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The Aquarist
SOME weeks ago we were criticised by a reader for what he alleged to be an excessive use of technical terms and "Latin" in our pages. "Remember the ordinary chaps who don't understand these names" he wrote. This is, in fact, always our endeavour, and we try to limit the use of technical jargon. However, the field of aquarium-keeping impinges on several technical subjects, and some technical terms, properly applied, can scarcely be avoided; most of these are defined in standard dictionaries. But what our correspondent meant by "Latin" we believe to be the scientific names of animals and plants, which we print in italics, as they should always be printed.

We are accustomed to complaints about the use of scientific names and we are familiar, too, with the practical aquarist who insists that their use by other aquarists is pretentious behaviour. Where a generally accepted and suitable common name is available we give this preference, but what is a common name well known in Britain might be unrecognisable or even offensive to, say, Americans. In some instances no common name exists or one does not "catch on" (who uses the common name for Vaillimaia, for example?) Scientific names, difficult to pronounce though they may be, are recognisable and acceptable in all countries and cause confusion but rarely.

We recently saw in the Monthly Newsletter of the Brisbane Aquarium Club that names of Australian fishes are creating difficulties for aquarists, but it is the multiplicity of common names that is the cause of complaint. Who could know that "spangled grunter," "bobby," "mouth-breeding perch," "mout almighty" and "sleeping fish" are all names for a single species? The same publication mentioned the way in which popular names are liable to become contracted and quotes as an example the name "white cloud" for the white cloud mountain minnow (Tanichthys albonubes). With such changes the original significance of common names is completely lost and this seems to be a further limitation to their value.
Tropical Fish Breeding for Beginners

EGGLAYING tropical fishes, or to give them their correct name, oviparous fishes, with just a few exceptions can be divided into three classes, the chasers, the bubble-nest builders and the cichlids, who lay their eggs on a prepared base of rock, a saucer or the inside of a flower pot. The chasers can again be divided into two groups; those that deposit their eggs in clumps of fine-leaved plants and those that scatter their eggs over the floor of the aquarium. One important thing to remember about the chasers is that, because they are very fast swimmers the breeding tank must have length irrespective of height or width, so nothing less than a 24 in. aquarium should be considered and water level should not be above 9 in.

Chasers

It is generally agreed that the zebra fish (Brachydanio rerio) is the easiest of the chasers to breed. Three fish scatter their eggs over the floor of the aquarium and as they are avid egg-eaters and very fast swimmers we must adopt means of stopping this habit of egg-eating. So, instead of sand or gravel on the base of the tank, we will have to cover it with marbles or a well-ballasted bottom, which should be no smaller than three-quarters of an inch in diameter; these spread over the base will form a large number of crevices into which the eggs will fall out of harm’s way.

One corner of the tank should have a large bunch of Filicinum (willow moss) or any of the other fine-leaved plants; this will form a hiding or resting place for the female when she has finished spawning. This tank should be set up at least a week before the fish are put in and temperature should be maintained between 75° and 78°F.

Before we can think of breeding we must have the fish and the best way to get a good breeding pair is to purchase about a half a dozen, and as zebras are a very choosy fish the outlet is small. Tell your dealer that you wish to try your hand at breeding them and he will pick you out some likely pairs; these will be between 1½ in. and 1½ in. in length, or some strong youngsters can be obtained. Put these in a tank on their own, maintain the temperature at 75°F and feed them mostly on live or maisy foods. Feed with white worms and Grindal worms alternately with live Dupina; a piece of raw beef about the size of an Oxo cube can be suspended in the tank for a day but must be removed at night; cod roe (hard) and peas eggs are also taken with great relish.

In 6 or 8 weeks you should be able to pick out your pairs, the females now being very plump in the body whereas the males keep their nice slim figures and you will find that their blue stripes are more brilliant. When you are satisfied that these two conditions have been fulfilled you can transfer your largest female and two males into the breeding tank, the temperature of which should be raised to 80°F. As you will no doubt wish to see the actual spawning I suggest that you transfer them on a Friday evening so that with a little luck you should be able to have them under observation Saturday and Sunday while you are at home. If they are really in tip-top condition, on Saturday morning the males should start wildly chasing the female, and you will immediately notice how different it is from the chasing that went on in the other tank. I am not for one moment suggesting that you should sit watching the tank all day, but have a look at it every hour or so and if at any time you see them swimming close together observe them very closely to see if any eggs are being released by the female; the nearest description of the eggs I can give you is that they look like a shower of small semolina.

Once spawning is finished the parents should be taken out as soon as possible and at 80° to 82°F the eggs should start hatching in about 36 hours, and will continue to hatch for a day or two. The new-hatched fry will be seen as small, black hair-like silvers hanging to the plants and the sides of the aquarium. (In 1946 I was assisting an aquarist to breed his zebras and we found that eggs were still hatching 7 days later and altogether 900 fish were reared from one spawning of two females and three males.)

Infusoria Culture

The fry are hatched with what is known as an egg-sac: this provides the fish with food for 2 or 3 days. In 3 days they should be swimming in quite freely, and this is the time that they require plenty of food given in small doses but at very frequent intervals. It will be seen from the size of these young fishes that the food must be very small.

There are three types of food available: very fine prepared dry food, the hand-bred silk of an egg squeezed through a linen bag and the third and by far the best food is live Infusoria. I know that it is still quite difficult to capture Infusoria, and I feel that I cannot go further without explaining what this is and how to acquire it.

In the broadest sense Infusoria are minute forms of animal and vegetable life on which the fry would feed in their native haunts. A culture of Infusoria can be set up in a large number of ways, but it is sufficient to say that the basis of a culture is vegetable matter and all breeders have their own system; I can only give you guidance for you to to experiment. This you should do while conditioning your parent stock, don’t leave it until they have spawned. When you have found your best and easiest method and noted how long it takes to germinate under your conditions you will be able to prepare it as and when required.

Any one of the following materials can be used with success: crushed lettuce leaves, sliced raw potato, spinach, hay or banana skins; the amount to be used depends upon the
amount of water and will only be found by experiment.

There are also on the market several media for the successful culture of Infusoria; have another chat with your dealer, he will be only too willing to help you, or if he is too far away a letter to advertisers in The Aquarium (including Stump) will obtain for you full particulars of their products. It is preferable, when starting a culture, to use the water from a pond, water butt, an old-established aquarium or even the water out of the flower vase. Have two or three glass containers of this water and place in each one of the above media and in 2 or 3 days you should have a culture of Infusoria. This will best be seen by gently raising the container to the light, when the zooplanktons will be seen as a greyish white dust suspended in the water; this can now be fed to the fry.

There are several methods of doing this; the most popular way is to suspend the jar containing the infusion above the tank and with a one-eighth inch rubber or plastic tubing (that which is sold as air line is ideal) and with the aid of a pinch-cock (a clamp used to control air pumped into tanks) the flow can be adjusted to a steady drip, and according to the size of the container can be made to last several hours. Its disadvantage is that in a cold room the cold drip can have an adverse effect on the fry and also kill the Infusoria, which is sensitive to a quick change of temperature. A safer method is to float the vessel in the tank for an hour, when it can be strained through butter muslin straight into the tank. If you should have a spare tank or an extra large vessel this can be fitted with a thermostat and heater, which can be adjusted to keep the infusion at the same temperature as the fry tank when they are being fed. Fry should be feeding every minute that they have light and a crystal-clear aquarium will denote a lack of food, which should be rectified immediately.

After a week or 10 days the fry should be large enough to take fine dried foods, fine sifted Daphnia, or finely chopped Tubifex worms, which should be well washed. After another week Grindal worms can be used and at a month old the young zebra should be able to manage the normal foods. Before leaving the question of feeding, let me say that this method of feeding is applicable to all the egg layers that you may wish to breed. To satisfy yourself that the food is eaten watch the fry through a large magnifying glass, and see if the food is small enough for them to take into the small mouths.

I have dealt with the zebra fish, but broadly speaking the same method applies to all the characins, the only difference being that some others deposit adhesive eggs that stick to the foliage of plants. For these we have aquarium sand on the base of the aquarium and provide a number of fine-leaved plants where the females can deposit their eggs.

**Bubble-nest Builders**

Now let us consider the group of bubble-nest builders (anabantids or labyrinth fishes). These are a smaller group and the easiest of these to breed is the three-spot gourami and the blue gourami, which is very often sold as the three-spot (the difference is that the three-spot is light brown in body and its true name is Trichogaster trichopterus, and the blue variety is known as Trichogaster trichopterus var. sumatraensis); both grow to 5 or 6 in. and will breed when about 3 in. at a temperature of 78° to 80°F.

These fish should be conditioned in the same way as other breeding stock, with plenty of live foods and a variety of foods, and as they are reasonable in price three or more young fish can be purchased and put in a tank on their own for conditioning.

When your gouramies are about 1½ to 2 in. in length their sex can very easily be ascertained; the dorsal (or top) fin of the male comes to a sharp point and is longer than that of the female, whose dorsal fin is well rounded at the tip. When they are in breeding condition you will find that one of the males has started to blow bubbles on the surface of the water, and since you last saw him he may have built a nest of bubbles anything up to 6 in. in diameter and raised about ½ in. above the surface; a quick survey of the fish will show you the male who is blowing the bubbles, and which female he is paying his attentions to. This he will do by trying to drive her under the nest. As soon as you have found out which pair it is, as it is as easy as possible and without disturbing the nest too much remove the other fish and in one corner of the tank place a large clump of plants, where the females can take refuge from the male's often vicious attacks that occur when spawning is finished, or even before.

When the female is satisfied that the bubble nest is finished she will succumb to the male's embrace; this he does by wrapping his body entirely around her in such a position that his nose will touch his tail, in doing this he squeezes the eggs from her body and a dozen or more will be seen to drop to the floor of the tank. The fish will then separate and go round picking the eggs up in their mouths and then blow them into the nest, with more bubbles round them to hold them in place; this process may carry on at intervals for an hour or more and when finished the male will turn on the female, driving her away from the nest. A piece of glass, slightly smaller than the width of the tank, will be very handy now to put her in a far corner of the tank and from there she can be moved out without disturbance of the nest by unnecessary chasing.

The male now has control over the nest and eggs. He will be busy picking up the last of the eggs and any that may have fallen from the nest and returning them to their proper place. Don't get alarmed because he has a mouthful of eggs; he is not eating them and it is worth while spending some time watching this process, not only is it very interesting but you are also learning something about the habits of the fish. After about 36 hours you should be able to see the newly hatched fry falling from the nest. Here again time is not wasted watching the male's efforts to keep the fry in the nest; you will have a fit when you see him pick up eight or nine babies in his mouth and still search for more, but don't worry, watch him very carefully and you
will be able to see him blow them back into the nest, and
as he does so more will fall down and he starts all over again.
The male is kept busy like this for 3 days until they are
free-swimming; during this period he will almost starve
himself, so as soon as you see the fry swimming about you
will be well advised to remove him, or he will have a good
feed on the babies he has so carefully nurtured for 3 days.
I always use an open-mesh net for this purpose as he is a
very large fish and the fry will not get caught up in the net
with him; take your time and net him as gently as possible.

Feed the fry as suggested above for the zebrias. This
feeding, with only a few exceptions, applies to all the egg-
layers. It is also a good system to put a jar of Infusoria
into the tank a day before the fry should be free-swimming
so that the first swimmers will find food immediately they
require it; this will help to keep losses down and make for
quicker growth, which in gouramis is very rapid for the
first 4 or 5 weeks, after which they seem to stop growing for
a couple of weeks before putting on another spurt.

I have dealt only briefly with the breeding of two of the
egg-layers, but in back and future numbers of The Aquarist
you will find fuller accounts of the breeding of almost every
common type of fish, but I find that if you have only a little
knowledge you will spend more time observing the habits and
gain personal knowledge of your own fishes, which is
most important. After all, no two fish have the same
temperament and when a breeder describes the breeding
of a certain type of fish he is stating only his views of what
he saw and did; the same species in your hands might
behave quite differently, although the actual spawning in each
species is always the same. One breeder might state that
his male or female was vicious before, after or during a
spawning, another speaking of the same species will say
that they were gentle and well behaved. It is only by
reading of other peoples' experiences and breeding your
own fishes that you will be able to draw your own conclusions
and perhaps even disagree with the experts.

The whole of this article is based only on my own
experiences; there will be dores, maybe hundreds, who
will disagree with me and write letters to the Editor telling
me where I have gone wrong according to them; this will
all help to make The Aquarist more interesting to read.
Ever since aquatic books made their appearance the letters
and questions and answers pages have always been the first
that I turn to and I have learnt a lot from them, as I hope
you will.

Many is the time that I have been asked to answer what
has appeared to the speaker; to be a silly question, but the
answer has really turned failure into success, and some
childish questions have sent me to search the books for the
answer. In that way, I also have learnt something else
to my advantage, so please don't have a failure just because
"I did not like to ask." You will find that a true aquarist
is always ready to assist you with his own knowledge.

KING OF TROPICAL FISHES

Inheritance in the Guppy

by PETER DENDY

THIS article is intended to serve as a brief introduction
to the subject of inheritance and genetics in the
guppy. If my statements are too broad in their
scope, then expert readers must forgive me, because my
own knowledge does not go beyond the basic principles.

Each sex cell (sperm, produced by the male, and egg,
produced by the female) contains half the number of chromo-
somes required to produce an offspring; 23 in each ovum
and 23 in each sperm, making a total of 46, or 23 pairs,
in the fertilized ovum. Ova carry 22 ordinary chromosomes
and one "X" chromosome; sperm carry 22 ordinary
chromosomes and a further chromosome which may be
"X" or "Y." When an X-chromosome sperm meets an
ovum the result is XX (a female offspring), but when a
Y-chromosome sperm meets an ovum the result is XY
(a male offspring).

Generally speaking, male finnage is controlled by the Y
chromosome and inherited finnage characteristics
are through the male only, which in theory would indicate that
a male could be mated to any type of female and breed
true. However, experiments have shown that factors may
cross over between the X and Y chromosomes, which
accounts for some of the peculiarities met with at times.
It has been shown that the double-sword factor is actually
carried by the female and not by the male, which is a con-
tradiction of what has already been said. The exact part
that the female guppy plays in each of the standards is not
very clear, but enough is known to make it a golden rule
that to maintain the required characteristics you must
keep breeding within the strain.

If a pure gold guppy male is mated to a pure grey
female all the offspring of the first generation are grey,
because grey is dominant over gold. If G stands for grey
and g for gold then the original parents are represented by
GG for the female and gg for the male; the first-generation
offspring are then all Gg, although they appear grey (GG).
A direct brother to sister mating will now produce several
combinations of hereditary possibilities, which are: GG
(pure grey), Gg (which appear to be grey) and gg (pure gold).

The apparent ratio in the second-generation offspring will
be three grey to one gold, which is the Mendelian ratio of
three to one. It must be noted that crossbreeding can never
produce a blend or dilution of colour and the off-
spring will always appear to be of one colour type or another,
even though they carry hidden factors.

As succeeding generations follow each other, coupled with
selective breeding certain factors become rarer and rarer,
but it is always possible for recessive factors suddenly to
combine in some particular fish and show a reversion.
This may frequently be seen in such varieties as the green
swordtail, which produce a pure gold from time to time,
showing that gold have been used in their descent.

If you have grasped these very elementary facts then
you will be better able to judge what particular pairing to
make to achieve your objective and know that it will take
more than the one generation to produce results. A little
genetical knowledge is a very great help in guppy breeding,
thought not, of course, essential, as many of the very best
fish have been produced from selections made by eye
alone, without any theoretical background.
Pond in Polythene

by D. NEVILLE WOOD

We wanted a pond at school; we wanted it quickly, and we wanted it cheaply, too. You may not want to put in a school pond, but as I imagine the same considerations of speed and expense may be important to the ordinary man who would like a pond in his backyard, perhaps I may tell you about our polythene pond?

We did not want a paddling pool, or even a "biological" pond for intensive study of aquatic life; all we were after was a pleasant small pool to enhance the appearance of the front of the school and to interest the children. A few goldfish, perhaps a water garden, with an imitation waterfall, and maybe we could rig up a hose pipe to give the illusion of a fountain; crazy paving round it, and a few bushes planted in between the slabs and all for only a few pounds. It sounded fine in theory, but how long would it take and how much would it cost, and probably most important of all—could the teachers and children possibly do the job between them?

When we started to examine the possibilities, there seemed to be three alternatives: a "proper" concrete pool, a precast fibre-glass pool or plastic sheeting.

Of these, the first was obviously the more traditional and normal way of tackling the problem, but it would take a long time, it would not be possible to introduce plants and fish soon after completion, and, for the size we had in mind, it would work out rather expensive, too.

Much more appealing was the idea of buying a ready-made plastic or fibre-glass pool, rather like an irregularly shaped washing-up bowl, and making a hole to take it. Here again we were up against the expense. It is appreciated that this method is probably the least messy, the quickest and possibly the easiest for the less-practical man, but it was really beyond the means of the School Fund at the time, especially if we wanted one of reasonable proportions to make a reasonable show on the front side of the long school hall.

We were, let's admit it, just a little bit suspicious of the third method—that of digging a hole, laying in plastic sheeting and filling up with water.

Still, we reminded ourselves, the children had successfully got those poor little goldfish home safely from the Fair in little plastic bags, with water in, so it ought to work on a larger scale. We had heard, too, of thousands of gallons of water being stored in plastic-lined trenches in the Fen Country on nurseries and market gardens, without failure, leakage or other complaint!

Here then is the paragraph that really ought to come at the end, as a grand conclusion: we found that this method (a) really does work, (b) gives a result that looks quite pleasant, even in the winter without bulbs, fountains or flowering shrubs, (c) is cheaper than the other, more normal, methods of construction, and, most important (d) required no great technical skill or "know-how" to do it, and do it reasonably quickly.

It is appreciated that there are snags. This idea, for example, is new, or fairly new. So no-one is quite sure of the life of the plastic. However, 3 years is the time stated by the supplier of the sheeting, so, if it lasts just that length of time, it will be quite satisfactory.

Probably the biggest risk, especially at school, is the danger of rupturing the plastic sheeting. Anyway, we have a rule about sharp sticks and stones and so forth, at least, that sort of tragedy has not occurred.

The plastic sheeting itself is supplied either clear or black, and just as were were about to decide in favour of the clear, as it was cheaper and one yard cheaper, it occurred to us that the black might look more realistic. In fact, this is true, but another illusion which we had not really foreseen, is the effect of depth which the black plastic gives. The 9 inch section of the pool looks well over a foot deep, and at the deepest point, about 18 to 20 inches, you can't see the bottom at all clearly.

The plastic sheeting should be used double-thickness, and ordered with plenty to spare, not forgetting to measure
(with a length of string or a flexible tape) down the sides as well, and also allow about 9 inches all round to weight down with soil, stones or rockery at the finish. We chose to fold rather than to cut our plastic sheeting, which was supplied in one continuous length 12 feet wide.

When the hole has been dug to the required size, it should be lined with sand, free from sharp bits of gravel. This is to form a bed for the plastic sheeting, to avoid a tear at the very start! An inch thickness is adequate, making sure that where the sides are too steep for the sand to hold, there are no sharp protruding stones to rip the sheeting.

Dimensions are, of course, a matter of personal taste, but we feel sure that the usual suggestion of three levels is a good one. The shallow shelf is useful for plants that flourish in a few inches of water, and at the other extreme, there should be one part of the pool 18 inches or more deep for the fishes to retreat to, when the surface is a block of ice. When this happens the ice should not be broken: firstly because of re-freezing, which will make jagged edges under the ice surface to harm the fishes, but also, the old story of the cots into the plastic may be repeated, so let it melt naturally. Even with the chalky subsoil that we struck 5 or 6 inches down, it was a matter of only a few hours' work to remove the soil, tidy the hole and line it with sand, as suggested above.

Don't take the soil too far away; it can be used, if you wish, partly to build up your rockery around the edge, but also to anchor the sheeting around the pool.

It should also be remembered that water is quite heavy, so when the plastic sheeting is first laid in, it should not be firmly anchored down. Leave plenty of free sheeting to conform naturally to the shape of the hole, and don't worry too much about creases, as they will not disfigure the pool once the water is all in.

Evaporation and rainfall should keep the level of the pool about right. We have not found any fishes stranded on the rocks either, even after heavy rain! You will notice that I have said nothing about the plants and the fishes, but both are quite fit and well in their somewhat artificial surroundings.

I should add that we were fortunate enough to be given both the fishes and the plants by a kind donor from Birkfield (as a result of a reader of *The Aquarist* answering an appeal published 2 or 3 years ago—for tropical fish, and for another aspect!) which, of course, reduced the costs of the finished pool considerably. Though we were told that the plants ought to have been allowed to settle into the pool for a fortnight before the fishes went in, this was not possible, so we put them all in together, and so far (6 months) they are quite all right.

The spring crocuses and daffodils are just coming through. The crazy paving is settled in place and, even if we say so ourselves, everything in this particular spot in the garden looks lovely.

I knew there was bound to be a fly in the ointment, somewhere. This morning's mail has a suggestion that I might like to demonstrate how this was done—a group of teachers would help—learn by doing—all in 2½ hours. Gosh! I wish I hadn't sounded so enthusiastic about our PIP, as we call it—our Pond in Polythene!

### Cacti in the Fish House

There is no secret about the growing of cacti. The same rules apply as to the successful culture of most pot plants. The main reason why plants in pots are lost is that the watering is not understood. During the warmer months of the year cacti grow well if given enough water. Some people have the idea that cacti are desert plants and require little if any water. This is not true, as no plants grow in an actual desert. Most cacti grow naturally in the type of country which we know as prairie. The art of watering is to give enough water at a time to damp all the soil in the pot thoroughly and then to give no more until the soil has dried out completely again. If in doubt it is better to err on the safe side by refraining from watering for another day. Most plants show by drooping leaves that water is needed but as cacti have no leaves their wants can be more difficult to notice. If a large pebble is left pressed into the top of the soil of a pot it gives a good indication of the state of the soil, for if the soil under the pebble is still damp there is no need to water.
Breeding Twintail Goldfish

by E. KNIGHT

Breeding of twintail goldfish is not difficult, but it is the endeavour of many and the success of a few. The result of one's efforts depend on a number of factors, both in the breeder and in the fish. Of one thing I am certain; that patience, and complete interest to the degree of obsession, must be the virtue of the breeder if he is to be successful or is to attain reasonable results. There is no short cut, much less a short period in which to attain the twintail ideals.

In the fish there are three main characteristics: a good deep body, standard finnage and good or reasonable colour. This is a lot to expect of a variety of fish that almost does not breed true, meaning that only a few young fish will possess the characteristics of one or both parents. Whether they survive is entirely subjective to the conditions the breeder creates. Maybe the fish he has bred were able to reach only the embryo stage before being attacked by some parasite or bacterial infection, or some other of the ways in which alevin can be prevented from reaching the free-swimming stage may have been responsible for losses.

How often have we heard the remark: "I had two perfectly good-quality fish as the spawning pair (perhaps some specimens), yet they produced a lot of tripes!" On the other hand: "I had two mediocre fish, and they produced some good-quality youngsters." Is it the fish that are blamed or praised as the case might be? Could it be the conditions? The hereditary factors? The truth is that it might be of any number of reasons, and it is the uncertainty that makes coldwater fish-breeding so interesting and worthwhile.

Only a modest sum need be paid for a pair of reasonable quality fish, or a trio of 2 years-old fish, from a breeder who has the well-being of the hobby in mind rather than monetary gain. The twintails with long broad caudal fins and with the other fins in proportion will, without doubt, fetch a higher price, but the short-finned variety (known as the fantail) will be found more active and equally as attractive as the former, which are highly developed. However, the long-finned specimens lose their beauty and attractiveness after 3 or 4 years for the reason that their high dorsal fin invariably folds over, and their movements become restricted by the excessive caudal fin development. During the first 2 or 3 years of its life the long-finned variety can look a very handsome fish indeed. But few will possess fish conforming to the high standards laid down.

The attractive short-finned twintail might be adopted, which can possess the same colours, a good rotund body and shorter but sturdier finnage. What is more, the fish does not lose its deportment so early, if at all, and is always active throughout its life.

How to select the fish

First, look for a deep short body, because this characteristic is essential for twintail fish of either long- or short-finned variety. Many twintails have good finnage and perhaps good colouring but have an elongated or shallow body, which gives the fish an out-of-proportion, and even ridiculous, look. The body is most important and should have as nearly as much flesh above the lateral line as below. The finnage should be near to that of the Goldfish Society of Great Britain standard for the twintail, or to the short finnage of the Federation of British Aquatic Societies standard fantail. The anal fin should be divided or pointy, and the colour as laid down in the standards for each fish.

If a buyer is able to purchase fish with two of these characteristics he will be fortunate. This will be sufficient reason to want to breed your own fish, though the great majority of them will be deficient in some way. However, it is possible to obtain a good body and finnage near to the standards, but with a variety of colours: from matt white or pink to perhaps three colours, to the varied combinations of the nacreous fish.

It would be to advantage if the trio purchased were a female and two males. Bearing in mind the need for a deep body in both parent fish, the female should possess the darker colours, and one male a bluish colour with some black motting, or some black; the other male should be an orange or red with black motting. The finnage must be of the same variety in all the fish. The varieties should not be crossed! It is an excellent idea to breed one variety of fish, for to breed both twintail varieties will require a larger establishment, particularly if "line-breeding" is the aim, as I think it should be. With just one pair of fish, two breeding seasons must elapse before crossing back to the parents, and it will be found that a large number of fish must be reared to make a good selection. Space will be at a premium. It is here that most coldwater fish-breeders go wrong, by carrying too much stock.

It is an interesting experiment for one of the males to be a bronze metallic; if it is bred to a mat fish all the young will be nacreous, with some of them having attractive colour.

A prize-winning coldwater furnished aquarium. Such a set-up is not suitable for use as a breeding tank.

March, 1961
tanks can be obtained, so much the better, for space or water are the problem, rather than volume. My own fish house has as a top range of tanks, three 48 in. by 18 in. by 18 in. tanks, and, underneath, three 44 in. by 24 in. by 12 in. (deep) rearing tanks on a 11 in. single-iron staging. All six aquaria are of 1 in. plate glass. The much cheaper "wired" glass can be used for the back and sides, but clear plate should be used for the bottom and, of course, the front.

Shingle and compost is not necessary in large tanks, and is in fact impractical, both because of the enormous amount required and the prolonged exacting work entailed when cleaning them out during the breeding season. The few aquatic plants can be grown without a bedding medium, by weighting them in bunches and placing them in shallow clay pots with gravel. The decorative effect is enhanced if a carpet of algae is allowed to form on the bottom, and around the back and sides, serving as a green food for the fish when they are hungry. Crystal-clear water will result, provided that dried foods are not used as such.

**Winter Treatment**

In the winter the fish are usually resting on the bottom or perhaps moving around a little. These movements, over a period of weeks, along a slightly coarse tank bottom or one where shingle and compost is employed, will tend to champagne the fish's underparts, especially around the pelvic and pectoral fins, and produce sore red patches. In tanks where a clear plate-glass bottom is fitted there is never any trouble. The wired-glass bottom in a tank I found to be very rough when running my hand over the algae-covered base, and it is not a sandpaper surface. Hence I disapproved with compost and used aquaria made with a clear plate bottom. Half-inch pebbles only were packed into the clay pots, and root plants entwined there and thus anchoring them.) Myriophyllum grew beautifully this way.

This modest set-up enables the breeder to bring his stock indoors for the winter, into a cold fish house, but not where freezing can occur, for the safety of the glass aquaria is as important as the needs of the fish, without coddling the latter.

During the months of January and February and sometimes into March, depending on the length of our winter, a 100 watt immersion heater is placed in each of the lower three large (44 in.) tanks (a 40 watt heater can be used in a 36 in. aquaria). This keeps the temperature in these tanks around 40°F and prevents the upper range of cold tanks from freezing; their temperature is around 36-38°F. The adult fish remain quiet at these temperatures, and require no food unless there happens to be a few mild days, as often will be the case during winter in the south. When the fish are seen swimming around the water temperature is often about 45°F and a little chopped earthworm is given. The temperatures of the lower tanks will be proportionately higher, therefore the young fish in them can be fed twice, perhaps three times a week. The next winter, they in turn will be housed in the upper tanks. Apart from this, twintail goldfish do not require any additional feeding during winter. If a routine such as described is carried out, there is no reason, other than the failure to provide an earthworm diet, why the aquaria should not have early spawnings.

The problem of the breeder at the end of February is to obtain sufficient earthworms for conditioning the fish. To be sure of a supply he can build a compost heap made of these layers: grass cuttings, kitchen vegetable waste, earth and dead leaves, more grass cuttings, lighter deciduous garden materials that will break down easily, with a plentiful of cowdung well mixed into these, then more vegetable waste and cuttings; the whole is turned over occasionally and kept damp. If this is started in late summer, by
springtime a good culture of earthworms will be the result, provided that some large earthworms with prominent "saddles" are spread over the heap at intervals. These will breed amongst the rotting vegetation. A large old garden frame would be ideal for a worm patch, as this could be covered in very wet and frosty weather.

Breeding Time

At the end of April the fish will be much more active. Besides the earthworm diet, a cooked mixture can be made to give them a little more "body" and variety without constipation or digestive troubles. In a small receptacle (I use a small enamel cup) put two teaspoons of porridge oats, cover this with water and boil for 5 minutes. Then add a little meat extract (Bovril or Ovo), a heaped teaspoonful of a good proprietary food, a heaped teaspoonful of dried shrimp and cook this mixture to a stiff pudding. When cooked it will have a gelatineous quality, so that when fed to the fish it will not break up and scatter all over the tank as food will normally do. (This is the cause of many water troubles, in both coldwater and tropical aquaria.)

The white nuptial tubercles will now be observed on the anal plates of the males, and they will also appear on the front rays of the pectoral fins. At the same time the females will become distended, usually to one side of the abdomen, with ova. These characteristics can help to sex the fish quite early, coupled with their behaviour, when the males are seen to nudge the females in the vent region occasionally (but do not let this be the yardstick, because two males will act similarly). I think that the specific way to sex goldfish is by the tubercles on the pectoral fins of the males. They can be sexed out of season in this way by the use of a magnifying glass; if the breeder observes the front ray of the pectoral fin of the male, it will be seen to be thicker than in the female, and slightly serrated.

Larvae and the food mixture already described, varied with scraped raw beef and liver, can be given all the year round when temperature permits feeding. Daphnia and Cyclops when in season are given to the young fish, also mosquito larvae, which seem to relish avidly. If enough of these larvae can be netted for the adults as well, this will help to keep them active, but large quantities are required. It would be better to spread the catch among the young fish, which will do the most good.

If the sexes have not been separated by March, this should be done then. Place them in separate tanks, or use a partition in their tank, either of glass or a polythene-covered frame. Should the water temperature remain steady in the lower fifteen, which it invariably does by the end of April, and if the fish are well conditioned, the breeder can expect his fish to spawn. I have had very good spawnings when the temperature was around 52° F.

It may be noted that a settled spell of weather can be expected around the second fortnight of April or the first week in May, perhaps for only a few days, and it is then that the breeder must prepare the spawning tank. The plants are collected: Myriophyllum, willow moss or the Elodea types, in fact any water plants that will, when bunched together, form a loose mat to catch the eggs, but which have sufficient "give" to allow the fish to swim without tearing them. Place the plants in a pull of felt into which has been stirred two teaspoons of Dettol. Remove the plants after 5 minutes into fresh running water for about an hour. Prepare a sea-salt bath in another container, the solution to be of a strength of 1 ounce of sea salt (this can be obtained at most large Chemists) to the gallon and at a temperature equal to that of the tank water from which the parent fish will now be taken. Immerse the fish for an hour in the sea salt solution, then remove them to the spawning tank.

When Myriophyllum plants (which I use) are weighted at the ends of the stems, the greater part of the plants float in the upper volume of water. On looking through the front glass, a number of spaces between the bunches can be observed. It is into these spaces that the spawning fish will often make their way, with the result that many eggs sink to the bottom; these, of course, will be lost if the plants only are removed from the tank for hatching the eggs. However, if a few pieces of plastic airline, cut to the width of the tank, are weighted and placed on the floating plants, the whole will sink and form a loose mat on the bottom of the tank, leaving 3 or 4 inches of swimming room for the fish; this will save many eggs that otherwise would sink to the bottom. Glass tubing will serve the same purpose. If lead weights are used, cover them with raffia strips to prevent damage to the parent fish during the vigorous "drive.

I made the mistake of using uncovered lead weights once, with the result that two of my best fish suffered wounds.

If the fish are removed after spawning, leaving the plants in the tank with all the eggs, the drawback is that the thousands of dead sperms which did not enter an egg can produce pollution and harm the fertilised eggs. On the other hand, all the eggs, whether adhering to the plants or the many on the bottom, have a chance to hatch out if fertilised, in this method, and some of those on the bottom may well be "the fish in a thousand" we are hoping for. Although we lose these by removing the plants and eggs after spawning, I favour this method. The plants, after the spawning, are placed in another clean prepared tank of tap water about a week old. The adults can be separated by a partition in the spawning tank, and the female removed to another "female" tank and fed liberally with earthworms etc.

(To be continued)
Water Lilies for the Garden Pool

by LAURENCE E. PERKINS

Photographs by the author

ANY plans the pond owner may have for beautifying his pond by the addition of water lilies should be put into action now if the plants are to settle down in their new surroundings and provide a show in this, their first year. In making the selection there are three factors which will control individual choice.

Colour will come first followed by area and depth(s) of the pond concerned. The four main representative colours among water lilies may be obtained in various varieties suitable to a range of depths so that the size of one's pond, even if it is a very small one, need not deprive the owner of the pleasure of owning at least one lily. Before giving details of those varieties which may be recommended it may be as well briefly to outline treatment in general for water lilies.

They are best planted in pots in a mixture of loamy soil and old cow manure. If the soil level is kept to within 3 inches of the pot top and large stones of the size of a potato are placed on top of the soil there will be little risk of the lily being uprooted by the pull of the floating leaves and less chance of the fish disturbing the soil to the detriment of the water's clarity. If the size of the pond offers a choice of siting for the lily the incidence of shade from marginal plants or neighbouring shrubs should be avoided so that the lily will receive as much sunlight as possible.

During sunless days most lilies will not open at all and any reduction of sunlight will also result in fewer blooms. Our summers are often more than short of sun so that the lily should not be robbed of its due amount by poor positioning.

Many varieties produce large numbers of leaves and it is advisable to remove one or two from time to time when there are signs of them becoming too numerous, for, apart from wasted nutrition which the lily can more gainfully use to produce blossoms, the condition of the pond relies upon its surface area for oxygenation and it doesn't require many plate-sized leaves to reduce the area of the average garden pool to nil. When the blossoms have finished blooming they should be removed to save waste of the plant's energy, which will otherwise go towards nourishing the forming seeds. This is, of course, unless one feels disposed to undertake the frustrating task of producing water lilies from seed.

Now for the choice of varieties. The main colours come in shades of red, pink, white and yellow and size of blossoms from as small as 2 inches across to as large as 9 inches.

Dealing with the small pool first, we may choose from those which are suited to depths of from 9 inches to 11 feet. The choice here will include the well-known pygmy lilies, which are really small with equally small leaves and which can be adequately supported in a tub of water. In this

Marliacea rosea: rose-coloured blooms of deep hue when the plant is established

Gladstoniana (variety of Nymphaea alba): large snow-white blossoms with golden centres

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James Brydon (variety of Nymphaea alba): rose-carmine red blossoms, a popular lily for garden ponds and one that will tolerate shady conditions.

Escarboucle (variety of Nymphaea alba): large crimson blooms are freely produced.

Attraction (variety of Nymphaea alba): red blooms are formed by this lily, which grows in water 2-3 feet deep.
category are Pygmaea alba, which has star-shaped little blooms of white, and P. helvola, which produces bright pale-yellow flowers. For red we have a choice of four popular varieties: Froebelii, which bears many white coloured blooms, Laydekeri fulgens with freely produced bright-red blooms, L. Silacea with scented blooms of very deep pink and L. purpurea, whose flowers are deep red, deepening in colour during successive days. Among the pink shades for these shallow depths Firecrest is the most brilliant, having fairly large blooms of bright deep pink, which are produced in quantity.

For depths of water up to 2 ft, Marliacea albida is a good choice for a white. It freely produces snow-white blooms which stand above the surface. Colonel A. J. Welch is a good yellow variety having bright star-shaped flowers which stand clear of the water. Marliacea rosea, with pale rose-coloured blooms with orange stamens, and M. carnea, with delicate pink blooms, provide alternative choices for pink lilies suited to medium depths. Among the reds we have a wider scope, which includes some of the most popular of all the water lilies. Escarboucle is so well known that it needs little recommendation. Among the most expensive, it nevertheless provides excellent value both in the number of blooms it produces and in the richness of their coloration. James Brydon ranks second to Escarboucle in popularity and is sufficiently different in its colour of rose-carmin and in its distinctive cup-shaped blooms to be able to share a pond with Escarboucle where space permits. Sirrus is a beautiful lily with blooms of large size, crimson in colour paling to pink at the tips and with golden stamens.

For depths of 2 to 3 ft we can draw from a choice of the largest lilies available. Among the whites are two, Virginals, which has enormous pure white blooms produced in large numbers, and Gladstones, which has large umbel-shaped blooms with golden centres. Brachyelis rosea makes a good choice for a rose-pink lily and is another which carries its blooms clear of the water. Attraction has huge purple-crimson blooms with lance-shaped petals, which pale-off to pink at the tips.

Wherever possible it pays to visit a reputable nursery at the time when their lilies are in flower so that choice of colour may be accurately made. Should it transpire that the lily or lilies which most appeal are suited to shallower depths than are to be found in the pond for which they are intended, it is a simple matter to arrange for the planting pot to be brought nearer the surface by standing it upon another such pot placed upon the pond bottom in an inverted position. If the fancied lily is for greater depths than can be provided the solution may not be so simple, but the disparity may be only a matter of inches, in which case the result will merely be that of wider spreading of the leaves, but the area of the pond should be considered for it may not be sufficient to permit such spreading without the pond having an unpleasant overcrowded appearance. With the very wide choice available, however, it shouldn't be difficult for the individual to satisfy his requirements.

Hints on Pond Construction

(continued from page 255)

new section will not join up properly, and a crack will form there later on.

If a raised-sided pond is to be made some bricks or paving slabs will have to be used to avoid the use of shuttering. Once the walls are built up the concrete coating should be applied thick enough on the inside to make a good water-tight job. The top of the wall can have a ledge of tiles to overhang the outside slightly. This overhang will prevent snails, frogs, toads and newts from entering the pond. If pockets for plants are required these can be moulded in position on the sides of the pond with fairly stiff concrete. These can be dispensed with if separate containers are used for plants. By using these it will be found much easier to clean out the pond.

Any modern type of concrete can be used as long as it is quite fresh. It is possible to use ordinary cement in a mixture of 1 part to 3 parts of sharp sand to make a concrete that will hold water when only half an inch in thickness. If the concreting is done in dry weather see that it is sprayed at least twice a day so that it does not dry out too quickly. This work should not be done in very frosty weather. Once the concrete is dry it must be well scrubbed round to remove the free lime, which could be dangerous to fishes if left. The more shallow the water the greater is the danger as there is then a larger surface of concrete to the amount of water. Leave the pond filled with water for a week and repeat the cleaning. Do not be in a hurry to put your fishes into the pond but see that some water plants are growing well first. Care in construction can save many headaches later on.
Hints on Pond Construction

by ASTILBES

The general rules for pond construction are fairly well known but there are a few snags which can be overcome if care is taken before the job is commenced. The position of the pond is very important but this is often governed by the shape of the garden. A help if the pond can be sited near the house, as water will be easily available. It should be on the highest part of the garden if there is any rise in the ground so that emptying is made easier. The pond should not be located under or too near to trees or large shrubs. For one thing there may be too much shade and then there is the trouble which may be caused by falling leaves. If the pond can be made where it will receive some sunshine it will be an advantage; although too much sun can be shaded out when necessary it is impossible to give the pond some sun if it is badly placed.

The shape of the pond may be decided by the type of garden. If the lay-out is a formal one then the pond should conform to this as much as possible, and can be circular, oval, square or oblong. If there is sufficient space a very good shape is in the form of a cross, especially if one arm can be longer than the other. This type enables one to construct partitions so that any one of the four arms can be isolated from the others to accommodate small fishes or those which might not agree with the others.

A few sticks should be used in the ground to mark out the shape and great care must be taken with the formal design to see that everything is geometrical: right angles and circles must be exact. Measure from opposite corners to make sure of this; unless these measurements coincide the corners will not be square. A spirit level is essential and can be used in conjunction with a long straight board. Pools are driven into the ground and the tops levelled off so that when the concrete is done all the edges will be of exactly the same height; otherwise, when the pool is filled, the surface of the water will look very wrong if uneven with the top of the concrete.

When excavating the soil for the pond a considerable pile is formed. Generally this can be heaped to one side of the pond and later made into an attractive rockery. One side of the pond can be left low so that a bog garden can be constructed there when the pond is finished.

Two feet is quite sufficient depth for the finished pond, and as a matter of fact 6 inches less will be all right. The deeper it is the harder is the work of excavating and the heavier the cost for concrete. It is only for the stronger-growing water lilies that an extra depth is needed. Most of the best lilies for the medium-sized pond need water no deeper than 18 inches. What of the fishes in a shallow pond? Many writers have stated that the pond should be either 2 or 2½ feet deep, the latter being the favoured depth. It is said that fishes will not go through the winter unless part of the pond is 2 feet deep. I do not agree with this as I have proved that even young goldfish under an inch in length can go safely through the winter in the south of England in water 8 inches deep.

In the deep pond during the winter, when most oxygenating plants are dormant, the water near the base of the pond is sure to be rather foul. The top area will be much better oxygenated owing to the fact that it is in contact with the atmosphere. This top water will keep pure, but the deeper the pond the harder will it be for the water at a depth to receive any fresh oxygen.

After excavation the next task will be to consolidate the base of the pond by ramming in half-bricks, stones or other course matter. Don't hurry this job, as the firmer the base the better will the concrete remain stable. Many writers have recommended the use of timber for forming the sides of the pond but timber is so expensive nowadays and can rarely be used for anything else afterwards that it is quite a luxury and at the same time quite unnecessary. Shuttering need not be used at all as long as the sides of the pond are not made perpendicular. Any shape of pond can have the sides sloping at an angle of about 45 degrees. Perpendicular-sided ponds are quite unnatural and even a square-shaped pond can have the sides sloping. The concrete can be floated up the sides with little trouble and the cost of shuttering is saved. The thickness of the concrete will depend on the size of the pond. A fairly small pond can have 3 inches, whereas a large pond may need 6 inches in thickness. Reinforcement can be used, especially at any corners, and this can be old bedstead rails or nails, or stout galvanized wire can be used.

If two coats of concrete are used see that the first is very coarse and not too wet and that the second one is added before the first gets too dry. The top coat is better if laid on fairly quickly, as if part is laid and then a short time is allowed to elapse before carrying on it will be found that the

Please turn to page 254
AQUARIST'S Notebook

by RAYMOND YATES

I N the November issue last year I referred to the Home Aquaria Competition run by the Merseyside Club and mentioned that, as far as I knew, this was something of a new idea. I was not too surprised when the entries began to arrive—from north, south, east and west. It seems that this type of competition has many adherents all over Britain, although the rules vary. Inverness Club has already set out its system for the benefit of readers in the January issue. However, there are plenty more enthusiastic who have kept me posted with details of their methods. The Northampton Society have held these competitions for the last 14 years. Originally only six entries were received; nowadays about 20 annual entries are the rule. The best entry each year gets a cup; judges (two) are engaged from another society to eliminate any possibility of favouritism. The Sheffield Club have had four annual events of this nature. Again a cup is awarded with a replica for the winner to keep. Cantebury Society has been running a contest of this type for 11 years; points are awarded for cleanliness, health and condition of fishes and plants, also the compost. Judges will advise members (if asked) how to improve their set-up. The judges are liable to visit the home of a competitor at any time in the year, no notice of an impending visit being given. A cup (and replica) is awarded annually. The Nottingham Club are no strangers to this type of event but I have no details.

Brookley & District Breeders' Circle run an annual contest and they tell me that the winner for the last 2 years (Mr. R. Dwyer) has already set up his tank for this year's entry. Shortly before the competition is due the club holds a meeting on the subject so that all members can be sure of the way in which tanks are judged and the points a judge will look for when he visits the entrant. The now-defunct Forest Hill Society ran these competitions for several years, mainly with visiting judges from outside the club. Several years ago the three clubs of Forest Hill, Lambeth and Pisces held an inter-club event, each putting up its best tank and these three winners were then judged independently. The winning club was Pisces; the judge was from the Friends Aquarist Society. If I have failed to mention any others who contacted me, my apologies. All interested will see that Home Aquaria Competitions are not confined to Merseyside, but this last club must take a bow for publicising its venture and telling other aquarists about it. If your club engages in anything out of the usual please broadcast it for the benefit of other hobbyists and to put them on to a good thing.

A newspaper report on a recent meeting in London of The Royal Institution mentions an unusual guest who wore a Terylene and nylon jacket with a zip-up side and lace-up back. This was Rupert, a 2 years-old seal, which was captured in the Wash and now lives on the roof of the London Hospital Medical College. He was taken to the meeting by Dr. R. J. Harrison, Professor of Anatomy at the Hospital, who told a reporter of his experiments on diving. Rupert is one of many seals which have taken part in the tests, the object of which was to find out how long and how deep seals could dive, and then to find out whether they had any special features associated with deep diving. It had been found that when a seal dived its heart rate slowed from 120 beats a minute to between 4 and 10, which would kill a human being. A seal did not hold its breath when diving, as man did, but breathed out. Seals could drink gallons of sea water without ill-effect, and scientists wanted to know why. Seals also manage to

time the birth of their young so precisely that all baby seals born round the British Isles had their birthdays between 16th and 18th June.

During the Christmas season the midnight depredations of Santa Claus can be expected to produce a few surprises. One of these was the report of the arrival down the chimney of a large bearded but very much alive goldfish. Things do come down the chimney besides soot and rain and I have had to put up with the fear-mongered antics of what was certainly a very black magic goldfish, of all things! The suggestion is put forward that this unfortunate fish was carried from a private pond and dropped by an owl, and this seems as likely as not. Although owls abound in my own locality, and in fact used to use the garden opposite as a headquarters, I have never heard of anyone who has had losses from ponds which could be placed to their account. In the north we see little of the heron but enormous flocks of herring gulls now live around all large towns. It is true that gulls in towns are nothing like so tame as at a seaside resort and they seem to frequent open fields which are little used by man. They fly high, never anything like rooftop height, so that a tiny pond is more likely to be overlooked, but one feels the risk is there. Has any pond-owner had trouble with gulls well inland, or owls either for that matter?

In a club magazine recently I was amazed to read an advertisement from a hobbyist who wanted dead fishes. Yes, stark, cold and dead. Corpses (3 inches or more if at all possible) were wanted for dissection and not for building up some monster in the horror-film manner. Taking of fishes, an advertisement one can look at without boredom depicts, in full colour, a tankful of oases, moors, veins, lakes and lindenheads. The product? A brand of fish food.

Having had a protracted period of being rather "off colour" I am afraid I have found little time for active fish-keeping. My few fishes have had to make the best of a bad job and for many weeks had to put up with no service of the tanks and a very rough and ready diet of whatever was available, usually from the table. When you just can't do anything you come to care, and I didn't bother myself unduly although I had tank lights on as usual and ran aeration. The plants grew and filled the tanks (so it seemed) and the mass of blue-green algae which formed fairly easily on disappeared as if by magic. The fishes prospered and the longer I left everything the happier they became. To me this was in its way a salutary lesson because I have always been a clean-tank fan. Probably those of us who are always cleaning and changing could do with a protracted lay-off to realise just how un-necessary much of our labours of love are.

Florence Leiser, writing in the American society magazine The Scalare, reports repeated success with breeding neon fish. She gives the following pointers to be followed by others wishing to succeed with this dainty fish. A clean tank, sand, plants and fresh water are prepared to start, with water 6 inches deep, on the acid side, and filtered for 3 days. Temperature 76°F. Several clumps of shortish plants are used. The tank is darkened to twilight hue and

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the fish (a trio of two males and one female or a pair) are added; if sexes are not known all the fish are put in. Remove all fish immediately after spawning. Egg hatching occurs in 2 days. Feed Infusoria for first 10 days, then switch to brine shrimp. After this stage it is plain sailing. A 3 gallon tank is ample as it is easier to use Infusoria and brine shrimp in one size. No direct light should reach the tank until at least 5 days after spawning.

In a recent Bulletin of the Goldfish Society of Great Britain some good suggestions are put forward for the use of polythene sheeting, namely, for lining fish house roofs to insulate against extremes, to cover ponds to retain heat, and to line old, cracked or leaky aquariums so that they can be used to contain fish in an emergency. It is also described in some detail how a member made a polythene pond. Having excavated the hole he lined the bottom and sides with old linoleum covered with an equally old blanket. This was to prevent rough surfaces, stones or roots pushing through and puncturing the polythene. Reference is made to any punctures being patchable with another piece of polythene and any good-quality waterproof adhesive. Readers will remember that I went through all this long ago and even managed to patch successfully 18 holes, some several inches square with the aid of Epo-Stik and double-sided patches. However, my experience was that 12 months is about the limit of the patches; after that they peel off themselves underwater. The article also mentions that polythene deteriorates in time from the action of ultraviolet light. It certainly does deteriorate under water but it becomes so dirty and stained that it is quite impossible to tell after 2 years just what condition it is in below the surface. It is useful for a temporary pond, or for experiments but for anything permanent it is unsatisfactory. The author also refers to a plastic sheeting material, which is fibreglass sandwiched between two layers of plastic sheeting. When available to “do it yourself” fans this will be “just the job.”

A goldfish convention held at Chessington Zoo proved that there is a strong demand for quality fish both from members of the Goldfish Society and from non-members. An annual distribution is not enough, and in future controlled sales of surplus fish will take place at various quarterly meetings. Some late pond spawnings have been reported by Miss D. Morris in the Bulletin, these taking place on 4th and 5th October. Surface temperature was 69°F; the first female was a 3 in. 30 month-old fish that had also spawned in May; the second female was 6 in. and 11 years old. The only known stimulus was the fact that adult fish were returned to the pond on 2nd October and then fell fed on worms.

An interesting technical paper has been issued by the Goldfish Society on Japanese goldfish and their culture about 1900 A.D., written by the late Dr. R. L. Affleck from notes by Dr. Matsubara of Tokyo, made in 1900. Much is still of interest to to-day’s hobbyist, particularly those who operate on a small scale and with limited accommodation. Numbers of males and females, feeding, size of ponds, sorting, grading, rearing—all details are included, and this is something worth reading.

The Variable Platy
by JACK HEMS

THE coloration of *Xiphophorus variatus*, as may be gathered from its trivial name, is very variable and, though the females lack bright colours, males collected in their native fresh waters of eastern Mexico often sport yellowish to green-blue fins, red or orange throats and tails and red or canary-yellow dorsal and caudal fins, with or without dark edges. It is from such attractively coloured wild fish that breeders in Europe and America have developed, over the past 30 years, the sunset variety and other charming yellow- or orange-bodied strains. Until a few years ago, *X. variatus* was referred to as *Platypoecilus variatus*, but nowadays the generic name of *Xiphophorus* covers both platy and swordtails.

*X. variatus* is a hardy fish and will stand temperatures in the low sixties, though normally it should be kept in a range of 70–78°F. It will eat any type of live or dried food, but needs vegetable matter, such as algae or duckweed, included in its diet. It likes thickly planted, clear, soft water and bright surroundings. If it cannot be accommodated in a tank placed close to a sunny window, then electric light must be substituted to keep it in good health and breeding conditions.

The male is a persistent wooer and does not give the female much time to herself. As a result of his ardent attentions, several dozen fry are dropped by the female every 6 weeks or so throughout the year, though a prolonged low temperature will lengthen the interval between broods. Although parent fish fed on plenty of live food are disinclined to eat their young, it is a good idea to transfer the male to another tank before the babies are born, and to move the female immediately after the happy event. It is easy to tell when the young are about to be delivered by the dark and swollen appearance of the female’s abdomen, particularly in the region of the vent.

It is not wise to net a female just before she drops her young because any excitement at this time may result in her death or in deformed or still-born fry being produced. The tiny fry dart about in the surface vegetation and look for food soon after they are born. They are readily fed on flake-dried food, micro worms, brine shrimps or similar items. For several weeks the fry look just like smaller editions of their unglamorous mother but, before 3 months have passed, the males will start to colour up and develop the typical thorn-like anal fin or gonopodium. Young males often show a dark spot in the anal region as in a gravid female.

Like the majority of livebearers, *X. variatus* is an inoffensive fish and adds charm and gaiety to a community tank, but, if you wish to keep a strain pure, you must not place a female in the company of other male platy or swordtails because they will mate with her.

The offspring of such matings are often splendidly coloured but sometimes lack the features most admired on the maternal side of the family. Nevertheless, in the hands of capable and visionary breeders, experiments in hybridising *X. variatus* with varieties of *X. helleri* or *X. maculatus* often result in excellent fish being produced.

March, 1961
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.

Correspondents Wanted
I have received a great deal of enjoyment from your excellent magazine since I began to read it 2 years ago and it occurs to me that it would be quite in line for me to tell you so.

It would be pleasant to write to one or more British fish-keepers and to exchange experiences and literature on fish-keeping. I shall be most happy to exchange American fish magazines and books, or for that matter American magazines and books on any subject, for British books and magazines published in the past that I do not have.

A. Windsor
230, Minnie Street, Godfrey, Illinois, U.S.A.

Fish Droppy
In the January issue of The Aquarist, on page 211, L. C. Dewison states “Cares should be taken not to feed with too many white worms, as there is a suspicion that these cause droppy.” I shall be glad to know what substance there is for this statement and whether the writer has any proof that this is so. I understand that droppy is caused by a red-shaped organism known as Chlamydomonas pennati. I do not see how the white worms can be carriers of this germ any more than any other food. I have used white worms as food for my young fantails for many years and use it exclusively throughout the winter months. I have never had a fish with droppy. If there is no proof for the writer’s statement it should be refuted, otherwise many aquarists may cease to use what I consider to be one of the safest live foods and the easiest to breed.

A. Roebuck
Ruislip, Middlesex.

Mr. B. Plant, in the January issue of The Aquarist claims a possible cure for droppy on the strength of only one case. On page 92, lines 5 to 9, in All About Tropical Fish by Derek McInerny and Geoffrey Gerard this method is mentioned as sometimes giving temporary relief but usually only for a month or so.

T. Kirk
Kingston-upon-Hull, Yorks.

Long-term Aquarium
I found Mr. B. Popland’s article on the long-term aquarium (The Aquarist, January) extremely interesting, as I have established a similar tank myself

Several months ago I became aware of a growing disparity of size amongst my fishes, which, apart from producing the usual results, detracted from the general appearance of my two main tanks. So the “big una” went “up top” and the “tiddlers” were put “down under.” By experimentation over a period of time, I have managed to strike a balance between fishes and plants.

Has Mr. Popland considered the anabantids? The larger species are quite capable of feeding for themselves amongst the cichlids. My own tank contains the following selection of fishes: a pair of firemouths, a pair of blue acaras, two kissing gouramis, a fully grown blue gourami, one Mekong, a tiger scat (3 in.) and two scarrangers Corydoras julii and Gymnocorymbus sp. (the latter being especially useful on the plant leaves). A gravid female guppy is also included to supplement the live food.

The fishes behave quite amicably although a certain amount of “horse play” is natural. The “pecking order” is interesting, bearing no resemblance to fish size, date of purchase etc. The blue gourami chases the firemouths (who have claimed a “territory” for themselves) and the kissing gouramis, but is chased by the blue acaras, who in turn defer to the firemouths. The latter work as a team and often one will make a frontal attack whilst the other carries out a flank attack on the unwelcome visitor. I realise that none of the fishes will grow much larger under their present conditions, but all seem quite happy and I am content to maintain the status quo.

Plants provided many problems. The firemouths uprooted the smaller varieties, the Mekong devoured giant hygrophilus and the scat ate everything! The only solution appeared to be strong-rooting, quick-growing vegetation. I had previously found that the use of loam renders re-landscaping difficult, therefore the plants were set in plain compost. A sub-gravel filter, besides increasing the life of the set-up, ensures that roots receive adequate nourishment. The plants used were various forms of Vallisneria, with top cover provided by Indian fern and Nana. Lighting at 30 watts per square foot for about 7 hours daily appears enough to stimulate good growth. Leaves now grow at least as fast as the scat can eat them, and the runners provide a well-rooted plant system that resists the cichlids’ attacks.

Feeding requirements are normal, but, in addition, a stone covered with dried spinach puree is placed in the tank each day, mainly for the scat although the other fishes also seem to enjoy it.

Like Mr. Popland, I am now searching for the rarer types of fishes, in my case a butterfly fish, and a mate for the blue gouramis, which is full of spawn! One final word of warning: Mr. Popland mentioned orange chromides. I have a pair but they are with the smaller fishes as the
firemouths chased them continually and they spent the whole time hiding in the plants at the back of the tank.

PLT. LT. J. R. PEMLEY-MARTIN
Risley, nr. Bedford.

Cats and Fishes
I was interested in Mr. Guppy’s article (The Aquarist, January) about cats taking fish. About 4 years ago I inadvertently left my cold-water tank uncovered. On returning from exercising the dog I found water all over the carpet. Glancing at the tank, I saw that my large 5 in. goldfish was missing, so I dashed out into the garden and down at the very bottom, some 30 yards from the house, I saw my cat nosing the fish in the air. I grabbed the fish, rushed indoors and literally threw it into the tank. It seemed none the worse for its ‘adventure’ and is alive to this day!

The tank the fish were in at that time was an all-glass one, 19 in. by 8 ft. and 15 in. deep, filled to about 11 in. It was standing on the window seat so the cat must have stood on his hind legs and fished it out with his paw, as he could not have got his mouth to the water without falling in head first. He then carried the fish upstairs, out at the top of the bedroom window, down over the kitchen roof into the garden. Quite recently he tried to get a fish out of the garden pool and fell in, which cured him of fishing!

On the question of why people start keeping fishes, it is hard to say. I first had one in a round bowl given to me many, many years ago, which I kept many years with not much interest and in the end passed it on to a friend— I think really took up the hobby because a friend gave me the aforementioned glass tank and I bought some fish to put in it, found them fascinating and went on from there. Now I would not be without them.

I often read questions about snails in tanks and remarks for and against. My fish always eat them; they are all gone in a day or two. I did have two large red ones in my cold-water tank for a year or so and even bred some in a jam jar. However, one died and the other, and I have never been able to get any more. All other kinds the fish pull out of their shells.

MRS. D. A. HANSON
Plymouth, Devon.

WORM CUTTER

A tool I have found very effective for cutting up worms of all sizes, is quite simple to make. All that is required is a piece of wood 4½ inches long by 1 inch thick and three discarded slotted razor blades. Six fine saw cuts are made in the wood and the razor blades are broken into halves and inserted in three of the cuts to form a saw cut. This makes a very good cutting instrument.

T. Pearson

March, 1961

The AQUARIST

Crossword

Compiled by J. LAUGHLAND

CLUES ACROSS

1. Striped favourite (5)
2. Taste of Xiphophorus (6)
9. Ten, figuratively speaking (4)
10. Our old friend, guppy (with 10) (6)
11. — of the Chondrus (2)
15. Snow shoe of fish skin (7)
16. Hoot is haunting around me for a bit (7)
19. See 19 Across (21)
20. Female, but not one, horse (4)
22. Bright eyepupil (4, 1)
23. The fish is this when hooked (2)
24. Grain seed (anagram), letting go (7)
25. Little submarine (2)
26. Consume most of the body (2)
28. You could have a yen for this Whipsnade (3)
30. Natural protection for wound (4)
31. Half a herring for her (5)
32. Flap (6)
37. A thousand taken from the most are but a grain (8)
39. Cut off the coriaceus fin, perhaps (7)
40. Skaters may do this (8)
43. Move as a coral moves (5)

CLUES DOWN

1. African race of outstanding physical quality (4)
2. Pasta also known as pasta (3)
3. Noisy to rhyme with cregar (7)
4. Female of fishes (3)
5. These red eyes for ctenophoran skin (4, 1)
6. Alternative (2)
7. Uppermost to a T for quality (5)
9. Vital features of some processes (5)
10. Javabawry (11)
12. Wild, wandering (6)
13. Snow shoe of fish skin (3)
17. These are used for aquatic propulsion (4)
19. Sunday, in short (5)
20. Vertical Milton (2)
25. Large section of the African continent (2, 1)
26. Arrangement (6)
27. Acids drop out far (4)
32. Counting (4)
34. Qualified person (1, 1)
35. To —, Beowulf (2) (2)
36. Sicken when the eel fish loses its head (3)
41. Small Pacific tree of lily family (5)

(Solution on page 266)
from AQUARISTS’ SOCIETIES

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

THI selection of officers at the Bedford and District A.S. annual general meeting visited as follows: Chairman, Mr. W. E. Donaldson; vice-chairman, Mr. R. H. E. Jones; secretary, Mr. J. J. Burke, 16c, Linth Road, Bedford; treasurer, Mr. H. W. Bell, 355, St. John’s Street, Bedford; show secretary, Mr. D. W. Wood, 43, The Ridgeway, Pavenham, Bedford; members of the committee, Messrs. John, Whit, Lawrence, Colman, Daniel, Tipton, Mrs. Smith and Mrs. Tyson.

During the meeting, the following officers were re-elected: chairman, Mr. D. H. Hammond; Hon.technical adviser, Mr. G. B. Banfield, (head of Blackpool Town Aquatics); hon. equipment officer, Mr. G. H. Bradley; hon. publicity officer, Mr. R. N. Twinn; hon. table show secretary, Mr. R. H. Cowan; F.A.S. secretary, Mr. W. C. Brown; F.A.S. treasurer, Mr. H. W. Tomlinson; and Messrs. H. A. Smith, H. G. Rawlings, and T. F. G. Smith, who are invited to attend and be members of the society.

The main event for the February meeting of the Northampton and District A.S. was a film showing dealing with sea fish and shells. The society gratefully accepted the resignation of Mr. J. C. Ball, secretary, and he was thanked by the committee for his good work over the past year. Mr. Bryce was appointed temporary secretary in his place. The result of the evening’s table show for cards and bowls was one: 1 and 2, Mr. R. Manley; 3, Mrs. Bryce.

OFFICIALS elected at the annual general meeting of the Sheffield and District A.S. were as follows: President, Mr. W. H. Whitehead; vice-president, Mr. H. R. Goodhead; treasurer, Mr. R. H. Cowan; hon. secretary, Mr. J. B. Foster; hon. equipment officer, Mr. R. H. Twinn; F.A.S. secretary, Mr. H. H. Cowan.

The annual dinner and show were held at the Town Hall, Richard Street, Sheffield, on 11th February. The dinner was held in the Town Hall, and the show in the泻湖 Hall. Mr. G. E. H. Cowan, F.A.S., was the guest speaker at the dinner, and Mr. T. E. E. Cowan, F.A.S., gave the vote of thanks. The show was well attended, and the evening was a great success.

Mr. H. W. Tomlinson, president, in his opening address, thanked the members for their support and efforts during the year, and stated that the society had made great progress in the previous year.

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trending of Badger point. Recently the club purchased a very handsome Tureen.

A very interesting evening was had by all members of the Thames A.S. at the January meeting, when neighbors Goose A.S. paid a visit. The meeting was held in the School Hall, and a most enjoyable evening was had. The school was well attended, and the焕mbers were all very pleased with the visit. The meeting was adjourned at 9:30 p.m.

The next meeting of the Thames A.S. will be held on Thursday, 15th March, at 8 p.m., and all members are requested to attend.

THURSDAY, 15th March, 8 p.m., School Hall, Thames A.S.

The title of the evening will be "The Thames A.S." and will include talks on various topics related to the Thames. It is expected that the meeting will be well attended and that the members will have an enjoyable evening.

AQUARIUMS OF THE WORLD

A meeting of the aquariums of the world was held at the Aquariums of the World Club on Friday, 16th March, at 8 p.m. The meeting was well attended, and the members were all very pleased with the visit. The meeting was adjourned at 9:30 p.m.

The next meeting of the Aquariums of the World Club will be held on Thursday, 22nd March, at 8 p.m., and all members are requested to attend.

THURSDAY, 22nd March, 8 p.m., Aquariums of the World Club

The title of the evening will be "The Aquariums of the World" and will include talks on various topics related to aquariums. It is expected that the meeting will be well attended and that the members will have an enjoyable evening.

AQUARIST'S CALENDAR

4th-6th April: Middlesex and District A.S., annual show at All Saints Hall, Middlesex. Entry forms are available from the show secretary, Mr. E. R. Jones, 18, Denham Road, Middleshine.

4th-6th May: Slough Aquarium Society annual show at the Slough Community Centre. Show secretary: Mr. E. C. B. Knight, Jasmine House, High Bridge, Slough, Berks.

25th May: Bradford and District A.S. open day show at the Assembly Hall. Cooperative Institute, Thornton Road, Bradford. Schedule is available from Mr. R. Marshall, 131, Park Hill Road, Bradford 10.

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THE BOTTOM

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Proprietor: Max Gibbs

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March, 1961
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KENT

Kingfishers Aquarium
138, Croydon Road, Beckenham
Telephone: Beckenham 3716 E.C.D. Wednesday (all day) W.P., R. C.T.P.A.A.

Sherwood Pet Stores
Proprietors, Fairhavens Aquarium, Ltd., 532, Sherwood Park Avenue, Sidcup

LANCASTHIRE

Hornby’s
Trafford Bar, Old Trafford, Manchester, 10

Liverpool Aquarium Company
23, Sir Thomas Street, Whitechapel, Liverpool, 1
Telephone: Central 4931 E.C.D. Wednesday, R. C.T.P.A.A. R. & A.

“Stanleys”
110-112, Shakespeare Street, Southport
Telephone: Southport 5369 E.C.D. Tuesday R. C.T.P.A.A.

LONDON (North)

Philip Castanz Ltd.
91, Haverton Hill, Hampstead, N.W.3

Paramount Aquarium
93, Haverton Hill, Hampstead, N.W.3

LONDON (South)

Fairbairns Aquarium, Ltd.
15, Wall Half Parade, Etham, S.E.9

The Jaynor Organisation
(James North (London) Ltd.)
316, Lee High Road, Lewisham, S.E.13
Telephone: Lee Green 3977 E.C.D. Thursday WR. C.T.P.A.A.

South Western Aquarists
2, Millburnie Road, Trinity Road, Upper Tooting, S.W.17

Tachbrook Tropics
244, Vauxhall Bridge Road, Victoria, S.W.1
Telephone: Victoria 3179 (Open all week except Sunday) WR. C.T.P.A.A. R. & A.

LONDON (West)

Owen Reid’s, Aquarium Dept.
12, Spring Bridge Road, Ealing Broadway, W.5

NORTHAMPTONSHIRE

The Aquarium
193, Wellington Road, Northampton

The Pet Shop
120, Kettering Road, Northampton
Telephone: Northampton 841 E.C.D. Thursday R.C.T.P.A.A.

THE AQUARIST
NORTHUMBERLAND
Watts
6, 8 and 10, Half Moon Lane,
Durham
Telephone: Durham 72407
E.C.D. Wednesday (all day). R. C.T.P.A.A. R. & A.

OXFORDSHIRE
The Goldfish Bowl
5, East Avenue, Cowley Road,
Oxford
Telephone: Oxford 41825

Headington Pets Supplies
150a, London Road,
Headington, Oxford
Telephone: Oxford 61706 and 5673

STAFFORDSHIRE
Walsall & Wolverhampton Aquatics
46, Stafford Street, Walsall and
147, Horsley Fields, Wolverhampton
Telephone: Walsall 21783 and Wolverhampton 24147

SURREY
Thameside Tropica and The Pet Shop
Bransley House, New Zealand Avenue
Wallace-on-Thames

SUSSEX
Preston Aquarium
44, Beaconsfield Road, Brighton
Telephone: Brighton 29620
(Open all week). R. C.T.P.A.A.

WARWICKSHIRE
The Coventry Aquarist (Prop. W. Dymond)
43, Melbourne Road, Earlsdon, Coventry
Telephone: Coventry 72772
E.C.D. Thursday. WR. C.T.P.A.A.

Fanday Aquaria
Fanday House, 129, Stratford Road, Sparkbrook,
Birmingham
Telephone: Victoria 3557

WORCESTERSHIRE
The City Aquaria, Bird and Pet Supplies
(Proprietor: Mrs. M. Hemmings)
34, Friar Street (opposite Union Street), Worcester
Telephone: Worcester 2005

YORKSHIRE
The Corner Shop (Prop. J. Wilde)
526, Abbeydale Road, Sheffield, 7
Telephone: Sheffield 51472

SCOTLAND
Aquarists' Rendezvous
164/168, Albert Drive, Pollokshields, Glasgow, S1
Telephone: South 4258
E.C.D. Tuesday (1 p.m.). WR. C.T.P.A.A.

Forbes, James L.
176, Blackness Road, Dundee, Co. Angus
Telephone: Dundee 66409
E.C.D. Wednesday. R. C.T.P.A.A.

NORTHERN IRELAND
Ulster Aquatics
15, Montgomery Street, Belfast
Telephone: Belfast 27144

W. HAROLD COTTON
F.R.A.S.
ICHTHYON TOMIST
POST MORTEM EXAMINATION
of Tropical and Coldwater fishes
Specimens should be wrapped absolutely and very well in greaseproof paper, surrounded by a damp cloth and then re-wrapped in dry greaseproof paper and sent in a strong envelope. A brief history and any relevant details should be given. No preservatives please.
Examination fee £1.
39, BROOK LANE, KINGS HEATH,
BIRMINGHAM 14
Phone: 41858

NOW IN STOCK
“A Simple Pond for the Amateur” 1/6 (post free 1/8)
“The Guppy” 2/6 (post free 2/10)
“Keeping Reptiles and Amphibia” 2/6 (post free 2/10)
“Coldwater Fishkeeping” 2/6 (post free 2/10)
“Exotic Egg-Laying Fishes” 2/6 (post free 2/10)
“Fish Foods and Feeding” 4/6 (post free 4/11)

Obtainable from:
“The Aquarist”
The Butts, Half Acre, Brentford, Middlesex
OR FROM ALL THE LEADING PET STORES
PREPAID ADVERTISEMENTS
5d. per word (12 words minimum) Box number 6d. extra

FOR SALE
GLAZED aquarium in all sizes including 36 x 15 x 12, 42s. 6d. 11 x 10 x 15, 5s., 6d.; 24 x 12 x 15, 7s. 6d., tanks depauched to any part of Britain carriage extra. Plants, Accessories, Fish. Wright’s, 16, Little Wordsworth Road, London, N.4. Phone Archway 2820.

AQUARIUM FRAMES. For quality and accuracy buy direct from the manufacturers. 1, 2, 3, 4, 5, 6, 10, 15, 20, 30, 40, 60, 100. 20s. 6d., tanks depauched to any part of Britain carriage extra. Plants, Accessories, Fish. Wright’s, 16, Little Wordsworth Road, London, N.4. Phone Archway 2820.

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### TACHBROOK TROPICALS
244 VAUXHALL BRIDGE ROAD, LONDON, S.W.1
Telephone: VICTORIA 5179

### TROPICAL FISH OFFER OF THE MONTH

<table>
<thead>
<tr>
<th>Item</th>
<th>Price</th>
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<tbody>
<tr>
<td>8 Large Neons</td>
<td>£1 0 0</td>
</tr>
<tr>
<td>4 Cardinals</td>
<td>£1 1 0</td>
</tr>
<tr>
<td>Red Tail Sharks</td>
<td>£1 6 6</td>
</tr>
<tr>
<td>Butterflies</td>
<td>£1 2 6</td>
</tr>
<tr>
<td>Elephant Noses</td>
<td>£1 1 9</td>
</tr>
<tr>
<td>Knife Fish</td>
<td>£1 2 6</td>
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**POST ORDERS.** Minimum order £5. Plus carriage.

### PLASTIC AQUARIUMS

<table>
<thead>
<tr>
<th>Item</th>
<th>Price</th>
</tr>
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<tbody>
<tr>
<td>Cleaning Appliances</td>
<td>£1 0 0</td>
</tr>
<tr>
<td>Air Rezzer</td>
<td>£1 0 0</td>
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<tr>
<td>Hand Rezzer</td>
<td>£1 0 0</td>
</tr>
<tr>
<td>Air Rezzer Spare Tanks</td>
<td>£1 0 0</td>
</tr>
<tr>
<td>Automatic Ecosystem</td>
<td>£1 0 0</td>
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<tr>
<td>Party Set</td>
<td>£1 0 0</td>
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<tr>
<td>Dick Rezzer Spare Tanks</td>
<td>£1 0 0</td>
</tr>
<tr>
<td>Aquarium Scraper</td>
<td>£1 0 0</td>
</tr>
<tr>
<td>Air Pump Accessories</td>
<td>£1 0 0</td>
</tr>
<tr>
<td>Taking Chasin, etc.</td>
<td>£1 0 0</td>
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### ANGLE IRON TANKS

<table>
<thead>
<tr>
<th>Item</th>
<th>Price</th>
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<tbody>
<tr>
<td>Complete Assembly</td>
<td>£1 0 0</td>
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<tr>
<td>Tank, Stand &amp; Canopy</td>
<td>£1 0 0</td>
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</tbody>
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### BOW-FRONTED AQUARIUMS

<table>
<thead>
<tr>
<th>Item</th>
<th>Price</th>
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<tbody>
<tr>
<td>Bow Front</td>
<td>£1 0 0</td>
</tr>
<tr>
<td>Bow Front Bubbles</td>
<td>£1 0 0</td>
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</tbody>
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### STANDS

<table>
<thead>
<tr>
<th>Item</th>
<th>Price</th>
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<tbody>
<tr>
<td>18x12x34 in.</td>
<td>£1 7 4</td>
</tr>
<tr>
<td>18x12x24 in.</td>
<td>£1 7 4</td>
</tr>
<tr>
<td>15x12x24 in.</td>
<td>£1 7 4</td>
</tr>
<tr>
<td>15x12x18 in.</td>
<td>£1 7 4</td>
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### AQUARIUM SCRAPPERS

<table>
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<tr>
<th>Item</th>
<th>Price</th>
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<tbody>
<tr>
<td>Black Scraper</td>
<td>£1 0 0</td>
</tr>
<tr>
<td>Aluminium Scraper</td>
<td>£1 0 0</td>
</tr>
<tr>
<td>Aquarium Scraper</td>
<td>£1 0 0</td>
</tr>
</tbody>
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### AIR PUMP ACCESSORIES

<table>
<thead>
<tr>
<th>Item</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taper Chassin, etc.</td>
<td>£1 0 0</td>
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### VICTOR ALL OVER BACK LIGHT SHADE

<table>
<thead>
<tr>
<th>Item</th>
<th>Price</th>
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</thead>
<tbody>
<tr>
<td>10x10x12 in.</td>
<td>£1 0 0</td>
</tr>
<tr>
<td>15x12x24 in.</td>
<td>£1 0 0</td>
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### DIFFUSER STONES

<table>
<thead>
<tr>
<th>Item</th>
<th>Price</th>
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<tbody>
<tr>
<td>Diamond with tube insert, l.t.</td>
<td>£1 0 0</td>
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<tr>
<td>Diamond with tube insert, r.h.</td>
<td>£1 0 0</td>
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### PRESSURED STEEL

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<tbody>
<tr>
<td>10 x 7 x 7 in.</td>
<td>£1 0 0</td>
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<tr>
<td>12 x 9 x 7 in.</td>
<td>£1 0 0</td>
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<tr>
<td>15 x 12 x 9 in.</td>
<td>£1 0 0</td>
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### PLASTIC TUBING

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<thead>
<tr>
<th>Item</th>
<th>Price</th>
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<tbody>
<tr>
<td>PVC Flexible Non-Tint</td>
<td>£1 0 0</td>
</tr>
<tr>
<td>Clear Air tubing, 12 ft.</td>
<td>£1 0 0</td>
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### PLASTIC AQUARIUMS

<table>
<thead>
<tr>
<th>Item</th>
<th>Price</th>
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</thead>
<tbody>
<tr>
<td>Complete Assembly</td>
<td>£1 0 0</td>
</tr>
<tr>
<td>Stand &amp; Canopy</td>
<td>£1 0 0</td>
</tr>
<tr>
<td>Aquarium Bubbles</td>
<td>£1 0 0</td>
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### HEATERS

<table>
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<th>Item</th>
<th>Price</th>
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<tr>
<td>S.F. 40, 60, 75, 100</td>
<td>£1 0 0</td>
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<tr>
<td>80, 120 watts</td>
<td>£1 0 0</td>
</tr>
<tr>
<td>E. X. Standard 25-55</td>
<td>£1 0 0</td>
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<tr>
<td>E. X. Super 55</td>
<td>£1 0 0</td>
</tr>
<tr>
<td>75, 100, 125, 150 watts</td>
<td>£1 0 0</td>
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### THERMOSTATS

<table>
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<th>Item</th>
<th>Price</th>
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<tr>
<td>E. X. Major Sub-mariner</td>
<td>£1 0 0</td>
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<tr>
<td>E. X. Major Sub-mariner (New)</td>
<td>£1 0 0</td>
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<tr>
<td>Ex. E. Standard Outside Control</td>
<td>£1 0 0</td>
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<tr>
<td>Ex. E. Super 55 Outside Control</td>
<td>£1 0 0</td>
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<tr>
<td>E. X. Standard Outside Control</td>
<td>£1 0 0</td>
</tr>
<tr>
<td>E. X. Super 55 Outside Control</td>
<td>£1 0 0</td>
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### THERMOMETERS

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<th>Item</th>
<th>Price</th>
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<tbody>
<tr>
<td>Stick on the tube, etc.</td>
<td>£1 0 0</td>
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<tr>
<td>Stick on the tube, etc. (outside fitting)</td>
<td>£1 0 0</td>
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### FILTERS

<table>
<thead>
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<th>Item</th>
<th>Price</th>
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<tbody>
<tr>
<td>Premier Base Filter</td>
<td>£1 0 0</td>
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<tr>
<td>UF Filter</td>
<td>£1 0 0</td>
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<tr>
<td>Conquest External Filter</td>
<td>£1 0 0</td>
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<tr>
<td>Regent Internal Filter</td>
<td>£1 0 0</td>
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### PUMP SPARE PARTS

<table>
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<th>Item</th>
<th>Price</th>
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<tbody>
<tr>
<td>Air pump chamber, etc.</td>
<td>£1 0 0</td>
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<tr>
<td>Procter, etc.</td>
<td>£1 0 0</td>
</tr>
<tr>
<td>Lehman Fish House, etc.</td>
<td>£1 0 0</td>
</tr>
<tr>
<td>Haltex, etc.</td>
<td>£1 0 0</td>
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### TROPICAL FISH

<table>
<thead>
<tr>
<th>Item</th>
<th>Price</th>
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<tbody>
<tr>
<td>New Blue Tets</td>
<td>£1 0 0</td>
</tr>
<tr>
<td>Clown Loach</td>
<td>£1 0 0</td>
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<tr>
<td>Talking Cats</td>
<td>£1 0 0</td>
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<tr>
<td>Black Shrimp</td>
<td>£1 0 0</td>
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<tr>
<td>Large Kuhl Loach</td>
<td>£1 0 0</td>
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<tr>
<td>Lyretails (per)</td>
<td>£1 0 0</td>
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<tr>
<td>Harlequins</td>
<td>£1 0 0</td>
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### PUBLICATIONS

<table>
<thead>
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<th>Item</th>
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<tbody>
<tr>
<td>Viberators A.C. only</td>
<td>£1 0 0</td>
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<tr>
<td>Viberators B.C. only</td>
<td>£1 0 0</td>
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<tr>
<td>Viberators C.B. only</td>
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<tr>
<td>Viberators D.B. only</td>
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<tr>
<td>Viberators E.B. only</td>
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<tr>
<td>Viberators F.B. only</td>
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<tr>
<td>Viberators G.B. only</td>
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<tr>
<td>Viberators H.B. only</td>
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<tr>
<td>Viberators I.B. only</td>
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<tr>
<td>Viberators J.B. only</td>
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<td>Viberators K.B. only</td>
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<td>Viberators L.B. only</td>
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<td>Viberators O.B. only</td>
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