its beauty. If a water lily has had good growing conditions it will need dividing in from three to four years. Especially is this the case where several lilies have been planted in one pond. Once the leaves of the different plants become entangled the whole look of the plants and pond will have been spoiled. Only enough plants should have been used to ensure that there is a good margin between each plant, as the beauty is often in the symmetrical shape of the leaf formation.

It is a fairly easy task to divide the water lilies, and the multiplication of specimens is simple. Where plants were originally set in pots these can be slid out of the pond for necessary attention. The plant can be removed completely from the pot as then the pieces of rhizome can be more easily dealt with. Sometimes pieces grow off from the main stock and can be broken off by hand; these will have several leaves and flower buds showing together with some roots and are ideal for forming fresh plants. Where the main stock has become very large and needs dividing the whole must be examined to make sure that when cutting the heads are not severed through the middle. The growing crowns should be seen quite plainly and divisions can be made with a large carving knife, or a garden spade can be used.

If the root stock has become very gnarled and old it may be necessary to discard the whole woody centre and concentrate on a few of the newer outside growths. These are more likely to thrive than the worn-out centre piece. Lack of flowers on some plants can be due to the fact that the main root stock has become impoverished. The younger growths should be potted up and the old can be thrown away or given to the local authority who may have ponds in need of planting. If water lilies are carefully divided they can flower the same year as dealt with, especially if those portions of crown are used which already show the flower buds. When replacing into the pond make sure that the young plants are not put too deep to begin with; stand their pots on a few bricks to bring the crowns nearer the surface. Once the plants are making good growth the bricks can be removed and the pots lowered.

Other Rampant Growers

Other water plants will have to be divided too, as such specimens as *Pontederia cordata*, the pickerel weed, can spread over most of the pond in a few years. I had a friend who planted some in a rather large pond but after some years the plant had become a pest, covering almost the whole pond. The pond in question had a good layer of clay on the bottom and so of course the plant had become so rampant that it was almost impossible to clear the bottom of pieces of the plant. When ordering plants for the pond it is well to find out from the dealer if the plants are of a type which increase by runners as these soon get out of hand. Some of the *Sagittaria* such as *S. japonica flor pleno* are not so rampant but increase by small, bulb-like off-sets.

When the young side pieces of a water lily or similar plant are set in a pot it is advisable to run a piece of galvanised wire around the top of the pot just under the rim and then a cross-piece right over the top of the plant. This will ensure that it will not be possible for the plant to float from the pot at a later date and rise to the surface. I have known quite large water lilies leave their pot completely and float on the surface when nothing has been done to form some anchorage. If pots are used which have holes round the lower sides it will be found that after some time the roots will grow through these and into the surrounding mulm and so become firmer.

Now is a good time to plant under-water oxygenating plants and to start these off well all that is necessary is to place some cuttings on the top of a pot of soil and sand and lay a stone over them so that they will remain steady until new roots have been formed. I find that if pieces of lead strip are used to weight pieces of plant the stem often breaks where the lead cuts into it and the cutting floats to the top.

Creation of the Blue-Black Medaka

by Dr. MYRON GORDON

Geneticist to the Aquarium, New York Zoological Society

ABOUT 1915, Professor Makoto Ishiwara, a Japanese geneticist, lectured on the subject, "On the Inheritance of Body Colour in *Oryzias latipes*" before the Kyushu branch of the Japanese Association of Neurology. Later this lecture was published in the Medical Journal of the Fukuoka Medical College. Fifteen years later Dr. Ishiwara kindly sent me two copies of this paper, one carefully transcribed in its original Japanese and a second thoughtfully translated into English. These are historic documents because his paper presents the second ever written concerning Mendelian inheritance in a fish, the Japanese medaka.

Only blackish brown medakas live wild in ponds and rivers in the vicinity of Fukuoka, Ishiwara said, but he was able to obtain two lighter-coloured varieties, one orange red, the other white, from fish culturists. He explained that the wild medakas have many black and yellow pigment cells in their skin—a combination of colour cells which gives them their characteristic dark olive grey to brown coloration. The orange red variety of the medaka has only a few of the black pigment cells in its skin, but many of the yellow ones. The white strain in contrast has only a few black and yellow pigment carrying cells.

1. When Ishiwara mated a brown coloured medaka to an orange coloured one, he discovered that the brown is dominant to orange because in the offspring of the first generation he obtained only brown coloured medakas; none were light in colour.

2. By making other matings between the orange and white medakas he found that the orange is dominant to the white.

3. From the mating of a brown medaka, with its rich supply of black and yellow pigment cells, to the white rice paddy fish, the least coloured one, the Japanese fish culturist developed a new variety which was *blue-black* in colour. This is the explanation of how Ishiwara got his black medakas from two differently coloured ones.

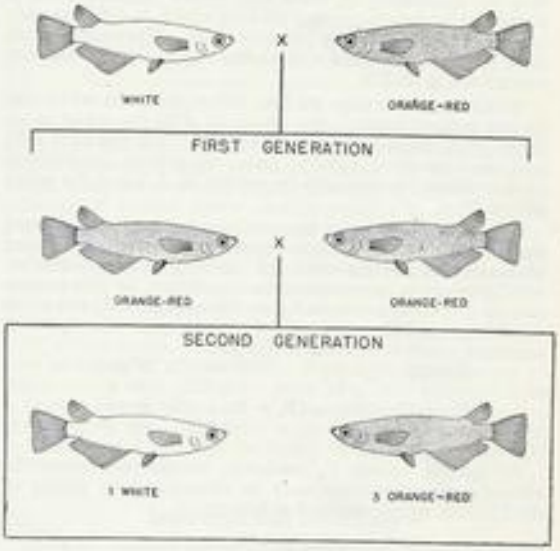
When Ishiwara mated the brown coloured medaka to an orange coloured one, he discovered, as was indicated before, that the wild colouring is the dominant trait. This may be expressed as follows:

Parents (P_1) = Brown (BB) × Orange (bb)
First Generation (F_1) = Brown (Bb) × Dark (Bb)
Second Generation (F_2) = 3 Brown (1 BB; 2 Bb), 1 Orange (1 bb)

As may be seen from the above, he obtained, on the average, three brown coloured medakas to every orange coloured one. This result reflects a typical Mendelian ratio of 3 to 1 in which the dark, or brownish black colouring is dominant to the lighter or orange colour. The experiments done by Ishiwara's predecessor, Ishikawa, are in complete agreement with these results. In another series of matings he crossed the orange medaka to the white variety and obtained again a typical Mendelian ratio in the second generation.

Since the orange colouring is the result of the presence of many yellow pigment cells he designated Y to represent yellow colouring and y, the recessive, to represent white or one which has few yellow pigment cells. But since geneticists after Ishiwara designated the orange medaka by the letter R for orange-red appearance and we will want to review their work too, later, it would simplify the continuous account if we were to use R instead of Y and r instead of y.

Parents (P_1) = Orange-red (RR) × White (rr)
First Generation (F_1) = Orange-red (Rr) = Orange-red (Rr)
Second Generation (F_2) = 3 Orange-red (1 RR; 2 Rr), 1 White (1 rr)



In the second generation Ishiwara again obtained the typical ratio of 3 orange-red to 1 white.

The Blue-Black Medaka

Then, the Japanese geneticist mated the brownish-black coloured medaka with the white one. From this mating he obtained ordinary dark coloured fish in the members of the first generation. When he mated some of the dark fish of the first generation, brother to sister, he eventually obtained in the second generation some medakas of the new colouring which were *blue-black*.

An important principle is involved in this experiment, a principle that successful fish fanciers may possibly have learned from their own experiences rather than from a knowledge of genetics. It is this: often, the new variety the fancier seeks may be obtained not directly from the offspring of the first mating but from the members of the second generation. The desirable ones are often derived as offspring from unpromising first generation parents. When Ishiwara obtained only dark coloured fish in the first generation, he was not disappointed. He knew in advance,

being a geneticist, that the dark colouring was dominant to the lighter. He expected that the offspring of the first generation would resemble their dark, dominant parent. He also knew that although the young of the first generation resembled their dominant parent in colouring, they differed from them in their breeding ability.

Perhaps some of the thoughts that Professor Ishiwara had, during his effort to obtain blue-black medakas from brown and white ones, were based upon his knowledge of the genetic constitution of his stocks. The three pure breeding colour varients of the medaka that he had at first are as follows:—

Variety	Constitution
1. Brown	*BB RR*
2. Orange-red	*bb RR*
3. White	*bb rr*

These genetic constitutions of the three colour varieties were derived from the knowledge that the brown medaka, with its abundance of black and yellow pigment cells, is dominant to the orange-red medaka which is deficient only in the number of black pigment cells. Therefore, while both have the *RR* gene, the brown one is *BB RR* and the orange one is *bb RR*.

Similarly, the orange medaka differs from the white one in one pair of genes; the orange is *RR*, the white is *rr*. Since both orange and white lack the black pigment cells and are recessive for the *bb* gene, the genetic constitution of the orange medaka may be written *bb RR* and the white one as *bb rr*.

In the list giving the three colour varieties as indicated above the genotype *BB rr* is not represented. Ishiwara obtained the medaka with the missing genotype *BB rr*, which turns out to represent the blue-black, by first mating two of the varieties he had, one brown *BB RR*, the other white *bb rr* as follows:—

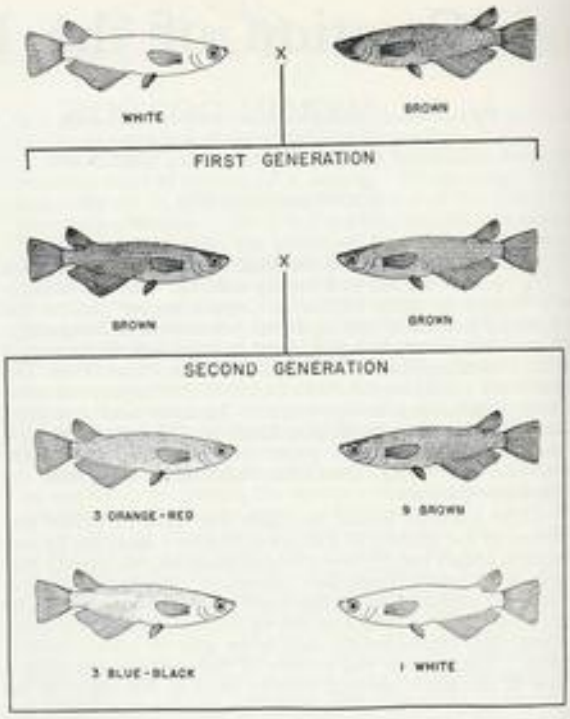
Parents (P_1)	= Brown	×	White
	BB RR		*bb rr*
First Generation (F_1) = Brown		×	Brown
	Bb Rr		*Bb Rr*

By mating brown F_1 medakas, brother to sister, the second generation types may be anticipated by means of the Punnett square method as follows:—

Gametes of F_1 Brown Male:

Gametes of F_1 Brown Female:	*B R*	*B r*	*b R*	*b r*
B R	Brown 1 *BB RR*	Brown 5 *BB Rr*	Brown 9 *Bb RR*	Brown 13 *Bb Rr*
B r	Brown 2 *BB Rr*	Blue-black 6 *BB rr*	Brown 10 *Bb Rr*	Blue-black 14 *Bb rr*
b R	Brown 3 *Bb RR*	Brown 7 *Bb Rr*	Orange 11 *bb RR*	Orange 15 *bb Rr*
b r	Brown 4 *Bb Rr*	Blue-black 8 *Bb rr*	Orange 12 *bb Rr*	White 16 *bb rr*

By counting the similar *visible* types (phenotypes) in the second generation, we may determine that there will be four colour groups. Their frequencies based upon 16 F_2 individuals will be in the ratio of 9:3:3:1. These, of course, will be the theoretical results expected. The actual results Ishiwara obtained will be given so that we may compare how closely his actual results coincide with the theoretical



figures. It should be kept in mind that the following genotypes, *BB RR*, *Bb RR*, *Bb Rr*, look alike. *BB rr* and *Bb rr* resemble each other; and *bb RR* and *bb Rr* are also phenotypically the same. That makes three groups. The fourth type is represented by the double recessive, *bb rr*.

Theoretical Results Expected On Basis of 16 F_1		201.0 F_2	Actual Results Obtained On Basis of 201 F_2 Fish
B R, Brown	9	113.0	122
B r, Blue-black (new)	3	37.7	34
b R, Yellowish red	3	37.7	36
b r, White	1	12.6	9
	16	201.0	201

Note how closely the results obtained by Ishiwara match the theoretical values. For example, on a basis of 201 second generation offspring he recovered 122 when he expected to get about 113. Actually he got more of the wild brown black medakas than he expected. On the other hand he got only 34 blue-blacks when he expected 37; only 36 yellows when he expected 37, and only 9 whites when 12 were expected. One could conclude, tentatively, that the brown-black medakas are slightly hardier and have a better chance of surviving than the lighter coloured varieties. On the whole the results Ishiwara obtained are remarkably close to those expected on the basis of Mendelian theory.

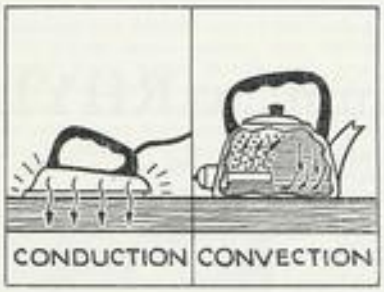
In 1921, still another Japanese geneticist, Tatsuo Aida, began to publish his results on inheritance of colour patterns in medakas. His work is particularly important because it introduced a new colour pattern and new methods of inheritance now well known to modern geneticists, but unknown to Mendel. Aida's work will be reviewed in forthcoming articles.

The Efficient Use of Aquarium Heaters

by A. P. RAYNER, B.Sc.

AMONGST the many factors which an aquarist has to bear in mind, while aspiring to successful fish keeping and breeding, are those of the reliability and efficiency of his heating equipment. The question of reliability of such equipment rests, to a great extent, with both its designers and manufacturers. Even so, the maintenance of the initial reliability is a very important factor to be watched.

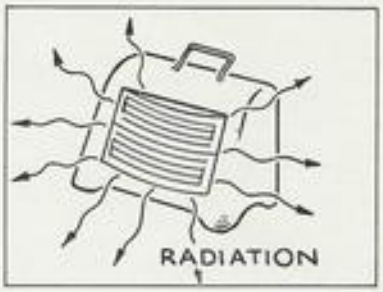
The efficiency of the heating equipment is likewise dependent upon the various design factors that are essential to the efficient operation of the apparatus. However, the efficiency is to a great extent governed by and dependent upon the manner in which the apparatus is, in practice, used (it is to be noted that this is equally true of reliability). Before proceeding to discuss some factors relating to the efficient use of electrical heating equipment, I feel that a very brief account of the processes by which "heat" may be transferred from one body (or substance) to another body (or substance) will be quite useful. Generally speaking "heat" may be transferred from one body to another by three processes. These are conduction, convection and radiation.



Conduction is concerned with the direct transfer of heat from one body to another by direct contact between the two bodies. The rate at which the heat is transferred is controlled by quite a number of factors, but for our purposes the most important of these is the inherent ability of a body to conduct heat. The physicist calls this factor the thermal conductivity of the body. This factor is different for each body; most metals having a high conductivity whilst that of liquids, e.g. water, is relatively small, as is also the case with substances like stones.

The second method of transfer, convection, may be regarded as the transportation of heat by the actual motion of the particles of the substance being heated. It is apparent that convection takes place in liquids and gases. The action of convection is based upon the fact that as the particles of a liquid are heated, the heated particles become lighter in weight, and in consequence tend to move upwards through the liquid or gas, whilst the colder particles, being heavier, tend always to move downwards. It will be seen that if a liquid is heated from the bottom, the particles heated by the heater rise through the liquid, whilst the colder particles fall towards the lower parts of the container. It will be apparent that, with a continuous heating, a cyclic process will be set up, i.e. the hotter particles continuously rising and the colder particles continuously falling.

The remaining process of heat transfer, radiation, is primarily concerned with relatively high temperatures, that



is, temperatures far in excess of those met with in our tanks. However, perhaps it may not be generally realised that the upper layers of a tank are usually heated by the action of lamps used for overhead lighting, which give a very large quantity of radiant heat; consequently, it is advisable to position the thermostat below this zone, for the tank heater may be permanently off even though the lowermost regions of the tank are quite cold. I would suggest that the simple experiment of checking the temperature of the water at the top and bottom of the tank is carried out. The result is often quite surprising. I have known a tank to remain at 75° F. for weeks, yet the above test shows that a temperature variation of 15° to 20° F. is present. An answer to this problem is to modify the tank lid so that reflected light is used. The modification of a metallic lid is quite simple and requires the addition of a tin box jutting out around each lamp, and painting the inside of the lid white so that a reflector is obtained.

Materials and Heat Loss

In order to effect the efficient utilisation of our electrical heating equipment let us consider the substances which form the greater part of our tanks. These are, water, stones, glass, slate and the metal framework.

For interest's sake let us compare the thermal conductivities of these substances.

Substance	Thermal Conductivity (approx.)
Water	14
Stones	4
Glass	17
Metal (steel)	1100
Slate	33

From the table we see that (a) glass and water conduct heat to approximately the same extent; (b) slate conducts heat twice as well as water and glass; (c) stones are bad conductors (one-quarter that of glass); (d) metals are good conductors (75 times that of glass).

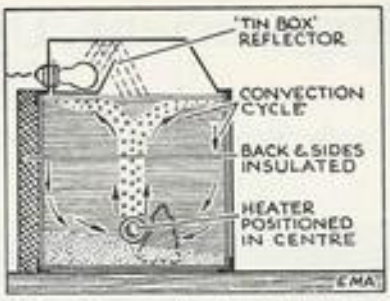
By now you may be saying, what has all this to do with my fish? I don't want to know how long or how quickly

my fishes heat up from tip to tail! Well, the above data tells us clearly that by placing our heaters near to the glass walls of our tanks, we are losing a great deal of the heat through the walls. Consequently, it is preferable to locate the heater as far away from them as possible, so that the longest liquid path is available. Secondly, the walls of the tank should be lagged, say at the back and sides, to offset heat losses from the glass walls.

Conserving Heat

This lagging does not mean completely hiding the fish on three sides, for a material like celluloid has a thermal conductivity of one-third that of water or glass. Another suggestion is to paint an underwater scene on paper and stick this to the glass on, for example, the back of the tank, since the conductivity of paper is one-fifteenth that of glass. If you dislike the idea of sticking paper to the glass, a background painted on wood serves just as well; in this connection balsa wood is the best from the lagging point of view. It is also apparent that the boxing-in of a tank for decorative purposes also serves to conserve the heat energy delivered by the heater.

In addition, we note from the table that the stones, which are often used for decorative effects, etc., have a hidden blessing, namely, reducing heat losses through the bottom of the tank. Whilst we have the stones in mind, we see that those who embed their heater either to hide it, or to ensure that it stays on the bottom are unwittingly losing quite a large proportion of the useful heat output by warming the stones. Consequently, we should locate our heaters clear of the stones. A couple of lead bands around the heater will keep it down, and at the same time leave a gap beneath it. This latter suggestion also helps in the convection transfer, since there is a larger



Sectional end view of an aquarium showing ideal features to avoid excessive heat losses

quantity of free water adjacent to the heater, which means that more particles of water can be heated by it during the convection heating.

Thus it is better to locate the heater near the bottom of the tank as opposed to a location in one of the top corners. This is apparent from the fact that the heated particles will have a greater distance to rise through the water and in so doing the cyclic process is effected over a greater volume of water. This leads to the fact that in the case of long tanks it is far better to employ two or more heaters in the tank; they may, of course, be actuated from the same thermostat. The introduction of two or more heaters assists in eliminating "dead spots" in a tank.

To sum up, we see that by locating our heaters well away from the glass, and by lagging, etc., we can prevent large quantities of our useful "heat" output from being wasted.

New Municipal Aquarium at RHYL

LAST year an aquarium opened at the Botanical Gardens at Rhyl provided a new interest for holidaymakers, and the innovation was so well received that the council was encouraged to extend the display. This year an extension has been built and a series of larger aquaria installed for the exhibition of coldwater and tropical fishes. The aquaria have been made in concrete, each six feet in length, two feet three inches high and two feet wide; plate glass, half-an-inch thick, is used to cope with the pressure of water (about half a ton in each tank). Mr. J. McCartan, Parks Superintendent to Rhyl Council and designer of the aquarium, is seen inspecting the tanks during construction in the picture on the left, and at the right a rear view of the tanks is given, showing the taps used for emptying and the step to facilitate maintenance from above. A glass roof provides natural lighting for the tanks.

North American Aquarium Sunfishes

by A. BOARDER

MOST of the sunfishes kept in captivity will breed from June to August when there is a water temperature of about 65° to 75° F. Naturally the fishes must be adult or almost so before they can be expected to breed, and they must be conditioned well on live foods, the garden worm being a special favourite. Most kinds will make a depression in the sand or gravel with their fins and snout and the eggs are laid in this cavity. If no sand or gravel is present certain species have been known to deposit their eggs anywhere in the tank. The male fish usually guards the eggs until they hatch, which time will vary somewhat with the temperature of the water. A three-day hatch is possible with a temperature of just over 70° F.

Not all sunfishes are alike in their breeding habits as some kinds lay their eggs among aquatic vegetation. There appears to be a difference in breeding behaviour among certain of these fishes; in some cases the male guards the eggs and young whilst in others the female will do so. So few of the more uncommon sunfishes have been bred in captivity that it is difficult to obtain much information about their habits. All types of the fry can be reared by using a method approaching that for rearing fancy goldfish.

That is, a start is made with Infusoria as soon as the fry are free swimming and then the size of the foods is gradually increased by giving micro worms, then brine shrimps, following with small white worms and tiny *Daphnia*. Once on small *Daphnia* the fry soon grow and are able to take larger foods such as ordinary white worms, mosquito larvae, glass worms and next small pieces of garden worms. Unless there is plenty of room in the breeding tank and plenty of cover for the fry it is well to remove the parent fish as soon as the fry are free-swimming, sooner if they show signs of eating the eggs.

When live foods have not been available it has been known to rear sunfish fry with the yolk of hard-boiled egg, but if any type of still food is used it is a good plan to have an aerator in the tank to ensure that the fine particles of food are kept on the move as much as possible. The fry make good headway as long as they are provided with plenty of the right food and have breathing space in the tank. As they grow it may be necessary to remove some to prevent overcrowding. Most of these fishes are not very long lived in tanks, and a life of about three years is all that can be expected of most of them. If running water can be provided it will be found that many will live longer and remain much healthier. This point emphasises the fact that fresh, clear well-oxygenated water is essential for the sunfishes as a general rule.

The species which are sometimes kept in aquaria will now be dealt with and certain details as to identification will be given as a guide to the recognition of each species mentioned. Although many popular names are listed it must not be thought that some of the fishes are not known locally by other names as well; in any case it is hoped that sufficient information is included for each species to make identification not too difficult.

The common sunfish (*Eupomotis gibbosus*), is perhaps one of the best known of the group and is often seen in Britain at shows. Some of the popular American names for this fish are:—sand perch, crapet jaune, tobacco-box,

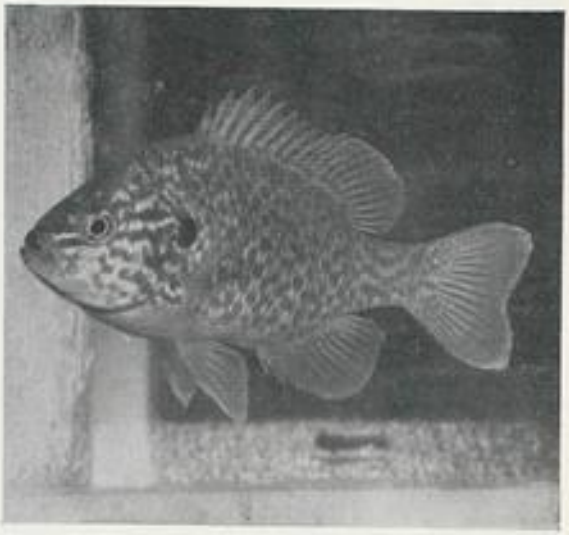


Photo : Laurence E. Perkins

Common sunfish (Eupomotis gibbosus)

flounder, redbelly, flatfish, yellowbelly, pumpkinseed, ruff, sunny, robin perch, female perch, northern pomotis, pond perch, kiver, quiver and harlequin. This fish can grow to eight inches in length and is very handsome. The colour is pearly with mottlings of black and orange in a chequered pattern. The belly and lower fins are brassy. There is a scarlet spot on the rear of the gill cover where it forms a small protuberance, but not such a distinct "ear" as in some species. There are three spines at the front of the anal fin, and the mouth is fairly small in comparison with some of the other species.

When in good condition this fish is so brilliantly coloured that it appears to be covered with small gems, in blues, greens and yellows. The male fish can usually be recognised by the fact that the ear marks are more conspicuous than on the female and the dorsal and caudal fins are a brighter blue. It is a native of the regions of the Great Lakes of North America. Spawning usually takes place in June or July and a depression is made in the sand for the eggs. The eggs are said to be adhesive and cling to the sand or gravel. This fish is rather a quarrelsome one and is best kept away from other species. Common sunfish have been kept in confinement for four years under good conditions.

The peacock-eyed sunfish or bass (*Centrarchus macropterus*) is also known as millpond perch, round bass, flier, round sunfish, flying perch, diamond bass, long-finned sunfish, shining bass, many-spined sunfish, peacock sunfish, sac-a-lait, and large-finned bass. The ground colour of this fish is green with blackish bars running down the sides. When young there is a mark like the eye of a peacock's feather at the rear base of the dorsal fin but this mark fades as the fish matures. The older fish still retain some of the dark bars, especially the one through the eye. This species can reach a size of six inches and can be kept for about three years.

The peacock-eyed sunfish breeds in a similar manner to the common sunfish and the male generally takes care of the eggs and fry. It is a very good aquarium fish and will learn to take some dried foods (such as dried shrimp). It is a

native of southern Illinois, Virginia, Florida, and the Mississipi valley. This fish has a normal shaped gill plate and the front rays of the anal fin merge into the rear ones and are seven in number. The dorsal fin gradually rises and increases in height towards the back portion.

The black-banded sunfish (*Mesogonistius chaetodon*), also known as the chaetodon, is a favourite fish among aquarists owing to its peaceful disposition. The colour of this fish is a pearly-grey with several black bands running vertically down the body. Some of these bands are complete but others are broken. The anal fins are black and orange. It is smaller than the two previously described species, reaching a length of about four inches. It looks very well in a tank and although it appears fine in a group it is said that often these fishes thrive better when not kept with too many others of the same species. The eggs are usually laid among aquatic vegetation and hatch in about four days at a temperature of 70° F. If well fed with Infusoria and then given egg yolk and mashed earth-worms the fry soon grow and take on the adult shape, reaching the size of an inch and a half in about five weeks. The black-banded is perhaps

Photo: Laurence E. Perkins

Young black-banded sunfish (Mesogonistius chaetodon) look very fine in a group

not quite as hardy as some of the species and will usually live for three years, although it is on record that one lived for 10 years under good conditions. It is found in sluggish waters in streams, creeks or ponds from Maryland to New Jersey and seems to prefer slightly acid waters. If these fishes are kept in an outdoor pond it would be safer to remove them to slightly warmer quarters for the winter. Some people keep these fishes in almost tropical conditions but too high temperatures are not recommended as the fish may not live so long as when kept at normal room temperatures. Conditions suitable for veiltail goldfish in this country will suit the chaetodon.

The diamond bass (*Enneacanthus obesus*) is also known as spot-finned sunfish, moon bass, rock sunfish, blue-spotted sunfish, spotted sunfish, banded sunfish, little sunfish and little bream. There are many silvery blue spots along the sides of the body and dark vertical bars down the sides. There is a small black spot on the gill plate. The caudal fin is rounded, which is unusual for the majority of the sunfishes. These fishes reach a length of nearly four inches and spawn among water plants. It is said that the adult fish may eat the eggs if not separated from them. They are found in streams from New York to Florida and have been often found in brackish waters near Chesapeake Bay.

There is another type of diamond bass (*Enneacanthus gloriosus*), known as the little sunfish, which is rather similar to the previously described fish. This fish gets to three inches in length but there appears to be some confusion over the correct scientific name of the species; *gloriosus* is given by some people to the larger diamond bass and by them the smaller one is named *obesus*. There are many dark vertical bars on this fish and sky blue spots on the body of the male. It is found in Massachusetts and Florida in creeks and rivers.

The red-spotted sunfish (*Allotis humilis*) is also known as the orange-spotted sunfish. This is a very showy fish and highly desirable as an aquarium fish. The ground colour of this handsome fish is olive or bluish green with small dots of gold and emerald. The belly is deep orange with a suspicion of brown, with about 20 to 30 orange spots on the sides of the body. This fish is found in small rivers and lakes in Illinois and the Mississipi Valley. This is quite a peaceable fish and does well with other species. It will live in captivity for about three years but does not appear to have been bred in aquariums. It can be kept in a garden pond and is very attractive and active during the warmer months of the year.

The blue-green sunfish (*Aponotis cyanellus*) is also known as: blue-spotted sunfish, blanco perch, green sunfish, wood bass, blue bass, buffalo sunfish, bluefish, black-eye sunfish, little red-eye and black-eyes. This fish has fairly large "ears" and has sometimes been sold as the long-eared sunfish. This is the common sunfish of the west and is found in Mexico, Louisiana and the Mississipi Valley. The colourings vary somewhat with different specimens. Some show a green ground colour whilst others are more blue-green. They are more yellow underneath and there are many blue-spotted scales on the body. They reach a length of seven inches and as they are inclined to be bullies should be kept to themselves, except when breeding. Although in nature it will feed almost entirely on live foods it will take many other kinds of food if live foods are not available. If disinclined to feed then crushed water snails should be offered; few blue-green sunfish can resist these.

The red-breasted bass (*Lepomis auritus*), also known as red-bellied bream, redbelly, kiver, quiver, black-eared pondfish, leatherwing, leather-ear, red-bellied robin perch, red-headed bream, red perch, red-tailed perch, yellow belly, yellow perch, robin, and horn-eared sunfish, is a beautiful fish, being blue with red spots overlaid with green. The lower parts of the fish are red. The elongated gill plate or ear is very conspicuous, with orange-yellow edges and black inner markings. The red-breasted sunfish can grow to eight inches in length and although a common fish in America does not appear to be imported into this country very often.

The long-eared sunfish (*Xenotis megalotis*) is also known as red-eyed sunny, small green sunfish, brilliant sunfish, big-eared sunfish, sun perch, eared sunfish, bloody sunfish, blackears, redbelly, black-tailed sunfish, red-eyed sunfish, and long-scaled sunfish. As some of the names imply, this fish has elongated ear-flaps to the gill plates. The colour is a brilliant blue and orange, the upper parts blue and the lower orange. On the sides of the fish may be seen vertical stripes of blue and spots of orange. The lips are blue and the cheeks orange with bright blue stripes. The fins are orange with blue rays. The colours of these fishes can vary considerably but in all it is a very handsome species and would be much sought after in this country if imported. This fish resembles the common sunfish in its requirements and will live for about three years in aquariums. Specimens can grow to six inches in length. The native habitat is from Michigan to Minnesota and South Carolina to the Rio Grande.

(*To be continued*).

Book-Case Aquarium Stand

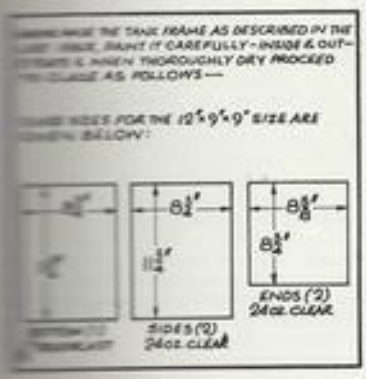
described by A. G. F. MALCOLM

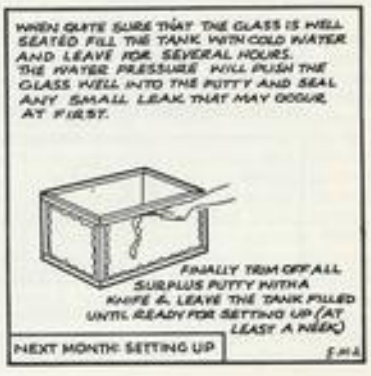
I HAVE recently designed and made the aquarium stand incorporating a book-case and desk, shown in the accompanying photograph, and the following details of its construction are given for the benefit of other readers who may wish to benefit from my experience. The aquarium itself is standard, 36 ins. by 18 ins. by 18 ins., and the frame is galvanised; its canopy, made from aluminium sheet (22G), carried two 40 watt bulbs. The side and back glasses were painted with blue (light to navy) before finishing off with brown paint to match the stand.

The stand comprises a steel-framed bookcase-unit, the desk section consisting of a pigeon-holed pull-out drawer with a "fall" front. Oak doors fitted with "Perma-lead" lead lights are fitted to the front of the book-case, the side panels of which are made from hardwood-faced plywood with small wood blocks glued to the inner surfaces and clipped to the angle-iron framework. A contrasting reduced moulding edge was used for the plywood to give a better finish. The width of 18 ins. was too great for the book-shelves, so a painted plywood false back was fitted to the book-case section, providing two cupboards at the rear, used for stowing aquarium accessories. The lowest shelf was left with the full width however, for storing periodicals and large books. The unit was finished in walnut brown French polish.

The assembly has been mounted on four ball castors capable of holding the weight, but this is an added refinement and not really necessary since the tank cannot be moved when set up. With an aquarium of this length I recommend that a strengthening bar is used for the longer sides, as they have a tendency to give, although I have not used such a bar. With the exception of the welding all the work was carried out by myself, and in view of the high prices charged for such jobs a careful account of cost was kept. The bill came to just over £11. It seems that labour charges are very high these days.

Glazing Tank Frames





Microscopy for the Aquarist—8 *by* C. E. C. COLE

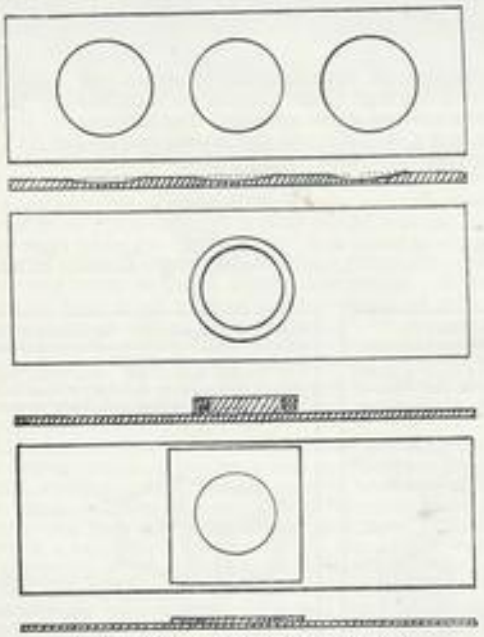
WITH the purchase of a microscope we have not procured all we need in order to embark upon the closer examination of things aquatic. We shall need one or two glass slips, a few cover glasses, and a small pipette—a fountain pen filler is ideal for many subjects.

Flat glass slips are made in various thicknesses, but of standard dimensions—3 ins. by 1 in. They are suitable only for examining very small, very flat objects. Better for pond or aquarium life are cavity slips. These are slips with a small depression made in the centre, in which a drop of water can be placed. Most firms make these, but W. R. Prior & Co. Ltd., stock particularly useful ones with two cavities and three cavities.

The two-cavity slips are 7s. 6d. per dozen, and the three-cavity 11s. Beck make fused microscope cells at 7s. 6d. each, several designs of which are most useful for aquarists. Messrs. Flatters & Garnett produce an admirable slip which consists of a square piece of glass with a circular hole in the middle, which is securely cemented to an ordinary flat slip. This is provided with six square cover slips, and costs only 1s. 3d. Cover slips are necessary to flatten the surface of the water, which would otherwise act as a lens.

Using any of the above, now let us proceed to examine a creature with size and depth—a *Daphnia*. With the pipette catch one and place in the cavity or cell with a drop of water. Lower the cover glass gently over the cavity, which should have just sufficient water in it to be completely filled when the glass is in position. Otherwise a large air bubble will completely ruin operations.

Place the slip under the clips on the stage, so that the cell is directly beneath the objective, using the lowest power objective at first. See that the concave side of the substage mirror is uppermost, and tilt this towards the light—a window, an electric torch, or the electric light of your room.



Three types of cavity slide shown in plan and sectional views

Move it backwards and forwards until a shaft of light is seen to illumine the water.

Now rack down with the coarse adjustment until a faint movement is visible through the objective. Slower now, continue the downward movement, and the magnified *Daphnia* will come into plain view. You will be surprised, even with this low magnification, at the detail which will be revealed. The heart will be plainly discernible beating away at the back of the shoulders, as it were. Do not be misled into thinking the rhythmic beating of the five pairs of legs is the beating of the heart. The legs beat to create currents of water which bring particles of food to the *Daphnia*.

Note the single large eye, which seems constantly to be rolled back and forth by muscle fibres. Notice, too, the tiny facets, appearing like minute bubbles round its perimeter. Beneath the large eye there is a tiny black spot—the ocellus. At the extremity of what appears to be a snout is a small projection surmounted by a few hairs—an organ of sense, much smaller in female than in male *Daphnia*. That which appears as a crude question mark in the centre of the body is the gut, usually crammed with food. On either side of this are the oviducts, usually carrying eggs in a grape like cluster. The next batch can be seen even while the young *Daphnia* are in the mother's brood case preparing to escape. See, too, the transparent backward processes at the lower extremity of the body, which imprison the eggs and embryos until they are ready to emerge.

Mark well the way the abdomen ends in a clawed tail—often mistaken for a leg owing to its position and frequent movement. The claws are present to comb the numerous hairs with which the legs are furnished, and prevent them from clogging with debris. The strong, branched, "arms" —actually antennae—with which the creature beats its jerky motion through the water, will also claim attention, but under a 2 ins. lens will not reveal much fine detail of structure. Further examination will, therefore, best be deferred until we have fixed a higher power objective.

It might well be that the vigorous movement of the creature in the comparative freedom of the large cell will render detailed examination well-nigh impossible. Should this prove to be the case, movement can be considerably restricted by the introduction of a ring of cotton wool, which will soak up some of the water, and also reduce the area of the cavity.

If no cavity or cell slips are available, a tiny ring of cotton wool can be substituted on an ordinary glass slip. This has the advantage that it can be made as small or large as desirable. If too thin however, the weight of the cover glass will crush the object under examination.

Cacti in the Fish House

A GOOD cactus for aquarists is the rat-tail cactus, *Aporocactus flagelliformis*, as this will make long slender growths which can hang down at the ends of a tank and not only give some shade from the sun but will look very attractive into the bargain. Many cerise coloured flowers will form in the early part of the year. The genus *Mammillaria* contains at least 300 different species and is ideal for most people as generally the plants keep fairly small and so lend themselves well to the grower with small spare space. Although most of these do not have large flowers they often have two or three rings of flowers around the top of the plant which are often followed by brightly coloured fruits. To ensure that many fruits are formed it is essential that pollination is carried out on the flowers, when the sun is shining for preference.

AQUARIST'S Notebook——

by
RAYMOND YATES

IN the United States, unlike Britain, quite a large number of clubs issue their own magazines, and most of these are very good indeed. In addition, there are four national magazines dealing with the hobby. The oldest of these is *Aquatic Life* which is published in Baltimore, monthly, at 15 cents a copy. It claims to be the oldest magazine in the English language for the aquarist, having first appeared in 1915, but its publication has not been continuous. Many of the articles which appear are translations from continental aquarium magazines and are well worth reading. This is the cheapest of the major magazines dealing with the hobby. The second is *The Aquarium Journal*, which is issued by the San Francisco Aquarium Society, monthly, price 25 cents. This was established in 1928 and is run as a non-profit organisation for the benefit of aquarists everywhere. All funds which it receives are used to increase its quality and effectiveness. Club meetings are held in the Steinhart Aquarium at the California Academy of Sciences. Articles by most of the leading writers in the hobby appear in its pages, which number around a dozen plus some 26 advertising pages.

Thirdly, we have *The Aquarium*, published in Philadelphia by Dr. Wm. T. Innes, who needs no introduction to readers of this magazine. He has been publishing *The Aquarium* monthly since 1932. It is now the dearest of the American magazines at 30 cents a copy, but it is also the largest, having some 32 pages of text and roughly 58 pages of advertising matter. There are many fine photographs although some are rather well known ones by now. Long articles by leading aquarists are a feature. There is always a coloured front and this is also a feature of the fourth and last of these American magazines, *Tropical Fish Hobbyist*, issued by Mr. Herbert Axelrod in New York. Mr. Axelrod also needs no introduction to our readers following his visit to England last year when he met many leading aquarists. Readers will probably have read his very fine book *Tropical Fish as a Hobby*. The magazine is a relatively new venture now in its third volume. It is published bi-monthly at 25 cents. (25 cents.=two shillings). This magazine is smaller than the others and runs to about 68 pages of which about 15 are advertising matter. There are many fine photographs and the articles deal with famous aquarists such as Dr. Werner Ladiges, Senor Ramirezi of dwarf cichlid fame, as well as notes on fish, breeding, water hardness and other things dear to the heart of the aquarist. This magazine also reprints *The Aquarist* crossword by J. Laughland.

All these magazines are good, all serve a very useful purpose in the hobby and all of them are read internationally. They cannot be compared with British magazines in size, as ours (with much higher paper costs) use smaller type and narrower margins and fewer gaps in set-out. There remains one other magazine which caters for the hobbyist, this being the *All Pets Magazine* issued monthly in Wisconsin. Founded in 1934 this magazine has stood the test of time in catering for all pet lovers. It includes sections on cage birds, canaries, dogs, cats, aquaria, fowls, pigeons, rabbits, cavies, hamsters, pet shop and children's corner. It runs to 92 pages and has over one-thousand advertisers each month, thereby enabling readers to obtain any pet they need.

* * *

The Nottingham club recently co-operated with the management of a local cinema by putting on a display of aquaria. This was a great success and attracted much interest. The management showed their appreciation by providing the club with two free tickets weekly for the rest of 1954 and the whole of 1955. There are many opportunities nowadays for clubs to put on displays at cinemas, in particular where sea films or underwater pictures are being shown. Recent titles such as "The Sea Around Us," "Hunters of the Deep," "Beneath the Five-mile Reef," "Under the Red Sea," all show the interest taken by the movie world in aquatic life. Clubs should investigate what can be done in their locality.

* * *

A Cheshire club some time ago organised a pet show for juniors. Practically anything was allowable quite apart from fish. This is a very good idea and is a great deal of fun for the organisers and club members, not to mention the children. It is also a grand advertisement for a club, one which is likely by roundabout methods to bring in new members. There is no difficulty in obtaining entries if you advertise it well and circularise the local schools, youth organisations, etc. There is much scope for unusual winners such as "Largest Pet," "Smallest Pet," and so on. Care must be taken to see that pets which do not see eye to eye, such as cats and cage birds or mice, are suitably separated. This sort of show is best held in summer, as much as possible in the open air if opportunities allow.

* * *

I get around quite a lot and one thing which annoys me is the fact that so many municipalities have ponds or lakes in their areas, attractive enough in their way, but all devoid of fish life. There are several reasons for this. Probably the most important one is the fact that the local council are not fish-minded and just "couldn't care less." Expense may be a factor. In seaside areas the excuse put forward for empty pools is that gulls would remove any fish introduced. This may be so, but the pool in the magnificent rock gardens at Llandudno has contained large goldfish and golden orfe for many years, although situated on the Great Orme, the home of hundreds of thousands of seabirds. The pond in Piccadilly gardens, Manchester, was nearly presented with a stock of goldfish by a local dealer until he remembered that they would all be fished out in a week by small, and not so small, boys. Southport must feel the same because there are no fish in the ponds in Lord Street. On the other hand there are many places where the visitor is delighted with the lazy antics of large pond fish, as, for example, the wonderful lake in the centre of Watford.

At Matlock Bath for many years the famous fishpond has attracted all and sundry. This was filled with large chub and barbel and one had only to throw something on the water for every fish to leap to the spot. These fish were alongside the main highway but were not disturbed. When the war came we all feared the removal of railings would result in the wholesale theft of plants and flowers from our parks, but this turned out to be wrong in the main. If your town has a pond or lake with no fish see what your club can do about it. Roundhay Park, Leeds, has a huge lake with numerous anglers; Graves Park, Sheffield, has grand fish on view but no fishing permitted. Derby has its lily pond and fish—what has your town to offer? In many towns a small river running through is turned into an open sewer, into which is thrown used tyres, old bedsteads, cycle frames and the like. Have you ever been to Winchester? The tiny stream running through

the centre of the city is a sheer delight. Bakewell has its wonderful trout which leap high for bread. There are a few other such happy places but mostly everything is sacrificed for industry. If you live in a place still unspoilt, do what you can to keep it that way.

* * *

One of the funniest fish cartoons I ever saw appeared in a Canadian paper. It showed a room almost under water with puddles, etc., the aquarist, quite oblivious, cleaning his tank, and the lady of the house stamping her feet in temper and shouting "I hate fish." This may be a little overdrawn but cleaning tanks can be a messy business. I spread old rubber groundsheets (6 ft. by 3 ft.) on the floor below the tank being cleaned and this catches most of the wet. If moving plants or rockery out of the room it is best to put these in a dish, deep saucepan or similar holder and return them the same way. This method results in practically no water at all spilling on to the carpet and domestic peace is assured.

* * *

The trained eye of the aquarist can usually tell when something is wrong in his tanks or with some individual fish, but even the best eyes have their limitations. The use of a good, large magnifying glass on the inmates from time to time is a wise policy. The fish show their real beauty this way; in fact one does not always realise how beautiful some fish really are until seen this way, particularly small fish like *Rasbora maculata*. The increased power given by the glass often shows up defects otherwise unseen and gives the aquarist a chance to take preventative action against troubles in their earliest stages. Fin damage, skin damage or skin infections, eye fungus and the like all show up clearly. I once had a neon which seemed in great trouble but the cause defied me. Seen through the glass it was at once obvious—a tiny splinter of some unknown substance was stuck in the mouth, holding the lips wide open. To catch the fish, remove the splinter and return the fish took a matter of seconds. Visitors never fail to be entranced when asked to look closely (through the glass) at your fish.

Most of us consider fish-keeping a fifty-two week a year job and view the holiday period of separation with some trepidation. Some people manage to be enthusiasts even though their jobs take them far from home for long periods. Such an enthusiast is Alfred Orda, the Polish-born baritone of the Sadler's Wells Opera Company. At his home he has four giant tanks containing 3,000 tropicals, the pride of the collection being a very large angel fish. When he is away from home on tour his wife, a Scotswoman lecturer at the London School of Economics, takes care of his finny pets.

* * *

It is well known that some of our supplies of glassworm come from the Rhine (Germany and Switzerland) but hobbyists can hardly have considered the possibility that *Daphnia*, however red, can have originated behind the Iron Curtain. It seems some may have found their way through but they will do so no longer. By a decree of the 28th December, 1954 the Soviet authorities in East Germany have established that no more water fleas are to be allowed into Western Germany.

* * *

Many aquarists will have seen recently some novel forms of jewellery which appear to be made up of real fish or other sea creatures. I did not know much about these until I came across an article on this topic in an old issue of *Everybody's* which was accompanied by some excellent photographs. It seems the idea occurred to a young R.A.F. officer during the war, who experimented with methods of preserving specimens for colour and shape. Unfortunately, he died, but a colleague carried on the idea in Colchester. The fish are put first of all in baths of formaldehyde to clean and strengthen, following which they are kept in basins of secret preservative until ready for the final stage, submersion in transparent plastic. Some tinting is often done for extra effect. The most popular of the many are sea horses, crabs and small fish.

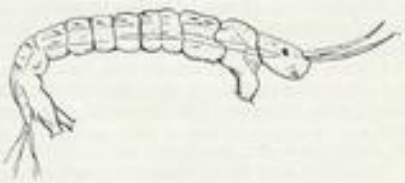
FRIENDS & FOES No. 36 — Corynoneura Midge

CORYNONEURA

PHYLUM:—Arthropoda, from Greek *arthron*—joint, and *podos*—foot.
CLASS:—Hexapoda, from Greek *hex*—six, and *podos*—foot.

CORYNONEURA flies are unusual in that the females are independent of the males for reproduction, producing fertile eggs by parthenogenesis, in the same way as does the Daphniidae. Eggs are dropped in small, jelly-like capsules—each about one-twelfth of an inch in diameter.

The larvae possess a pair of long, jointed antennae twice or three times as long as their heads, and these serve as an easy means of identification. Their bodies have one pair of fused legs on the thorax, and a second longer pair at the end of the abdomen, above which is a tuft of several hairs and at the base of which are the gill processes. Extremely active, the larvae can swim by vigorous lashing of their bodies in the water. They can frequently be found in considerable numbers during the spring and summer months on the undersides of lily leaves. I have found them apparently feeding on shubunkin eggs, but closer examination under magnification revealed that they were browsing upon confervae and vegetable matter



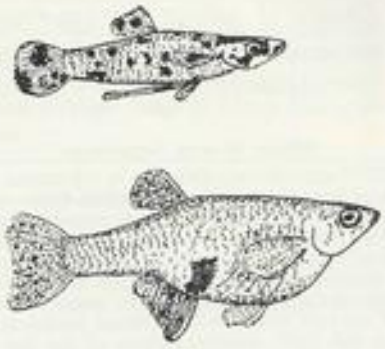
Corynoneura larva magnified × 4

adhering to the egg-shells, and in fact were doing a useful scavenging job cleaning the eggs. I believe them to be 100 per cent. vegetarian.

Pupae are small and do not possess breathing trumpets. Eggs in their jelly capsules are left undisturbed by fishes, but both larvae and pupae are eagerly swallowed, the fishes thus obtaining both animal and vegetable matter. Extremely common midges in natural and artificial ponds and lakes, I do not consider they can in any way be regarded as pests.

C. E. C. Cole

A Mosquito Fish
(Gambusia affinis)



Gambusia affinis (male: top fish)

ORDER:—Microcyprini—from Greek *mikros*—small, and *kyprinos*—a kind of carp.
FAMILY:—Poeciliidae — from Greek *poikilos* — many coloured.
SPECIES:—*Gambusia affinis*, from New Latin *gambusi*—a farce, and Latin *affinis*—related.

OBSERVANT readers will probably have already noticed that I have referred to *Gambusia* as "a" and not "the" mosquito fish. This is because two other of our aquarium fishes also bear this popular appellation—an argument for the use of the scientific name rather than the popular.

The two species which share this distinction with *Gambusia* are the guppy (*Lebistes reticulatus*) and the smallest livebearer, known to us as *Heterandria formosa*. To all three species man owes a tremendous debt for their grand work in clearing large areas of disease-bearing mosquitos, thus rendering them safe for his colonisation and exploitation. Incidentally, *Gambusia* was the first live-bearing fish introduced to aquarists, and therefore must, in the early days, have excited much interest.

It is seldom seen in aquaria nowadays, having been ousted from its position by the other, more colourful species. In the wild fishes, bodies of both sexes are bluish-grey with dark-spotted dorsal and caudal fins. The male reaches a maximum size of one and a quarter inches, and the female about double this. During early importations one or two with velvet black patches on their bodies were segregated and mated with picked females. After many crossings had been made, a black spotted and patched female was produced, and the start of a new strain was accomplished. As far as I know, however, this has now disappeared.

The male *Gambusia* is an ardent suitor, and entirely promiscuous. Within a short time of his introduction into a tank of females all of them will be gravid, and even if he is removed from the tank the females will give birth to several broods of youngsters, at intervals varying from four weeks to three months. The time between broods is considerably influenced by the temperature of the water. Thus it will be in the region of four weeks in a temperature of 74°-78° F., but six weeks at 70° F. In the lower sixties the maximum period of three months is reached. Lower than this the eggs are not produced.

Gambusia affinis dearly loves its progeny—as titbits, so provide plenty of cover in the shape of floating plants or clumps of bushy ones in which they can seek refuge. The fry are independent of Infusoria—or at least consume much less than the fry of egg-layers before being ready to tackle small live foods. Even if no live foods are available they can still be raised on the smaller grades of dried fish foods. Better fish result, however, from the inclusion in their diet of natural food in the form of mosquito larvae. A supply of these can generally be obtained throughout the late spring and summer months if various bowls of water are placed outdoors in the shade of trees. Female gnats will visit the bowls and lay their egg rafts upon the surface of the water, and these may be placed direct into the aquaria, or left to hatch out and the "wrigglers" netted, according to individual preference.

Another reason for the almost complete disappearance of *Gambusia* in the aquarists' tanks of to-day may be that they are given to fin-nipping and are not particular as to which species of fish they attack. Many of the first keepers of these little creatures placed them in aquaria which housed fancy goldfishes, only to discover the following morning that the much-prized flowing finnage of the latter was in tatters. The enthusiasts thereupon provided separate tanks for the "new" species—the others disposed of them as quickly as they could.

What's New?

WHOEVER coined the phrase about there being nothing new under the sun couldn't have been an aquarist. New gadgets of one sort or another seem to appear almost weekly. The latest is a "Tropical Fish Carrying Box" issued by Cornerstone Products of 20, Folly Lane, St. Albans, and has been issued to meet the needs of those aquarists who do not carry fish long distances, over several hours. Such fishkeepers do not want to be put to the expense of large vacuum jars nor the inconvenience of bulky Kilner jars, wrapped in paper or a scarf. The box is made of cardboard and is really two boxes, one inside the other, with an insulating packing of glass wool between them. The inner box is silvered on the inside to reduce heat losses. Two polythene bags are supplied to hold the fish and both could be used at once (holding different types of fish) if necessary. A single bag will hold rather more than a pint and it is always wiser to use as much water as possible. If needed, an inlet pipe for air is supplied for each bag, but if this is dispensed with the heat loss will be less and the box can be turned upside down without risk. There is practically no weight, apart from the water, no risk of breakage as with glass, and the inner bag is almost shock proof. The polythene bags each measure 11 ins. by 6 ins., and the dimensions of the outer box are 7 ins. by 6 ins., with a depth of seven inches. For aquarists who make relatively short journeys of an hour or so with their fish this box will prove very useful, and for those who do not like to be seen carrying fish (and they exist) it can be wrapped up with string and carried like any ordinary parcel.

Raymond Yates

Practical Tips

Details of gadgets for aquarium use and other ideas submitted by "Aquarist" readers

White Worm Separator

HAVING experienced difficulty in separating the white worm from the culture I set out to devise an apparatus to do this, and as I have succeeded to a very high degree I feel that other aquarists might like to take advantage of what I have made. To enable them to make up this simple apparatus I have set out below a brief description of the materials, how to make it and how to use it. I am sure that it will be found useful to all aquarists using this food, especially those of the fair sex, who hate to handle such things as worms The whole apparatus can be made up for a few shillings and is very effective.

The materials required are a cocoa or coffee tin, and a screw top jar, lampholder, flex and 2 amp. plug I used a ¼ lb. cocoa tin and a Horlicks jar with a metal screw cap. First perforate the screw cap with holes of about one-sixteenth of an inch diameter,; cut the bottom from the tin, insert the perforated lid and solder it into position (a tube of cold solder will be found most useful). The lid of the tin is then drilled to take the lampholder In this is placed a 15 watt pigmy lamp; the attachment of the cable and two-pin plug is all that is now required and the apparatus is ready for use.

A cluster of white worm and culture is placed in the tin, and about half-an-inch of water put into the jar. Screw the tin back on to the jar, replace its lid and plug into the electricity supply. After a quarter of an hour or so the heat generated by the lamp will drive the worms through the perforated lid into the water below It is advisable to switch off the current when the first worms appear in the jar, as overheating will kill them. The culture can be returned to the breeding box and not wasted as is the case with other methods of separating.

C. MATTHEWS
Hampstead, London, N.W.

Automatic Feeding

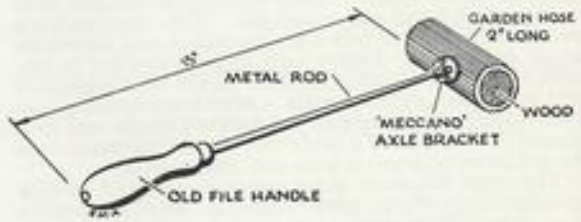
I HAVE used this simple automatic feeding system with success each time the annual holidays come round. A 2 lb. screw top jar partly filled with water is nearly submerged in the aquarium and has attached to its top a strip of plastic or waterproof sheet hanging over the tank frame. This sheet is loaded with dried food which is gradually drawn into the tank as water evaporates and the jar sinks, so continually feeding the fishes.

F. A. STOKES,
Coventry.

Glass Cleaner

FOR cleaning the inside glass of aquaria I have found this gadget most efficient. Ribbed garden hose provides the actual cleaning surface, and it is slipped over a hard wood rod. When attached to a suitable handle (as shown in the illustration) and moved up and down the glass, there is a minimum of water disturbance and there are always two or more "ribs" of the hose in contact with the glass to rub away algae.

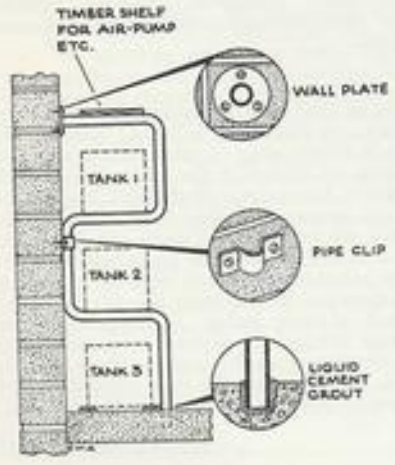
S. W. EVANS,
Guildford, Surrey.

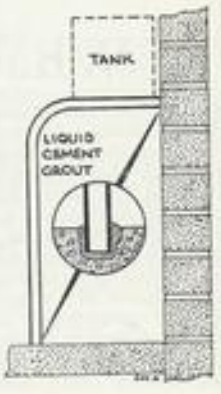


Tank Staging

AS tank staging in a small brick building I have converted into a fish house I am using electrical conduit tubing and galvanised iron water pipe, materials readily obtainable second-hand from demolition sites. For a few shillings a plumber or an electrician will bend the tubes and then these can be used as supports for stout timber battens by fixing them to walls and floor. If a hole is made in the wall rather larger than the tube it can be cemented into this, or else the tube end can be threaded and screwed into a cast-iron wall plate, which is then fixed to the wall. The tubular supports can be set any convenient distance apart; I have single staging carrying two tanks each 4 ft. 6 ins. by 15 ins. by 15 ins. and a three-tier staging supporting nine 30 ins. by 12ins. by 12 ins. aquaria. The manner in which the tubing is bent and used in each instance is illustrated.

N. F. EASTER,
Ramsgate, Kent.





OUR EXPERTS' ANSWERS TO READERS' QUERIES

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

I have been told that scats are intelligent and soon grow quite tame. Please will you tell me the requirements of these fish, and whether they are easy to obtain?

If you are a newcomer to the hobby of tropical fish-keeping, we advise you to gain some experience in keeping the cheaper "tropicals" such as guppies and rosy barbs before you attempt to keep *Scatophagus* and the like. *Scatophagus* are never very cheap, but now and again a dealer may have some small ones for sale at about twelve shillings and sixpence each. These fish need plenty of swimming space, clean, clear water with a little household salt added to make it slightly saline, a temperature of about 75° F., and a diet composed of chopped earthworms, minced butchers' offal, shredded, chopped lettuce leaves, algae, and the usual feeds of live food such as *Tubifex* and whiteworms. Scats are intelligent fish and soon learn to recognise their owner, and take tit-bits from his fingers.

Although I have read that most tropical fishes flourish best in soft, acid water, I have been told that I may be doing wrong to fill my aquarium with water drawn from a domestic water softening appliance. Is there any truth in this, please?

Domestic water softeners often employ chemicals to produce the desired results, so we do not think it wise to use water obtained from such a source. The safest plan is to fill a clean wooden cask with ordinary tap water and leave it to mature for about a week to a fortnight. On the other hand, if you need only a small amount of soft water to add to an established aquarium, obtain several large glass jars and cover the bottoms of them with an inch thick layer of chopped peat. Top up with water and leave to stand for a few days. The water will gradually become faintly tinged with brown. Directly you notice this brownish tinge of the water, it will be ready to use in the aquarium.

I have a pair of zebra fish, but the male is much smaller than the female, and she chases him about all the time. Do you think the difference in size will prevent the fish breeding in my aquarium?

It might be a good idea to keep the two fish separated for a short time; that is, until the male has grown a trifle larger. On the other hand, so long as the female is merely chasing after the male, and not actually bullying him away from food little harm, if any, will be done, and the fish may spawn when you least expect it. You must remember that zebra fish are full of vitality, and like to chase about the water at all times.

My angel fish has developed a red patch like a bad bruise on its ventral, and a blood-coloured streak along the top of the back and underside of the body. It is eating well, and shows no other signs of disease. Can you please tell me what is wrong with it?

We think the appearance of your fish might be the result of a slight chill. This often results in a red line showing where the anal, dorsal and caudal fins join with the body. We do not advise medicinal treatment in this case. But make sure that you feed the fish on plenty of nourishing live food, and keep the temperature a few degress above normal for a week or two. We must point out, however, that angel fish often develop bloody patches on the body after dashing against rockwork or a glass side of the aquarium. These patches usually clear up within a few days. On the other hand, some angel fish have been known to dash themselves so hard against fixed objects that death has resulted in a short time.

A pair of angel fish have spawned in my aquarium. How often will these fish spawn during a season?

There seems to be no strict spawning season for angel fish. They are the sort of fish which will decide to raise a family just when the mood takes them, winter or summer. But most species of "tropicals" are more likely to spawn during the spring and summer than during the autumn and winter, for the longer, brighter days always act like a tonic to aquarium fish. To return to angel fish. A true pair may spawn every four or five weeks during the summer. But it is not wise to let them spawn too many times during a season, for too many family cares saps the strength of the fish and often leads to illness.

A few of the fishes in my large aquarium have been unwell. A friend told me that they have been suffering from a chill. I am puzzled by his statement, for how can a few fish in a large aquarium contract a chill while the others remain perfectly healthy?

Some species are more susceptible to a change in temperature than others. Then again, some species are happier in warm water than cool water, and *vice versa*. So when the temperature suddenly goes up or down, and stays that way for a time, some of the fishes will show their dislike of the changed conditions by going off their food, losing their colours, lying in corners or on the floor of the aquarium, or even losing their balance altogether and developing swim-bladder trouble.

I should very much like to establish a good strain of tuxedo platys. How should I go about realising my ambition, please?

In the first place, you will need to buy a good pair of fish to begin the strain. Then, having obtained a good pair of fish, you must keep them in tip-top condition by supplying them with plenty of live food and scraped lean meat or finely minced butcher's offal. But as uneaten meaty foods soon foul the water, make sure that the floor of the aquarium is kept clean by regular use of the dip-tube or siphon. Give the fish plenty of room to swim around in and have their babies. If the aquarium is on the large side, and well-planted, most of the babies of every brood will escape being eaten. Do not maintain a very high temperature—72° F.is warm enough for platys, though when the female is noticed to be gravid you may increase the temperature to 75° F. Keep only the best baby fish of every brood: and breed the best to the best.

Please can you tell me how to treat pop-eye disease?

To treat pop-eye disease, raise the temperature of the water five or more degrees above normal, then add four or five drops of ordinary household ammonia to every four gallons of water to be treated. Leave the fish in this ammonia bath for about three hours, then drain away some of the water and gradually top up with fresh, heated to the temperature of the aquarium. If the fish undergoing treatment becomes distressed soon after it is placed in the ammonia bath, reduce the strength of the solution by adding fresh water.

I am a beginner in tropical fishkeeping, but should very much like to breed some fish before long. Can you please tell me the names of a few species which can be bred without much trouble?

If you set up a 24 ins. by 12 ins. by 12 ins. aquarium with masses of bushy-foliaged plant life along the back and ends, you should be able to breed most of the livebearers without much trouble. Among the egg-layers, make your choice from any of the following: zebra fish, rosy barbs, half-striped

barbel, blue, thick-lipped or dwarf gouramies, Australian rainbow fish and *Epiplatys chaperi*.

How can I soften my aquarium water without introducing chemicals?

Siphon your aquarium water through a layer of peat a few inches thick, or introduce small amounts of peat-water obtained by leaving peat to soak under water for a few days, and then straining the amber-tinted liquid through fine silk or muslin into the aquarium.

Please can you tell me how to determine the presence of lime in aquarium compost?

Place a handful of compost in a glass or china vessel, and pour on to it a small quantity of hydrochloric acid. If the compost fizzes like an effervescent salt, then you may take it for granted that the compost is of an alkaline nature.

I have found several of my fishes dead on the bottom or floating at the surface. All of them have been very much bitten about the head and underparts. Do you think they died a natural death, or has some other fish in the aquarium killed them?

Your fish might have died of old age. On the other hand, another fish in your aquarium may be a bully or extremely pugnacious. Pugnacious fishes usually attack the head or soft underparts of the victim-fish; dead fish floating about the aquarium are almost always nibbled at by other members of the community. We advise you to keep a watch on the behaviour of your other fishes. Perhaps you are housing a "killer-fish" among them.

One of my fish seems to have something wrong with its mouth. It cannot swallow its food, and every now and then it makes an effort as though to spit something out. When I looked more closely, I could see what looked like tiny worms or bits of fleshy tissue filling the cavity of the mouth. What can I do for this fish, please?

We think that your fish has contracted mouth fungus, a horrible disease. In its early stages, a cure may sometimes be effected by painting the snout, and, if possible, the inside of the mouth, with mercurochrome, or a mild antiseptic, such as permanganate of potash, made up as a pale pink solution. As mouth fungus is a contagious disease, you should transfer the diseased fish to another aquarium as soon as possible, and keep a close watch on the mouths of the other fishes which have been sharing a tank with it.

Can I use plaster of paris for making artificial rock formations to decorate my aquarium?

Plaster of paris soon dissolves when kept submerged for any length of time, besides which it has the power of altering the pH value of the water, creating an alkaline condition. Any appreciable amount of plaster of Paris in the aquarium would quickly render the water too hard for the fish.

The top bars of my aquarium soon become coated with rust. I have tried painting them several times, but the paint soon flakes away. Can you suggest any way I can prevent this rusting-up of the frame?

Yes. Cut four lengths of rubber tubing to fit the two long sides and short ends of the frame. Then slit the tubing down the middle and press these lengths over the edges of the frame so that a protective rubber cushion is formed. Rest the cover glass on this rubber cushion. You will find that the rubber tubing will prevent a great deal of the moisture from reaching the frame, and the little that does can be wiped off with a piece of soft cloth every now and again.

COLDWATER FISHKEEPING QUERIES *answered by* A. BOARDER

I have a small pond in my garden about 18 ft. by 10 ft. and 18 ins. deep. This is supplied through a pipeline bringing rain-water from the roof. There are about 70 goldfish in the pond with water lilies and other plants. All seem to flourish but yet the water appears to grow more and more muddy and thick, even after heavy rainfall. Why is this?

The probability is that the rain water brings into your pond all the soot and filth from the roof. It is surprising how dirty roofs can get. I should stop the water from running into your pond for a time and you will find that the water will soon become clear. I used to have an over-flow from a rain tank which I could guide into my pond as desired, but found that the water in the pond kept clearer when the rain water was not used. There may be a deep deposit of mulm in your pond caused partly by the accumulation of dirt from the roof. It may be necessary to clear out much of this from the pond before the water gets quite clear again.

I am going to make an out-of-doors pool, or pools, and have been told that three pools, one above the other, are much better than one large pool both in respect of neatness and breeding. Is this so, please?

I do not see why three pools as you suggest should look any neater than one large pond. It all depends on how they were constructed. If well made it is possible to make them look very nice, especially if a small waterfall can be arranged from one pond to the others. On the other hand it is not an easy task to construct such pools. Usually this method is carried out when there is a natural fall of the ground, otherwise you will have to do a considerable amount of building up for the highest pond. When this building up is done unless great care is taken to see that the foundations are quite firm there might well be a sinking later on, when the pond may leak. Unless you have a natural fall in the levels of your garden I advise you to make one large pond in preference to three small ones. The large pond will not be as liable to quick variations of temperature, is not so likely to freeze up in the winter, and will be far more easy to keep in good condition than would the small ponds. You mention the probable breeding of the fishes; well, you can arrange for one or more divisions to be inserted in the pond so that parts can be divided off. This will enable you to separate parts of the pond for adult fishes as needed and this method will be found easier to do than to construct three ponds at different levels.

There seem to be many problems concerned with packet foods and I have been experimenting with foods of my own. I am anxious to be sure that I am not leaving out anything important from such foods and would be grateful if you could make any suggestions.

In the first place most packet foods sold to-day are mixed by experts, but some kinds are more readily taken by fishes than others. You must try one or two kinds to test them out. You say you feed on chopped earthworms, scrambled egg, porridge flavoured with cod-liver oil and then occasionally you give raw steak, raw liver and mashed potato and other vegetable scraps. Well, some of my fantails are looking over my shoulder and want to know where you live! This is a pretty good menu for any self-respecting goldfish and I can only suggest the addition of Bemax now and again to make it an excellent diet. It is not everyone who can take the trouble to get all these foods for their fish and that is why so many thousands of packets of food are sold to-day.

I have a 2-inch goldfish whose tail and dorsal fin have gone black and split. I have tried all sorts of supposed cures to no avail. The fish is with three others in a tank 18 ins. by 10 ins. by 10 ins. We change lots of the water every day; can I cure the fish?

I should not try to cure the fish to put it back with the others. You have too many fish in your tank for them to

keep healthy. Even with all the so-called cures you will not succeed in keeping more fish than the tank will comfortably hold. Your limit is about seven inches of fish and it is hopeless trying to keep more therein. The weakest always go to the wall until there is the correct balance for the tank. The fish appears to be suffering from a form of fin-rot, which may have been caused by different diseases. The safest treatment for such complaints is the salt treatment. Put the fish in a gallon of water in which has been dissolved one tablespoonful of sea salt. Leave in the shade for a few days and the condition should improve. However, once the trouble has been removed it will take some time for the damaged fins to heal and mend. The warmer the water the sooner will this mend take place.

Can you tell me of a book dealing exclusively with plants for tropical and coldwater aquariums?

I do not know of such a book. Most books on fish-keeping include notes on the subject of water plants. There is a very good book dealing with most water plants but not especially from the angle of the aquarist. It is called *Water Gardening*, by Frances Perry, and published by Country Life, Ltd.

Would fish caught in a near-by stream survive in an indoor aquarium?

They will possibly do so but it does depend to some extent on the species of fish. The stream may contain gudgeon, minnows, sticklebacks, trout, miller's thumbs, dace, bleak and roach. If fairly small the following would live in a well-kept tank provided they were not overcrowded:—minnows, sticklebacks, gudgeon, bleak and roach. The trout would require some form of aeration and miller's thumbs do not seem too happy in still waters. The dace might also be kept but I think they need plenty of space to remain healthy. Do not try to keep sticklebacks with other small fishes as they might injure them. Remember the golden rule, one inch of fish to each 24 square inches of water surface, and do not try to exceed this.

I hope to establish a strain of metallic veiltail goldfish capable of colouring early. Would you advise crossing veils with coloured scaled fantails, or any other cross to bring colour?

I do not recommend the crossing of any varieties of goldfish. If this is done it may be very many years before the unwanted traits can be bred out, and, in fact, I would go so far as to say that it is practically impossible completely to breed out any other variety once it has been introduced into a strain. If you keep breeding from the veils you will surely keep getting many fish apparently too scale-less for your purpose. A better plan is to breed from scaled fantails which show a tendency to over-development of finnage. I find that among fantails there are often youngsters which develop extra long tails etc., and if these were bred from for a few seasons it would be possible to get more and more long and flowing tailed fishes among the strain. Among my own stock of scaled fantails I often get fishes which are more like veiltails in shape than many I see on the show bench, especially when some of them are getting on a bit in age. I have fish which won in the best company years ago which would now pass almost as scaled veiltails.

I have heard of using tannic acid to hasten the colour change in goldfish. Do you think this a good idea?

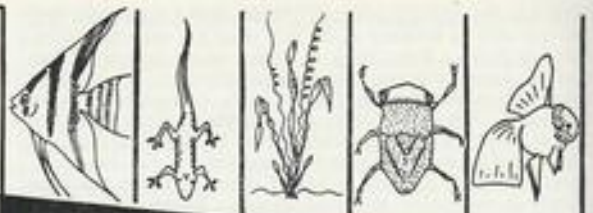
Candidly I do not. In the first place I have no first hand knowledge of the practice and secondly I would not use the method if I knew it. I believe in breeding into the strain the tendency to quick colour change. If you do this you are on the right track whereas if you use any artificial means to procure a quick change in a particular fish the strain would not be altered and you would be again forced to use the unnatural methods with subsequent youngsters. If you only use for breeding purposes those fishes which change early you will find that the strain will gradually improve. If, on the other hand, you continue breeding from fishes which make a late colour change you are certain to go back more quickly than you go forward. Fishes left to themselves to breed in a pond would soon be producing many fishes which only coloured after two or three years. You need a strain which can change in less than a year, and this is quite possible if you have plenty of patience.

Zoo Aquarium Curator

Dr. H. G. Vevers

IN September this year the Aquarium at the London Zoo passes into the charge of a well-known marine biologist, Dr. Henry Gwynne Vevers, M.B.E., M.A., whose appointment as curator was announced earlier this year. Dr. Vevers, now in his thirty-ninth year, has been engaged continuously in biological research since graduating in Zoology with honours from Magdalen College, Oxford, in 1938, except for the war period when he saw commissioned service in the R.A.F.V.R. in Iceland, Belgium and Germany. During this service he was appointed M.B.E. (Military), in 1942. Whilst at Oxford University Dr. Vevers was a member of the O.U. Expeditions to Greenland (1936), Faeroes (1937) and Faeroes and Iceland (1939). Since 1946 he has been bursar and zoologist at the world-famous Plymouth Laboratory of the Marine Biological Association, where his studies of the biology of the starfishes, food of fishes and other marine animals, animal pigments, photography of the sea floor and sea bird populations have resulted in the publication of numerous papers and reports in scientific journals. Dr. Vevers is also author of *The British Seashore*, a book published last year by Routledge and Kegan Paul. At the London Zoo Aquarium he will be continuing his scientific research and combining with it the tasks of supervising the care and display of aquatic life housed there for public viewing. *The Aquarist* wishes to associate its own best wishes with those of its readers for Dr. Vevers' success in his new appointment.

our readers write



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

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

Callichthys Nomenclature

IN the March *Aquarist* I note a letter from "Pisces" which purports to give my translation of *Callichthys* as "a fish having bumps or callouses." This is one of the name meanings in Dr. Innes's book for which I must disclaim responsibility. *Callichthys* was not introduced into ichthyological nomenclature by Linnaeus, as "Pisces" seems to think. It is a classical Greek name for some Mediterranean marine fish. Oppian applies it to some fish comparable to a tunny, but, like so many of the old Greek fish names, modern ichthyologists cannot place it.

Why Linnaeus, Gronovius, Klein and other 18th century writers applied it to the catfish species now called *Callichthys callichthys* it is difficult to see, but there is no accounting for the tastes of ichthyologists. Possibly the symmetry of the lateral plate system was the reason. Beauty can be seen in structure as well as in general appearance. Of course the name means "pretty fish."

"Pisces" has also fallen into the common aquarist's error of considering the small and really rather obscure family Callichthyidae to be "the South American catfishes." The fishes of this family form only a miniscule part of the South American catfish fauna. It is only because of the popularity of the genus *Corydoras* among aquarists that this error has become current.

PROFESSOR G. S. MYERS,
Stanford University, California, U.S.A.

Earthing Aquaria

Our Expert writes:—

I THANK the two correspondents who dilated at length in the March issue of *The Aquarist* upon the subject of earthing aquariums, and would respectfully point out that when a heater or thermostat leaks, and the water becomes charged with electricity, the current is almost always communicated through the thin, moist conductive walls of the cement or mastic to the frame itself; for rarely is a tank so perfectly constructed that the glass panels provide complete electrical insulation of the water from the frame. Hence it follows that any leakage of current into the water is invariably taken up by the frame, which at once becomes "alive." While agreeing that direct contact between the water and the frame is best provided by a metal contact strip, readers are warned against taking the advice of the correspondent who suggested using a piece of zinc for this purpose. For a zinc strip kept permanently submerged in the water would soon have a deleterious effect upon the health of the majority of tropical aquarium fishes. A piece of lead wire, as proposed by the other correspondent, would prove admirable, and harmless.

Fish (Green) House

IN the answered queries published in the March issue of *The Aquarist* a correspondent asked about converting a greenhouse into a fish house, and I am enclosing a picture of my own fish house which I built myself and which has been most successful. If your enquirer would care to write to me I will forward him the building details.

C. S. EARL,
Crayford, Kent.

Table Show Tour

THIS summer the Hendon Aquatic Society will tour the coast and provinces to meet other clubs in one-day table shows. The Hendon Society will bring supporters and entries, and will also "lay on" the Hendon Van, with equipment and erector team with their "Quick-up" tanks and

stands. It is guaranteed that fish will be able to enter within one hour of the club's arrival, at any destination.

Clubs requesting a visit are required only to supply the venue; coastal show secretaries should contact Mr. Hartnup, Hendon show secretary, stating if tanks and stands will be required. Hendon will supply a lecturer for the period whilst the show is being erected. All costs will be borne by the Hendon A.S.

B. CALROW,
Hendon Aquatic Society.

Hydrogen Peroxide

IN a recent edition of "Aquarist's Notebook" Mr. Raymond Yates said that he has used hydrogen peroxide for preventing and getting rid of blue-green algae. Having been a regular reader of his articles for some considerable time I have had no cause to disagree with any of his statements until I used hydrogen peroxide in two of my tanks that were covered with this algae.

The first tank contained four dozen *Vallisneria* and a few varieties of tropical fishes. I used a small dose of the peroxide, always being cautious in using chemicals where plants and fishes are concerned, three to four teaspoonfuls to the 14 gallons tank. In three days the plants completely collapsed but the fishes were in excellent condition, and the blue-green algae remained as before. In the second tank, a small one containing young guppies and *Hygrophila*, although I used a stronger dose the peroxide had no effect on fish or plants. It would be interesting to know why peroxide does not affect *Hygrophila* yet completely breaks down *Vallisneria* in less than three days.

Perhaps it would be wise to give a warning concerning the use of hydrogen peroxide for preventing and removing blue-green algae where plants and fishes are present.

P. E. JEFFRIES,
Pontypool, Monmouthshire.

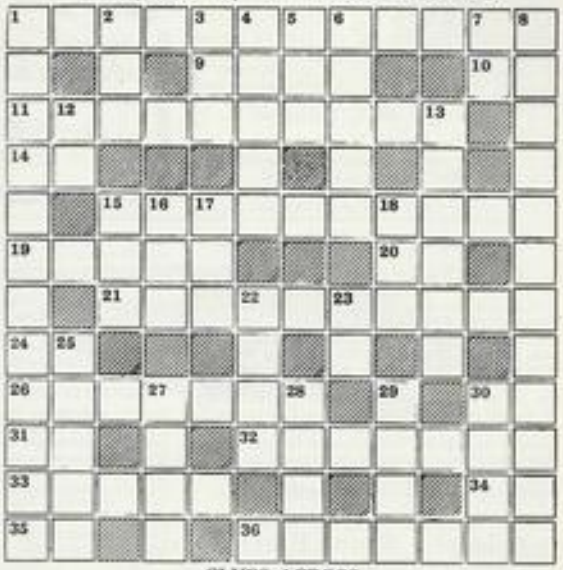
N.Z. Trout "Harvey"

WITH reference to Mr. Raymond Yates' paragraph on the New Zealand rainbow trout called Harvey (*The Aquarist*, March), I thought you might be interested in the accompanying picture I took while at Rotorua last November. The fish is in a deep pool fed by several powerful springs in the bottom, and when visitors call, Mr. G. Burton turns a big spot light on Harvey. The box in the foreground of my picture contains an underwater mirror, so that when the fish come close to this a very clear view of the colours is given. These lovely rainbow trout breed in their thousands at Taniwha Springs; I was living right on the lake side in my six weeks' visit to Rotorua and when fishing started on 1st November last my son's first catch was a trout weighing 8 lbs. 12½ oz.—they have been caught up to about 15 lbs.

(MRS.) H. BRANSON,
Stoke Poges, Bucks.

The AQUARIST Crossword

Compiled by J. LAUGHLAND



CLUES ACROSS

1 *Hippuroides, prismatum, lapland, spicatum or verticillatum* (12)
9 Plane surface or enclosed space (4)
10 Mixed type (but not hybrid) (2)
11 Those fishes able to breathe atmospheric air (10)
14 Low tension in short (1.1)
15 *Brachydanio albolineatus* (5.5)
19 Rushes (5)
20 Distinction of the doctor fish? (1.1)
21 Home for herpetologist's collection (10)
24 Consumption (1.1)
26 Crossbreeds (7)
30 See 20 across (2)
31 City of the Chaldees and of gurnard (2)
32 *Pterophyllum* this is the more common angel fish (7)
33 Her surname is more likely to be Malone than *sphenops* (5)
34 Indefinite article of the anchovy (2)
35 Military body in brief (2)
36 *Epiplatys* this is the barred panchax (7)

CLUES DOWN

1 Bullhead (7.5)
2 Part of bone structure of the fish tribes (5)
3 Long limb of the water boatman (3)
4 Before (5)
5 Female fish or fowl (3)
6 Gated in an old-fashioned way (5)
7 Read down to get up (2)
8 The toothed carps (12)
12 Denoting presence in catfish (2)
13 Mr. Capone follows the tank planting medium for a shoe (6)
15 By means of most of the perch (5)
16 Ex cabinet minister upsets the Welsh river (3)
17 Cleopatra's serpent (3)
18 The gourami has a French friend (3)
22 Movement of interest to the marine fisherman (4)
23 Poetical look of loaches (2)
25 "The bad Lord B——" (5)
27 "The brill is too big for the streamlet (4)
28 "——— no more, ladies." (4)
29 Seaweed burned to provide iodine (4)
30 Ide are expensive for the most part (4)

PICK YOUR ANSWER

1. *Serrasalmus piraya* (the piranha) was named by: (a) Cuvier. (b) Kner. (c) Linné. (d) Peters.
2. Which one of the following families contains one genus only? (a) Mastacembelidae. (b) Mormyridae. (c) Pantodontidae. (d) Polypteridae.
3. The family Goodeidae is native to: (a) Amazon basin. (b) Central Mexico. (c) Eastern U.S.A. (d) West Indies.
4. The pike cichlid is the popular name of: (a) *Acaropsis nasus*. (b) *Cremicichla lepidota*. (c) *Herichthys cyanoguttatus*. (d) *Uaru amphiacanthoides*.
5. *Amblas lanceolata* (water aspidistra) was discovered in: (a) 1915. (b) 1925. (c) 1935. (d) 1945.
6. The thickness of 26-ounce glass is approximately: (a) 1/12 in. (b) 1/10 in. (c) 1/8 in. (d) 1/6 in.

G.F.H

(Solutions on page 40)

News from AQUARISTS' SOCIETIES

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

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

MEETING place of the **Lambeth Aquarist Society** is incorrectly listed in *The Aquarist's Directory of Aquarium Societies*. The society now meets on alternate Wednesdays at St. Luke's Church Hall, Norwood High Street, London, S.E.27.

MONTHLY table shows are held by **North Staffs. Aquarists,** who meet on the second Wednesday of each month at the Marquis of Granby Hotel, Hanley. A community tank competition, held recently, was judged in members' homes by Messrs K. Durose and L. V. Perks.

CHANGE of venue for meetings of the **Merseyside Aquarists' Society** is announced. These now take place on the first and third Thursday of each month at Grenville Café, Tithebarn Street, Liverpool.

This Year's "National"

TO encourage societies to visit the **National Aquarium Exhibition** (9th-11th June) in parties, a special inducement is being offered by the National Aquarists' Society. To societies applying for 28 or more admission tickets in advance one of the N.A.S. plaques will be given for use at club shows. Although the minimum 28 tickets must be purchased together to qualify for this, there is no compulsion for all the ticket-holders to visit the Exhibition at the same time. Applications for tickets, accompanied by remittance, should be sent to Mr. F. G. Odams, 9, Natal Road, New Southgate, London, N.11.

Pakistan Show Entries

THE Pakistan Aquarium Society held their first exhibition at Karachi from 7th to 13th April, and made a request through the British High Commissioner for an exhibit to be sent from the United Kingdom. The Commonwealth Relations Office made contact with the **Federation of British Aquatic Societies,** and arrangements were made at once. A series of guppies, representing all the accepted standards, was supplied by the **Federation of Guppy Breeders' Societies,** and a number of interesting characins were loaned by members of the **Hendon Aquarists' Society.** This collection, 63 fishes in all, was brought together at London Aquarium, at South Bank, which was used as a depot by kind permission of the curator, Mr. Ilric Bowler, who also supplied the necessary container and oxygen. The fishes were placed in two polythene bags, half-filled with water, charged with oxygen, and sealed, and packed in a special lightweight insulated box. They were flown to Karachi by B.O.A.C., who provided special facilities for quick transit. At the time of writing no report of the Karachi exhibition has been received, but judging by a telegram received at the Commonwealth Relations Office the fishes were greatly admired and the Pakistani aquarists were reluctant to let them come home.

Secretary Changes

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

Kettering and District Aquarist Society (Mrs. P. Eales, 15, West Street, Kettering); **Nottingham and District Aquarists' Society** (Mr. H. Lightfoot, 39, Crosby Road, West Bridgford, Notts.); **Rochdale and District Aquarist Society** (Mr K. Cousins, 774, Manchester Road, Castleton, Rochdale, Lancs.

Aquarist's Calendar

2nd-7th May—**Oxford Aquaria Society** exhibition of fishes. Details from secretary, Mr. V. H. Lewin, 21, Halliday Hill, Oxford.

20th May—**British Herpetological Society** (London Group) meeting, "Amphibians," 7 p.m. at the Linnean Society's Rooms, Burlington House, Piccadilly, London, W.1.

20-22nd May—**Rochdale and District Aquarist Society** fourth annual open show at the Fire Station Hall, Rochdale. Show schedules and information from show secretary, Mr. J. Dodsworth, 251, Rooley Moor Road, Rochdale, Lancs.

23rd-28th May—**Blackpool and Fylde Aquatic Society** fifth annual open show at Trinity Schoolroom and Lecture Hall, Coronation Street, Blackpool. Schedules and entry forms available from Mr. J. Peck, 82, Bathurst Avenue, Blackpool.

9th-11th June—**National Aquarium Exhibition** at Roya Heerticultural Hall, London, S.W.1.

20th June—**British Herpetological Society** (London Group) meeting: "General Anatomy of Reptiles," a talk by Dr. Malcolm Smith, 7 p.m. at the Linnean Society's Rooms, Burlington House, Piccadilly, London, W.1.

23rd-25th June—**Southampton and District Aquarists' Society** sixth annual open show at Avenue Hall, Southampton. Entry forms and further details available from show secretary, Mr. E. C. Golesworthy, Westways, Romsey Road, Nursling, Southampton.

Photo: W. H. Wood

Grouped around this tropical aquarium, recently presented to St. Mary's Hospital, Plaistow, London E.13, by Forest Gate A.S., are society officials, hospital nursing staff and some young patients

Crossword Solution

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

PICK YOUR ANSWER (Solution)
1 (a). 2 (c). 3 (b). 4 (b). 5 (c). 6 (c).