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<td>Yellow</td>
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MARGINAL PLANTS

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COLDWATER PLANTS

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Goldfish Breeding

by C. E. C. COLE

Many years ago I was acquainted with a parks' superintendent who was extremely proud of the fact that during a period when goldfish were almost impossible to obtain, those in the ornamental pond in his beautiful park were doing extremely well. Anxious to obtain commendation for initiative and enterprise, he decided to provide sufficient fish for all the needs of his area by helping those in his care to increase.

To do this he waited patiently until he saw one or two fine specimens of females well swollen with eggs, netted them out of the pond and kept them entirely on their own so they could raise the expected babies without interference.

He, at last, knew the difference between male and female goldfish. Many pond-owners and goldfish-keepers are not sure even of this. They take over or construct a fair-sized garden pool, plant a few lilies and 'oxygenating weeds', purchase a very mixed bag of goldfish, tip them into the water and—the job is finished for all time. They have no idea whether their fish are strong and healthy or weak and diseased or pest-ridden.

Occasionally the fish increase in number. More often (particularly after such a severe winter as the one we have just come through), all stock needs replacement. And small wonder! Let us look into the pond world of the goldfish. To the student this is a fascinating, absorbing world—the world into which your female goldfish ejects her eggs.

Nudged and buffeted by excited males, the females are pushed and chased amongst the reeds, releasing a stream of amber hued, separate, semi-adhesive eggs (each about the size of a large pinhead), which stick to whatever solid object they reach first. The males emit a milky fluid called milt, containing millions of sperms which enter and fertilise as many eggs as they can find. The potential number of fertile eggs is astronomical—if all those thrown by a single female during the breeding season were able to reach maturity, the pond would be solid with fish.

A high proportion, however, are never even fertilised. The sperrms must many, and these are doomed from the start. Then in the wake of the breeders come the fish that were not breeding; with keen senses of sight and smell...
they consume as many of the eggs as they can get. And
after the fish come a host of smaller egg-eating creatures
which I will discuss in a later article.
Within 4 to 10 days of fertilisation (time depends upon
temperature of the water) the surviving embryos burst
from the softened membranes of the eggs. They wriggle
and hang suspended like quarter-inch splinters of glass
from plants or rocks. They barely make any effort to
move. Independent of external food supplies, they absorb
the nourishment contained in their yolk sacs, and wait
for the development of their swim bladders, the organs
that enable them to control their movements.
It is during this brief period that they are most vulnera-
ble. Prey to infestation by surface parasites—such as
the gill flukes—and at the mercy of all other fish, includ-
ing

their parents, it is a marvel that any escape at all. Those
that do, provided that they can find a sufficiency of food
and there are no violent sudden changes of temperature,
will make satisfactory progress during the summer months.

With the approach of autumn and winter, however,
comes further dangers. The drop in temperature causes
appetites to begin to fail, and this alone can be very weak-
ening. Even the loss of leaves will drop into the water, first
keeping out light and afterwards adding poisonous by-
products of decomposition as they lie on the pond bottom.
Many of the aquatic plants will also begin to die down,
adding their quota of pollution. The fish can move nearer
the surface of the water, but they seem to prefer the depths.
Finally they have no choice—the surface of the water
freezes and seals them out of contact with atmospheric
air. The oxygen supply cannot be sufficiently replenished,
the water becomes really foul and death ensues. If the
pond freezes solid quickly enough some of the fish might
be saved, remaining in a state of suspended animation until
 thawed out.
In spring the ice melts and any survivors are able, if
not too weakened by their experiences of the winter, to
pursue the abundance of suitable live food once again
present in their environment. They are also subject to
fresh attacks by their many enemies, who are taking advan-
tage of favourable conditions to increase in numbers.
So there you have it—some details of the perilous journey
of goldfish from egg to adult when raised under “natural
conditions” in outside ponds or pools.

The natural hazards are not the only objections to
indiscriminate spawning, however. The shape and con-
dition of the fishes can be improved by selective breeding.
Serious minded breeders have compiled ideals at which
to aim when breeding goldfish. Whereas you may not
agree that the ideal shape they like is the most desirable
one it is well to take note of the best procedure to adopt to
produce an increased number of fish of the shape you
prefer.

The first and most obvious step is to restrict your adult
fish to those most nearly approaching your ideal. Take
a single pair embodying all you like best, and breed from
these. Save as many of the young fish as you can until you
see their potentialities, and raise only those showing the
greatest promise. That is the procedure in a nutshell, but
it is not so simple as it sounds. If you spawn the fish
under natural conditions the chances are that very few
youngsters will survive a single season, and you will have
no say as to which should do so and which should be dis-
pensed of.
You need lots and lots of fry from which to choose, and
I intend to tell you in my next article how you can get
them, in conditions where they stand a good chance of
escaping the normal hazards of existence.

Siamese Fighting Fish

HOW reliable is the white ‘egg’ beneath a fighting
fish’s abdomen as a guide to the sex of the fish?
What is the age at which fighters will breed? Are
white eggs from a fighting fish dead ones? How can the
breeder determine the earliest safe time for the male fighter
to be taken from the breeding tank after the eggs have
hatched? What can be done to save fighter eggs in a
deserted bubble nest? Will one male look after the eggs
of two bubble nests? Is it possible to breed a pure strain
of blue fighters? What causes the brilliant colours of the
fighting fish?

Answers to these questions, together with much other
information about the fighting fish not previously brought
together in a practical monograph, will be found in The
Fighting Fish of Siam by Dr. F. N. Ghadially (3d. ed. at
your dealers, or from The Aquarist, 9th. Vol. post paid). No keen aquarist following the advice of this book can fail
to breed the fighting fish successfully.

Locust Hoppers

In the article on “The Three-Horned Chameleon” in
the April, 1963 issue it was said that “no initial culture
of locust hoppers can be obtained from the Anti-
Locust Research Centre . . .”. We have been asked to
state that this was not authorised by the Director of the
Centre, who wishes it to be known that locusts will not be
supplied from the Centre for feeding reptiles and other
animals.

THE AQUARIST
Rearing the Fry of Cichlids

by ROBIN SANDERS

FEW people would disagree that breeding a pair of adult cichlids and watching them raise a brood of fry is one of the most rewarding experiences an aquarist can enjoy. It is, however, necessary to rear fry to maturity, and I feel that it is not until he has done this that the aquarist can feel a real sense of achievement.

Most species of fish present their own particular problems as far as breeding and rearing are concerned, and cichlids are no exception. For cichlids there are two extremely important factors to consider. Spawning is usually large, and may run into many hundreds, and the fry grow rapidly and need ample space in which to develop. This calls for an abundance of food, especially live food, and also for spacious tanks. For the purpose of analyzing the development of these young fishes, it will be convenient to divide the process into four stages.

Stage 1
This stage begins at the time that the fry is first seen. This occurs when the fry are free-swimming and have absorbed their yolk-sacs. With the large cichlid fry, such as Cichlasoma bicirratum (Jack Dempsey) and Herichthys cyanopterus (Texas cichlid), this stage does not apply, as the fry will be large enough to start on Stage 2. But with the smaller and medium-sized fry, such as those of C. mochil (gymnorynchus), Aequidens purpurascens, Aequidens latipinnis (brown and blue aequidens), it is necessary to start them off on a fine preparation, such as hard-boiled eggs, mixed to a smooth cream with a small quantity of water. This will last only for a few days, until the fry are able to cope with live shrimp in Stage 2. In the earlier days, the fry prefer a larger form of food such as that just mentioned.

The quantity of food should be small, but given frequently. Three or four times a day is not too often, but none must be taken not to overfeed, as this may lead to the fry becoming polluted, and the entire batch of fish being lost. The exact quantity to give can only be learnt from experience, and I learnt the hard way! My fault was in overfeeding, not in underfeeding. The secret is to give small quantities often.

Stage 2
This is the live shrimp stage. I believe brine shrimp to be essential with young cichlids. The fry love it, and grow rapidly if they are fed often. Their swollen pink stomachs are an indication of whether or not they are feeding well. It is also a very successful way of catering for the large numbers of fry. Brine shrimp eggs can be purchased from nearly all dealers, and should be hatched out in an open dish. If at 80°F (27°C) they will take only 24 hours to hatch, and so feeding can be done once a day, the fry being spoonfed off and collected by filtering them through a piece of linen or muslin.

The live-shrimp stage will last for a couple of weeks until the fry are large enough to graduate to the third stage. An exact number of days would be misleading, as it depends entirely on the size of the fry and the many factors influencing their rate of growth, but about 14 days is normal.

During this stage the diet should be varied by feeding with portions of finely powdered dried foods, or, in the early days, continuing also with the egg solution mentioned above. If this is not done, the continued feeding of live shrimp will adversely affect the fry because of its salinity, and may even kill them. This is one of the few disadvantages in feeding with live shrimp, and one that can easily be avoided. Once daily feeding of live shrimp, and one of dried food, is a fairly reliable guide.

Stage 3
This is about 3 weeks from when the fry are free-swimming. By now they should be capable of eating finely chopped Tubifex and white worms, and once a week the fry should be encouraged to continue. These worms can easily be cut to a manageable size with an old pair of scissors, and a good food of one or the other should be given every day. My particular routine is to feed the fry twice daily. In the evening they receive dried food, and in the evening chopped Tubifex (on 3 days of the week), and white worms (on the other 2 days). Not surprisingly the fish are now beginning to put on weight, and it is at this stage that they really begin to look like miniature versions of their parents.

Stage 4
At about the 6 weeks stage it is no longer necessary to chop the worms, and the young fish can be seen wrestling with full length Tubifex worms. This is a milestone on their path to maturity, and it now means that their mouths are large enough to consume small scraps of meat, and their diet can be varied accordingly. I have an order for a regular supply of fresh minced beef which I find very successful, both for young fish when cut up finely, and for full grown specimens in larger pieces. Particularly during the last winter, this food has been an excellent substitute for garden worms.

This is the last stage, with the tank no longer full of fry, but of young healthy fry, only too anxious to eat their way through all the Tubifex, white worms and raw minced beef that the aquarist can obtain. From now on this will be their main diet, but with a corresponding increase in consumption as they continue to develop. It is perhaps fortunate that their favourite food is the common garden worm. Once again, with a pair of old scissors the garden worm can be cut into appropriate portions for all sizes of fish, right down to our youngsters at Stage 4. The only cost involved is in the physical effort entailed in going to the bottom of the garden to dig for worms!

Take Eggs from the Pond

If bunches of water plants have been provided for the fishes to spawn on they should be removed when a good number of eggs are seen to be attached to them. The bunches can be replaced by fresh ones and those with eggs can be placed in hatching tanks. The water should be warmed up if possible as this brings a quicker hatch. The time taken for goldfish eggs to hatch depends entirely on the temperature of the water. If it is 70° to 75°F the eggs will hatch in 4 days. If at 65°F they can take a week, and if in the fifties they can take a fortnight to hatch. A fairly quick hatch means that the eggs are less likely to be attacked by pests whilst development is taking place.
they consume as many of the eggs as they can get. And after the fish come a host of smaller egg-eating creatures which I will discuss in a later article.

Within 4 to 10 days of fertilisation (time depends upon temperature of the water) the surviving embryos burst from the softened membranes of the eggs. They wriggle free and hang suspended like quarter-inch splinters of glass from plants or rocks. They barely make any effort to move. Independent of external food supplies, they absorb the nourishment contained in their yolk sacs, and wait for the development of their swim bladders, the organs that enable them to control their movements.

It is during this brief period that they are most vulnerable. Prey to infestation by surface parasites—such as the gill flukes—and at the mercy of all other fish, including

![Male goldfish showing tubercles on the gill cover](image)

their parents, it is a marvel that any escape at all. Those that do, provided that they can find a sufficiency of food and there are no violent sudden changes of temperature, will make satisfactory progress during the summer months.

With the approach of autumn and winter, however, comes further dangers. The drop in temperature causes appetites to begin to fail, and this alone can be very weakening. When lots of leaves will drop into the water, first keeping out light and afterwards adding poisonous by-products of decomposition as they lie on the pond bottom. Many of the aquatic plants will also begin to die down, adding their quota of pollution. The fish can move nearer the surface of the water, but they seem to prefer the depths. Finally they have no choice— the surface of the water freezes and seals them out of contact with atmospheric air. The oxygen supply cannot be sufficiently replenished, the water becomes really foul and death ensues. If the pond freezes solid quickly enough some of the fish might be saved, remaining in a state of suspended animation until thawed out.

In spring the ice melts and any survivors are able, if not too weakened by their experiences of the winter, to partake of the abundance of suitable live food once again present in their environment. They are also subject to fresh attacks by their many enemies, who are taking advantage of favourable conditions to increase in numbers.

So there you have it—some details of the perilous journey of goldfish from egg to adult when raised under “natural” conditions in outside ponds or pools.

The natural hazards are not the only objections to indiscriminate spawning, however. The shape and condition of the fishes can be improved by selective breeding.

Serious minded breeders have compiled ideals at which to aim when breeding goldfish. Whereas you may not agree that the ideal shape they like is the most desirable one it is well to take note of the best procedure to adopt to produce an increased number of fish of the shape you prefer.

The first and most obvious step is to restrict your adult fish to those most nearly approaching your ideal. Take a single pair embodying all you like best, and breed from these. Save as many of the young fish as you can until you see their potentialities, and raise only those showing the greatest promise. That is the procedure in a nutshell, but it is not so simple as it sounds. If you spawn the fish under natural conditions the chances are that very few youngsters will survive a single season, and you will have no say as to which should do so and which should be disposed of.

You need lose and lots of fry from which to choose, and I intend to tell you in my next article how you can get them, in conditions where they stand a good chance of escaping the normal hazards of existence.

![Female goldfish with abdomen distended with eggs](image)

Siamese Fighting Fish

How reliable is the white ‘egg’ beneath a fighting fish’s abdomen as a guide to the sex of the fish? What is the age at which fighters will breed? Are white eggs from a fighting fish dead ones? How can the breeder determine the earliest safe time for the male fish to be taken from the breeding tank after the eggs have hatched? What can be done to save fighter eggs in a deserted bubble nest? Will one male look after the eggs of two bubble nests? Is it possible to breed a pure strain of blue fighters? What causes the brilliant colours of the fighting fish?

Answers to these questions, together with much other information about the fighting fish not previously brought together in a practical monograph, will be found in *The Fighting Fish of Siam* by Dr. F. N. Ghadially (3rd ed. at your dealers, or from The Aquarist, 3rd 10d. post paid).

No keen aquarist following the advice of this book can fail to breed the fighting fish successfully.

Locust Hoppers

In the article on “The Three-Horned Chameleon” in the April, 1963 issue it was said that “an initial culture of locust hoppers can be obtained from the Anti-Locust Research Centre, We have been asked to state that this was not authorised by the Director of the Centre, who wishes it to be known that locusts will not be supplied from the Centre for feeding reptiles and other animals.
Rearing the Fry of Cichlids

by ROBIN SANDERS

Few people would disagree that breeding a pair of adult cichlids, and witnessing the devoted attention shown by the parents towards their young, is one of the most exciting and rewarding experiences an aquarist can experience. It is equally rewarding, however, to raise these youngsters to maturity, and I feel that it is not until he has done this that the aquarist can feel a real sense of achievement.

Most varieties of fishes present their own particular problems as far as breeding and rearing are concerned, and cichlids are no exception. With cichlids there are two extremely important factors to consider. Spawnings are usually large, and may run into many hundreds, and the fry grow rapidly and need ample space in which to develop. This calls for an abundance of food, especially live food, and also for spacious tanks. For the purpose of analysing the development of these youngsters, it will be convenient to divide the process into four stages.

Stage 1

This stage begins at the time when the young fry first become free-swimming and have absorbed their yolk-sacs. With the large cichlid fry, such as Cichlasoma bicirratum (Jack Dempsey), and Herichthys cyanoguttatus (Texas cichlid), this stage does not apply, as the fry will be large enough to start on Stage 2. But with the smaller and medium fry, such as those of G. moorei (fremouthi), Apistogramma panachaeus, and Apistogramma leichardti (brown and blue aequifasciata), it is necessary to start them off on a fine preparation, such as hand-boiled egg yolk, mixed to a smooth cream with a small quantity of water. This stage will last only for 1 or 2 days until the fry are able to cope with live shrimp in Stage 2. It is unnecessary to culture infusoria, as the fry prefer a larger form of food such as that just mentioned.

The quantity of food should be small, but given frequently. Three or four times a day is not too often, but care must be taken not to overfeed, as this may lead to the water becoming polluted, and the entire batch of fry being lost. The exact quantity to give can only be learnt from experience, and I learnt the hard way! My fault was in overfeeding, not in underfeeding. The secret is to give small quantities often.

Stage 2

This is the live shrimp stage. I believe brine shrimp to be an essential with young cichlids. The fry love it, and grow rapidly if they are fed often. Their yellow pink stomachs are an indication of whether they are feeding well. It is also a very successful way of catering for the large numbers of fry.

Bread shrimp eggs can be purchased from nearly all dealers, and should be hatched out in an open dish. At 80°F (27°C) they will take only 24 hours to hatch, and so feeding can begin immediately. The shrimp being pipetted off and collected by filtering through a piece of linen or muslin.

The live shrimp stage will last for a couple of weeks until the fry are large enough to graduate to the third stage. An exact number of days would be misleading, as it depends entirely on the size of the fry and the many factors influencing their rate of growth, but about 14 days is normal.

During this stage the fry should be fed by feeding with portions of finely powdered dried foods, or, in the early days, continuing also with the egg solution mentioned above, if it is not done, the continued feeding of live shrimp will adversely affect the fry because of its salinity, and they may die. This is one of the few disadvantages in feeding with live shrimp, and one that can easily be avoided. Once feeding live shrimp, and one of dried food, is a fairly reliable guide.

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Not surprisingly the fish are now beginning to put on weight, and it is at this stage that they really begin to be miniature versions of their parents.

Stage 4

At about the 6 weeks stage it is no longer necessary to chop the worms, and the young fish can be seen wrestling with full length Tubifex worms. This is a milestone on their path to maturity, for it now means that their mouths are large enough to consume small scraps of meat, and their diet can be varied accordingly. I have an order for a regular supply of fresh minced beef which I find very successful, both for young fish when cut up finely, and for full grown specimens in large pieces. Particularly during last winter, this food has been an excellent substitute for garden worms.

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June, 1963
A JUDGE'S THOUGHTS ON JUDGING FISH

Assessment of Finnage

by FRANCIS BARRATT

The fourth character to be assessed in judging is finnage, which can receive 20 points. After the complications of judging colour this part is comparatively easy; firstly because most photographs of fishes are in profile and whether colour or monochrome makes no difference; secondly because there are many line drawings in profile which cover nearly every species that appears on the show bench. These line drawings have a big advantage from the judge’s point of view, in that they almost always show the fins Contact and of the correct size and shape. I refer here to the drawings that appear in books, or are copied from the originals which were made for scientific purposes when suitable photographs were not available.

In most classes which appear before us there will not be a great deal of difference in the fins of individual entries within the class. A class of barbels will have perhaps one or two of the species in which the males have filamented dorsal fins. There is perhaps a little more variety among the characins, amphilids and cichlids, and still more among the livebearers. This latter is partly because the livebearers have been subjected to the attentions of the specialists in breeding new fin shapes to a rather greater degree than any of the other tropical classes.

However, there are slight variations in shape of dorsal, caudal and anal fins of even closely related species, and it is our duty as judges to learn all these variations to the best of our ability, and to keep up to date with new species as well as retaining our knowledge of the older ones.

It is easy to forget details of fin shapes among those species we have not seen for some time, and we may find ourselves wondering if this barb should have a pointed or round tip to its dorsal, or that cichlid the extended rays of its dorsal, anal or ventral fins. We can only be really competent judges if we keep up with our studies, constantly going back over all the books as well as seeing live fishes so as to refresh our mental image of the ideal.

As in body shape, there will be a difference in size, shape and proportions of fins between fish of any one species. This corresponds with the variations in length of limbs in humans, and is natural. There is, however, a tendency to greater variation towards sub-standard finnage amongst those species which have for long been bred by aquarists from “domesticated” stock.

What we must look for is a set of fins which are better than average in size and shape before we give full marks. We cannot just divide the 20 points into so many for dorsal, so many for caudal etc., as do the specialist societies for their special shapes, because in many cases the comparative value of fins varies. We must look at each fin separately for faults of shape, formation of rays, presence or absence of filaments and for alignment. Not all fins are set on the body straight. Some have malformed or underdeveloped rays. Many have tips missing in such a way that it can be difficult to decide whether it is due to injury or the way it has grown.

If we decide it is injury, we ignore the fault for now, but take notice of it again when judging condition. If we decide this fin has developed in this shape contrary to the ideal, then it may be treated as rather more serious, being an inherent fault. When each fin has been examined we take them as a whole and look for “balance”. Generally speaking a fish will look better with all fins slightly small than with a normal tail when the others are bigger than average.

Here again is where we can use the formula as for “body” and “colour” to assess the points value. Finnage that is of average good size and shape, with no visible faults, is worth 15 or 16 points, leaving the extra points for those with better development of size and shape, which are so desirable. The practice of first using one of the categories “Excellent”, “Very good”, “Good”, “Fair”, “Poor”, “Very Poor” and “Bad”, and converting this into points is very helpful and saves time.

Some of the faults we have to look for are the less obvious ones of missing or abbreviated filaments of tail, dorsal or ventral fins, and in some cases the anal fins. These filaments are not quickly regrown if nipped off during early development and sometimes they show a kink at the point at which new growth begins. Angel fish should show these filaments at top and bottom of tail fin, at least the length of the normal part of the fin, so should the firemouth cichlid and several others. Most medium sized cichlids have the long tapering dorsal fins, which, in the male, end in a single ray.

In most of these cichlids there should be some matching between dorsal and anal fin, with the anal being slightly shorter. Angelfish, however, can have only the anal fin pointed, as opposed to a nicely rounded tip to dorsal.

All the gouramis and most other amphilids have the extensions to ventral fins, in most cases there being no

Continued on opposite page.

THE AQUARIST
Knife Fishes

Among the interesting families of fishes that differ somewhat from those with which we are familiar is the knife fish family, the name being a reference to their shapes, which come from the South East Indies and Africa.

They have the facility of swimming backward as well as forward without any apparent difficulty, and travel as though they were operated by reverse as well as forward gears. This enables them immediately to retreat from any dangers which may confront them. The operative mechanism for this purpose is the anal fin, which runs practically the whole length of the underside of the body into the caudal fin.

They have large mouths with very many small teeth and are small scaled. They also have a larger swim bladder than most fishes and are able to take air from above water. They are not generally regarded as good fish and tend to travel on their own.

Because of their size, which I will describe below, it is better to keep only the smaller specimens in aquaria, which should not be too well lit, be profusely planted and should also have hiding holes, into which these fish will "backpedal" and keep watch from the opening. Soft peaty water is recommended for their aquaria. They prefer somewhat higher temperatures than normal and these should be 70° to 84°F (24° to 28°C). They prefer all live foods and are usually voracious eaters.

Provided that they are not too large, they will make good community fish if all other inmates of the tank are of similar size, and should never be kept with smaller fishes.

I can recall seeing some specimens in 1951 at the British Aquarists' Festival in Manchester, which belonged to Mr. A. Fraser-Brunner, who used to delight in showing their backpedaling abilities.

The three main species of this family available to aquarists are the following:

*Notopterus afer*. This is usually found in the Gambia River to the Congo and in Nature specimens are recorded as being up to 24 in. (60 cm.) in length. They have a very flat body with a dorsal fin resembling a small flag. This species has no ventral fins. Young fish are usually a soft red or yellow in background colour, cross-crossed with a fine network of lines. Sometimes dark spots are also present. Older fish are usually violet brown.

*Notopterus chitala*. These are usually found in Siam and Burma and differ from *N. afer* in having small ventral fins. They can be larger than *N. afer* and reach 30 to 33 in. (75 to 83 cm.). It is, however, more usual to find specimens of 15 to 17 in. (40 to 45 cm.). The ray count on the anal fin is usually 45 to 50 rays.

*Notopterus notopterus*. This is perhaps the most handsome one of the trio. It is found in India, Burma, Siam, Java and Sumatra and when full size is rarely more than 15 in. (35 cm.). It is much smaller scaled than the other varieties, particularly on the gill plates. Its usual colour is a grey silver with a darker silver top to its body. The dorsal fin has a white tip, and the anal fin has a dark run to it. The iris of the eye is a bright gold and in fact the fish is quite an attractive fellow.

Knife fish are of some importance to the natives in the areas where they are found since they are edible and are considered quite a delicacy.

R. O. B. List

Assessment of Finnage

continued from page 44

normal fin, just the "feelers". Where the extensions occur in the siphon, however, it is just the front rays of a normal fin that are twice as long as the others. The exception, again, is the angel fish, where the soft rays are absent. Most pouter fish of the genus Aplocheilus and some of radiatus are other examples.

When these single filaments are missing there is obviously very little missing in proportion to the mass of all the fins, and it is difficult to decide how many points to deduct. No matter how good the rest of the finnage, an angel or firemouth without the tail filaments, Aplocheilus radiatus without the dorsal filament, lined pouter without ventral extensions, or gourami without the long feelers, could not be called excellent or even very good. The number of points deducted therefore must seem high considering the size of the fault. It is a matter of that little bit extra which is the finishing touch, and which is therefore of comparatively great importance.

No one can tell us how many points to deduct for any given fault; it is something that we have to decide for ourselves on the basis of whether it reduces the "excellence" to "very good", "good" or something lower down the scale. Only our own experience can tell us what category to use.
STARTING RIGHT WITH THE COLDWATER AQUARIUM

Setting up the Tank

by A. Boarder

THERE are several different ways of setting up the aquarium, according to its purpose. The tank for exhibition work is not intended to be permanent and so it requires special treatment. The tank for breeding, perhaps in a fish house, also needs special attention. But here I am going to consider the tank that is to be kept in the house as an ornamental and point of interest.

For the tank in the house, which can remain for many years, I consider that some under-compost soil is essential. Planting in pure gravel is not likely to bring about speedy results. No one would think of planting specimens in the garden in a heap of stones, and so it must be realised that if decent growing plants are to be present, a little soil should be included for a start. Once the tank is inhabited by fishes their droppings will make nourishment for the plants, but something must first be added for their benefit. I suggest that some old turf be placed in the bottom, towards the back. If this is unbearable, John Innes potting compost no. 1 will do. There is very little added fertiliser in this, just about a quarter of a pound to a bushel of compost, and so the small amount needed in the tank will not contain anything likely to be harmful to the fishes.

Soil, Sand and Rocks

Place the soil up to 2 inches deep at the back and gradually it to nothing right at the front. Then add the ordinary aquarium gravel (compost) so that the soil is well covered, but do not allow any to come above the front frame. If you do, there will be so much of the finished picture blocked out. The compost should be well washed and I think it is an advantage to have it fairly coarse, like washed grit. If a type of rock is to be used it will look better if the compost matches it as much as possible. Crushed rock will often make a good covering to the ordinary compost.

Rocks are not essential for the well-being of the fishes, but they will certainly add to the attractiveness of the tank. One wants to create a living picture, although perhaps not like a pond in the wild, as this is probably too foul and unhealthy. The idea should be to create a picture which will instantly attract the attention of anyone entering the room. I have yet to find any person who can enter a room where there is an attractive tank without going straight over to it and admiring it.

Arrangement

Country scenery is very ordinary if flat, but with either hills or small undulations the scene is improved out of all recognition. Therefore the introduction of a few well chosen rocks should enhance the beauty of a tank. Do not have too many rocks you will only be boring the fishes of swimming space. See that there are no points or sharp edges that could injure a fish. Do not use any type which will disintegrate in the water or release harmful lime. The type known as Westerfield rockery stone is very good, or well-washed large stones from a river. Try to arrange the rocks in a natural formation. Do not place one huge rock mid centre with one on each side equidistant. Start with a fairly large one to one side and then continue with two or more in a smaller size; this will look far better. If a platform is desired at one end, this can be made with large flat stones with a little gravel on top. This breaks up the flatness and can be made to look very fine. Do not have the rocks too close to the front of the tank nor yet too close to the back glass, where they could form a trap for the fishes.

Don’t be in a hurry to place your rocks, but try them out in several positions before deciding on the best one. Remember they may be there for many years.

Water Plants

There are many coldwater plants obtainable now but I do not think that it is a good idea to include too many kinds. If you do it is possible that the stronger growing ones will gradually choke out the weaker growing ones. For the 24 in. by 12 in. by 12 in. tank about four kinds will be sufficient. The first choice should be Sagittaria natans. This seems to last almost for ever. My own tank was planted with some 16 years ago and these plants are still in good order and have not had to be replaced. Any extra shoots or runners not required can be removed quite easily. Try to hide the back frame and ends of the tank, and keep the middle front clear. Another fine plant is Hygrophyllum. Although this is not allowed in an exhibition tank by the Federation of British Aquarium Societies, I consider it to be one of the best plants for decoration. The pale green leaves are very attractive. The plant resembles a smaller leaved Ludwigia, but is greener. Some hair grass (Eleocharis acicularis) is good for planting just in front of one of the rocks. For the back some plants of Egeria densa and Lagarosiphon major can be used. These grow very well but must have some pruning now and again as they become rampant. A little Fontinalis antipyretica can also be used.

Remember that the plants will soon grow and so do not plant them too thickly. It is well to have the tank about half-filled with water whilst planting, and then it is gradually filled when planting is done. If a small piece of flat wood is included to pour the water on, the gravel etc. is not disturbed. Now draw a sheet of paper along the water surface to remove any dust or scum. It may be necessary to empty the water out and refill to ensure that the tank looks perfectly clear.

If needed, a little duck weed (Lemna) can be placed on the surface, as fishes like this occasionally, but see that it does not become too overgrown or it will shade out the light from the lamps.

Now leave the tank in a good light position or put the lights on for a few hours each day. The water plants will then become established before any fishes are added. If you can root any plant cuttings in a jar containing some earth as well as water they will get going far quicker than if they are just pushed into the gravel, where the ends may rot off and the cutting fail to grow.

The next article will deal with the choice of fishes for the tank.
“Instant Ponds”

by BARRY R. JAMES

Easy to install are the fibre-glass pools such as the Leedale Charplas Engineering Co., illustrated here. Paving or rocks are used to conceal the edges of the sunken pond.

DURING the last few years manufacturers have been devoting a great deal of research and initiative to the development of a range of ready-made pools, in a variety of synthetic light-weight materials. The sales potential of their products is enormous, not only to keen cold-water fish fans, but also to the average garden conscious person who would like the luxury of a garden pool, but lacks either the enthusiasm or the capacity for hard labour necessary to build a concrete pool.

Portable pools are made from four main materials: 1. heavy-grade polythene, 2. heavy plastic, 3. fibre-glass, 4. Plastic-glass.

Heavy-grade Polythene

Polythene sheet for garden pool construction is usually of 500 gauge, although heavier material of 1000 gauge is also available, and obviously the thicker the better must be the rule when dealing with flexible materials. It is available in blue, black and transparent colours; black is to be generally favoured because its surface is non-reflecting and provides a neutral background for viewing the inhabitants. I remember seeing a transparent polythene pool with a grand growth of dandelion and chickweed luxuriantly under the side walls; although somewhat attractive, it did look decidedly odd to say the least.

Polythene sheet is in standard widths, up to 144 in., and of unlimited length. It has been tested by one of the foremost aquatic plant nurserymen in the country, who uses it extensively for his own work and recommends it to his customers.

Polythene may suffer mechanical damage, if for instance, a large piece of rock is knocked inadvertently from a rockery by the side, but such accidents are rare and, in any case, puncture repair outfits are available to repair a small hole at once.

A minimum life of around 5 years can be expected from a correctly installed polythene pool, and even then when it does start to deteriorate, it is a simple operation to add a liner and waterproof your pond once again.

Other advantages: 500 gauge polythene costs 7s. 6d. a yard for sheets 144 in. and a ready-made pool with sheeted corners 5 ft. by 3 ft. by 18 in. costs around £50. This is by far the cheapest way of making a pool. Polythene pools can be either formal or informal and can be made with a sufficient depth for the tallest growing lilies and for the fishes to be able to winter successfully below ice level.

Disadvantages: (1) Care must be taken during installation to prevent air pockets and unsightly creases forming. (2) It may be difficult to retain the shape of the sides and prevent them sagging if the soil is crumbly. (3) If the pond is built too near to large trees it is possible that roots may cause damage to the sheeting.

Plastic Pools

The fact that the pools made to house the sailing craft at London’s boat show are made of plastic should be a sufficient testimonial to the worth of this type of material for holding water in large quantities. The plastic used is extremely thick and durable, and it is difficult to pierce by accidental means. Plastic pools are usually offered already shaped in standard sizes up to 10 ft. in length, but larger sizes can be made to order if required. Another attractive feature offered by one manufacturer is the insertion of cycle holes along the sides. With the metal scales applied, the pool may be drained out during installation, which helps enormously, and enables the whole operation to be carried out by one person. These pools are flexible and, with the instructions supplied by the makers, informal or formal shapes can be attained.

Although these pools are more expensive than polythene in my view the extra cost is justified. A 10 ft. pool costs around £10 10s.

Fibre-glass Pools

Fibre-glass is widely used for car and boat bodies because it is light, easily moulded to any desired shape and is virtually indestructible. It is also waterproof and this, combined with the other advantages, makes it an excellent material for pool construction. Fibre-glass pools are obtainable in many shapes and sizes and usually have ledges and marginal pockets incorporated. Its toughness enables it to sustain severe blows and attacks from frost and ice. The models I have seen offered so far usually have a large surface area but are too shallow (around 15 in. at the deepest part) to enable them to accommodate any but the dwarf growing varieties of water lilies, and during the last severe winter I saw several pools frozen down to the bottom, resulting in the premature demise of the inhabitants.

However, this apart, fibre-glass pools have an indefinite life and can be easily dug up and transported if by any chance you have to move house. Placing them in position is simplicity itself in any soil; all you need is a shovel and a spirit level.

Fibre-glass pools are very expensive. A 10 ft. pool will cost close on £30, although smaller models can be had for £15. A 5 ft. pool will cost £8 15s.

June, 1963
Skinks for the Vivarium

by ROBERT BUSTARD, B.Sc.

Photographs by the author

Skinks form a large group of some 400 species with a wide distribution on all six continents, although in Europe the number of species is limited. Representatives of four diverse genera have been selected for this article. In 1969 (The Aquarist, 23, 256) I wrote, "The smaller skinks are easy to keep"—this article covered popular African Mabusea and American Eumeces species. Schneider's skink (Eumeces schneideri) from North Africa is a particularly handsome species although subject to colour variation over its extensive range. The back possesses numerous bright brick-red markings on a chocolate ground, the sides are yellowish and the ventral region is grey-white. As the photograph shows, this is a sturdy species but the limbs are small for the size of the animal, as is characteristic of skinks which are thought to be following the evolution taken by snakes in becoming limbless. There are, however, degenerates (i.e., limbless or reduced limbs) in many lizard families. Eumeces schneideri is often sold as the Algerian skink, which is likely to cause confusion with Eumeces algeriensis, which requires similar treatment in captivity. The vivarium for Schneider's skink should have a floor area of about 30 in. by 24 in., as although not very active it is a large species. My specimen (illustrated) measured between 15 and 18 inches and was still growing. Specimens possibly reach 2 feet in total length although once again there is much variation. The vivarium had a 3 inch layer of coarse sand and two slabs of bark as basking sites and hiding places. A small dish of water was sunk into the sand and a temperature of at least 77°F (25°C) and sometimes 80°F (30°C) was provided by means of light bulbs during the day. In their natural habitat the temperature is said often to reach 104°F (40°C) in the shade during the summer. At night 59°F (15°C) is suitable. Schneider's skink is easy to feed, as in addition to the usual insect fare this handsome skink will readily accept strips of raw meat and chopped banana. This diet I have found to be excellent for many species of large skinks and it has kept them in good condition over many years. When newly obtained this species may bite and hold on with determination. However, it soon becomes tame and is then one of the most gentle species. Like many large skinks it does well in the vivarium, where it is long lived with little attention.

The blue-tailed skink (Mabusea antiquumannii marginata) is a very different animal, which has earned the name rainbow skink because of its beautiful coloration. This name is perhaps to be preferred because only the females possess the blue (ultramare) tail—the tail of male specimens is orange. The total length of 10 inches is largely accounted for by the exceptionally long tail. The body is iridescent and possesses yellow markings forming stripes and also spots and flecks on a dark chocolate coloration. The rainbow skink is a native of southern Rhodesia and requires a vivarium of similar size to Schneider's skink, as it is most active. The vivarium should contain stones to provide numerous hiding places and growing plants or moss should be added. The vivarium should not be as dry as for Eumeces schneideri. A day temperature of 77°F (25°C) is suitable and any live insects will be eagerly consumed. My specimens feed eagerly on nightcrawlers, which can be dropped into the vivarium singly or placed in a small glass dish sunk into the sand, and blueberries. This is certainly a most handsome and incredibly fast-moving species.

The next two species are Australian. The giant skink (Egernia major) is a handsome and docile lizard attaining a total length of 2 feet. The young specimen illustrated measured 16 inches overall and was of a most gentle disposition. The coloration was subtle, and in my opinion attractive, as each scale appeared as if individually painted
DISEASES OF FISHES

Internal Worms

When a disease attacks any of the internal organs it becomes difficult to diagnose the complaint. In some cases the symptoms can be recognised, whereas in others the fish will die without any apparent cause. Only dissection after death and a microscopic examination will reveal the true nature of the disease.

Sucking worms (Trematoda) are rarely found in aquarium fishes and are generally introduced to the tank by either snails or some of the live foods. Their attacks are seldom fatal and nearly always they escape detection, for the only visible effect they have on fishes is to make their victims appear somewhat wasted in the abdominal region and to be continually off-colour.

If the infection is suspected and treated at an early stage a cure is possible. Treatment may consist of feeding the fish with dried foods soaked in a 1 per cent solution of phenornatol. A 1 per cent solution is made by adding 1 millilitre of phenornatol (easy to obtain from dispensing chemists) to 99 millilitres of distilled water.

R. E. Macdonald

Cacti in the Fish House

Cacti in the fish house must be given all the light possible or they may become drawn and weak. They are not then likely to flower. If a shelf is fitted below a window the plants will be quite safe there, will get plenty of light and provide some shade from strong sun during the summer months. The pots should stand on gravel in trays or saucers so that drips do not occur and so that the drainage holes of the pots remain open.

“Instant Ponds” continued from page 47

as little as £7. Water-falls of the same material are also available, though they cost almost as much as the pool itself (just over £5).

Rather similar in properties to fibre-glass, Plasto-glass ponds in some models I have seen are equipped with a drainage plug in the deepest portion, which can be very useful if the pool is situated in low ground where siphonage is impossible. These pools have plenty of depth but are very narrow in some cases, giving them the appearance of bath tubs. There are other models, mostly rectangular, which are very good and are to be recommended.
WATER PLANTS

THREE great genera of amphibious and aquatic plants have been notably explored by aquarists: *Echinodorus*, *Cryptocoryne* and *Aponogeton*. Species of each of these provide the largest and most decorative of specimen plants for tropical aquaria.

Members of the genus *Echinodorus* occur naturally in the warmer regions of the American continent as members of bog floras. Many of them are now commercially available in this country and are admirably suited to submerged growth, some of them displaying an attractive variation in leaf form in the course of the life cycle.

The foliage of each species grows from a short compact rootstock anchored in the substratum by abundant adventitious roots. When planting, the rootstock must not be completely buried. The best rooting media for species of *Echinodorus* contains garden soil or clay mixed with sand and a little peat to keep the compost open. Such a medium is best contained within a 3 or 4 in. diameter pot and covered with a thin layer of coarse gravel or sand to prevent clogging the water. Potting plants generally is to be recommended, even if the pots are submerged beneath the gravel of the aquarium bed, because it greatly facilitates attention to and removal of the plants without disturbance of the root system.

Species of *Echinodorus* are really suited only to tropical aquaria, though some will withstand temperatures as low as 50°F (10°C) for short periods. Most species grow quickly once they are established and occasional discreet trimming of old leaves is necessary for tidiness. Several species naturally produce floating or aerial leaves or both as they approach maturity. Propagation of these plants is not easy; occasionally young plants develop from the parent’s rootstock and when these have reached an appreciable size and become established the rootstock may be carefully divided. Some species may, after flowering above the water, produce viable seed and occasionally plants develop directly on the flower stalk. Seed may be germinated and such young plants grown on in pots, containing a fairly fine soil and sand compost, submerged in shallow water at a temperature of from 65° to 72°F (18-22°C). It is usually 18 months or more before seedlings reach a handleable size of about 2-4 in. in height.

Though they may be small when initially obtained, many species grow to a considerable mature size and adequate room must be allowed for future growth, as development tends to be very stunted when competition for space is keen. Similarly, for vigorous growth the artificial light must be good; daily exposure to sunlight is almost essential if the plants are to be induced to flower.
of the Echinodorus Group

by C. D. SCULTHORPE

Photographs by the author

Fig. 1.—A 2 years old specimen of Echinodorus berteroi, the callithamn plant, showing the linear and lanceolate translucent submerged leaves; two leaves of a broader shape may also be seen; as the plant matures the leaves become progressively larger and broader and eventually cordate floating and aerial leaves and small white flowers develop.

Fig. 2.—A dwarf chain sword plant, possibly Echinodorus tenellus; rosettes of leaves reach a height of 1 to 2 in. and form a dense carpet; propagation is easy as young rooted plants occur at the nodes of the frequent runners.

Fig. 3.—A flourishing specimen of the junior sword plant, Echinodorus brevipedunculatus, which grows to a submersed height of up to 12 to 15 in. Leaves are pointed and lanceolate, though varying considerably in overall shape; veins are often cappery red. Aerial leaves are rather smaller and rounded. It occasionally produces runners.

Fig. 4.—A 2 years old specimen of the Amazon sword plant, Echinodorus paniculatus. Leaves are lanceolate, yellowish green. It grows to a height of about 15 in.; plants frequently develop on the aerial flower stem.

Fig. 5.—A 2 years old specimen of the broad-leaved Amazon sword plant, Echinodorus paniculatus var. robustus; leaves are slightly tougher in this variety, with three to five prominent primary veins, and more elliptical in shape.

Fig. 6.—A 18 months old specimen of the narrow-leaved Amazon sword plant, Echinodorus paniculatus var. gracilis; leaves are linear to lanceolate, veins less conspicuous.

Fig. 7.—A 19 months old specimen of the uncommon Echinodorus macrophyllus; the more recently formed leaves are narrowly heart-shaped and their veins are conspicuous. At maturity this species is large, with broadly cordate leaves bearing nine or more prominent veins, and provides a handsome specimen plant for a decorative aquarium.

Fig. 8.—Seedlings of Echinodorus grandiflorus; the largest of 9 months old, the smallest of 2 months old. Leaves of this species do not change markedly in shape as the plant matures; the juvenile leaves being elliptical and the mature ones more broadly so; the leaves are a rich mid-green and their primary veins are very prominent on the under surface. At maturity the plant is about 15 to 18 in. tall.

Fig. 9.—An immature specimen of the Amazon spear plant, Echinodorus muricatus, showing oval, elliptical and spear-shaped young leaves.

Fig. 10.—An older specimen of the species in Fig. 9 showing more nearly mature, elongated cordate leaves with five main veins. Foliage is bright green. Mature height in the aquarium nearly exceeds 16 to 18 in.

Fig. 11.—Two specimens of a species of recent introduction, Echinodorus andressii. These are young plants showing the juvenile linear, spiky leaves; towards maturity the leaves apparently become considerably broader.

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OUR EXPERTS’ ANSWERS TO TROPICAL AQUARIUM QUERIES

I intend setting up a tropical tank measuring 30 in. by 12 in. by 12 in. How many small fishes could be safely housed in such a tank and what wattage in heaters would be needed to maintain a suitable temperature?

By small fishes we assume you mean those about 1-2 in. long, in which case your tank, without artificial aeration, will support about 20 pairs. We suggest you employ two 75 in. heaters controlled by a thermostat. Wire the heaters in parallel and place them in a horizontal position just resting on the sand. A heater towards each end of the tank will ensure a more even distribution of heat.

I am new to the tropical aquarium keeping hobby and am rather worried because the thermostat I have installed to maintain a temperature of 70° F. (21°C) permits a drop to 65° F. (20°C) before it switches on again. Will this irregular rise and fall in the temperature have a bad effect on the health of the fish?

The rise and fall in the temperature of your tank is too small and protracted to warrant any alarm. It is a rapid change of several degrees that causes trouble.

A local dealer has some tiny firemouth cichlids for sale. He says they would not prove troublesome in my community tank. Is his statement correct?

Young firemouth cichlids seldom make themselves a nuisance in a roomy, well-planted community tank. But as soon as they reach about 2 in. in length, it is advisable to give them a tank to themselves, or choose as companions robust bodied, alert and rapid-moving fishes of about their own size. When firemouths are in breeding condition they become extremely spiteful towards any other fish venturing near them, or their chosen spawning site.

I had the misfortune to break a mercury-filled thermometer in my aquarium and now have a few specks of the mercury escaped from the stem and were lost on the compost. Will I have to take the aquarium out for renovation?

We do not think a few specks of mercury will do any harm in your aquarium, but if much of it became mixed in the aquarium, it would be advisable to try and spot it out without delay, or use fresh compost to carpet the bottom.

I have just acquired a 24 in. by 12 in. by 12 in. aquarium. How many pounds of washed sand must I obtain to grow good plants in it?

About 14 lb. of sand will give you sufficient depth of compost to grow most plants satisfactorily. Spread it deepest along the back and ends.

The appearance of my aquarium is absolutely spoiled by swirling sediment. What can I do to get really clear water?

First and foremost, exclude bottom-swimming fishes from your tank unless you are prepared to siphon the bottom at frequent intervals. Another essential is a fine of plant life from the back of the middle of the tank and at both ends. Further, try and feed with as much live food as possible. If dried food predominates in the fishes’ diet, take care not to feed too much at a time. A good filter run every night from ‘lights-out’ until morning will remove most of the cloudy particles in the water.

I have just purchased a couple of disc-shaped fish called Alacoconus aureus. Please tell me something about habits and preferred food.

As this characin grows to nearly 4 in. in length it needs a fairly large aquarium to feel at home. It will get along quite well with companions too large to be mistaken for live food. This, of course, it loves, but it will eat almost anything, including aquatic greenstuff. Therefore you must not expect to maintain a beautifully planted aquarium if you introduce this species into your set-up. M. aureus appears to be quite comfortable at a temperature range of 70° to 80° F. (21°C to 27°C) and, given proper care and attention, will live for many years in captivity.

Many queries from readers of “The Aquarist” are answered by our experts at our office. Not all queries and answers can be printed. A stamped self-addressed envelope should be sent to us if a direct reply can be given.

How much light is necessary to grow Cryptocoryne, giant Sagittaria, and chain sword plants in a 36 in. by 12 in. by 15 in. aquarium placed in an alcove out of the direct light from a window?

It is impossible to lay down definite rules about artificial lighting because the quality of natural light reaching an aquarium not in a direct line with a window is bound to vary according to the season of the year, the sort of weather prevailing, the size of the window and its aspect. Thus a window facing south or west permits more light to enter a room than a window facing north or east. Contrastwise, a window overshadowed by trees or outbuildings does not let so much light into a room as one facing an open position. Nevertheless, two 25 watt lamps in a reflector hood should give sufficient illumination if kept switched on for about 6 hours every day to maintain your tank in fine condition; the plants you have chosen are among the few that will flourish without the constant stimulation of a bright light.

I have two tanks placed one above the other. Both receive the same amount of light and were filled with well water and bedded with washed sand more than a year ago. My problem is this: In the top tank I can grow the most lustrous-looking plants, but in the bottom tank I can remember whatever plants I put in soon show a lot of pulpy yellow leaves and refuse to grow. Soon after the tanks were set up, I introduced various kinds into the bottom tank to clear up an attack of white spots. Since then, these plants have had anything to do with the plants’ decline?

Some drugs used in the treatment of fish diseases are not among the best things to encourage a healthy growth of plant life. We suggest that you empty the tank, wash it out well and set it up anew with a complete change of water and bedding medium (or the original compost stirred well to clean it in a bucket of boiling water).

I have just rigged up a tropical aquarium for the first time, and would like to shock it with small-sized, spectacular-looking in colour and shape, fishes of peaceful habit. Can you help me with the names of a few choice species.

You cannot do better than include some or all of the following in your aquarium: the cardinal or neon tetra, the glowlight tetra, the pretty tetra, the penguin fish, the r. paramicrinus, harlequin fish, sheba fish, opalescent fish, lampa-eyes, the cheddar and waggtail platies.

How can I prevent planarian worms being introduced into my aquarium on purchased plants?

Make up a solution of one dessertspoonful of ordinary household ammonia to 1 pint of water. Leave the plants to soak in this for a minute or two. After a rinse of clean water, all should be well.

In your opinion, does filtration really help to maintain a tank in first-class condition?

Indeed it does. But there is no need to keep the air pump running every hour of the day. If it is switched on last thing at night and turned off again first thing in the morning much, if not all, of the water in the tank will be cleared of suspended sediment. Nevertheless you must
bear in mind that filtration does not prevent a certain amount of heavy sediment collecting in corners of the aquarium, or in depressions in the compost. This dirt should be siphoned away every now and again.

A scale dwarf gourami fed almost exclusively on dried food, has developed what looks like an ulcer near the root of its caudal fin. What should I do to treat this complaint?

Include plenty of live food such as Daphnia or washed, chopped Tubifex in the fish's diet, and siphon away all dirt from the bottom of its aquarium. With a richer and more natural diet, combined with scrupulous cleanliness it is likely that the ulcer will disappear of its own accord. But if not, it is better to make the fish in it with a new razor blade and press the edges gently to expel any pus. Before returning the fish to the aquarium, swab the wound with a strong solution of permanganate of potash and smear with petroleum jelly.

I love just bought a small knife fish X. nigra. I should very much like to know its country of origin, its maximum size, its requirements in the way of temperature and food, and its suitability as an occupant of a community aquarium.

X. nigra is native to central and west Africa and grows to a length of about 8 in. It is a good scavenger and eats after dark as well as by day. Though it is not a food-faddist, it likes and should have scraped meat and some live food in its diet. It is not recommended for a community tank; for, in smaller sizes, it is often picked on and nibbled at by inquisitive companions. If it survives such debilitating treatment, it grows space and then, when it reaches about finger-length, it turns the table. This becomes increasingly aggressive. It has a temperature range of from 70° to 85°F (21-30°C).

**COLDWATER FISH-KEEPING QUERIES** answered by A. BOARDER

I have set up a tank out of doors with all the usual plants in it. There are no fish in as yet but although the tank gets plenty of sun all the plants have gone either clear or red in colour. What has gone wrong?

You do not say if you provided any soil on the floor of the tank under the gravel. Many plants must have some nourishment for their roots before they will make good growth, and there is none at all in gravel. Also it may have been very cold out of doors and if the plants came from warm quarters then they are bound to suffer from the change. No doubt they will improve as the weather gets warmer and if some nourishment is provided.

I have a number of fishes of various kinds in an outdoor pond. When I run fresh water into the pond some of the fishes rub themselves against the hose. One or two also have a white spot or two on their bodies. What is this and what is the treatment?

Many fishes like to knock themselves against a hose which is running fresh water into a pond and it is not necessary that it signifies that there is anything wrong. The white spots on the fishes may be a touch of fungus. This can be cured by using a weak solution of formaldehyde. Tape fishes get a slight attack of fungus at the end of the cold weather but as warmer days appear the trouble clears up. If however any fish is badly infected it should be caught and treated before the disease gets too strong a hold.

What kind of plants do I need to set up a tank for coldwater fishes?

There are many water plants to choose from and the following are the ones most often used for the purpose: Myriophyllum; Elodea densa; Lysichiton americanum; Ceratophyllum (hernwort); Vallonia torosa; Fontinalis (willow moss) and hate grass. See that tall growing kinds are at the back, especially covering the back corners to hide the frame. Keep most of the plants towards the back so that there is plenty of swimming space in the front of the tank for the fishes.

Please give me some advice about one of my goldfish. Just lately it has been swimming around in the pond very slowly and I note that the tail has been torn and a "ribbon" of it is curling behind. What can I do to the fish?

This often attacks fish in a pond after a bad winter and those fish with a flowing tail are usually the ones that are in trouble first. You should catch the fish and carefully, with sharp scissors, trim the broken fin away. Then dip it into a mixture of equal parts of iodine and glycerine. During the summer the general health of the fish should improve and the part heal. The cut-away portion of the tail will grow again.

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There may be a thickened part where the new growth commences but this will hardly be seen when the fish is swimming in the pond. A salt bath will help all the fish in the pond if they seem to be troubled with any fin rot or fungus.

I am studying the breeding habits of sticklebacks and I caught one a short time ago which was growing above. For interest's sake I took it home and after a fortnight I noticed a white ribbon-like substance coming from it. What is this and will the trouble spread to my other sticklebacks?

The fish had a tape worm in it and this caused the belly to swell. The trouble can be easily spread to other fishes in the tank as any small section of the tape worm extruded or picked up by another fish can grow into a normal tape worm. There are many types of tape worm and if a fish is suspected of being infested with one it is better to kill it to save the pests from spreading to other fishes.

I have made a pond in my garden and wish to run water into it from a stream near by. Will a quarter-inch pipe be large enough? I have caught a few fish which I understand are trout. Will I be able to keep them? If I take some gravel from the stream; is it all right and shall I need plants?

Your feed pipe will be all right as is not made of copper or brass. These metals are fatal to such fish as trout. Otherwise I do not see why you should not be successful at keeping the trout. They are not particular about water plants in their pond but prefer a gravel bottom. However, a few plants will help to furnish the pond and be the home of many larvae etc. that will provide some natural food for the fish.

I am considering approaching a local mason for some stone for my tank. Will this be all right? If I use cement on the inside of the tank will this be harmful and what should I do to make it permanent? I have seen in some books say or do you think it is a suitable fish for a community tank?

The best type of stone is the Westmorland rock as sold for rockeries. This is well coloured and is not likely to give off any harmful soluble compounds. If you use a little cement to fix your rocks the tank can be filled with water for a week, cleaned out, filled again for another week. You should then when washed out again it should be safe. A bullhead is not a very suitable fish for a tank. It can be aggressive but I consider that its value is very little and is usually lies motionless on the bottom of the tank and so can go unnoticed for long periods. I have not found that these fish take kindly to tank life; they prefer running waters.

*Please turn to page 56*
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.

**Insurance of Fish**

It seems that Mr. Pethick's query about insurance of fish (The Aquarist, February) has not yet been answered, therefore perhaps I may be permitted to offer my own comments.

Insurance is generally entered into when there is an element of risk, the insured party passing this risk on to an insurance company for a small payment. The insurance company has, of course, calculated just how much the risk is likely to be, and makes a premium which will allow them a margin of profit on the total of their transactions on that particular kind of risk. These rates are difficult to calculate, and rely on certain factors: for mammals, on the average expectation of life, average bill of health, mortality rates etc. When they come to do the same service for fish, it is easy to see why it is impractical. One fish may live 6 months, another 20 years. It would be necessary to calculate a different premium on every species, and it would be difficult to check on claims. I doubt very much if we will ever see a company willing to insure a community tank, such as the average aquarist possesses.

There is a possibility that we may find companies willing to insure large collections of single species, or smaller numbers of fish like discoids, where the fish are valuable. This should certainly help the serious aquarist, who cannot always afford to lay out a great deal of money to replace fish lost through no fault of his own. You may manage to find a company who is willing to insure you against power failures, but I doubt if it will be worth it, as the premium is certain to be high, owing to the difficulty in ascertaining the cause of death of fish under these circumstances.

**James McE. Ure**
Glasgow, S.A.

**Guppies Galore**

HAVING read in your April issue of The Aquarist that George Phillips "still keeps a few fish", I thought it was time I paid him a long-promised visit. However, when I saw him during the holiday my worst fears were soon dispelled, for he still has more than 20 tanks and 600 guppies (at a guess). It may be that the writer was referring to his coldwater fishes, as he lost all his pond fish during the winter, except for the few special ones he keeps indoors.

**A. F. Wilkinson**
Judge and Standards Committee, F.G.R.S.
We believe that the writer of the paragraph concerned took it as read that Mr. Phillips is, as ever, surrounded by guppies, and was referring only to "a.o.s." — Editor.

**Water**

I CAN hardly see how Mr. E. Hall (The Aquarist, April) can lay the blame for fish rot on tap water. The causative organisms of fish rot would almost certainly be destroyed by the chlorination carried out by the water boards. Surely the answer lies in the pond itself, Mr. Hall’s reference to the “sludge” on the bottom of the pond conjures up a picture of black evil-smelling mud, hardly conducive to healthy fish. I don’t know whether Mr. Hall puts netting over his pond in the autumn but I find this a necessity for any pond where leaves can fall or be blown in. A quantity of leaves decaying in a small garden pond will soon turn the water cloudy and often the leaves and the sides of the pond will turn mucky with colonies of bacteria feeding on the organic waste matter. Last winter after I had removed the netting from my own pond large quantities of leaves were blown into the pond by the north-easterly gales. Every leaf for a mile or so around seems to have made a bee-line for my pond, which now looks a sorry sight. Mr. Hall doesn’t mention whether his pond has accumulated a large quantity of leaves or whether he has cleaned it out since he set it up. A small garden pond is far from “balanced”, for the leaves and other rubbish that invariably collect in a small pool cannot all be coped with by the natural purifying processes.

No, I do not think the tap water can be the cause of the trouble. I would subscribe to the view that the pond now having been set up for several years is possibly polluted.

Whilst on the subject of tap water may I remind readers that water authorities do on occasions increase the amount of chlorine added to their water. Personally I have never worried much over the chlorine in the water, for there seems to be sufficient in my water to harm my fishes. However, during the severe weather that we have just had two acquaintances came to see me with a sorry tale of fish losses after topping up their tanks. Presumably the water board had increased the chlorine content of the water as a safety measure as these were some burst pipes in the area.

**P. F. Capon**
Billericy, Essex.

**Goldfish Standards**

I WAS interested to read the article on “Standards for Shubunkins” by Johnson H. Hood in the January issue of The Aquarist. He asked for “more realistic show standards” or better still one agreed show standard for the whole of Britain. All your readers may not know that the Goldfish Society

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of Great Britain "singletail" covers the nucreous and mott groups, i.e. the shubrinkin and also the metallic group, thus meeting the points made by Mr. Hood. The G.S.G.B. Standards cover the three groups for each variety recognized. The reasons for the G.S.G.B. Standards differing to some extent from other published standards is that this body of goldfish fanciers has always striven for standards which seemed to be achievable and has rejected those which seemed to be impossible. Another very important guiding principle has been to try to strengthen and preserve each worthwhile special feature occurring in fancy goldfish, e.g. divided tail fins, hood on head, protruding eyes, by keeping down the number of varieties recognized and avoiding the combination of features so as to discourage cross breeding. In 1950, Standards for four basic varieties were produced to cover the features then known in Britain. These were the "singletail" (a slender-bodied fish), the "twisttail" (a deep-bodied fish like a "veil-tail"), the globe-eye (a deep-bodied fish with protruding eyes like a "telescope") and the "brainhead" (a short-finned "limbhead").

With the passage of time other goldfish with other special characteristics became available. After very careful consideration and discussion with our members, it was decided to introduce Standards for four more basic varieties, bearing in mind the original G.S.G.B. principles. These were the "pearlscale" (domed scales), the "celestial" (upward protruding eyes), "bubble-eye" (oculos under eyes), "pom-pom" (highly developed nasal septa). In all eight varieties heavy extra pointing is allotted for the special characteristic, e.g. 10 extra points for the "brainhead" on the "brainhead". This meets the point made by Mr. Board in The Aquarist (September, 1962) in his article on the oranda with reference to judging the hood.

At the same time, G.S.G.B. recognizes that there are other popular varieties, for which as a specialist organisation it should provide Standards for the guidance of the hobby. These are the "oranda", the "fan-tail" and "the common goldfish", which have their own Standards, as well as the nucreous and mott groups which are known to the fancy as the "London shubrinkin".

The booklet incorporating these 11 varieties, with points and measurement proportions in addition to the diagrams, is published this month and sent to every G.S.G.B. member. It will be advertised in The Aquarist and all goldfish fanciers will be asked to obtain it. We trust that the Standards will be acceptable to all and that any judge in this country will use this handbook.

M. D. CLAY
Chairman, The Goldfish Society of Great Britain.

Ultraviolet and Life

THE answer to Mr. P.W. Kavanagh's request for information on ultraviolet light (The Aquarist, March) there is so much to be said that in the space of a letter it is hard to know where to begin, and only the barest details must suffice.

Apart from its use in sterilising machines, as a germicide, and in weak, measured doses for restricted medical purposes, ultraviolet is used best of all by the aquarist. Most of the ultraviolet damage to living cells takes place at the molecular level. By bombarding chromosomes, it can produce abnormalities and mutations, and can interfere with cell division. DNA (deoxyribonucleic acid) is the master substance of all living cells, the master substance of life. The giant molecule resembles a spiral ladder. The sides consist of long chains of alternating deoxyribose sugar and phosphate units. The rungs, attached to the sugars, consist of a right and left half of one of four nitrogen-containing compounds: thymine, adenine, guanine and cytosine, joined by a bond of hydrogen. These four 'bases' always seek their same partners; thus adenine pairs with thymine, and cytosine with guanine. The essential difference between all species of plants and animals is a greater number of base pairs. The higher the form in life, the longer the 'ladder'. Nevertheless it apparently takes more DNA to make a kingfish than a man.

Where DNA is exposed to ultraviolet radiation of 2,600 Angstrom units (1 Angstrom unit = one hundred-millionth of a centimeter) it is the bases which absorb most of the rays, thymine and thymine being the most sensitive. About one 'packet' or quantum of ultraviolet energy in every hundred will change their molecular configuration. In the case of adenine and guanine it is one 'packet' in every 10,000 which will effect a change.

In some types of cells exposure to blue light will reverse the ultraviolet radiation damage, through light-mediated enzyme reaction. An enzyme is a substance that speeds biochemical reactions without itself being changed in the process. Some bacteria have gone a step further, and can repair DNA damage by enzymes manufactured without blue light. At the wavelengths in the electromagnetic spectrum increase beyond about 4,000 Angstroms the region of invisible ultraviolet 'light' is left behind, and the stimulation on the retina of the human eye gives the sensation of seeing violet light, then on through blue, green, yellow, orange and red. Beyond red light energy again becomes invisible as the infrared or heat waves part of the spectrum is reached.

As with pH and hardness, natural ultraviolet rays from sunlight (a powerful source) need not worry the aquarist. Fortunately the layer of ozone (a form of oxygen with three atoms to the molecule instead of two) in the upper atmosphere absorbs most of the ultraviolet radiation below 2,900 Angstroms. Otherwise all exposed life on earth would be killed.

JOHN BETHROYD
San Salvador, C.A.

Glass Prison

RECENTLY, during the course of conversation at a neighbour's house, an interesting, baffling incident was related. This little girl, while playing on the shores of the nearby loch, found a jar full of squeaking half-grown frogs. The lid was a screw-on type, it is obvious they had not entered it on their own. If this was a prank by some one, it was a very cruel act. They had not been put in the jar in the spawn-stage, for there was a full grown frog at the bottom of the jar. If anyone can give another explanation it would be interesting. The whole thing has us stumped, not surprising, really, as it occurred so close to even a greater aquatic mystery—the 'Loch Ness Monster', for the jar was found on the shores of Loch Ness!

A. MACDUGALL
Aldborough, By Inverness.

Unpublished Standards

THE item below was found among 32 years' accumulation of papers in our files. I found it amusing and hope that other readers will, too. Acknowledgements are made to its unknown authors.

R. U. F. HARRIS
Secretary, The Croydon Aquarists' Society.

Recommended Standards for Tank Furnishings other than Fishes and Plants

1. Gravel should be large-profiled, big-rounded and of basic nature. Any sign of fish's disease will be penalised. Location in the same tank as number 3 must be considered dangerous.

2. Prop. Bulbs. Bulbs ejected from the mouths of ornamental frogs shall be spherical, 1 inch in diameter, and retained at regular intervals of 20 minutes. Those moving out from the other end will be penalised. The frog is to be highly coloured and of known species.

(Continued overleaf)
5. Sudden changes must be made to avoid discomfort when compared with the accompanying fish, and must not be shown to the fish. Sudden changes should be made in a stepwise manner to prevent stress to the fish. It is recommended that they be placed slowly over a period of time. A benefit must always be visible, as slow changes results without the capture will be penalized as unsatisfactory.

6. Giant marbles are to be at least half an inch in diameter, the larger of the better as more charging and other debris can be accumulated between them. Colours are to be vibrant and to clash with one another as much as possible.

7. Aeration of the water is to be in two parts. The upper half is to resemble as nearly as possible "B.B.", but with the gas reaching the top. The bottom should be well developed and evenly balanced. The lower half should breathe at the top, but the rate of breathing should be under control. The water should not be allowed to accumulate dead fish or in a manner that is harmful to any known fish.

8. Treasure chest should have four sides and a lid. The lid may be permanently open, from which the items should be clearly visible and in a container that allows for easy retrieval.

9. Treasure chest should have a lid that is easily opened to release a gift of fish that is knocked from the side. No one will care whether there is treasure or not. Everyone will be given to choose from an overgrown with algae as to be unsuitable.

10. Submerged objects must give no indication as to why they are submerged. The highest target must be below water level; actual current will be penalized. These should be enough room inside for dead fish to be removed. The subterranean style recommended is Burton's Pan Fish early period.

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The AQUARIST Crossword
Compiled by M. W. SAUNDERS

Coldwater Fish-keeping Queries
continued from page 53

What is the best way to feed golden orfe?

Golden orfe are very active fish and need plenty of fresh food. They prefer live food but will take anything that a goldfish will eat. During the summer months they eat voraciously and can be fed at least three times a day. The live foods include all the usual ones such as garden worms, white worms, maggots, flies, and a variety of insects. They also need a well-oxygenated water supply and air as they grow. By feeding large pieces of food and providing a suitable space and a well-oxygenated water supply, the orfe will grow very large. A friend of mine used to feed his orfe on the entrails of chickens.

I have a couple of goldfish which have anchor worms. I have only had them and my tank a short time. How did the fish get infected with the anchor worms?

It appears fairly certain that the fish were attacked by the worms before you bought them. Once your tank is full of them you may not be troubled again. The worms can be killed by keeping the fish in a tank and touching the worms with a strong disinfectant such as Milton or Dettol, dabbed on with a piece of cotton wool.

I have had a pond for some years and have now found some black-spotted creatures like tadpoles on the sides of the pond. What are they and are they dangerous to fish?

The creatures are leeches and they could harm the fish. They attach themselves to a fish, usually a sick or slow-moving one, and suck the juices from it. Search for them with a torch at night when they are more active and destroy all these caught.

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Solution on page 58

THE AQUARIST
Monthly reports from Secretaries of aquarists' societies for inclusion on this page should reach the Editor by the 15th of the month preceding the month of publication.

AN enjoyable evening was spent by the Cardiff A.S. at their headquarters, with a number of club centenaries including a memorable one of the Monmouth A.S., who car each the way. The prices adopted by the Monmouth A.S. were well thought of by the visitors, and a very popular choice. The members of the Cardiff A.S. are to be congratulated on the choice of the occasion and it is hoped that it will be even more successful than the two previous shows the Society has held.

Any aquarists wishing to visit or join the Society would be welcome any Monday evening at Ring Alfred School, Pensarn, Caerphilly Road, Cardiff. S.E. For further details please ring HIT 8444.

THE meeting place of the Crewe A.S. has been changed to Sunday Baths, South Norwood, 5th, 7th, and 4th Thursday each month at 9 p.m. The Secretary is R. V. F. Harris, 5, Laurence Road, Crewe, Crewe.

AT a recent meeting of the Northampton and District A.S., members heard a talk by Mr. B. M. Grace, of the A.S.A. Channel Road, about Table Show results for the month of September. The Secretary, Lilian B. Sunley, 1 and 2, Miss L. Mentor, 21, Middleton, Northampton, gave some useful hints on setting up.

The first Open Table Show held at Derby was an outstanding success and attracted a total of 395 entries to the sections.

The cup for the best Fish in Show went to Mr. K. Hie, of Ridings, Derbyshire, the outstanding exhibitor who gained 90 points with a Checker Barb. Given by Mr. J. Foster, a pun for the Best Fourth was awarded to Mr. T. John, of the Regent Society for his Red Devil. Class winners were: Group 1, Mr. Messenger (Red Devil), 9 points; 2, Mr. T. Prinsep (Red Devil), 8 points; 3, Mr. R. Bowers (Red Devil), 7 points; 4, Mr. T. Prinsep (Mossel), 6 points; 5, Mr. T. Prinsep (Red Devil), 5 points. Best of Section, and the Certificate, was awarded to Mr. T. Prinsep (Red Devil), 5 points.

A subsequent meeting was addressed by Mr. B. M. Grace, of the Northwich A.S. of Northwich A.S., well known in North Wales and the West, who spoke on his experiences in breeding marine aquariums with particular emphasis on ascidians. A discussion followed, during which a number of points were raised.

There are several European members of the society and another interest is to promote an interest in the society. Mr. T. L. Wallis, 3, Wyton Road, Norbury, London.

AT the Leeds A.S. open table show, the Yorkshire section of the A.G.B.S. were invited. F.G.B.S. points went to Mrs. Charnock, Miss Hattersley, Miss West, Miss Hattersley. Other results were as follows:ковырь, 1, Mr. L. P. Jones (Leeds); 2, Mr. G. H. Hattersley (Leeds), 2 points; 3, Mr. J. P. Jones (Leeds), 2 points. Best of Section was Yours, 1, Mr. L. P. Jones (Leeds); 2, Mr. G. H. Hattersley (Leeds), 2 points; 3, Mr. J. P. Jones (Leeds), 2 points. Best of Section was Yours, 1, Mr. L. P. Jones (Leeds); 2, Mr. G. H. Hattersley (Leeds), 2 points; 3, Mr. J. P. Jones (Leeds), 2 points. Best of Section was Yours, 1, Mr. L. P. Jones (Leeds); 2, Mr. G. H. Hattersley (Leeds), 2 points; 3, Mr. J. P. Jones (Leeds), 2 points.

An exhibition was held by Workhouse Aquarium and Zoological Society, which was attended by many local people. Following this exhibition a number of local people expressed an interest in different types of plants, fish and general notes. Small animals and their care was one feature of the show. All of the main attractions was a pool with a fountain, stocked with collection fish. The pool was a simple structure of a tank with four plaques nailed together as sides, and a short of blue marble tiles surrounding the pool. A rocky composition was constructed, with flowering plants and shrubs planted among the rocks.

Several people expressed interest in starting the hobby and it is anticipated that many new members will be enrolled.

The first annual open show of the Nelson A.S. proved to be an outstanding success with a total of 196 fish entries. A number of citations were awarded, enough so that the prize winners can be assured that there will be

June, 1963
remained next year. The Bass Fish in Show was won by Mr. W. W. Skene of a Miscellaneous. No. 1, Mr. H. J. Taylor, both of whom are included in the list. Mr. Taylor was third Mr. G. R. Halford, of the awards. The next day, Mr. V. C. Halford, gave a Slides of slides of slides made from his collection of slides at a cost of various local aquatic events which have taken place during the last three years. The slide lecture of 47 minutes and afterwards was greatly enjoyed with the excellent lighting and display of the slides.

On Friday and Saturday, August 30th and September 1st, the Club will be holding its third annual Open Show at the Congregational Church Hall, Newson street, Kingstown Road. Breeders' Schedule and Entry Forms are available from the Secretary, Mr. J. D., Brown, 76, Field Street, Balmuir, Bristol, X.

RECENT activities of the Uxbridge and District A.S. have included a number of close-up table shows. For the last table show which was held at the end of April, and was particularly interesting, several new in the first, second, and third classes, and the following names will be awarded: Mr. C. Biggs, Mr. J. D., Brown, 76, Field Street, Balmuir, Bristol, X. The election of officers at the Annual General Meeting of the A.S. is followed by the next meeting, Mr. W. M. Crim, Chairman, Mr. E. V. Lawton, Vice-Chairman, Mr. R. C. Jackson, Secretary, Mr. C. Biggs, Treasurer, Mr. J. D., Brown, 76, Field Street, Balmuir, Bristol, X. The Club will be meeting at the end of August, and the place is to be announced.

NEW features of the 1965 A.S. show will include a new breed, the 'B.A.S. show species', and the 'B.A.S. show variety'. The new breed will be the 'B.A.S. show species', and the 'B.A.S. show variety'. The rules governing the award of Federation stars will be announced.

In the Match issue we published a paragraph in our Club Notes in which the Society was shown as the 'Marsupial A.S. This was an error on our part as the Society should have been the Medway Aquarian Society.

THE results of the annual table show of the Leith A.S. was held on 10th September. The secretary, Mr. J. D., Brown, 76, Field Street, Balmuir, Bristol, X, was present. The second show was on 10th September, and the third show was on 10th September. The fourth show was on 10th September, and the fifth show was on 10th September. The sixth show was on 10th September, and the seventh show was on 10th September. The eighth show was on 10th September, and the ninth show was on 10th September. The tenth show was on 10th September, and the eleventh show was on 10th September. The twelfth show was on 10th September, and the thirteenth show was on 10th September. The fourteenth show was on 10th September, and the fifteenth show was on 10th September. The sixteenth show was on 10th September, and the seventeenth show was on 10th September. The eighteenth show was on 10th September, and the nineteenth show was on 10th September. The twentieth show was on 10th September, and the twenty-first show was on 10th September. The twenty-second show was on 10th September, and the twenty-third show was on 10th September. The twenty-fourth show was on 10th September, and the twenty-fifth show was on 10th September. The twenty-sixth show was on 10th September, and the twenty-seventh show was on 10th September. The twenty-eighth show was on 10th September, and the twenty-ninth show was on 10th September. The thirtieth show was on 10th September, and the thirty-first show was on 10th September. The thirty-second show was on 10th September, and the thirty-third show was on 10th September. The thirty-fourth show was on 10th September, and the thirty-fifth show was on 10th September. The thirty-sixth show was on 10th September, and the thirty-seventh show was on 10th September. The thirty-eighth show was on 10th September, and the thirty-ninth show was on 10th September. The fortieth show was on 10th September, and the fortieth and one show was on 10th September.
SECRETARY CHANGE

STRETFORD and District A.S. (E. Whittaker, 7 Haymon Avenue, Stretford, Manchester)

AQUARIST CALENDAR

15th June: Basingstoke and District A.S. Open Table Show. Enquiries to Show Secretary: Mr. J. E. F. B. Jones, 44 Oakridge Road, Basingstoke.

16th June: Stockport A.S. Annual Open Show at the Victoria Hall, Victoria Avenue, Stockport. Enquiries to Show Secretary: Mr. A. R. Perkins, 34 George Street, Stockport.

30th June: Pembroke A.S. Second Annual Open Show at Edensor Community Centre, Peakside. Details can be obtained from Mr. E. P. Harrison, 89 Houghton Road, Harestowe, Newark-on-Trent.

27th July: Bedworth and District A.S. Open Show at Victoria Hall, Bedworth. Enquiries to Show Secretary: Mr. G. M. W. Perkins, 34 George Street, Bedworth.

5th August: Portsmouth A.S. Open Show at Portsmouth Community Centre, Eastney. Details and show schedule are available from Mr. W. J. B. Smith, 60 Commercial Road, Mile End, Portsmouth.

28th-31st August: Midland Open Aquarium Exhibition and Aquatic Show, National Exhibition Centre, Birmingham. Full details from Mr. T. E. Edwards, 17 Wyndham Street, Madeley, Telford.

30th August to 3rd September: Bristol Tropical Fish Club Annual Open Show, Congregational Church Hall, Newton Street, Bedminster, Bristol. Details and show schedule are available from Mr. J. J. Brown, 29 Queen Street, Bedminster, Bristol.

4th September: Wrexham A.S. Annual Open Show at the Civic Centre, Wrexham. Details and show schedule are available from Mr. G. M. W. Perkins, 34 George Street, Bedworth.

14th September: East London Aquarium and Fishkeepers Association. Annual Aquarium and Fish Show at the Victoria Hall, Honiton. Details and show schedule are available from Mr. W. R. Bumgarne, Show Secretary, W.R. Bumgarne, Visit Block, 83 Whitley New Road, Blackburn.

15th September: Nottingham and District A.S. Open Show at Old Hall, Denby Road, Nottingham. Apply to Show Secretary, Mr. A. A. Lingard, 61, Seabright Street, Hucknall, Notts.

18th-21st September: Leeds & District A.S. Annual Open Show. Details from R. Moore, 15 Hill Road, Haxby, Leics.

27th-30th September: Three Counties Show, Gas Social Club, Gower, Nr. Reading. Details can be obtained from Mr. C. E. P. Masters, 12, Perrin Road, Greenford, Reading.

5th-7th October: Four Annual Dinner of the British Ichthyological Society at Glasgow. Information from Mr. G. M. W. Perkins, 34 George Street, Bedworth.

26th September: Kingston and District A.S. Annual Charity Show.

28th September: Blackpool and Fylde A.S. Open Show at 67 Station Road, Southport, Blackpool.

16th-17th November: B.A.A. Show, Belle Vue, Manchester. Details are available from Show Secretary, Mr. G. W. Cook, "Spring Grove," Paston Hall, Barley, Yorkshire.

Crossword Solution

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