The Aquarist

and Pondkeeper

APRIL, 1961

MONTHLY
Vol. XXVI No. 1

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Editorial

DON'T shoot the author—he's doing his best. The old phrase might thus be adapted on behalf of those who write, and especially, it seems, for those who write books about fish-keeping. If a reader finds that things do not go "according to the book," how justified is he in making a charge that the author does not know his subject? Not at all if some of the examples of dissension over what is printed that have been quoted to us are typical ones. It certainly does happen that some inaccuracies are perpetuated from book to book and the writers are then not to be excused for failure to deal critically with the material they have assembled. But much of what is presented to confound the words of an authority is what we heard our good friend the late Dr. Myron Gordon call "anecdotal evidence." Stories said to prove some particular point, from "personal experience," do not always give all the facts that, if known, might lead to a different interpretation.

There is often, too, a failure to recognise the variability of living things. What is found to apply in the conditions of one aquarium does not always hold true in other tanks. What one fish pair is observed to do might not be characteristic of the majority of the species. An event observed consistently in a pond in the south need not necessarily be expected to occur in a northern pond at the same time. It would be so simple if accounts of keeping a given species of fish could be given in the pattern of an instruction manual for a car or a record-player, for example. Why, we were asked a short time ago, do books not give the exact number of days of age of fish fry at which their food should be changed from one grade to another? This is the approach of the true manual-user; it ignores the fact that many things other than time govern rate of growth. However, we prefer to have authority challenged intelligently now and then rather than the sterile alternative.

Let's Look at the Mollies

by R. E. MACDONALD

As mollies are now inexpensive as well as being colourful, energetic, peaceful, promiscuous and hardy, it goes without saying that these particular species have become extremely popular. It does not mean, however, that because of their popularity all mollie fans are acquainted with the needs of these fishes. The ultimate results from the lack of knowledge can be disheartening, to say the least, particularly when ignorance of certain facts causes failures in the keeping and propagation of the species.

Tank Water

The various species of the genus *Molliensia* (family Poeciliidae) are found mainly along the coastal waters of eastern America (see map), which indicates that the nature of the tank water should be seriously considered if the fishes are to be kept successfully.

Mollies can be found either far out in the Gulf of Mexico and the Caribbean Sea or inland in the fresh or brackish waters, which points to the fact that this genus is somewhat

Distribution of species of mollies

adaptable to varying degrees of salinity (salt content) in their environment. Mollies will not flourish successfully in salt-less water and time soon tells how really averse these fishes are to water without salt.

Mollies become particularly prone to white-spot disease (ichthyophthiriasis) and fungus (*Saprolegnia*) if kept in water lacking salt, for an environment of this nature soon causes the protective mucous (slime) covering on the fishes to break down and in doing so allows the protozoan parasites and fungus spores to penetrate the epidermal layer of the skin. To prevent any such adverse conditions arising, salt may be added to the water in the aquarium in sufficient quantity to be of advantage to the fishes and yet not enough to cause any harm to the vegetation. One teaspoonful of Epsom salts and one teaspoonful of table salt added to every gallon of water is most suitable. To assist the fishes in fighting white spot and fungus, however, 2 drops of a 5 per cent. solution of methylene blue may be added to each gallon of water in the tank.

Salt water appears to increase the fertility of mollies; water that is too acid is found to retard growth and promote dropsy in aged fishes of this genus. It is recommended that mollies be kept only with other live-bearing species of the family Poeciliidae as the vast majority of other tropical fishes cannot tolerate the high salinity of the water.

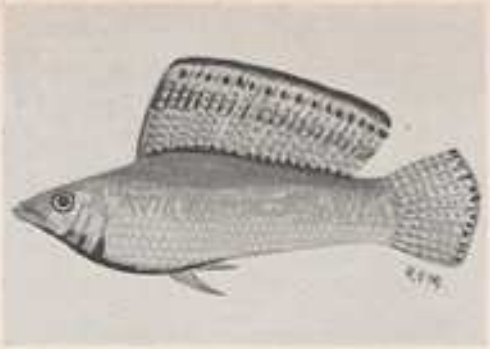
Temperature and Feeding

Although most species of the genus *Molliensia* have a temperature range of 50-90°F, rapid fluctuations should be avoided as sudden chills will produce "shimmies," a complaint which mollies develop very easily. However, gradual variations of about 10° will increase the hardiness and strength of the fishes. Mollies will enjoy and benefit most from a temperature range of 75-85°F in the summer (which incidentally encourages them to breed freely) and a drop to between 65° and 75°F in the winter to give the fishes a rest. A good temperature optimum is 78°F.

Feeding should not present any problems if the tank is placed so that it can receive the required amount of direct sunlight to produce an abundance of green algae, for this form of food constitutes the main diet.

All species of mollies, in fact all poeciliids, are mainly herbivorous, i.e. vegetarian, but dividends will be reaped if the green diet is supplemented occasionally with meat foods such as minced earthworm (which is the most nourishing) and sifted live *Daphnia* or mosquito larvae. The meat foods should always be given as small forms or minced.

When there are a profusion of algae in a tank the water becomes green water, and it contains thousands of these microscopic green plant organisms that abound in the aquarium whenever there is an excessive amount of light and an abundance of plant foods such as the sulphates, phosphates and nitrates that have been produced from



Sail-fin mollie (Mollienisia velifera)

waste matter by aerobic bacteria in the water. Even though they appear rather repugnant to the eye, algae in general possess no harmful properties.

Green water is obviously undesirable as far as the show tank is concerned, and the food problem there must be solved by other means. Bemax or chopped cooked spinach make good substitutes for algae.

Trouble may be experienced when rearing the fry of mollies if algae is not present in the breeding tank. After their birth, the fry will feed first from their yolk-sac and then on algae found in the tank. If this natural food is missing it becomes essential to ensure that the fry receive plenty of substitute food. Proprietary liquid fry food supplied in tubes can be recommended as a substitute. If this requirement fails to receive attention, the majority of the fry will die from starvation. It is found that the greater number of deaths amongst new-born fry can be attributed to starvation.

From experiments I have found that the algae content of a tank is diminished if any form of filtration is used. Filtration extracts algae from the tank water, leaving it crystal clear and sparkling, which is all very well for the show tank and for carnivorous species of fishes but it deprives the herbivorous fishes of their most natural food and can mean death by starvation to livebearer fry.

Apart from actually extracting algae from the water, filtration will attack the growth of these plant organisms in another way. Filters clear the organic waste from the bottom of the tank before the aerobic bacteria in the water have had time to complete the conversion process which produces the foods the algae need. Even the filter manufacturers admit that the growth of some plants, e.g. the Amazon sword plant (*Echinodorus brevipedicellatus*), will be stunted because of the loss of plant food or mulm caused by filtration.

Lack of food during the early stages of fish life has a far-reaching effect, for how often do we hear someone relating in the club room how three-quarters of their livebearer fry have developed humped backs, become wasted and died, or that their livebearer fry developed caved-in bellies and mysteriously "passed on" before they were 3 months old? It is not often that we hear the correct diagnosis applied to these symptoms: starvation, malnutrition, rickets. These complaints are the results of deficiency of food; food that is lacking either in quantity or quality, where quality refers to proteins and vitamins and not to an impressive label on a packet! Fry spend the first months of their lives building their bodies and escaping from the ever-hungry stomachs of the larger fishes, and a good natural growth of algae will provide the necessary building material as well as increase the density of the water to such an extent that visibility becomes poor, making it harder for a predacious fish to see its prey.

All species of mollies are suitable for the community tank, though male specimens may tend to become bullies at times. This applies particularly to the male *Mollienisia sphenops*. Even so, over-boisterous fishes should be taken as an exception, for nearly all mollies are friendly creatures both to other fishes and to the hand that feeds them. Any aquarist will immediately agree that this is a most desirable quality for the community tank.

Breeding

Mollies are extremely free in producing young and therefore do not need outside inducement before they will breed. As with all other fishes, it pays in the long run to condition the fish before breeding commences by feeding with the most suitable and nourishing diet; in this case it is a vegetable diet supplemented with meat foods. Always flood the breeding tank with light, for apart from making the fishes more fervent in their sex life, the extra light will produce a marvellous quantity of algae.

When breeding, the size of the tank and depth of water are two very important factors. Breeding mollies is one thing, success in rearing the fry is another, and successful development of the young calls for ample space. Cramped quarters creates cramped fishes and a 24 in. by 12 in. by 12 in. tank should be regarded as the absolute minimum size for breeding mollies. The size of the brood can amount to anything from between 24 and 200 fry, depending, of course, on the size and age of the female. Some mollies survive for over 5 years and grow to 5 inches in length. Heated concrete pools make the best quarters for rearing purposes if really first-class specimens are required, for, like growing fancy goldfish, they need at least 1½ gallons of water per inch of fish.

In new-born livebearer fry, the swim bladder is in a state of collapse and must be inflated with air immediately after birth. This necessitates an exhausting swim to the surface. If the water is deep, only the strongest will survive the ordeal. If the swim bladder is not inflated soon after birth it will remain permanently collapsed and a fish without balance or stability (known as a "bottom-shuffler") is the result. The depth of the water in the breeding tank should therefore never exceed 9 inches.

The breeding cycle of mollies occurs about every 5-10 weeks, depending on the species, but there is a natural resting period during the winter months which should be encouraged by lowering the temperature of the water as previously suggested. It is most undesirable to move or handle a pregnant female mollie, for a premature birth may result or the brood may be delivered still born; most serious of all, the death of the female may follow. The effect of indiscriminate handling can also result in malformed fry. It is advisable to remove the female from the tank for a few days after her giving birth so that she may rest and is not subjected to the never-ending courtship of the male.

If the parents are well fed there will be little to fear from them in the way of infanticide. The surface of the breeding tank should be well covered with floating plants such as crystalwort (*Riccia* species) and *Nitella gracilis* as a precaution and these will enable the fry to escape and shelter from the parents.

Careful attention is needed when feeding the fry. One way of assisting the growth of these fry is to give them finely sifted live *Daphnia* and mashed earthworm as a supplement to the diet. Young mollies prove to be very slow growers and very few actually develop the tall fin characteristics of a first-class male.

Sexing the fish is easy, for the male can be identified by

the presence of the gonopodium (intromittent organ) and the possession of the larger dorsal fin. The dorsal fin is normally folded back along the body when the fish is swimming and is only displayed in an upright position when courting or perhaps at rest.

Species of Mollies

The promiscuous sex habits, the close relationship and the wide geographical area of distribution has resulted in these fishes hybridising in the wild state. This has perhaps complicated matters for the identification of some species of *Mollienisia*. The nature of this genus is such that inter-specific hybrids are a common occurrence and inter-generic strains, e.g. mollies × guppies, can also be bred. Nearly all the species have colour varieties implicating melanism and albinism. The species can be separated into either of two groups: (*a*) sail-finned mollies or (*b*) short-finned or common mollies.

(*a*) Sail-finned species. *M. latipinna* and *M. velifera* are both known as the "sail-fin" mollies and the only way to differentiate between these two species is by taking a dorsal fin-ray count. If the number of rays is nearer 14, the species is *M. latipinna*. If the number is nearer to 18 it is *M. velifera*.

M. latipinna is known to hybridise with *M. velifera* and *M. sphenops*. It is possible to inbreed the melanistic (black) fish of *M. latipinna* into the most popular of all mollies, the "black sail-fin" mollie. When black specimens of *M. latipinna* and *M. velifera* are crossed, the result is known as a "perma-black" mollie. A cross between a black sail-fin and a green sail-fin produces specimens known as "marble" mollies.

(*b*) Short-finned or common mollies. *M. sphenops*, known simply as the "mollie," produces many different varieties, which freely interbreed, two of the most famous being the "orange-tail" and "liberty" mollies. Black varieties of *M. sphenops* can be produced to give the beautiful "orange dorsal sail-fin" mollie. Because of the wide geographical area of distribution, the size of this fish varies to some great extent. In a southern locality *M. sphenops* can grow to over 5 inches in length, whereas in a northern locality it may scarcely reach a length of 1 inch.

M. formosa presents something of a problem, for there is some difference of opinion whether this fish is a distinctively separate species or a hybrid of *M. latipinna* × *M. sphenops*. *M. caucana*, known as the "South American" mollie, is a very small fish that rarely grows longer than 1½ inches. The generic name of this species was changed to *Allopoecilia*, but this has since been classed as being a sub-genus and the fish is once more included in the genus *Mollienisia*. It is a comparatively rare fish in the aquarium and is a short-finned species.

One last word about the genus *Mollienisia*—anything can happen! (Surely this can be said about many other genera.) There are always exceptions to the rule. Nature never strictly adheres to the "Rule Book" and there are occasions when authors are unjustly ridiculed because of these exceptions. All information should be digested and one's own experiences added. The longer one keeps mollies, the greater is the realisation that there is always something new to learn about tropical fishes.

First aquarium (18¼ in. by 9½ in. by 7¼ in.) made by the author

Meccano Aquaria

by D. MARTIN

DURING the past 2 years I have constructed several aquaria with frames made from Meccano. The following notes may therefore be useful to anyone wishing to try this method of construction.

The frame consists of Meccano angle girders (nos. 7 to 9f in the Meccano catalogue), joined together with Meccano nuts and bolts (no. 37). The size of a Meccano aquarium is limited by the thin-ness of the girders and the lack of rigidity in the bolted joints. I would not recommend constructing one longer than 12 to 14 inches. Although the girders are sold only in certain lengths, they can be cut easily, midway between adjacent holes, with a small hacksaw, giving lengths up to 24½ inches in multiples of ½ inch.

The method of construction is as follows. The lower horizontal frame is assembled first, the two longer girders overlapping the two shorter ones in order to provide the best support for the bottom piece of glass. The bolts should be put in so that their heads are on the inside of the frame, and the nuts at this stage are not screwed on tightly. The vertical girders are added next, on the outside of the lower horizontal frame, and may then project below it to form "legs" of the desired length. Lastly, the upper horizontal frame is added; this can be identical to the lower frame, giving the conventionally shaped aquarium. Alternatively the top edges of the girders can be turned outwards. The advantage with this is that the girders do not overhang the water and thus do not tend to rust. The frame should now be checked for squareness, either with a set-square or by measuring the lengths of the diagonals of the sides, and then the nuts are tightened with a spanner (no. 34); a screwdriver (no. 36 or otherwise) is usually necessary to stop the bolts turning with the nuts. The completed framework is now covered on the inside with

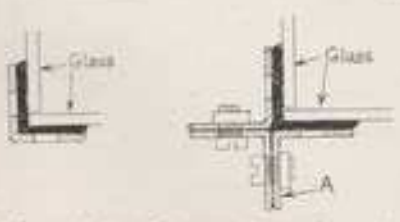
Left, the redesigned first aquarium of the author and, right, end view of a 10 in. by 6 in. by 8 in. aquarium

1 inch-wide adhesive cellulose tape to cover the holes and slots in the girders. I also cover the outside of the frame, in case dirt and dust should adhere to the sticky side of the tape exposed through the holes.

Glass ¼ inch thick is suitable for glazing the aquarium, and should fit the frame as accurately as possible. The corners of each piece of glass must be cut off just sufficiently to clear the heads of the bolts on the inside corners of the frame. When glazing my aquaria, I used Seclastik as the glazing compound, and found it possible to squeeze the layer between the glass and the frame until it was so thin that the outlines of the holes, and the green colour of the metal, could be seen through it. It must, however, be remembered that some pieces of the frame overlap the others, and thus it is not possible to make the layer equally thin all round one of the pieces of glass; if one attempts to do this by pressing the glass and frame together, they move apart again when the pressure is removed, and leaks occur. It is important to cover the bolt heads in the corners with the glazing compound, so that no metal is in contact with the water.

The glass can be cleaned up with a razor blade, and the aquarium is then ready for use. It is not advisable to move it when full of water. I find it useful to stand the "legs" of the aquarium on little pieces of glass about 1 inch square, because the metal is sharp and leaves L-shaped marks on the surface on which they rest.

I have, in fact, constructed four Meccano aquaria. Two small ones, 10 in. by 8 in. by 6 in. deep and 10 in. by 6 in. by 8 in. deep, of conventional shape, have both been satisfactory so far. My first attempt, of conventional shape and 18½ in. by 9½ in. by 7½ in. deep, was not, however, so successful. The frame was too weak and bent slightly when the tank was full of water. I found that when newly glazed it could be filled with water without leaking, but that it always leaked when emptied and refilled. Thus I had to fill it, set it up, and when cleaning it be careful never to remove more than about one-third of the water at any one time. After a year or so it began to leak, and I dismantled it and rebuilt another, ½ inch deeper, with the top angles pointing outwards, and with a different form of bracing. When it was glazed I added thick fillets of Bostik to the inside corners, and it has not leaked since.



Left: sectional view of construction normally used. Right: proposed more rigid design of frame formed from sets of three girders

An idea that I have had but have not tried out, might make it possible to construct larger sizes of aquaria than I have recommended; it is explained in the diagrams which represent parts of vertical sections through an aquarium.

The frame, where longer than 12 inches, would be formed of sets of three girders bolted at frequent intervals. It would be more complicated to join together at the ends, however, and it would be necessary to cut ½ inch away at each end of the lower part of the girder A in the diagram so that the vertical girder could be bolted on.

Here is a list of the advantages and disadvantages that I have encountered:

Advantages

Attractive and unusual appearance.
Top girders may face outwards.
Odd sizes of aquaria can be made.
Simple to construct and no special equipment required.

Disadvantages

Small size.
Not very robust.
Meccano is rather expensive.

Installation at Millport Marine Station

THE non-corrosive and non-tainting properties of thermoplastic piping are of special interest for keepers of marine aquaria. In the latest installation at the Scottish Marine Biological Association's Marine Station at Millport, Isle of Cumbrae, Durapipe, in ½ in. to 3 in. bores, has been used to pipe sea water into the research aquarium.

Dr. C. H. Mortimer, Head of the Station, chose Durapipe because metal pipes had been found liable to corrosion and to impart impurities to the water. It had previously been necessary to pipe sea water in lead, ebonite or glass. "Durapipe is simple to instal with our own labour, does not corrode in sea water and, as far as we know, is not toxic to the majority of marine organisms" says Dr. Mortimer. The piping will be exposed to temperatures of 0° to 20° C and a maximum pressure of 20 lb. / sq. in.

Durapipe is also being used experimentally to construct cooling coils for direct immersion in tanks of sea water. Thin-walled ½ in. tubing has been cut and joined with right-angle elbows to make a rectangular system inside the tank. Ethylene glycol inside the tube acts as a cooling medium. The lower thermal conductivity of Durapipe compared with, say, copper, is offset by providing a longer coil with a greater area for heat transfer.

Durapipe (supplied by Durapipe & Fittings Ltd., West Drayton, Middlesex) is simple to instal and easy to experiment with. There is an enormous range of fittings from which to build up individual systems. Pipe and fittings can either be permanently welded together by means of a chemical solvent, which is painted on with a brush, or supplied with moulded-in screw threads for quick dismantling.

The Garden Pond in April

by ASTILBES

Photo: W. J. Hooper

Familiar springtime sight in the pond, a breeding pair of common frogs

Photo: W. J. Hooper

Pair of smooth newts. Eggs are seen in the the plants below the female (right)

THIS is the month when the garden pond comes into its own. The pondkeeper has no doubt been impatiently waiting all the winter for signs of awakening life in the pond, and now surely his interests will be revived by the appearance of water-lily leaves, fresh growth on many water plants and the appearance in the pond of the spring visitors.

Whether we like some of these last-named in the pond depends on whether we are very keen to breed young fish from our stock and whether the fish in the pond are of a good strain or not. In any case it is not easy to keep out some of the newcomers. Among them may be frogs, toads and newts, but it is always strange that some ponds get regular visitors of all these while other ponds which appear similar in most respects get no visitors at all. My own pond has had frogs to spawn in it for the past 23 years, but never has a toad been seen in the pond. Smooth newts come every year in numbers to breed but never is there a sign of the great water newt.

Amphibian Visitors

If the pondkeeper is not particular whether he breeds any young fish or not then he need have no worries if any or all of the visitors come to his pond. Male frogs and toads do very rarely seize a fish and can kill it, but this is unusual, and if a fish is attacked it is usually a sick one too slow to escape. Frogs and toads are not likely to eat any of the food put in the pond for the fishes but newts will eat garden worms longer than themselves. If one is intending to breed any good strain of goldfish in the pond the newts can be a further nuisance. Female newts lay their eggs in the water plants and the young tadpoles soon become avid eaters. Once they grow a little they can eat goldfish fry and so care must be taken to see that newts are kept from the breeding pond. Even if the breeding is done by a controlled method such as removal of the bunches of water plants with goldfish eggs attached it may be that there are also some eggs of newts in the bunches, and so the young newt tadpoles can be introduced into the hatching tank, where they can become a danger later on.

It is not an easy matter to keep out all of the amphibians which might visit a pond. Toads and newts can be kept

out by making a foot-high wall round the pond with a small tile on top set to overhang on the outside of the wall. This, however, would not stop a frog from jumping over. It would stop any pair which had joined up before reaching the pond, but whereas many toads pair before getting to a pond the frogs are more likely to be at or about the pond some time before actually pairing and so could jump into it with ease. Frogs can be caught with a net when they come up to breathe, and at nights if one goes quietly to the pond with a torch most of the frogs will be seen with eyes and noses just clear of the water round the edge of the pond. If these are caught they must be taken some distance from your pond before they are released, preferably into another pond, as otherwise they will soon find their way back again! If any newts are in the pond they can also be caught with a net when they come up to breathe, as they must do this once they are fully developed although their tadpoles have gills and so do not come to the surface.

After-winter Care

The fishes in the pond must now be fed regularly as they may be rather weak after their winter's rest. Start by giving some broken garden worms; there is little to beat this food for most fishes. Then give some other live foods and dried ones such as dry brown bread, wheat germ or similar starchy foods. A good packet food for pond fishes can be given but make sure that it does not contain a lot of fine dust-like particles. Most fishes are greedy feeders and will always take the largest piece they can see, ignoring the small parts which can ultimately foul the water of a small pond. Always try to feed with care so that the fishes are left rather hungry. They will not starve in any well-balanced pond. The amount of vegetation eaten by all varieties of goldfish would surprise many aquarists who have never troubled to make experiments with these fish to see what they can eat.

If one has a few goldfish in a well set-up tank it is easy to test what they eat. On one day feed well on white worms, but not so much that some are left over. Do not feed at all for the next 2 days. The day after the fish have been fed with white worms their droppings will be copious and white, looking like fine vermicelli. The following day all this will have been cleared from the fish and it will be noticed that their droppings are just as copious but almost black. This is the product of the intake of algae and filamentous vegetation, which the fish have eaten from the plants and sides of the tank. As a matter of fact the fish can be seen browsing over the leaves and sides of the tank, sucking off anything soft enough to move. It is an excellent plan to give the fishes a rest from all artificial feeding in pond or tank, so that they can have a change and a rest from one particular food, at least 1 day each week.

Now is the time to divide and replant any water plants requiring treatment. Fresh subjects can also be planted now. In any pond artificially made with concrete it is better to plant in separate containers rather than in soil at the base of the pond. This separate potting enables the pondkeeper to keep the plants in check and makes removal for cleaning much simpler. The soil to be used for potting is always a matter for argument but I know of nothing better than old rotted turves for this purpose. John Innes potting compost is often recommended for water lilies and other water plants, but the soil is often too loose and contains fertilisers which are un-necessary and might foul the water. The advantage of using the rotted turves is that the roots will hold much of the soil and prevent it from being washed out. There is never any need to give added fertilisers for most water plants, as they will get plenty of nourishment from the droppings of the fishes, and if they are fed too well artificially they are not as likely to perform one of their most important tasks, that of assisting to keep the water pure by clearing up much of the decaying matter in the pond.

Photo: Lawrence E. Perkins

Potted water plants will keep upright in the pond if the pot is set on a mass of concrete to support it

"Dear me—he must have watched 'Escape' on T. V."

The Home Aquarium for Marine Tropicals

by JOHN BOURSOT

THE appearance of articles on marine aquaria from time to time is most heartening, and it may well be that this intensely absorbing branch of the hobby is at long last coming into its own, even in England.

Reference to some of these articles will show that the marine aquarium is not the highly complicated, involved, almost dangerous contrivance that the ignorant and many of the older books would have us believe. Nothing could be plainer or truer than the following statement by Mr. M. H. Robinson in *The Aquarist* (February, 1958): "Keeping a suitable selection of marine animals requires no more care than maintaining a good tropical community tank . . ." The marine community tank is, of course, limited, as is its freshwater counterpart. The experienced aquarist instinctively refrains from dumping an ill-assorted collection into either, and none but a novice or a nincompoop would put pigmy sea horses with sea anemones, or damsels with Jack Dempseys. In short, to attempt a complete range of marine life in a single tank would be as unthinkable as a complete range of river and pond life in one tank.

This series of articles is addressed principally to the many experienced freshwater aquarists who have successfully bred some of the commoner "tropicals," and to all those for whom a tank in first-class condition is an effortless achievement. Without being too sweeping I feel safe in saying that such aquarists could embark upon the marine branch of the hobby with a minimum of initial disappointment and, through their knowledge of how to handle freshwater tanks, attain success almost from the outset.

The principles underlying the successful maintenance of the marine tank are the same as for the freshwater tank. There are, however, a few slight modifications and differences in the management of the marine aquarium which are worthy of mention.

A stainless-steel, cement, plastic or an all-glass aquarium is what is required for sea water. Ordinary angle-iron frames are to be deprecated as they quickly corrode under the action of sea water. I favour cement tanks with a glass front, as the opaque sides and back shut out distracting views of the wall-paper or furniture behind, and consequently show off the inhabitants to greater advantage. However, if all four sides are of glass a piece of stiff dull-black paper held against the outside of the rear glass by adhesive tape will make an admirable backing. If, in addition to this, one or two dried sea fans and sponges are sandwiched between the glass and the paper the appearance of the tank will be enormously enhanced.

The arrangement of a sea-water tank is easier than that of a freshwater one; far less sand is required and there is no planting to be done. The appearance of the finished tank may be as pleasing as it may be ugly, depending on the imagination and skill of the aquarist in achieving a natural scene or just a mess. It is positively remarkable how few tanks of any sort are worth looking at from the point of view of natural effect. Sand in the marine aquarium is best reduced to a thin layer just thick enough to hide the bottom. It should be thoroughly washed and finally rinsed in sea water in order to dispel the remaining freshwater which would un-necessarily dilute the sea water used to fill the tank.

Coral controls Water Reaction

If the aquarium is a cement one, stones and coral may be piled in natural formation round the sides. Place no sand under stones or coral where its decorative effect is lost. It might cause trouble by arresting food particles. Lumps of coral in the tropical marine tank not only look well, they are of prime value in keeping the water alkaline. Should they become too thickly coated with a growth of algae, they may be removed from the tank and brushed with a nail-brush in a separate plastic or enamelled basin of sea water. After this treatment they will have a natural soft green rubbery appearance, owing to the many algae still lodged in the thousands of tiny cups of which the coral surface is formed. As these algae are virtually beyond the reach of the brush, they should not be killed by scrubbing the coral in freshwater; their dead remains in the tank would be harmful. If it is desired to clean the coral completely, it should be soaked in chloride of lime until quite white, then thoroughly boiled and allowed to dry out in the sun or in a warm place. As even a very mild concentration of chloride of lime in the tank tends to bleach the colours of the fishes the coral should not be returned until all traces of smell have gone. The red of the organ-pipe coral is not affected during bleaching. However, time and labour will be saved and the aquarium will look more natural if the coral is left green after the first treatment described above. The pH of natural sea water is about 8.0-8.3. I never pay any attention to it as the coral in the tank takes care of the matter for me. But the more punctilious will enlist the aid of special testing kits and papers, though some do not function in salt water.

So slowly does sea water dissolve coral, the dead limestone skeleton of the coral polyps that built it, that, apart from by microscopic examination of the calices, columellae and septa, it does not seem to change. However, the gradual dissolving of the coral shows itself as a thin whitish film of carbonate of lime on the glass when the tank is emptied and allowed to dry out. It is particularly noticeable on the under side of the glass cover after the glass has been periodically washed and dried for cleaning purposes. A razor blade quickly removes the film, which is in no way injurious to aquarium life, and is quite invisible when wet. But its presence slowly clogs the minute pores of air diffusers. By immersing the diffusers in a cup containing a solution of hydrochloric acid and water an immediate effervescence is produced as the acid violently attacks the carbonate of lime and dissolves it away. Upon cessation of the effervescence the diffusers are ready for rinsing under the tap. Hydrochloric acid is readily removed by water, but a few "suckings" and "blowings" through each diffuser

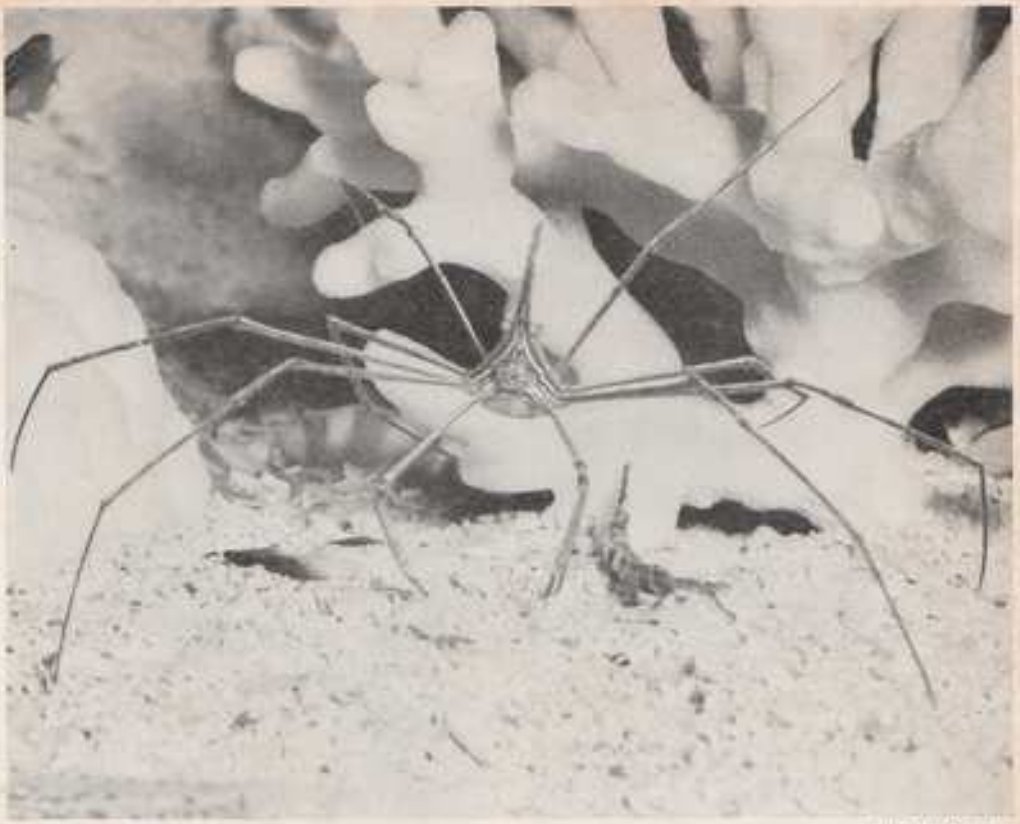


Photo: Robert P. L. Straughan

An arrow crab seen against a coral skeleton as background

in clean water will insure the thorough removal of the acid from the centre.

Until very recently few people would have questioned the superiority of real sea water over a synthetic mixture prepared from salts. But in the meantime science has inclined its ear to the cries of aquarists, and has supplied the market with some excellent brands of salts, complete with trace elements, for making artificial sea water. These salts when added to soft tap water may be relied upon to produce a sea water equal to almost any found in the ocean. They are sold in convenient packets with directions, and have brought the marine aquarium into the home of many an aquarist who would never have known the thrill of marine life without them. Needless to say, aquarists living within easy reach of the coast may find it simpler to draw their water straight from the sea. Each aquarist will devise his own particular method according to the nature of the shore he has to visit. But the general outline of a satisfactory way may serve as a guide.

Collection of Sea Water

I take ten 5 gallon glass jars to the beach when on a water-collecting expedition. An enamelled funnel is then placed in the mouth of the first jar to be filled. Sea water dipped straight out of the sea with a large enamelled pail is then poured through the funnel until the jar is full. A plastic pail also serves the purpose admirably as plastic is inert in sea water. When all the jars are full they are corked and taken home to stand for a day or two. When the bulk of the sediment has settled the water is siphoned off through a funnel lined with filter paper, into another clean but identical jar kept in readiness. When full this jar is tightly corked. The jar that has been emptied is then flushed of sediment under the tap, stood on end to drain for 10 minutes, and used to receive the filtered water from the next. I find it wise to change the filter paper after every two or three jars filtered. But this will depend on the quantity of sediment in the water. A supply of sea water so filtered and stored away in a cool dark place will remain fresh and wholesome almost indefinitely, and is always on hand when needed.

There are aquarists who despise the filtering of sea water on the grounds that it is robbed of its plankton. This is true. And the food value of the microscopic crustaceans and other tiny organisms which constitute plankton is high.

However, not all the plankton is chosen as food by the fishes, and what is rejected soon dies under aquarium conditions, and the risk of pollution arises. But in any case it is not worth clouding a 35 gallons tank containing two or three choice 4-5 inch coral fishes by emptying unfiltered sea water into it for the sake of the 30 or 40 microscopic organisms which the fishes will probably fail to observe! Actually there are always a few cyclops and other minute copepods in my tanks in spite of an outside filter, but even small fishes of 1½ inch find them too small to bother about. And even if these organisms were eaten they would be of no more sustaining value to the fish than an orange would be to an elephant. But if the aquarium is intended for creatures whose sole form of food is plankton, then, naturally, unfiltered water would have to be used. It would also have to be renewed continually to keep up an adequate supply of organisms. The question of whether plankton should or should not be introduced into the tank is a difficult and complicated one, depending on what the aquarist wishes to keep, and on many other factors besides.

It may be argued that scavengers will clean up any dead plankton which fall to the bottom. But, like snails in the freshwater tank, they cannot be relied upon to do a thorough job. I have often seen scavengers reject particles of food in disgust and move away. I therefore urge beginners wishing to start with fishes to ignore plankton and filter the water before using it. Then, as time goes on and experience is gained, new tanks may be set up for other creatures, and the complications and dangers of cramming everything into the one initial tank (and the temptation to do so is often very great) will be avoided.

(To be continued)

The Penguin Fish

by JAS. STOTT

IT is the amusing and fascinating habits rather than its appearance which make the penguin fish (*Thayeria obliqua*) an interesting addition to the community tank. When swimming about it will suddenly stop, make a quick backward movement to "rest," as it were, on its tail with head up and the body in an oblique position. Sometimes, while in this position, it will start bobbing up and down like a bouncing cork, and just as suddenly as it started this up and down movement will the fish stop, right itself, then swim away in a normal manner.

To do the fish full justice, however, it must be said that apart from this appealing little trick it is not unattractive in looks, for the broad black line, extending from above the eye along the medial line of the body into the lower lobe of the caudal fin, gives the fish a somewhat striking appearance. The upper part of the body above this stripe is an olive green with the under part of the fish silver grey. It has an eye that is large and bright, rather prominent gill plates and the lower lobe of the caudal fin is slightly larger than the upper.

Principally a native of the Amazonian tributaries, it may be described as a true tropical and appreciates a temperature of around 75 F. It grows to a length of 3 inches but requires plenty of swimming space and good feeding to attain this in the aquarium. There is no difference in colour or shape in the sexes, except when coming into breeding condition the female can be detected by the fuller body line.

This characin is not too difficult to breed in captivity once the intended pair have attained tip-top breeding condition. To do this the pair should be separated and given a diet consisting entirely of live food such as *Daphnia*, finely chopped earthworm and white worms and kept at a temperature of 75°F. While the conditioning is in process the breeding tank (24 in. by 12 in. by 12 in.) should be set up. The back half of the tank must be planted with *Myriophyllum* or any other fine-leaved plants as recipients for the spawn. A water depth of some 6 inches should be provided, preferably of rain water adjusted to a slightly acid reaction (pH 6.5) and the temperature set at 78 F. This tank will settle down during the period of time that is taken to condition the fish and will be ready to receive the breeding pair when this procedure is completed.

Put the pair into the tank in the evening, and if the conditioning was sufficient spawning will, in all probability, take place the following morning. The eggs will be deposited on the plants and the spawning should be completed in a couple of hours although, of course, this time varies considerably. The behaviour of the fish usually indicates when this is completed; they show unmistakable signs of exhaustion. The pair should now be removed from the breeding tank to prevent the possibility of egg-eating.

Hatching usually takes place from 48 to 78 hours after the spawning and the fry become free-swimming in about 3 to 4 days. Infusoria feeding should then be commenced and maintained for about 12 to 14 days, when micro worms can be introduced. The Infusoria feeding may be stopped 3 or 4 days later. Finely chopped white worms can be fed later when growth permits and gradually the water depth increased. Bring variety into the diet as soon as possible to produce good rearing results.

FISHES for the GARDEN POND

Comet-tail goldfish

by LAURENCE E. PERKINS

(Colour photographs by the author)

THE choice of fish varieties for stocking the garden pond depends largely upon the interests of the owner. The gardener, for example, for whom the fishes in the pond are an incidental feature to his carefully planted water garden and its rockery surrounds, will often be contented with a shoal of "non-standard" goldfish, as long as they are brilliant and colourful. The man who has constructed his pond for the prime purpose of containing fishes, on the other hand, will obviously be more selective and painstaking in his choice. The one factor common to both types of pond-owner in most cases will be that the fishes will be sufficiently showy to be seen easily and to contribute, thereby, to an already colourful area of the garden. Although the purpose of these notes is to describe some of the more suitable varieties of showy and hardy fishes and to illustrate some in colour to aid the reader in his choice, some mention has been made of those more soberly dressed varieties which can add interest for the fish-keeper.

The common goldfish (*Garassius auratus*) is by no means undeserving of its popularity as a pond pet and ornament, for its characteristics meet with all requirements for this. Extremely brilliant in colour, very hardy, unafraid of humans and omnivorous in the extreme, the goldfish is also easily and cheaply obtained. It is a good breeder in our climate when average summers are enjoyed, so that a thriving stock can be maintained and increased with comparative ease.

If variety of colour and shape within the species is required, specimens such as the shubunkin, those with short or long tails, and the comet, can be included with the probable chance of subsequent variations on several themes resulting from spawnings. Some of the colours exhibited by shubunkins will be found too subtle for appreciation under pond conditions but the colour patterns are so variable that if young fish from a spawning are selected when the colour is determined there should be ample specimens for retention on the strength of their brilliance.

All fishes truly suitable for ponds are species of carp, and we now come to those varieties more readily recognised as being of the family Cyprinidae.

At the head of the list is the monarch of ornamental pond fish, the hi-goi or golden carp. To really appreciate this glorious creature one has to see a good specimen of some 6 or 7 years of age, when its size, colour, beautiful line and graceful mode of swimming place it in a class of its own. Its colour can be all-over gold but is frequently copper-gold with black velvety mottling extending from the dorsal area to around the lateral line. This contrast of black and gold is often admired in specimens of goldfish but in their case is seldom lasting, the gold colour eventually supplanting the black pigment when the fish reaches maturity. The disadvantage of the hi-goi is its speedy attainment of large proportions, and it must ruefully be admitted that it is no fish for the small lily pond, as a pair requires an area of some 100 square feet, with depths of up to at least 3 feet, if they are to live comfortably with, perhaps, a shoal of some dozen goldfish.

Another fish suited to the larger pond and, in particular, to a pond with length, is the golden orfe. Developed from the common ide (*Leuciscus idus*) after patient selective breeding, this fish has a delicate livery of gold suffused with rosy-pink above, paling to silver beneath. A rapid and

Hi-goi carp

active swimmer, feeding principally on insect life, it is ever on the move, twisting and turning at the surface in its quest for mosquitoes settling on the water. Without doubt the finest fish for the pond-owner who likes lively colour in his pond, the orfe does, however, require a moderate volume of water in which to sport owing to its active habits and the fairly large size that it can attain.

Of smaller proportions and therefore more suitable for the modest pond is the golden rudd, a variety of our native common rudd (*Scardinius erythrophthalmus*). Its gleaming scales of burnished copper and fins of scarlet, along with its hardiness and quiet disposition, have endeared it to many a pond-owner. There are those who express a preference for the wild variety, because of its subtle coloration of olive green and contrasting fins of scarlet, and it must be admitted that a few less ostentatious specimens among a shoal of gaudy fishes can add a spice of mystery to the depths of a pond.

"The Pike, being either sick or hurt is cured by the touch of the Tench. The Tyrant Pike will not be wolf to his physician, but forbears to devour him though he be never so hungry." Thus wrote Izaak Walton and even to-day the tench (*Tinca tinca*) is often referred to as the Doctor Fish in allusion to a fluid supposedly exuded from its slimy skin and which is reputed to cure of their sickness those fishes which rub against it. Be that as it may, this fish has an indirectly hygienic attribute in its scavenging habits among the refuse at the pool's bottom, and can be considered a useful occupant of the garden pond. The golden variety is an extremely handsome and colourful fish and although naturally sharing the same mode of life with its wild forebear, it has the added advantage of being more decorative and visible in the pond.

Photo: Laurence E. Perkins

Tench

The crucian carp (*Carassius carassius*), which takes its name from the German (*die Karausche*) and which was introduced from eastern Europe, has no bright colours to recommend it for inclusion among the pond stock but it is a neat, rounded and well-proportioned fish that does not increase rapidly in size nor attain a great weight. Very like an uncoloured goldfish, it has no barbels around the mouth, is deeper in the body and has rounded lobes to the tail, which is less forked than that of the goldfish.

The last of the carp family likely to be of interest to the pond-owner is the mirror or king carp. Its peculiar scale arrangement, wherein a few large, mirror-like scales are disposed along the lateral line—rather like the shield stacking employed by Roman soldiers when afloat in their troop-carriers, endows it with an intermittent and flashing brilliance that lights up the pond's depths at those instants when the sun's rays are caught and thrown back by the highly reflective scale surfaces.

All the above-mentioned varieties will coexist quite amicably, and apart from the incidence of infanticide common to all fishes to some extent, complete harmony should prevail among a mixed community of these docile carp. Most of the ills which befall fishes kept in garden ponds spring from man's over-indulgence or negligence.

All fishes need underwater foliage for refuge and to spawn in, and members of the carp family also make this plant life part of their diet. Likewise, the shade-giving pads of the water lilies are very much appreciated during periods of sustained sunshine. Moderation in the amount of underwater and floating foliage, however, is strongly to be advocated, for apart from the contradiction of stocking a pond with attractive fishes and then allowing them to become obscured by dense plant growth, tangled underwater jungles are no more enjoyed by fishes than are the crowds in Oxford Street during the Sales by humans, and a mat of leaves carpeting the surface can be likened in its effect upon the fishes to the strangling blanket of a London fog upon ourselves. I have been astonished at the many attractive ponds I have seen stocked with beautiful fishes but in which the vegetation has taken control.

Stocking the Pond

by A. BOARDER

(Colour photographs by LAURENCE E. PERKINS)

STOCKING of the new garden pond can be an important matter for the subsequent success or failure of the pond. Unless care is taken at the outset the pondkeeper may easily find himself in serious trouble. Should something go wrong which might have been avoided with care, the pondkeeper will become discouraged and think that the venture was not worth while.

Provided that due care has been taken to wash away all the free lime from the concrete of a new pond, the first step is to see that a good number of water plants are growing before any fishes are introduced. It is very difficult for many people to contain their patience long enough to let this happen. It is more likely that as soon as the new pond is made plants will be put in, and fishes as well, before the water has had a chance to mature or the plants can start to grow.

Buying the Fishes

If all looks well in the pond and new growth on the plants can be seen, the fishes can be obtained and introduced. The choice of fishes is an individual matter but it is almost certain that all pond-owners will want some varieties of goldfish and perhaps one or two tench, golden orfe or rudd. The purchasing of the cultivated fishes can be a problem to pondkeepers living in rural districts, as many people have a dread of ordering fishes by post and fear that these may not live on the journey. There need be no fear of this, however, if they are ordered from an established firm, and a dealer regularly advertising in *The Aquarist* has too much to lose not to have the know-how about sending out fishes to customers. Tell the dealer exactly what you require and then you can safely leave it to him; the fishes will be despatched by rail and if necessary you can be informed by wire when this is done.

Photo: Laurence E. Perkins

Mirror carp

Some of the British freshwater fishes can also be obtained from the same source, but perhaps the pondkeeper will prefer to obtain his own, either by angling or netting. The latter method is to be preferred as then there is less likely to be any damage to the fishes. Great care must be taken when introducing fishes to a garden pond from the wild as they can carry disease and pests.

If one is able to visit a dealer's shop to choose the fishes required it is well if a few points are understood before-

Golden orfe

Golden rudd

hand. The experienced aquarist will be able to tell at a glance if a fish is not in good condition but the newcomer to the hobby cannot be expected to have this knowledge. However, there is one definite indication for the purchaser to watch for. If the fishes are active and have their fins well extended (like the specimens seen in the photographs on these pages) there is little the matter with them. As soon as a fish is "off colour" in most species the dorsal (back) fin is lowered. This is the signal to look for, as it indicates that something is wrong. The eyes should be bright and the fish to look for is the one searching about on or near the bottom of the tank. The fish mouthing at the surface with fins folded and the body at an angle of about 45 degrees to the top is the one to be avoided.

Examination of New Stock

Even when the fishes have been purchased some further care needs to be taken before they are put into the pond. The fishes should be placed in a glass tank and examined carefully to make sure that there is no sign of disease or pests which could introduce trouble into the pond. Scales should be tight to the body and not standing out at all. Red streaks on body or fins can indicate congestion, and red spots, raw perhaps, can indicate the presence of fish lice. Immersion of the fishes in a salt solution (about a heaped tablespoonful of salt to a gallon of water) will do no harm. When the fishes are being put into the pond ensure that the temperature of the pond is not a lot lower than that of the carrying can. Some fishes when introduced suddenly into water which is colder than that of the can receive a shock and can drop to the bottom, where they may remain on their side for a long time; the swim bladder can be damaged by such treatment. The can should always be stood or floated in the pond for an hour or so to enable the water temperature to become nearer that of the pond. The can may then be tipped carefully so that the fishes enter the pond without having to be netted or handled in any way. Damage can be done to fishes by careless handling or netting.

If the fishes are showing slight damage there is no need to panic, as even lost scales can be replaced and damaged fins can grow again. If fins are ragged it is possible to trim them with scissors and paint their edges with iodine, whilst the fish is held in a net out of water, and they will soon grow again.

Once the fishes are in the pond their owner will probably start feeding them right away. This is a big mistake but one that is only too often made. It seems almost impossible to prevent newcomers to the hobby feeding their stock every time the fishes open their mouths. It must be realised that they can go for weeks without food and so it is unnecessary to start feeding before they have settled down. Food so given that is uneaten can soon pollute the water. If the fishes are watched for a time and can be seen to be feeding from the leaves of the plants and sucking at the sides of the pond a little food can be offered. A piece of garden worm can be thrown in near the fishes and if this is taken quickly other feeding can be started.

Do not Stock to Capacity

When stocking your pond you will be well advised not to stock to capacity. Remember that, if healthy, the fishes will soon grow and provided that they have space, will breed. Do not buy large fishes for the new pond. Small ones always seem to establish themselves quicker than big ones. Do not try to have a few of every species you can obtain. Have a few fishes at first and then if all goes well some more can be added. A few healthy active fishes will look better than an overcrowded number which are anything but healthy.

To sum up make sure that the pond is ready for the fishes before buying, purchase them from a well-known source, examine the fishes carefully before they are put in the pond and do have patience about feeding them before they are accustomed to the change of environment.

Photo: W. J. Howes

Silver orfe

Breeding Twintail Goldfish

by E. KNIGHT

THE usual time for the fish to spawn is early in the morning after being placed in the breeding tank, but not always, as sometimes they will not start until the early evening of the following day, with the drive and courtship going on all day. If this should be the case then, during the evening, place the partition to separate the sexes, or remove the female to another tank, for it is possible that she is not "ready." The female will be quite exhausted, but may be encouraged with a feed of earthworms, and the males can also be fed.

After about 48 hours the female will be quite recovered. Put the fish together again that evening. Meanwhile siphon out about a quarter of the water from the spawning tank and replace it with tap water. Around dawn, they will probably be spawning. If not, leave them during the day, and hope; if there are still no signs of spawning by evening, separate them again for a period of at least a week. Give them all the live food possible. It is now that the breeder needs patience. There will be thoughts and misgivings about whether the female is "spawn-bound."

This state in a female is not uncommon. I believe it to be brought about by the female not being encouraged or allowed to release its eggs late in the year. Most breeders rear the first two spawnings only. But the female will again form and fill with eggs during July and August, and she should be encouraged to be rid of them; a vigorous male will do the work, but, failing this, the breeder might "hand-spawn" her when she is ripe. I suggest that all stock should be placed in the pond to spawn at will; a large tank would be better, and then in late autumn, when the fish have quietened down, a thorough cleaning of all tanks can take place.

I think that the female should be given to the end of May to spawn, before coming to any conclusion, because some fish will spawn late, and these are usually older fish. May and June, of course, are the natural spawning months, when conditions outside are just right. But fish that have been brought in for the winter and which begin feeding well through the slightly higher indoor temperatures during early spring, should spawn early.

After the Spawning

An immersion heater should have been placed in the hatching tank, to which the plants from the breeding tank are transferred, to bring the temperature to 70°F. This will encourage the hatching within 4 days. There is no need to use a thermostat. Use a heater that will warm the water to within a few degrees on either side of 70°F for a given volume of water. With a 100 watt heater in a 48 in. by 18 in. by 18 in. tank, with the water 6 in. deep, the temperature will fluctuate between 68° and 74°F. This method has been found successful over a number of years.

The fish have spawned, the plants have been removed, and the hatching tank temperature is 70°F. The next problem is the provision of sufficient Protozoa, live food which the fry will require in large quantities during the first 3 weeks.

Success as far as the breeder is concerned depends mainly on the provision of sufficient and varied live foods, particularly during the first month. A fortnight or so before spawnings are expected, place an old receptacle in a sunny position in the garden, and in it place a few bruised lettuce leaves and two or three pond snails, and then fill it with old aquarium water—not pond water. Also chop finely some fleshy earthworms and stir these into the water. The algae spores present will flourish in the strong light and the water will become green, and there will develop many Protozoa and rotifers. It is from this infusion that a quick culture of Protozoa can be made whilst the eggs are hatching.

Fry Food Culture

Obtain a large lettuce, bruise the leaves and place them in a large bowl of about 5 gallons capacity. Pour boiling water over the leaves, sufficient just to cover them, and allow it to cool. After a few hours fill the bowl with green water from the garden container. Drop in a few chopped earthworms, immerse a 75 watt heater, and in about 4 or 5 days there will be a mass of paramoccia and some amoebae on the surface. Skim this into an old saucepan and carefully pour this fluid into the hatching tank. The temperature of the infusion bowl will be 70-75°F. The fry should be free-swimming, at least most of them will be, and looking for food. After pouring the infusion from the saucepan into the fry tank, refill it from the container in the garden and float it in the infusion bowl until the temperatures of both liquids are equal; then empty the contents of the saucepan into the bowl. By doing this it will prevent the much colder water from killing off some of the culture.

Meanwhile a drip-feed into the fry aquarium can be started with the green water from the outside container, using about 2 or 3 gallons a day. If this is supplemented by the infusion tablets that are now on the market (two a week will be sufficient), there will be plenty of microscopic food for the first fortnight or 3 weeks. The Protozoa will multiply under these conditions.

When the fry are about a fortnight old the first visible live food can be introduced in the way of brine shrimps (*Artemia salina*). Their eggs can be purchased from dealers. To hatch them in a short time, a sea salt solution should be prepared (a heaped tablespoon of salt to a quart of water) in a container that can be heated to a temperature of 75-80°F but not higher. Brine shrimp eggs are sprinkled over the surface of the solution, and provided that they are not disturbed, in 2 or 3 days hundreds of shrimps will be swimming just underneath the shell-covered surface, and in groups further down. They can be siphoned out by a piece of airline tubing on to a piece of linen stretched loosely across the neck of a jar, into which the water will filter, leaving the shrimps in a pink mass on the cloth; this can be submerged in the fry tank until the shrimps are all shaken away into a spreading cloud for the thousand or so fry that will eagerly devour them. The result can be observed an hour later, by the fry showing pink shrimp-filled stomachs, a pleasing sight indeed!

The peoblem of brine shrimp culture is the presence of hundreds of egg-shells after the shrimps have hatched, many of which are inadvertently siphoned with the live

shrimps. However, it can be overcome by using a large deep enamel dish as the solution container. Fit a wooden partition across the centre of the dish, with the bottom edge of the wooden slat half an inch clear of the bottom. Fill it with the solution, put a fair sprinkling of eggs on the surface of one half of the dish, and cover this half to keep out the light. When the hundreds of shrimps hatch they will immediately be attracted to the lighted half (keep a small wattage lamp over the container) and swim down, underneath the partition, to gather in a mass at the lighter part, clear of the hundreds of egg-shells held back by the partition. It remains for the live shrimps to be siphoned out as required. The solution that is now in the jar can be carefully poured back into the light part of the container, to avoid swirling the solution and bringing the unwanted shells into the clear end, thereby making the arrangement useless.

If brine shrimps, sifted *Daphnia*, "worm wash" and a good proprietary fine fry food are fed to the fry after 14 days, for a number of weeks, their development is assured. In the early days, when there may not be sufficient Protozoa in the tank, a small piece of the yolk of a hard-boiled egg squeezed through a piece of linen held underneath the surface of the water, will cause a cloud of egg particles to be in suspension for an hour or so. It must not be overdone or pollution will result. One will observe the same effect with this food as with brine-shrimp feeding.

Selection of the Young

By the end of the month many single-tailed fry will be seen. They should be removed and destroyed. There are many of us who are tempted to, and do, place some of these in a stock pond, because of their size, for they are usually the largest and have the markings of good colour, to be perhaps sold or given away later. Likewise some of the best twintails at first observation will be metallics, and these have little chance of colouring unless the parent stock were coloured metallics. The breeder must be drastic when he first culls his fry at the end of the first month. Thereafter, a more leisurely culling can be employed during the next 5 months.

There will be quite a number of very small fry which grow little, and these should be netted and destroyed, for they will either be devoured by their larger brethren, or finally will die off in a couple of weeks. If over the past fortnight a green-water drip has been kept going the water will have risen quite a few inches in the fry tank. Substitute this green-water drip for a freshwater drip, and very carefully siphon out along the bottom of the tank. This is an exacting job, because of the risk of drawing up the fry as well. Use a "fish-tail" siphon. Begin by making sure that the area around the siphon is clear of fry, and then, when the water begins to flow through the tube, pinch the tubing, stopping or controlling the flow, whilst guiding and lightly tapping the siphon on the bottom. This will cause any fry in the vicinity to dart away from the flow. Even so, two or three may well be drawn up and deposited in the pail receiving the water and waste matter. However, these will be seen swimming around, despite their somewhat speedy exit, and none the worse for their experience.

Fry a month old can stand very rough treatment indeed, although this should not be deliberate. After I have finished the first culling of a spawning, and removed over a thousand fry from a 48 in. by 18 in. by 18 in. tank to the rearing tank, the former is three-parts filled with tap water containing Dettol before scrubbing and cleaning. After a good swishing and scrubbing has taken place, the water is allowed to settle for an hour, leaving the sediment on the bottom to facilitate siphoning. On more than one occasion, on looking into the tank I have seen about a dozen fry that had escaped my notice, busily foraging around the sediment and algae as though nothing had happened. I netted them, thinking that they deserved to live, and some have become quite good fish! Fry delicate? The will to live? I feel the question is open.

The freshwater drip that has been continued will have practically filled the tank within a week, and the temperature will have been lowered with the increased volume of water until the heater can be dispensed with altogether. Normal air temperatures will be much the same as the temperature in the tank at the beginning of June. During this month another selection should be made, whereby 50 fish or so can be chosen and, if the breeder has a number of ponds at his disposal, put into a pond where netting them will be easy. A final selection can be made in July. Put the very best fish in aquaria, and the rest outdoors, or keep the final few in the pond and the rest for disposal in tanks, where viewing and netting will be convenient. Those in the pond will grow apace, mainly because they will be foraging all day amongst the aquatic plants as well as taking all the live and cereal foods that the breeder can provide.

The characteristic that should be carefully looked for at the final selection is the twin or paired anal fins. Sometimes they can be seen when the fry are a month old, but in the main they cannot be distinguished for sure until the fish are about 3 months old. A fairly good magnifying glass will help immensely. Also a microscope of about 100-fold magnification is a must for the breeder. This will help in the preparation of the Protozoa cultures mentioned earlier on.

If a breeder disposes of the majority of his stock by the end of autumn, retaining only the very best of the season's young fish, his chances of success will be much greater, for all along the line, space will be his main problem. By the time these young fish are a suitable age and size for breeding, apart from the existing stock, he will have had several spawnings to contend with during this period. He might obtain a few pounds for his surplus stock; beyond that, if he has been able to breed half a dozen fish conforming to the standards, he should be satisfied with his annual effort. As has been said before, it is not so much the goal, but the journey that makes it so worthwhile.

Cacti in the Fish House

MANY of the other succulents can be grown with cacti and many of them can be propagated easily from leaves or from cuttings. To take cuttings all that is necessary is to make a clean cut through a shoot and allow the cut part to dry completely. Then place it on a mixture of peat and sharp sand but do not push the cutting into this medium. If necessary, support it with a stick so that just the base of the cutting is in contact with the medium. An inch of this medium placed on top of cactus compost enables the cutting to send its root into this. A good plan is to place the pot in a saucer with a little water. Do not water from the top at all. The roots will be encouraged to grow by the dampness seeping up from below. Place the pot in a sunny position whilst rooting is taking place. The plant can remain in such a pot for a year before being potted in ordinary cactus compost.

THE common cactus known as *Echinopsis*, because of its resemblance to a hedgehog, is an easy plant to flower and has long trumpet-like flowers in pale shades. Most *Echinopsis* reproduce freely by making offsets. These can be taken off and rooted for fresh specimens. If too many off-sets are allowed to remain on the plants flowers are not produced so well as when most are removed. *Echinopsis eyriesii* is a well-known species and one which will grow well if given a fair amount of water during the growing period.

AQUARIST'S Notebook——

by
RAYMOND YATES

WHEN I visit a dealer's shop I usually spend at least an hour looking round, peering into the tanks and listening to the small talk which goes on between customers and dealer. The same old questions are being asked daily which have been asked so many, many times before—what wonderful patience dealers must have! In any shop worth visiting there are frequently a large number of tanks on view and one must make several rounds before being sure that one has seen all the specimens contained therein. As a rule I make a quick round of the tanks to get a good general idea of what is in, then I look again at those tanks where the most interesting fishes (to me) are to be found. It is a good idea to look these tanks over carefully, at the temperature, the other fishes and for any sign of biting or disease. I would never buy fish from a tank which contained any sign whatever of disease or trouble.

Some time ago a dealer pointed out to me a large *Lepomis fasciatus* which had caused havoc in a tank by biting and annoying the other inmates. To look at it was deceptive: it was the picture of innocence. I saw some fishes related to *Mogurnda mogurnda* and these also appeared harmless and there was no sign of there having been any trouble in the tank; the other fishes appeared quite unafraid and I thought that these newcomers were safe. Actually I have always found *Mogurnda* perfect gentlemen, but then I have invariably kept them with fishes as large as themselves, although some authors describe them as poor community fish. I was talking to the dealer, who mentioned that his shop dealt in monsters and went on to explain that as they were within easy reach of several clubs large fishes were quickly snapped up by customers. In some areas it is all but impossible to get rid of large specimens, particularly cichlids. This was quite a change, because, as a rule, when I get home and see my own fishes I feel that they are monsters compared with the diminutive tiddlers seen all too often in aquarium shops.

One cannot always be sure of the colour of fishes offered for sale because some dealers use unsatisfactory top lighting, and others insist on tinting the water with chemical cures. As a rule fishes look better at home than in the salesroom but one has to know one's fishes. Some, such as angels, discus, black widows etc., change with chameleon-like rapidity, but most fish colours are constant in normal lighting conditions. If a fish hasn't got colour to start with no amount of feeding it with your pet dried food (or animal food) will help.

I purchased a small *Anostomus anostomus* and introduced it to my adult pencils (*Poecilobrycon harrisoni*). For about half an hour they quite "went to town"—a complete honeymoon, and then, suddenly, both varieties lost all interest in the other and it has remained that way ever since. *Anostomus* grow quite large and are not then so attractive, but when small they are really a larger and more beautiful edition of *Poecilobrycon marginatus* and are real pencils. Although they will eat almost anything, and are not a bit shy, they do require a supplementary diet of algae and they will go over the rocks and leaves, in very odd positions, satisfying this need.

I enjoy weighing up new varieties even when I have no intention of buying them. Many new varieties are really mere colour variations of old favourites but now and again something different turns up. Such a fish is the very delightful *Bedotia gayi*, sometimes sold as the Madagascar rainbow. This is a fish well worth having in any community tank for it has appeal, mainly because of its wonderful translucent colours and the liberal spangles which adorn its sides. At first sight it may look aggressive but this is false, as it prefers dried foods. On the odd occasion when it can be coaxed into taking live food it has a sort of twinkle in the eye which seems to say "Boy, look what I found." The fins are rather small, as also is the tail, but the rippling movements of these remind one of the Congo catfish. The eyes are large and blue and hold the attention. Two dark bars run from nose to tail, and there is a black semi-circular edge to the caudal fin. This fish must be seen in good lighting to get the best effect, but even side-lighting, or side daylight, is enough to show up this beauty at its best. Now in more common supply, they are now in the lower price ranges, so get a couple if the opportunity offers.

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Paradise fish are grand when well coloured, but nowadays all I ever see are washed-out, colourless creatures of no interest whatever. This is perhaps due to so much in-breeding. It is a pity that so many hobbyists have never seen a really brilliant paradise fish. Some time ago I noticed some of my old friends, the keyhole cichlid, on sale and got a couple. I have always liked this cichlid because it is sedate, not aggressive and particularly nicely marked when young. Small specimens are not unlike some of the coral fishes in shape and in the way they flit about from rock to rock. When mating they develop a vivid broad white line along the back and tail and this is very attractive indeed. Small specimens are a bit delicate at first and prone to various diseases, filmy growths etc. In good health they are most active and everlastingly on the search for food.

* * *

The last of a long line of catfishes died on me the other day (*Corydoras arcuatus*) and I wondered just what variety I ought to replace it with. Fortunately luck was with me. A new species to me happened to be available, and what a delightful addition to any tank they are. These are sold as *Botia lohachata*. Ever on the move, they rarely remain quiet for more than a few seconds and use all levels of the tank except the surface. They thoroughly investigate the gravel, the rockery, the plants, all the electrical equipment inside the tank and are absolute clowns. Quite harmless, they eat anything edible and will dig down into the compost for tit-bits. Fearless with other fishes, they hold their own and are much more attractive than the *Corydoras*. The body is greyish silver with a series of black markings and blotches which make up a succession of YYY along the sides of the fish. Having three Y's in my own full name, one in each name, I look upon it as my Y fish.

Of all the loaches (apart from the rarely seen pal fish) this is by far the most attractive, bearing in mind the fact that it is always on view and on the move, unlike the clown loach. As a matter of interest it also seems to be less affected by disease than other loaches. A couple in a large tank are quite blameless; however, a tank full of nothing else is quickly clouded with their gravel-digging activities—I know, I've seen it!

* * *

During a recent visit to Leeds I called in again at the Museum and was delighted to observe that the aquaria there had been cleaned up and made much more attractive. Although not exactly overstocked all the tanks had something on view and cards indicated just what the occupants

were. There were some nine tanks in all, situated on the first floor at the top of the stairway.

* * *

Whenever I buy dried daphnia I always ask the dealer to check each carton just to see if the contents are in good condition. A bug (in the American vernacular) can get into the mixture and breed at an alarming rate, so that it is possible to lift the lid of a box which has been undisturbed for a long period and find it swarming with the insects; a most unpleasant sight.

* * *

The advent of another birthday reminds me I am more of an old "has-been" than an up-and-coming aquarist. After some 43 years of fish-keeping I am not unduly worried. In that time one has seen most of the hobby, although I, for one, have not as yet bothered with marine aquaria. Ideas have come and gone, what was once all the rage is now forgotten, long-cherished views are now ridiculed. Once upon a time in the aquarium world you had to "do it yourself," as the modern idiom goes; nowadays it is all done for you. All you need is the money. When I was at school I used to spend my lunchtime at a local fish-tackle shop which used to have an enormous tank in the window full of carp, rudd, minnows, perch and other coldwater fishes. It was here I saw my first bitterling and decided one day I would have some of my own. After school one could go round with a can and go home with a wonderful collection of coldwater specimens for mere coppers. Later, my ideal was to buy one of those wonderful golden orfe for 2s. 6d. (about 8 inches long), when fingerling types sold for 9d. How far away those days are now! My first tropicals were livebearers, of course, but I seem to remember blue gourami also.

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With the years I have not lost my interest in coldwater fishes. There is a place for tropicals and a place for coldwater types; I still keep both. Of course, when one has kept most of the fishes available to hobbyists one is rather spoilt for a favourite; some fishes one never wants to keep again but others have a more lasting appeal. Nowadays the vogue is for the Top Ten.

As a matter of interest I jotted down what my top ten would be and the result surprised me, mainly by what was not put in but also because the accent is on colour. I had not realised it before, but colour affects our likes and dislikes. In the past many clubs have had meetings given over to "My list of the 20 best fishes etc.", and rarely do any two aquarists see eye to eye. Here is my list in no order of preference (you will probably think it a poor choice; if so, I am sorry, they are the fishes which appeal most to me): chocolate gourami, rosy tetra (*Hyphessobrycon rosaceus*), tiger barb, paradise fish, pal fish, clown loach, leeri gourami, golden orfe, cardinal tetra and blue gularis. One or two other runners-up: fighters, festive cichlid, discus, velifera mollie, common rudd (large). Of these 15 I have only five at present—such is life. I hope the goldfish, guppy and swordtail enthusiasts won't have it in for me now. "Each to his taste" as the French so aptly remark.

Beautiful Hart's-Tongue Varieties

THE suitability of the common hart's-tongue fern for the moist shade of the water garden has been emphasised. Many natural "sports" or artificial varieties of the wild form have been discovered, each with some modification of the fronds, and of these beautiful ferns a few are hardy. They belong mainly to the group of varieties known as var. *cristatum*, whose fronds are repeatedly cleft at the tip and thus appear to be heavily crested or tasselled. These hardy plants flourish in the moist loamy compost recommended for the wild form.

Other varieties may easily be kept in an unheated aquaterrarium, where their bushy, luxuriant foliage provides excellent shade for amphibians and reptiles. A large group of varieties, known as var. *crispum*, have beautifully furled and frilled fronds ranging from dwarf forms about 6 inches in diameter to massive forms with fronds up to 18 inches long. Of the more bizarre varieties, *Phyllitis scolopendrium* var. *muricatum* has the surface of the frond densely wrinkled and blistered, var. *marginatum* has fronds whose edges are white, var. *sagittatum* has fronds shaped like arrow heads, and var. *cervi-cornu* has fronds whose cleft tips resemble stags' antlers.

In the cultivation of hart's-tongue ferns and their varieties a little charcoal should be washed into the compost every few years; a top dressing of bone meal should be given every spring and a teaspoonful of ground chalk every autumn.

C. D. Sculthorpe

Photo: C. D. Sculthorpe

Mature specimen of hart's-tongue fern (var. crispum) growing in a pot

our readers write

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

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

Of Fishes, Cats and Snakes

AFTER reading your contributor's article "Of Fishes, Cats and Bears," in the January issue, I agree with his theories on how we lose our fish. I would like, however, to supplement his excellent article with a few observations of my own. Some years ago I was able to rescue nine 4 inch goldfish from a pond in a nearby empty house; the pond at the time was receiving attention from teen-age louts who were throwing rocks from a nearby rockery (nice people).

Having no pond of my own at the time I placed these fish in a 60 gallon disused water cistern, until I could make further arrangements. However, I reckoned without Jacky, the hideous tom cat from the flat upstairs. A quite casual glance from the lounge window caught him completely in the act. His technique was as follows: as a fish came within striking distance, he could, by sitting perched on the side of the cistern, deal it a blow with claws fully extended, making no attempt to scoop it out; the fish, badly torn from mouth to tail, heeled over dying, when Jacky put phase two of his plan into operation and this time scooped it out, which with the fish near to death he accomplished easily. This cat had dealt with four fish in this manner in a few minutes before I could get down and intervene.

Cats appear to me to be like humans and possess greatly varying degrees of intelligence and cunning; that particular cat was outstanding in both and displayed this in many more ways than I have space to relate, and yet my present next-door neighbours' cat is such an idiot that I don't think he could catch a fish if it came up on the side of the pond and placed its tongue out (if fishes had a tongue, that is).

Now seriously, and from my own observations in this district, I firmly believe that our largest single enemy is the common grass snake. This gentleman lowers himself into any convenient pond, one with the edges level with the surrounding garden for preference, and in a very short time will clear the pond of all but the very largest fish. And when he feels the vibrations which tell him of an approaching human being he is up and gone, or is very able to hide in the pond under water, most times without being seen or even suspected by the owner of the pond.

A lady I used to call on weekly in connection with my business had a pond, and having a common interest we used to discuss fish-keeping. One day during the hot summer of 1959 she said that six or seven of her largish fish were missing. Walking over to the pond, which was overstocked with water lilies, I noticed a green yellow coil lying in the shallows; realising at once what it was, I looked round for a possible weapon. Seizing a pair of grass-cutting shears lying nearby, I crept close and cut this snake in two. Here was the culprit, having gorged himself into a state of stupor: a grass snake 2 feet 6 inches long.

On opening it up, a process the lady firmly declined to watch, I found nine fish in various stages of being digested. I imagine the only reason I was able to catch him so easily was because he had overfeasted himself on the contents of that lady's pond.

G. W. WRIGHT,
Hastings, Sussex.

I DISAGREE strongly with Mr. Richard Guppy in "Of Fishes, Cats and Bears." I do not think it possible that an owl could grasp a fish through 10 inches of water. It is a commonly known fact that light, when passing into water, gets very much distorted. How could the owl eyes, very carefully adjusted for land work, suddenly change and enable it to catch a fish; the very idea is absurd.

He is correct in saying that cats can easily catch fish when in a garden pond but in the wild certain members of the feline family are only too pleased to catch and devour any fish they can stick their claws into.

The reason they did not stay in the pond should be obvious to the most inexperienced of all aquarists. The pond though large is not large enough to hold nine trout. They really survive in running water. I take it that the water in the pond was not flowing—the trout, in vain hope of freeing themselves, leapt from the pond and so to death. Surely this is the only answer to the problem?

P. M. FULLER,
Eastleigh, Hants.

A Beginner's Breeding Experience

MAY I, as a humble tropical fish-keeper of one year's standing, intrude upon your correspondence column, as I feel that other readers may be interested to learn of some of the experiences I have encountered as a mere beginner.

Like most beginners, I have learned from my mistakes, being plagued with swim-bladder trouble in the first few months. A friendly dealer, however, advised me to siphon off a few inches of water weekly, topping up with fresh to restore the water to its former level. If I had known this and had it impressed on me from the start I would most likely have lost less fish than I did. The value of this advice is in the fact that, touch wood, I have not had a single loss since adopting this practice.

Point number two was picked up from a friend who uses wire wool to clean algae from the tank sides and front. This, however, proves expensive, for fresh material has to

be used each week for cleaning and I find that a nylon pot scourer is far more satisfactory as it may be cleaned and sterilised after use to be re-used time and time again.

Perhaps the most interesting happening in my community aquarium is the birth of two lots of black mollies. The parents were purchased in mid-November and soon got to work, the first batch of young arriving in early January. A dozen specimens were netted and isolated in a carrying jar, which was suspended in the aquarium, the babies being fed on tube fry food, sifted dried food and *Daphnia*. The rest, needless to say, were gradually eaten, to the obvious benefit of a pair of angels, which have since grown considerably!

After a couple of weeks I decided that the young mollies were large enough to fend for themselves and they were set free, to the glee of the angels, which made short work of some of them. A glass screen was hastily inserted in the tank and at the time of writing the young are approaching a size which should be too large for the angels. At this juncture I should mention that the other inhabitants of the tank are beacons, platys, neons and a *Corydoras aeneus*, none of which seemed interested in "cannibalism."

The second brood of young I left as live food, apart from half a dozen which are now making good progress behind the "glass screen."

I claim no credit for actually breeding the young mollies but I feel that the method of rearing is a little unorthodox, being far from the methods advised by the text books, and may prove of value to any other beginner who, like myself, only has room for one tank measuring 18 in. by 10 in. by 10 in., no facilities for proper breeding and a desire to preserve any offspring that arrive without warning.

C. G. L. Moore,
London, S.W.2.

A Dealer Replies

I TRUST you will allow me some space in your magazine to answer the acidulated outpourings of Mr. Raymond Yates, and especially the last paragraph of his article in the February issue.

Of course—if we sell good-quality fishes and they may be short in supply the cupboard may sometimes be bare! Most of all I resent his slur on dealers when he says "a fresh shipment of very special fishes due in tomorrow. You cough hollowly. You know this one . . ." I receive imported fishes twice weekly—always on regular days—and all my customers know this. Consequently they tend to come on these days, and if they like what they see they buy. Should this be on the late-week delivery, I naturally have some gaps, for a new batch cannot be obtained until after the week-end. Certainly some "shelves" are empty but, Mr. Yates, with some 60 varieties left, the "cupboard" can hardly be called bare!

The ending motto of the paragraph is the final straw, and I think it could better be applied to Mr. Yates's article than to the fish trade—most of whom try to please.

C. R. Crayne,
The Crayne Aquarium, London, N.19

Guppies for Ever

AFTER keeping fishes for some 17 years I, like Mr. Dendy, eventually turned all my attention to the guppy. I can honestly say that no other fish has given me the same satisfaction and unending interest in the hobby.

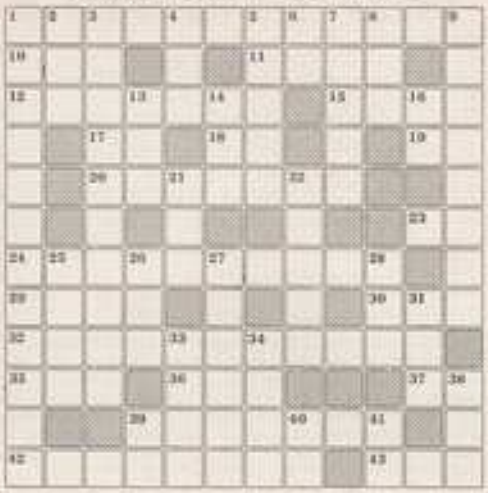
To Mr. Ashton, who remarks (*The Aquarist*, January) that they are cheap, small and show no solid tint in them, I would say that he has never seen a good guppy or attempted to purchase a pair as breeding stock. I would like him to see some of the new Hahnel veils which have recently come into the country and perhaps we could make a guppy breeder of him, even if it means pushing out a couple of his Jack Dempseys.

I would also invite anyone in the Midlands area who has thought about taking up guppy breeding and not yet taken the plunge, to get in touch with me, when I will, through the channels of the new society, the Fancy Guppy Association, do all I possibly can to make their new hobby as much a source of joy to them as mine has been and still is to me.

J. E. Wootton,
Stoke-on-Trent, Staffs.

The AQUARIST Crossword

Compiled by J. LAUGHLAND



CLUES ACROSS

1. Blame ill wish for these dark beauties of tank (5, 7)
10. Help (3)
11. After Sandy (4)
12. Artificial bait used by anglers. Likely to give fishes quite a turn (7)
15. Sell the vendace for a card less (4)
17. Mixed type of piscatorial origin (2)
18. Aged (2)
19. As 17 Across (2)
23. Egg of mackerel (2)
24. Timber of "stately" quality, a great favourite with rod-makers (10)
29. Couch in so far as it goes (4)
30. Not in it in trout (3)
32. Various aquatic plants with fine lanceolate leaves (11)
35. Tell the girl to get away from the garnet (3)
36. Curved part of the archer fish (3)
37. This is just an example (1, 1)
39. One who stands surety for another (7)
42. Fishes thus cured never all agape (8)
43. Fish eggs (3)

CLUES DOWN

1. Great fish for sun-bathing? (7, 5)
2. Naturally a feature of thick-lipped gouramis (3)
3. Find a point (anagram) (7, 3)
4. Of the same family (3)
5. Equipped as a rower or a water boatman is (5)
6. Latin laws (2)
7. Horizontal line; but in aquatics means height of water (5)
8. Very hard water? (3)
9. The "sweepings" of the tank (6)
13. Scotsman's pin up? (3)
14. Being forth young (3)
16. Nickel plant (1, 1)
21. Possess (3)
22. Gives birth (5)
25. Darkish eel speckled with grey (4)
26. Organ of balance in a fish (internal) (5)
27. Excessive fear and loathing (6)
28. Sounds as if the road has lost a penny (3)
31. Employ in the fish house (3)
33. Often those who do this are likened to fishes (4)
34. Cave in a way (4)
38. One is a horse, two are a horse (3)
39. You might look 39 on these terms (1, 1)
40. Not in its own grounds (1, 1)
41. Still the heart of the aware and a synonym for the best (1, 1)

(Solution on page 22)

News from AQUARISTS' SOCIETIES

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

THE first annual dinner of the **Goole and District A.S.** was held recently and was a great success. At this dinner Mr. J. N. Banks was presented by the vice-chairman's wife, Mrs. Hann, with a plaque which was awarded for the greatest number of points in the year's table shows.

The meeting following this was the annual general meeting and new officers were elected as follow: Chairman, Mr. R. Hunt; vice-chairman, Mr. L. Holroyd; treasurer, Mr. K. Coultish; secretary, Mr. J. N. Banks, 169, Dunhill Road, Goole. The meeting place is now at the Modern School under the auspices of the Yorkshire Institute of Further Education.

The table shows held so far this year resulted as follow: Danios and Rasboras: 1, R. Hunt (pearl danio); 2, F. Denby (pearl danio); 3, J. N. Banks (Rasbora maculata). Pairs of Eggslayers: 1, R. Hunt (giant danio); 2, G. Appleyard (Haplochromis gourami); 3, J. N. Banks (Rasbora maculata). Catfish: 1, F. Denby (Corydoras sodalentus); 2, G. Appleyard (Corydoras paleatus); 3, F. Marshall (Corydoras aeneus).

Recently the society visited Thorne to hear a lecture by Mr. Peden of Huddersfield. At their last meeting Goole were entertained by a lecture by Mr. Bunting of Thorne Moorends on water life.

* * *

AT the March meeting of the **Northampton and District A.S.**, members took part in the instructional game: "I am a Fish," which was conducted by Mr. N. Lyon. Winners in the table show, for Cichlids, were: 1 and 3, Mr. J. Wright (kribensis); 2, Mr. D. Bell (blue acara).

* * *

OVER 100 aquarists attended the meeting of the **Federation of Scottish A.S.**, and to which the East of Fife A.S. acted as hosts. Deep regret was expressed at the disbanding of the Glenrothes A.S. but a welcome was extended to the members of the newly-formed Dunfermline A.S. David Ritchie spoke on "Aquaria in Schools" (with special reference to marine aquaria); Angus Jeffrey (Kirkcaldy A.S.) gave a talk and demonstration on "pH and Water Hardness," and there was a display of the colour transparencies "Symphony in Colour" prepared by the "pro Aqua" Society of Amsterdam.

The table show was the largest the Federation has yet had at one of their meetings, 136 entries being forward. The winners were:

Swordtails: 1, Dr. R. E. Evans, Alloa A.S. (Xiphophorus helleri-red); 2, P. C. Watson, Inverness A.S. (Xiphophorus helleri-green); 3, Alexander Cross, Dundee A.S. (Xiphophorus helleri-black); 4, Anthony Watt, Alloa A.S. (Xiphophorus helleri-black). Barbs: 1, James Campbell, East of Fife A.S. (Barbus schwanenfeldi); 2, Dr. R. E. Evans, Alloa A.S. (Barbus arulius); 3, J. G. Main, Inverness A.S. (Barbus ortegai); 4, Alan D. Christie, Dundee A.S. (Barbus nigra). Catfish: 1, R. D. Watters, individual member (Pterodoras granulosus); 2, Alexander Cross, Dundee A.S. (Corydoras aeneus); 3, Robert Gold, East of Fife A.S. (Loricaria microlepteus); 4, James Campbell, East of Fife A.S. (Corydoras aeneus). Dwarf Cichlids: 1, Anthony Watt, Alloa A.S. (Nannacara anomala); 2, Hector Kerr, Edinburgh A.S. (Pelmatochromis kribensis); 3, Ian Motion, Kirkcaldy A.S. (Apistogramma agassizi); 4, S. Gardiner, Edinburgh A.S. (Pelmatochromis klugei). Breeders Livebearers: 1, Hector Kerr, Edinburgh A.S. (Lebistes reticulatus); 2, George M. Gibson, Dundee A.S. (Xiphophorus helleri-red); 3, S. Naismith, Alloa A.S. (Xiphophorus helleri-black); 4, J. Smith, Kirkcaldy A.S. (Mollienisia velifera). Breeders Egglayers: 1, J. D. Hird, Edinburgh A.S. (Hyphessobrycon innesi); 2, Ian Motion, Kirkcaldy A.S. (Nannostomus anomalus); 3, Peter Harrison, individual member (Ephippicharax orbicularis); 4, S. Naismith, Alloa A.S. (Trichogaster leeri). Best Fish in Show: James Campbell, East of Fife A.S. (Barbus schwanenfeldi).

Two trophies have been donated to the Federation, a shield by Mr. David H. Gourlay, Kirkcaldy, which will be used for one of the Breeders Classes, and a lovely silver rosebowl by the recently disbanded Glenrothes A.S. for Siamese fighters. Other trophies are being obtained and it is hoped that they will be presented at the next meeting of the Federation which will be held in Edinburgh in September.

* * *

AT the March meeting of the **Leeds and District A.S.** entries were closed and judges appointed for this year's Home Furnished Aquaria Competition. The arrangements for this year's Annual Open Show are in hand. Once again it will be a five day show from the 12th to the 16th of September. The schedules will be circulated to society secretaries in good time. A suggestion that a class be formed to introduce new blood into the art of judging at society table shows was made by one keen exhibitor. There was quite a good response to the idea, and the president, Mr. J. M. Skinner, who is a F.N.A.S. judge, agreed to draft a course and arrange a class at the earliest opportunity.

For the April meeting, Mr. Pengilly of Burnley, who is well known in the north for his colour slides, has been booked to entertain the members.

* * *

MR. BOB CALROW of Hendon A.S. gave an interesting talk on fish and their habits in their natural surroundings at the last meeting of **Ilford A.S.** It was illustrated by projected coloured films and a tape recorder. There were pictures from locations in Africa, South America, and other parts of the tropics. In addition a film was shown of the shrimp industry in California.

The table show was for catfish and swordtails. Winners were: Catfish: 1 and 3, Mr. Stebbing; 2, Mr. Parsons; 4, Mr. Bell. Swordtail: 1, Mr. Moore; 2 and 3, Mr. Stebbing.

* * *

THE **Friends A.S.** are holding their first open show at Brixton on Saturday, 17th June. Setting up is on the Friday evening. Entry forms may be obtained from P. Jakes, 6, Westwood Park, London, S.E.23.

* * *

AT the last meeting of the **Dewsbury and District A.S.** it was proposed to re-commence a library, the president asking members to donate books and other literature relating to the hobby, for which they had no further use. The position is to be reviewed in April to consider purchasing some of the more expensive publications.

Mr. C. Graham (Wakefield), treasurer of F.N.A.S., gave a lecture and slide show entitled "Rock Gardens and Pools." It was obvious from the questions asked after Mr. Graham's talk that he had aroused interest in several members in this aspect of the hobby which is perhaps rather neglected.

The society's own Furnished Aquaria Show will be held on the 24th June at Batley Agricultural Show, Mount Pleasant, Batley. The meeting nights are second Thursday and last Wednesday in every month at 8 p.m. in the Textile Hall, Union Street, Dewsbury.

* * *

THE February table show of the **Slough A.S.** for pairs of fish, was won by Mr. E. C. B. Knight with rosy barbs, the second being Mr. W. Cyster with black-banded sunfish and third Mr. Knight with cherry barbs. In March the society's most important competition, the Eric Kitching Memorial Trophy, was held and resulted in a win for Mr. E. C. B. Knight with a rosy barb; second was Mr. B. A. Seaton with a serpae and third Mr. L. Power with an Aphyosemion australe. There were 27 entries and a very fine cup and replica were presented by Mrs. D. Kitching. There will be a show for catfish in April, but most energy is being directed towards making the May Open Show a success.

* * *

THE secretary of the **Freelance A.S.** states that the club's strength has now settled and that several members have got together successfully with breeding various species of fish. Three new members have almost completed a very modern fish house.

* * *

TEN years old this year, **Dudley and District A.S.**, the only society to hold its meetings in the aquarium of a zoo, celebrated recently with a dinner at which some 50 members and their friends were present. Starting at the beginning of the year the society inaugurated their own newsletter, edited by Ray Hadley, Curator of the Dudley Zoo aquarium and reptile house, and this is circulated every month.

The club plan to hold one meeting every month and plans are already in hand for visits from several interesting speakers.

* * *

THE titles of two film shows given to members of the **Blackpool and Fylde A.S.** at their two February meetings were "Big Fish" and "Secrets of Nature."

Following the first of these, Mr. G. N. Hadley, vice-president, reported the results of the annual home-furnished aquaria competition and said that the tanks he judged maintained the high standard set by members over the past 12 years. At the last meeting, Mr. B. Done, chairman, told members that he had received an urgent appeal from a local headmaster of a school for mentally handicapped children for guidance in setting up a number of tropical aquaria. A sub-committee was formed to decide how this could best be done.

The new junior section of the society, comprised of boys and girls attending Blackpool primary and secondary schools, made a grand start at the year's first two table shows, the results of which are:

Singleton Trophy: 1, Mr. L. A. Childs; 2, Mr. G. Glover; 3, Mr. H. Barnes. Junior (single) Fish Trophy (single): 1, Bryan Crowther; 2, Janet Davies; 3, Neil O'Hare. Feb. 22nd—Singleton Trophy: 1, Mr. B. Done; 2, Mr. H. Barnes; 3, Mr. B. Simmons. Junior Single Fish Trophy: 1, Bryan Crowther; 2, K. Silverwood; 3, Janet Davies.

* * *

THE **North-West London Group of Aquarists' Societies** held their annual general meeting recently. The final result of competition year 1960/1 was as follows: Willesden 116 points, Hendon 97 points, Riverside 55 points, Independent 51 points, Hampstead 39 points, Arnold 4 points. Willesden thus win the N.W.L.G.A.S. Shield and they also won the London Challenge Cup for the Furnished Aquaria Class. Mr. F. W. Meyer was again elected chairman of the N.W.L.G.A.S. and Mr. E. H. Mann will carry on as competition secretary.

For the competition year 1961/2 the group have decided to award a bonus of five points to any member clubs that enter full classes in our competition meetings. The Furnished Aquaria Classes will be held at the Hendon Open Show at the Brotherhood Hall, Hendon on 13th May and it is hoped to hold the Coldwater Classes

at the Willesden Open Show, Roundwood Park, Willesden on 9th and 10th September. The first competition meeting of the group will be held at Hendon on Thursday, 20th April, the classes being: Guppies (male), Guppies (female), Egglaying mothercarps, A.O.V. egglayers (mopsus).

Any aquarist interested in the details of any society belonging to this group can obtain them from Mr. E. H. Mann, 63, Whitchurch Avenue, Edgware, Middx.

* * *

THE first table show of the year of the **Southend, Leigh and District A.S.** was held recently. This was a livebearers table show. The results were 1, Mr. G. Hodges; 2, Mr. Pryor; 3, Mr. Cheveright; 4, Mr. Wylie. While the judging was being carried out by Mr. W. Hoare, an ex-president, Mr. Hedges briefly outlined some of the more interesting aspects of line breeding. The last meeting was devoted to "Breeding Techniques Past and Present." This was given by Mr. L. Willis, a keen club member.

* * *

A "QUESTION TIME" formed part of the February meeting of the **Bedford and District A.S.**, when all questions on any aspect of the hobby were answered by a panel of three experienced members. The second part of the meeting consisting of a coloured slide show, was presented by Derek Ward, and included a series on the spawning of angel fish. An open show will be held in conjunction with the Bedfordshire Agricultural Show on the 14th and 15th July. Classes will be as follows: Individual Furnished Aquaria: Tropical and Coldwater; Club Furnished Aquaria: Tropical and Coldwater; Own Brood: Tropical; Own Brood: Coldwater. Judged under F.B.A.S. Rules.

Show schedules can now be obtained from the show secretary, Mr. D. Ward, 42, The Ridgeway, Putnoe, Bedford.

* * *

A FULL programme has been arranged by the **High Wycombe and District A.S.** for its twice-monthly meetings for the next six months and includes a number of table shows and lectures. Two of the recent lecturers were Mr. A. Villiers of London and Mr. B. Foster-Jones of Basingstoke, who also judged the club's table show.

The club have now settled in their new headquarters, The Royal Oak, Bridge Street, and would welcome new members and visitors. The secretary is Mrs. P. Watts, 2, Leigh Street, High Wycombe, Bucks.

* * *

AN interesting evening was spent by the **Erith and District A.S.** at their February meeting, when the speaker was Mr. A. E. Jessup, who gave a talk on marine aquaria. The speaker stated how fascinating this branch of the hobby can become, and illustrated his talk by bringing a small aquarium and several jars containing sea-fish, anemones, crabs etc., all of which he had collected from south and south-east coasts. He stated how easy it was in these days of rail travel to obtain adequate supplies of sea water and fish and described the method of filtering, and of topping up to maintain the correct density of the aquarium to ensure healthy fish, as well as the feeding of the fish. The large number of questions asked during and after the talk showed the interest of the members in the subject.

The table show for the evening was for catfish, danios and minnows, and several entries of a high standard were submitted.

* * *

THE **Cambridge and District A.S.** were given a talk by Mr. Glover of Welwyn Garden City at their March meeting. The talk was on "Furnished Aquaria," and the speaker dealt with all aspects of this subject, the right sort of plants, the art of giving depth to a tank by the arrangement of the plants and rocks and also the correct amount of light and the provisioning of the tanks to encourage the growth of plants. He mentioned that the addition of useless galleons, divers and so on, were not desirable as it made the tanks look too artificial. This applied particularly to the show bench. At the end of his talk, Mr. Glover answered various questions put to him by the members, and he was afterwards thanked by the chairman.

The date for the next members' show, to be held in Tracy Hall, is 9th May.

* * *

A SUCCESSFUL year has been enjoyed by the **Salisbury and District A.S.** which is now in its second year. A monthly table show has been started, and it is hoped to form a junior section in April. The secretary is Mr. R. C. Prior, 29, Coleshot Close, Amesbury, Salisbury.

* * *

AT the early March meeting of the **Merseyside A.S.** the guest speaker was Mr. Pengilly also well known for his colour photographs. Some members of the society recently visited Shirley Aquaria and had the pleasure of seeing Mr. Roe's private collection—a trip really worth while. Among other recent events was an auction which was also fairly well supported.

* * *

AT the 13th annual meeting of the **Reading A.S.**, the following officers were elected: President, Mr. A. Crisp; vice-presidents, Mr. R. Thompson; chairman, Mr. E. Pitts; vice-chairman, Mr. S. Humphreys; hon. secretary, Mr. G. Thompson; assistant secretary and press secretary, Mr. D. Anderton; treasurer, Mr. I. Goddin; committee, Messrs. S. Humphreys, D. Anderton, D. Gooding, H. Frost, T. Job, I. Parsons and E. Partridge.

The president presented cups and plaques as follows: The Cichlid shield, May cup, Championship cup and one plaque, Mr. E. Pitts; breeders' cup, Mr. S. Humphreys; Labyrinth cup, Mr. H. Frost; the Barbs cup, Charson cup, Livebearer's cup, "best fish of the year" cup and three plaques, Mr. D. Anderton; three plaques, Mr. R. Drake; one plaque each, Mr. T. Job and Mr. I. Goddin.

* * *

THE **Weymouth and District A.S.** have changed their name to the **Weymouth and District Aquarist Society** and now meet on the second Friday in each month at 7.30 p.m. in the Criterion Restaurant, Weymouth. The secretary is Mr. R. W. R. Cide, 2, St. Lawrence Road, Upwey, Weymouth, Dorset, who would welcome correspondence with other societies. Anyone visiting Weymouth will be welcome at the meetings.

* * *

THE last meeting of the **Dundee A.S.** was well attended. Recent events have included table shows on catfish and barbs and also a film show with slides from the Amsterdam Aquarium Society. At the April meeting a one-film of "Marine Land" Aquarium, Florida, will be shown. The secretary is Mr. G. B. Kirkland, 2, Kerrington Crescent, Barnhill, Dundee.

* * *

RECENTLY there was a gathering of the **Fancy Guppy Association** in Manchester when members were able to hear from that much-travelled fishkeeper, Chas. MacRae, who had travelled up from London for the meeting. Also present were Mr. and Mrs. J. Wootten from Stoke on Trent, who described their methods of keeping fancy guppies, the necessity of feeding brine shrimp to fry seeming to be the most important factor. The assembly concluded with a table show, 20 members being present.

* * *

NEW SOCIETY

PARTICULARS are now available of the newly formed **Attleborough and District A.S.** The officers are as follows: Chairman, Mr. Roberts; secretary, Mr. R. W. Armstrong, 19, Charles Street, Hunslorth, nr. Leeds. Tel: Hunslorth 3402; treasurer, Mr. Senior; librarian, Mr. Wade. The meetings are held in the Tradon British Legion Band Hall the first Thursday of every month, and enthusiasts in the district would be most welcome.

Crossword Solution

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

AQUARISTS' CALENDAR

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

7th May: Association of Yorkshire Aquarists Societies' area day table show at Ambulance Rooms, Bradford Road, Dewsbury.

7th May: Fancy Guppy Association. Open Show. Any variety Livebearers. 2.30 p.m. Ivy House, Bolton Road, Pendlebury.

13th May: Hendon and District A.S. open show at the Brotherhood Hall, Hendon.

27th May: Catford Aquarists' Society annual open show. Full details from Mr. S. Cormack, 19, Howard Road, Bromley, Kent.

28th May: Bradford and District A.S. open table show at the Assembly Hall, Co-operative Institute, Thornton Road, Bradford. Schedules are available from Mr. R. Marshall, 13, Park Hill Drive, Bradford, 8.

3rd June: Federation of British Aquatic Societies general assembly.

10th-11th June: British Aquarists' Festival, Belle Vue Zoological Gardens, Manchester. Schedules are available from Mr. Geo. W. Cooke, Spring Grove, Fieldhill, Batley, Yorks.

17th June: Friends A.S. first open show at Brixton. Entry forms from Mr. F. Jakes, 9, Westwood Park, London, S.E.23.

22nd-24th June: Southampton and District A.S. annual open show at the Avenue Hall, Southampton. Details can be obtained from Mr. D. E. King, 32, Clover Nook, Redbridge, Southampton.

24th June: Dewsbury and District A.S. furnished aquaria show at Batley Agricultural Show, Mount Pleasant, Batley, Yorks.

14th-15th July: Bedford and District A.S. open show in conjunction with the Bedfordshire Agricultural Show. Details can be obtained from the show secretary Mr. D. Ward, 42, The Ridgeway, Putnoe, Bedford.

8th-12th August: Portsmouth A.S. annual open show at the Community Centre, Twyford Avenue, Stamshaw (setting-up date 6th August). Show schedules are available from the show secretary Mr. W. Ryder, 493, Commercial Road, Portsmouth, Hants.

10th-12th August: Three Counties Aquarists' Show at Basingstoke. Details can be obtained from the show secretary Mr. B. Forster-Jones, 5, Park Lane, Old Basing, Basingstoke, Hants.

1st-2nd September: Bristol Tropical Fish Club open show and exhibition of tropical fishes at the Trangle Colston School, Victoria Street, Bristol. Schedules are available from the show secretary Mr. J. D. Brown, 76, Pearl Street, Bristol, 3.

2nd September: Federation of British Aquatic Societies general assembly.

2nd-3rd September: Accrington and District A.S. eleventh annual open show at the Town Hall, Accrington, Lancs.

12th-16th September: Leeds and District A.S.

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Asst Rainbows	2/-
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Tiger Barbs	2/-
Schubertti Barbs	2/-
Nigger Barbs	2/-
Lined Barbs	1/6
Zebra's	2/6
Pearl Danio	1/6

CHARACINS

Beacons	2/-
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Neon Tetra	3/-
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Lemon Tetra	3/-
Anomalus	3/-
Penguins	3/-
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Panchax Chaperi	only few 3/-
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Aqyos Calliurus	" " 12/6 pr.
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Angels	2/- & 2/6
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Polto Cloeghi	5/6
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Male Fighters	few	3/-
Female		2/-
Blue Gouramy		1/6
Pearl Gouramy		1/6
Paradise fish		1/6
Dwarf Gouramy		1/6
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Black Mollies	2/6
Platies Mixed Col.	2/-
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Cor. Julii	9/-

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