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**TROPICALS**

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THE AQUARIIST
If you keep livebearers and if you were uncommonly observant on the 18th June you might have seen an extra splash of colour, an enhanced vivacity and generally exuberant look about your guppies. All this you could have missed, but if you are a serious guppy fancier it is unlikely that the significance of the excitement would have escaped you. It seemed only right on the eightieth birthday of W. G. Phillips that the fish to which he has devoted so much interest and technical skill for so many years should have appeared to be aware of the special date. The name of this senior aquarist is in fact as well known among fishkeepers outside the large circle of guppy specialists in Britain and elsewhere, for as will be seen from the article on page 66, Mr. Phillips has by no means restricted his enthusiasm to the guppy, and he continues to be a familiar and expected figure at gatherings of aquarists. We wish to add our congratulations to the numerous messages of goodwill he has been receiving on and since becoming an octogenarian, and to express the hope that he will continue to show us all how to breed fancy guppies successfully for many years to come.

It is just one year since we used this column, at the close of last summer's British Aquarists' Festival, to ask why no large-scale aquarium show is held in any part of Britain other than the north of England. We ask again the same question: why, in particular, are the densely populated areas of London and the Home Counties without such a show? There are already indications that this year's B.A.F. to be held in Manchester on 20th and 21st October, is going to attract as great an amount of interest and generate as much, if not more, enthusiasm as last year's show and those of previous years. We know that our Editorial mention of this matter caused its debate at the assembly of the Federation of British Aquatic Societies last September, but despite the interest of the delegates, nothing seems to have come of a lengthy discussion, and still, we think pitifully, the south is without a major show.
A Visit to Goodwood House to meet

"George Guppy"

written and illustrated by DEREK WARD

WHEN asked if I would like to run down to "Goodwood House" my thoughts turned to racing, and I was about to make some excuse. Then my friend continued, "To see George Phillips", and at once my thoughts turned to guppies, of course. Mr. W. O. Phillips ("George" in the hobby) is without any shadow of doubt one of the world's foremost guppy breeders. His name is known all over the aquatic world as breeder, experimenter and author of guppy articles in the aquatic journals, and it has long been my ambition to meet him and discuss guppy problems in his fish house. Here, at last, was to be my opportunity.

Three Ponds

We left Bedford one Sunday and arrived at Goodwood House, the home of George Phillips, at about 11 a.m., and found him busy at one of his garden pools, of which he has three. One of these holds over 1,000 gallons, and he has another of about 400 gallons which he has reserved for breeding Daphnia, but told us regretfully that the Daphnia had got him bust, being much more difficult to breed (in quantity) than guppies, and that he has never been able to breed enough to feed all his guppies. In a corner there is a smaller pond, reached by a flight of winding steps, in which he hatches goldfish eggs taken from his large pond, which up to quite recently held over a hundred good-sized fish. George told us that he has been keeping coldwater fishes as long as he can remember, and joined his first fish club, The Southern Fischartists, at the age of 17, in 1899. This club catered for anglers as well as fish-keepers, because if you wanted fishes in these days you had to catch them. In another corner of the garden I saw a large galvanised-iron tank, and when I asked if there were any fish in it, he told us: "Plenty; that's where I breed my sticklebacks, and throw any unwanted guppies, rather than kill them. Of course, they die when cold weather sets in, but I consider that is a more natural death than some fishes get from their keepers."

Mr. Phillips' guppies are maintained in two separate sections, from which they have been sent to new owners practically all over the inhabited world. In his conservatory are 11 tanks, one a very large one, built into a recess at one end, roofed in with glass and decorated above water at the back and both ends to represent a wild country scene, with trees and rockwork reaching up to the glass roof over the tank. Along the top at the front is a miniature suspension bridge, which hides the strip-light. Inside this tank are several large coldwater fishes which he keeps for showing at any of the four aquarist societies of which he is an honorary member. In the same tank we also saw a pair of large sticklebacks, with which he told us he has on more than one occasion taken the premier awards.

Large-bodied Guppies

In one of the other 10 tanks of various sizes, all of which contain guppies, we saw some very-large-bodied fish. When asked how he obtained such large body size, and what he fed them on, he said it was not the kind of food which was in any way responsible but the nature of this particular strain (their generical make-up, so to speak). In each tank I noticed that the compost was swept back, leaving a large clear oval swimming space, into which the slime and debris

Award cards, trophies and plaques form a colourful display along one wall of Mr. Phillips' fish house

THE AQUARIST
Talk down the sloping sand (not gravel) and it is more easily maintained when this becomes necessary.

The plants I saw consisted chiefly of Hygrophila, and the large green leaves of this plant, with its bright-green leaves, made each tank look like a haven for guppies. I noticed, too, that in each of the tanks there was a Cryptocoryne plant, placed in a small pot. This, we were told, apart from being the best way to grow this lovely species, made possible the catching of any particular fish wanted for show, or simply lifting out the pot while the fish are nested from the clear space thus provided. Each tank, we noticed, had a deep layer, some of which had been fashioned by bowing the leaves, and there were also two small tanks fitted up as breeding tanks, by the addition of a piece of glass plate at one end, kept in place by rubber suckers.

By this means, George told us, he saved most of the fry, which on one occasion last year amounted to 121 babies in one breed, and he had had many broods of 80 to 90, and over.

We then went out to George’s garage, now used as a fish house, and there we saw 12 more tanks, four of which are 40-gallon galvanized-tin tanks. Not all these tanks had guppies in them at the time we saw them, but we were told that before the season is over he may have up to 100 tanks in these two rooms. He told us that some time ago he did not have more than ten tanks in this fish house, but decided to reduce, as it was getting too much for him. He disposed of all the fish except one (which he was unable to sell) and, of course, those in the conservatory. Then like the smoker who tries to give up the weed by reducing the number of his cigarettes gradually, he soon found himself back to where he was before.

Trophies of Success

The whole of the side wall of this fish house is covered with trophies, in recognition of many years of experience and from many aquatic societies, and there are rows of cups, shields, plaques and other trophies, medals and medallions, all displayed on a long glass shelf, in front of all three different coloured cards. These stretch the full length of the garage fish house, from waist-high up to the roof, and form a most impressive and fascinating display. Over 500 awards are on show here, reward of the greater part of a life-time devoted to the aquarist’s hobby.

George told us that he obtained his first pair of guppies from Hurst Fish Farm, Watford, Herts, in the summer of 1936, and for some considerable time kept them in with his goldfish. Mr. Phillips was appointed the first official judge and official judge-instructor of the Guppy Breeders’ Society, which he joined just 3 months after the society was founded, in 1938, and of which he has been an enthusiastic and active member ever since. He estimates that he has judged at nearly 300 shows, including the judging of other tropical fishes, and given more than 200 talks on fish-keeping, principally about guppies, which, by the way, he considers are much harder to keep and maintain in health than most of the other varied species of tropical fishes which he has kept during the past 26 years.

Eighty and After

Mr. Phillips is a Fellow and active member of the Fancy Guppy Breeders’ Society, and been president of the Fancy Guppy Association, and very well known, by name at least, to most of those in the hobby, for his many and varied writings, bearing mainly on guppy matters, in the aquatic press. George said that he has one ambition remaining. What is it? To judge a class of guppies and sign his name on the award cards, after the 18th June this year (his eightieth birthday), and then to retire as a judge.

So many were the birthday greetings and messages received by Mr. Phillips that he regretfully is unable to make individual replies, but he sends his sincere thanks to all well-wishers. More than 100 cards took the form of “First— Special 80th Birthday” award cards from Fancy Guppy Association members in Britain and overseas, to whom Mr. Phillips is affectionately known as “Mr. Guppy”.

Mr. Phillips at work in his fish house, in front of the tokens of his successes from 63 years as a fish-keeper
BREEDING FANCY GOLDFISH

Sorting and Rearing the Fry

by A. BOARDER

In previous articles I have dealt with the constant spawning and hatching problems and now will give advice for the breeder to follow from the time that the younger are about a month old. Up to this time many things can go wrong, but provided that the fish have reached a month of age and are in good condition there is every chance that their rearing troubles are mainly over. Many failures with fry can be attributed to the fact that they have not had sufficient space in which to swim around and develop. This is most important. Whilst the fry are small very tiny it does not seem to matter how crowded they are but once they take on the shape of real fish and are from 3 weeks old upwards they must be given much more swimming space or there will soon be trouble. Some breeders suspect all sorts of reasons for the fry going wrong but it is very often just the fact that they have become overcrowded which has accounted for the trouble. Many fish would escape the troubles that can worry fry if they were spread out to more tanks soon enough.

Sorting is an essential task and must not be deferred too long. In the first place it will be easy to sort out all those fish that have grown much larger than the others. It is not done it is possible that these larger fish will eat most of the food and then grow on more quickly than ever. In many cases it is possible for young fish to eat or at least worry smaller fry in the same spawning and I have seen very small fish with smaller ones stuck in their mouths. It is not always the larger fish which make the best specimens when dealing with fancy goldfish. Often these are coarse and is the smaller ones that develop into show specimens. Once the sizes are separated the task must be to work through all the others so that any which will never make good specimens can be discarded and the good must be left to receive more space and attention. This is especially the case when one is breeding exhibition-standard fish, as there is no sense in spending time, space and food on poor specimens to the detriment of the good ones.

The sorting of the fry can be fairly easy for the experienced breeder but the beginner will find it no easy task to sift out the good fish from the throw-outs. The variety of fancy goldfish can be most important now, as any that have divided tails will be far easier to sort than those single ones. If a white bowl is used and a few fry at a time are placed in it the tails will show up clearly. It will then be seen if any have single tails or tri-tails and these can be discarded, as they will never make good fish. Some may not show the division at an early stage and so it is well to keep these back for a time in case the tail is actually divided but holds together when examined.

Little more can be done when the fry are in the bowl but if a clear-sided tank is now used many more faults may be seen. The dorsal fin can now be examined and those with a poor one can be taken out. It will also be possible to see what kind of body the fry have, and those with bad shapes can be eliminated. While this examination is all right for the divided-tail varieties it will not help much for such kinds as shubunkins. With these the sorting will be more difficult as many may not show their true colours at an early age, although most of the shubunkins change colour far more quickly than the scaled types of fancy fish. Whence such varieties as orandas and longheads are being bred it is a slow job to sort out the good ones, as the bloated-like protruberance on the head does not develop until the fish are over a year old, and sometimes much longer than that. With these varieties then, one will have to show considerable patience and rear many more fish than would be necessary with other kinds, to make sure that good fish are not discarded too soon.

When the better fry are segregated it will be far simpler to see that these get the maximum food and space. The food should be of varied kinds, with some Bemax, dried shrimp and dehydrated meat as the main dried foods, with frequent feeds of earthworms, Tubifex and white worms. Any maggots given should be broken first for any young fish. Also see that earthworms are cut up for thinner smaller fish. When heavy dried-food feeding is taking place watch the water carefully in case it turns foul. This can happen and not always because food has been left to go bad. Often after heavy concentrations of feeding the droppings from the fish can become very heavy and these, too, can pollute the water. Once the young fish are over a month old they can gradually be acclimatised to the natural temperatures.

There is no doubt that warmth plays a very important part in the development and speed of growth of very young fish and I suggest that up to the age of a month a temperature of about 70° (21°C) should be maintained if possible. Do not be afraid of changing some of the water in the rearing tanks fairly frequently. Some pumps would have you believe that it is bad policy to change any of the tank water, and they even seize that which is taken when cleaning and return it to the tank. This idea I consider ridiculous, as nothing brightens up fish more than an addition of fresh water. Some of the water should be changed at least once a week, and where there are many fish or feeding has been heavy, twice a week will not be too much. I suggest that about a third of the total water can be changed. If tap water has to be used try to stand it in the open for a few hours so that the chlorine has a chance to escape into the air and it takes on a slightly warmer temperature. Not that I think that it is necessary to be too particular about the warmth of the water, as I find that cold-water fishes rarely mind a change of a few degrees at any time; in fact a slightly lower temperature often invigorates them considerably.

In my next article I shall consider some causes of failure to spawn, hatch and grow on various types of fancy goldfish.
Far and Wide

by RAYMOND YATES

Old Tanks

I NEVER used to think of having fish tanks in any of my houses before, but it is counting trouble to buy old tanks. They are often in a bad state of repair and may be quite disgusting. One does not like to bring them into the house, but it is the only way to have any fish tanks. I have found that if you buy a second-hand tank, it is not always as bad as it looks. When you buy a second-hand tank, it is often a real bargain. They are usually very cheap, but they can be a nightmare to keep clean and in good condition. The most important thing is to make sure that the water is clean and that the fish have plenty of room to swim in. The tank should be large enough to accommodate the fish comfortably. The tank should be cleaned regularly to remove any dirt or debris that may accumulate. It is also important to keep the water fresh and well aerated. The tank should be placed in a cool, shaded spot and should be kept away from direct sunlight. It is also important to make sure that the tank is kept out of reach of children and pets. Finally, it is important to make sure that the tank is not too cold or too hot for the fish. The water temperature should be maintained between 20 and 26 degrees Celsius. By following these simple steps, you can be sure to have a healthy, happy fish tank.

Waty Binoculars

A EUROPEAN manufacture of binoculars is using an advertisement showing these lying on the bottom of the “sea”, where they had been for 12 months and are still in good condition. Unfortunately the picture looks rather like a tank set-up with well-known water plants from tropical freshwater sources. The fishes are brightly coloured but hard to place and the bottom contains driftwood, sticks and bright red and blue cockle shells. This may seem authentic to the lay public but aquarists will not be impressed. One feels that with the excellent underwater photography which goes on to-day something more realistic could have been produced. Talking of underwater photography in its real sense, any skin-diving aquarists may be interested to know that aquaphotos housings are available for most 55 mm, still and 8 mm. movie cameras. The York Photo Service, 20, Bootham, York, will be pleased to advise anyone who is interested in this new form of photography.

Lake Rudolf

LAKE RUDOLF in Kenya is a remarkable lake, as it appears to form with fishes and, in fact, provides a food supply for man, bird and beast for a large area around it. It has been said that crocodiles will not bother human beings as fishes are so plentiful, and that it is therefore quite safe to swim inshore. The Nile perch breeds in Lake Albert in Uganda and then makes its way down the Nile. This is certainly one of the largest freshwater fishes in existence. The largest caught on rod and line was 226 pounds, but monsters of 336 to 360 pounds have been netted. Strictly enough all the large fish are females, males rarely exceeding 45 pounds. This fish is also common in Lake Rudolf, together with Tilapia mossambica and galilaeus (6 pounds), and tiger fish some 18 inches long. Further interesting notes on this area will be found in "No Room in the Ark" by Allan Moorhead (Hamilton), a book I can recommend.

July, 1962
The Sucking Loach (Gyrinocheilus aymonieri)  
by BARRY R. JAMES

This fish is gaining a great deal of popularity among British aquarists because of its algae-eating habits. It is hardly surprising, as it has been the largest selling sucking fish in the United States for some time now. Of late, sufficient numbers have been imported into this country so that we are now very familiar with the species and my stock of them is now the largest in England.

Plenodontus and Otoconus have both been known to us for a long time, and have won a justised place on the dealer's list of "regulars". However, I feel the time is not far off when Gyrinocheilus will be afforded a similar place of honour, as it fills a gap between the two before-mentioned both on account of its size, and its ineritable appetite.

This species is imported from Thailand, where it is found in flowing as well as still water. Of stream-lined shape, the body is slightly compressed laterally with a dorsal fin closely resembling that possessed by the Loher species. It is said to reach 8 inches in length in its native environment, but is usually offered for sale at about 3 inches or less.

Colour varies greatly among different individuals but generally the upper parts of the body are a light brown, with two rows of black blotches, one along the sides and the other following the dorsal ridge; the fins are often interlaced with yellow, or running into itself to form a line. The belly is whitish and slightly flattened.

The fish is extremely active and schools when a sufficient number of its fellows are present. Constantly on the move, the small fish will even escape from their home with some difficulty. I have introduced a pair of the fish into my aquarium, and I must say that they are very pleasant to have about.

One of my own tanks was heavily infested with a blue-green slime algae that was rapidly engulfing everything. I was forced to install a continuous current, which no amount of cleaning seemed to check. My ancient Plenodontus was far too large to be thrown into the tank, so I introduced a pair of Gyrinocheilus. Within a couple of days there was a marked improvement and by the end of the week the tank was virtually clear, with the exception of a thin band around the waterline, which the fish seemed to avoid.

As the tank in question was in the shop I was particularly relieved, and with this convincing demonstration of its efficacy my customers were very soon persuaded to the species and my stock of them is now the largest in England.

The tank should be well lit to encourage the growth of a certain amount of algae. Apparently this species has never been spawned, although I should imagine that very little work has been carried out in this direction. Gyrinocheilus is very suitable for medium-sized tanks, about 12 to 15 gallons, whereas Plenodontus soon outgrows its quarters, and Otoconus is rather too small to do an efficient job on excess algae.

Photos:  J. E. Neuman

The Persian Pearl Fish (Aphanopus sophiae)  
by F. G. JONES

One of the most beautiful of the smaller fishes kept by aquarists, though one not often seen, is the Persian pearl fish. It is, however, well known, and is a valuable addition to any aquarium. The male is a lovely fish, with a bluish tinge to its body. The female is a duller colour, with a bluish tinge to its body. The male drives the female continuously and so it is a good idea to use two males, one male to two females.

There is no need to rush to remove the parent after spawning as they will not eat their eggs if left alone. The young are soon able to eat small brine shrimps.

Although this fish can live in ordinary tap water, it is much better in soft, preferably alkaline water. The male prefers live food, though it is very hard to keep alive, and this has led to the introduction of the Persian pearl fish to the aquarium world.

The Persian pearl fish is easy to keep and has a wide temperature range, 60°-90°F (16°-32°C), although it prefers a temperature around 75°F (24°C). The pH value and hardness of the water do not matter; my fish are kept in alkaline water with over 18 degrees of hardness. This is probably the best water for them, and also a great pity, that it is not more popular.

THE AQUARIST
(6) The Veiltail

by A. BOARDER

The veiltail is a short-bodied fish with long and flowing fins. It is one of the most handsome of the fancy goldfish and a breed favourite with many aquarists. A really good fish is seldom seen, that is, one to which a judge would be likely to award 90 or more points. If a fish is of good shape the colour is generally poor and if the colour is good then there is something wrong with either the shape of the body or the fins. It would be correct to say that the veiltail turned out in a hundred among a lumbering from good breeders would be of sufficient quality to win at a good open show. This uncertainty makes it a fascinating variety to breed, as it is a challenge to the experienced breeder. There will be great satisfaction if a real winner is bred and the trouble will not have been in vain.

The body of the veiltail should be deep and round, approximating a sphere, excluding the head. The depth should be more than half the length with a good clean curve over the top of the body and a corresponding one below. Any suggestion of hump back will be frowned on by the judge, but this is a fault often found. A flat back is also often seen and this will lose many points when being judged. The sitting of the tail or caudal fin can also be bad, if it starts too low down. The caudal fin is one of the most important features of this fish. It must be completely divided and fall in graceful folds. It must not be stiff and held out from the body and the edges of the fin should be as near straight as possible; any tendency for forking at this point will lose many points for finnage. The dorsal fin is very well developed, held erect with a good curve in front. The back of the fin should start with an incurve and then sweep out in a good convex shape. The pectoral and pelvic fins should be long and well developed, rather pointed. The anal fins must be double; single anal fins will call for disqualification. The anal should be of equal length and be held separately.

The colour of the shubunkin type should be as for that fish, a blue ground with violet, red, yellow and brown markings and the whole speckled or splashed with black. A self colour of either a rich red or a rich chrome yellow is also recognised, although I am right against an all red or chrome fish as I consider that such a fish would be hard scaled with stiff finnage. This stiff finnage would be quite out of character with a fish that should have soft flowing finnage. A variegated fish with two or more colours in a pleasing pattern is also recognised. The minimum size for exhibition is 2 inches body length. The head of the fish should be short and broad with prominent nasal flaps. The shubunkin-type fish should have soft gill plates and show no hard shiny scales. The veiltail requires careful training if needed for an exhibition as so many of these fish will walk at the bottom of the tank when being judged and it is almost impossible for the judge to see what they are like. Often another tank will be above the one being judged and so it is quite impossible for the judge to get the fish to move from the bottom to see if it has paired anal fins or not. If a fish is placed in a show tank each day for a little while and a few Daphnia are introduced the fish will start to expect such a treat when in the tank and so will keep more alert. Many a good fish has been passed over by the judge because it has been impossible to get it to move so that it can be examined.

The veiltail needs a good sized tank, say a 24 in. by 12 in. by 12 in. for a couple of fishes of adult size. Feed on a mixed diet, dried food every other day and give live food between. Garden worms and white worms are very good food for this fish. Owing to the delicate fins this fish is not suitable for an open air pond during the winter in cold districts as the fins are very liable to be attacked by fin rot and fungus.
THE OUTDOOR REPTILIARY

(5) Chameleons and Anolis Lizards

by ROBERT BUSTARD, B.Sc.

Photographs by the author

THE outdoor reptiliary can be put to several uses, and although many people consider lizards, such as chameleons and anoles, to be solely for the indoor housed vivarium, they are in fact seen to much better advantage out of doors, at least during the warmer weather.

There are about 75 species of chameleons, of which a fair number are available from time to time. Some of these are particularly hardy and naturally it is to such species that the herpetologist with an outdoor reptiliary must turn his attention. For many years I kept, in an outdoor reptiliary illustrated in the first article of this series, chameleons of several species and also anolis lizards (Anolis carolinensis). They went outside on the first of April and were there until the first week in October. As my reptiliary was situated on the east coast of Scotland (Dundee) collectors in the south of England can see the scope which is available to them.

The Kenya highland chameleon (Chamaeleo hribornielli), itself a dwarf species, and the South African dwarf chameleon (Acanthocercus paumla), formed the basis of the chameleon collection. Both are accustomed to cold nights, which was just as well as some evenings when I came down to watch them shortly after 8 in the morning the temperature was well below 40°F (4°C). Indeed on several occasions it was only 37°F (2°C), and had presumably been colder during the night. This treatment did not seem to cause them any harm and although there were at this time about 60 of them in the reptiliary I had no fatalities. On these cold mornings they were resting on their perches or among the everlasting sweetpeas, and waiting for the sun. After basking in its rays for half an hour they were sufficiently warmed up to move around and start feeding. There is one species of chameleon—the helmeted or two-homed chameleon (Chamaeleo铺reus), that I kept at the same time. This species comes from even higher altitudes in Kenya (7,000 ft.) than those at which my Kenya highland chameleons were collected (5,000 ft.). The helmeted chameleons did not seem to be at all inconvenienced by these cold early spring mornings and were frequently moving about at temperatures just a few degrees above freezing. So much for their sub-tropical nature!

It is important that the outdoor reptiliary for chameleons be well planted. If foliage is scarce they may feel ill at ease. It is also important that it is sufficiently planted to provide shade. No chameleon will feed unless it is properly housed and receiving adequate drinking water. As chameleons generally do not drink from a dish it is advisable to spray the foliage (the outdoor reptiliary recommended had a glass roof which kept out the rain) at least twice a week.

In this reptiliary the chameleons seemed to be completely at home and I used to sit and watch their antics for hours. Each specimen had its favourite “perch”, a space on a twig, and waited other chameleons trying to pass it by. Here it should be stated that chameleons hate being touched on the body by humans, other chameleons or indeed by any other creatures. When handling them try to persuade them to climb on to your hand, where they will cling on very securely, rather than pick them up by the body. The anoles were also a great source of interest as they are so unlike the chameleons. While the chameleons are so slow

Jackson's chameleon (Chamaeleo jacksonii)

Lumbert's chameleon (Chamaeleo lumbertii)

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in their movements, yet deliberate, the anoles rush here and there, stopping momentarily to bob their heads at another and inch their throat pouch as a female or a rival male. Rarely would a chameleon be deliberately taking an insect when an anole would rush in and grab it, and it has on several occasions witnessed a chameleon catch an insect a bluebottle which an anole was chewing. This rare is often used successfully against their own kind.

**Feeding**

Many people ask me how I could possibly feed such a large lizard collection. The answer is simple—each week I put just one containing one part of guppies into the reptarium. There is no time emerged as bluebottles, which were largely ignored. The anoles and chameleons never seemed to tire of this diet and it was only occasionally eaten when I collected a large number of larvae of the common dragon white butterfly and put the pupas into the reptarium. Frequently I allowed them to become fully grown, and so produced my own maggots, so that the reptiles did have a wide variety of different species of flies and bluebottles. The larger chameleons are very fond of grasshoppers.

**Other Species of Chameleons**

I selected three specimens of the common chameleon (Chamaelos chamaeleon) as I had discovered that they are very poor "eaters". I would stress clearly that the common species should not be kept. The first specimen I ever had belonged to this species and I was lucky that he lived for 30 months, doubling his size from 3 to 6 inches in the animal. I was much less successful with adult common chameleons, and they are often quarrelsome when kept together. The food required by any large chameleon is quite outside the resources of the average collector, since gentle and mealworms are seldom accepted.

Another species that caused me some trouble is the three-horned chameleon (Chamaelos jackson), often called Jackson's chameleon. Despite it's attractive and unusual appearance I cannot recommend it. Specimens that I kept in my outdoor reptarium lived satisfactorily but spent long hours down at the front hiding up to the glass. This behavior was entirely restricted to this species, all the others spending their lives high up from the ground among the foliage. Another species that lived successfully in the reptarium was Lambert's chameleon (Chamaelos lambertii), a smallish species from Madagascar.

**Breeding**

I have bred the dwarf Kenya highland chameleon (Chamaelos bitaenata allii) on a great number of occasions. Strangely enough the young have, to the best of my knowledge, been born indoors, although when placed in the outdoor reptarium they flourished there. I say "to the best of my knowledge" because at times when I had put out babies I would not notice the presence of additional ones, but on many occasions when there were none put there by myself, none appeared. Life in the outdoor reptarium appeared to slow down the rate at which the gestation period progressed and possibly this was a result of the lower temperature. This species, like the helmeted chameleon, and the S. African dwarf, is ovo-viviparous, i.e., it produces living young. I first had a birth of the South African dwarf chameleon in 1955 (reported in the British Journal of Herpetology, vol. 2, page 1, 1955), when 11
Keeping our Native Fishes

by J. R. TINGLE

MENTION fish-keeping and most people immediately put their thoughts to tropical fishes. Eighty per cent. of our budding aquarists to-day start with the "little jewels" and, with a little success, soon become familiar with scientific and common names. Tropical communal displays, with their marvellous variety of fishes and plants, give a wonderfully colourful display, and this, with the possibility of a little breeding now and again by livebearers, whets the interest of all budding fish-keepers. Old aquarists in this country used to say "you are not an aquarist until you have kept and maintained our native fishes": They also said that "if you keep fishes long enough, you begin to look like one". I've kept all kinds for 50 years, but I don't like to look like one! Many anglers keep tanks of native fishes they have caught and find much interest in maintaining them. To start a native aquarium, thought must be given to the setting up of the aquarium. A tank 24 in. by 12 in. by 12 in. in a suitable size (but a larger one, say 36 in. by 12 in. by 20 in. is a high, gives a much better display). In any case, the rule of "1 inch of fish to 1 gallon of water" must always prevail for a well-balanced aquarium. The tank can be clear glazed at the front, with moulded 1 in. glass for the back and sides. The bottom of the tank is improved by a double thickness of glass, to support a tremendous weight of water, rocks and gravel or compost. The tank should be given sufficient compost to allow 4 in. depth at the back and to taper to 1 in. or 2 in. at the front; coarse sand, well washed, is suitable. Pieces of sandstone, tufa stone or fancy rocks purchased from any dealer can make a suitable rock display. If it is possible to get some red shale, found on old colliery tips, well washed or boiled, will give a marvellous colour effect and will have no harmful effect on fishes or plants. Lime stones or quartz should not be used. Planting should consist of small clumps of Elodea canadensis (or cipra); giant Vallisneria or Sagittaria should be planted well back in the aquarium. Small sprigs of Ludwigia can be planted at will near the front of the rocks. No hiding places should be left for freshly introduced fishes, as all native fishes are shy on introduction but very soon become quite comfortable and tame. Artificial aeration is helpful for a start but should not be necessary when the plants are established. Obviously, the smaller the fishes the bigger the variety that can be kept: 2 small roach or Rudd (preferably), 2 smelt (golden or green), 1 small perch, I carp, I gudgeon or 2 minnows or sticklebacks. Trout, miller's thumb or loach are not suitable, and all fishes from running streams and rivers do not adapt themselves to stagnant water so well. Food such as chopped worms, maggots, a little ground liver and biscuit meal, and, of course, bloodworms, woodlice, water shrimps, will be readily accepted, but all foods must be eaten up at once and given very sparingly. Freshly caught fishes, before placing into the tank, should be put into a bucket containing a light port-wine coloured mixture of water and potassium permanganate for 2 or 3 minutes: any fish lice, fluks and other parasites will then be removed and can be found in the bottom of the bucket. Careful "angling" of fishes (hooks) does no harm to them, and I have had roach and perch feeding happily in my tanks the day after being hooked. Once a native aquarium is established, with the inmates settled, not only can a wonderful picture be achieved with memories of happy hours spent fishing, but it will be the object of envy and admiration from all the tropical fans who come to view it.
ANABANTIDS in General
—and FIGHTING FISH in Particular

by H. LODER

Dwarf gourami (Colisa lalia), a species that likes to incorporate small plants into the bubble nest

THERE Anabasidae group has a charm all its own with an attraction I cannot put into words. It's a feeling one gets on first seeing almost any of this family: something exotic, something far away plants about them, and something else, a "we've been here longer than you" look in their brilliant fish eyes. And as they are fishes I suppose they have at that! No, I cannot analyse the feeling or put the charm into words, no more than I can tell you why I love homes and only like "dog" dogs. From a practical point of view, say a practicing aquarists point of view, this group is very satisfactory.

It is possible to keep anabantids of all sizes, from the small to the very large, from the delicate chocolate gourami to the very tough paradise fish. The aquarist can run the gamut of fish-keeping within this group. He or she can experiment with the "difficult" species, like the spending gourami or the usually difficult chocolate gourami, or have the fish that is easiest to breed of all, the blue or brown three-spotted gourami (I once had 2,000 fry emerging from one spawning of a big pair of blues!). The aquarist can breed straight wild-type fish, as with most of the gouramis, with very little effort to improvement, and, of course, starting with good and perfect stock. Or he can go the whole hog on line-breeding for improvement in size, shape and color, as is done with the Siamese fighter and, not as commonly, with the paradise fish.

There is a blue strain and a red strain of paradise fish, and also a strain with very long caudal fin points has been

Colour photographs by B. PENGILLEY

developed. Of course, more should have been done with the paradise fish. He is the father figure of tropical fish-keeping in Europe. Samuel Pepys mentions "a fish from Calthay kept in ye glass of water other than the golden fish of Calthay." This must have been the paradise fish. From old Sam's description and the kind of treatment the fish would have received and yet still live it could have been no other. Of course, fish-keeping didn't catch on here as a popular pastime in the time of Charles II.

A good selection of anabantids for a 36 in. tank would be as follows (in trios: one male, two females): leeri gourami, three-spot gourami, thick-lipped gourami, striped gourami. This last is sometimes called the giant gourami—I suppose because it resembles the dwarf gourami in most things except size—although the real giant gourami is an Indian food fish that reaches 2 feet in length and is, incidentally, the only true gourami mentioned here, scientifically speaking, that is. I sold some to Belle Vue Zoo some years ago and I think they still have one, a real monster.

There is some difficulty about distinguishing one from the other with the striped gourami and the thick-lipped gourami, especially if the pair of thick-lipped are large and the striped gourami are of medium size. Things are also made more difficult by the hybrids of these two species.
Blue gourami (Trichogaster trichopterus): male above, female below

turning up in dealers’ tanks and being sold as one or the other. However, well-developed specimens of either species are quite distinct from each other. A good tip, if you have any difficulty, is to look at their mouths. Readers may wonder why I suggest two very much alike species for their show tanks. I admit they are not a contrast but they blend well and are good conversation pieces. It’s good to have something to talk about in your tank— it gives you a chance to show off your piscine knowledge to your pals (that’s how reputations are made!).

I’ve told you of a few anabantids that I am fond of. Let me tell you of a few things that anabantids are fond of.

Food: as a group they are excellent eaters, refusing very little when healthy. The live food the food the better of course: white worm, chopped earthworm, Daphnia and, for the larger species, mosquito larvae and small frog tadpoles, and young guppies. They will eat almost any kind of dried foods and I find that they relish, of all things, dried ant’s “eggs”. Chopped fine liver is a good food, and most good makes of dried foods can be recommended. In fact, anabantids are so obliging about food that, like a hen-pecked husband, they can be pushed off with anything until they die before their time through being given the wrong diet, and I suppose of broken hearts through waiting and hoping for the right kind of food. Anyway, experiment with them: give them a really varied diet but do see that it’s all good and plenty of it.

Anabantids like to be warm. The only one of this group who will stand low temperatures in the paradise fish, but though he’ll stand low readings he doesn’t like it, and the fish breeds better and looks better at around 77°F (25°C), for the rest 77°F is all right, but for breeding use 82°F (28°C) or a little higher.

Water condition for fishes is something that can be argued about, and a lot depends on what water the individual specimen has been born and rear in, but I think it is safe to say that old mature water should be used for this group. It does not matter so much what the pH reading is, but use water from a tank with old gravel and with plenty of growing plants, and one not too well oxygenated. The anabantids do seem to prefer water that is a little ‘olive’ and very slightly green—a condition easy for a beginner to provide but sometimes rather hard for the old hand to achieve, since he has acquired the habit of overfeeding through long usage.

What kind of tank makes them feel at home? Naturally, the bigger the better. And the shy ones are not so shy in deep water, which applies to all fishes, I think; shallow water makes adult fishes nervous, just as “a bench-head landing with no cover” used to make the boys nervous.

Plants, in good groves here and there, for the fish to use as cover, will in fact be used less and less provided that they are there to be used. Members of this family never look at their best in unplanted tanks at the dealers; they don’t settle and colour properly in poorly planted or unplanted aquaria.

Anabantids will breed regularly and prolifically, provided that they are mature and healthy and have the right conditions. The breeding system described for fighters below applies with some slight variations to most of the anabantids; also, feeding and rearing the fry is about the same, with the exceptions of the dwarf gourami and the chocolate gourami.

The fry of these species need green water at the start. They will not thrive without it. The diatoms of green water are the only foods that these minute babies can manage at first, and if they get plenty of it they grow really fast, and inside 10 days they should be eating Paramecium and often large infusorians. Pond Infusoria is a good grade of food in some seasons of the year; late spring and early summer are best, before the larger inedible animals predominate. Of course, as the babies grow, they can have brine shrimp, graded Daphnia and fine dried foods, and when they start eating these they are on their way.

Spawning condition is easily noted in most anabantids; the females fattest, the males become more colourful. The pair of dwarf gourami illustrated here are, in my opinion, ready for spawning. Remember that anabantids like a warm tank, and they don’t come into breeding condition.
Fishing is not cool. The fish also need warmth, too high is better than too low, for all this family. Also provide plenty of space if you want show fish. Don't believe anyone who tells you that it's all right to crowd geraniums because they are labyrinth fishes and breathe atmospheric air, giving you the impression that they take no oxygen from the water. I admit that they will be amongst the last to die in overcrowded conditions, but they do take oxygen from the water by gill action like any other fish. It is only occasionally that they use the labyrinth organ, when there is a very foul water or highly over-heated water that has lost its oxygen because of the heat. But as your aquarium should never be in this condition, treat your mollusks as you would your other fishes as far as space is concerned.

Now I come to my own personal preference in this group, and perhaps my choice in any group of fishes—the Siamese fighting fish.

The fighting fish must be the best known of all Siamese characters, with the possible exception of Vlad Breyner (of "The King and I" fame), and until we received the red-tailed black shark the fighter was the best fish to come out of Thailand for the European aquarist. Of course, this fish has been receiving the attention of aquarists in its country of origin for a very long time, and is in consequence a cultured species. Great care has been lavished on the fighting qualities and inbred pugnacity of this fish. Also, the males have been carefully preserved and improved, it was much easier to bet on a definite colour than to bet on intermediate shades that might cause arguments and a fight after the fight! So definite colour was always important in the cultivation of this fish.

A good male will take on all comers, one after another, and should be finally beaten and give up, which sometimes happens, he will, and this is the remarkable thing. Fight again the following day, provided that he has the strength to do so. The spirit colour is never really quenched, only death ends it. This is different from the behaviour of that other great fighting machine, the game cock. Once a cock has been beaten in battle (and allowed to live, which is not the usual practice), he will not fight again. It may be, of course, that the Betta is a creature without any natural caution, or perhaps it fights in a more gentlemanly fashion than the game cock. If you have ever seen a 'fish fight' you will know that the fights are in a different way arranged by the fish themselves. Each fish breaks off to rest at the same time, as if by mutual consent. This gives a rather artificial effect, as in all-in wrestling, but unlike wrestlers, the Betta contestants mean it. There is also "the moment of truth" in a fish fight; fatal as the moment is, the fish show only courage to the last.

Of course, for every one aquarist who admires the Betta for his fighting abilities, there are hundreds who admire him for his beauty alone. And western aquarists have helped a great deal in improving this beauty by breeding the fish to a really good well-balanced standard. We have lengthened and broadened his fins and shortened his body, giving him an appearance of compact grace that is hardly beaten by any other species. Also we have helped a little with colours, though not enough in my opinion. I will never forget the colour of a pair that I received from Siam before the war, These had golden bodies and purple fins; I dubbed them 'royal Siamese fighters', and sold them to a man who could afford them, and have never since seen any fish like them since. I should have kept them but for "the wounds of hunger", as they say in Mexico. 

By our attempts at seducing the lily, which, of course, have taken many years of inbreeding, we have lost possibly some of the hardness of the fish. Possibly we have now a slightly more delicate individual. We have lost some natural instinct in some of the well-bred individual specimens, but not much of the fighting instinct (although I have read somewhere recently of a split-tailed variety produced in Malaya that will not fight at all).

I have found that with well-bred specimens there occurs the odd individual who has lost the nest-building ability. These are usually very handsome males and well worth
breeding from. They will pair and embrace females and they do get feral eggs, which they usually blow to the surface just anywhere, but build no nest and show no care. I usually collect these eggs and put them in a shallow saucer. The depth of water that can be put into a saucer from your wife's best crown Derby eggshell-china tea set (left by her great-aunt Louise, who died at the age of 102 when she fell down the apple cellar), and which will still allow the saucer to float on the surface of the tank is about perfect for the youngsters until they can properly swim.

Under normal conditions I always leave the male with the young until they are properly swimming. By swimming I mean leaving the nest of their own volition and not falling head or tail first to the bottom of the tank. It's really very easy to know when to move the male. Observe him and you will see that he gets very ill-tempered when the babies can swim. He loves to put them back in the nest when they fall out, but he can't keep up with them when they swim out in every direction at once. So he usually eats a few and begins to lash his tail about, which scatters the nest and his wayward children (his tail action possibly saves them all from being eaten). It may be that in Nature it is a way of disposing of the fish, breaking up related specimens and preventing to some extent close interbreeding, which could take place easily with this short-distance swimming species. Anyways, you get fair warning when to move the male, so act on it. Many aquarists fail with fighters because they will persist in having only one or two females. They say, "Oh, the females are not very pretty—one's enough." It is policy to have a fair number of females on hand. For one thing a small shoal of females of different colours can look very pretty. For another, male fighters are rather choosy and great boys for the ladies. You will find also that the females are choosy and prefer some males to others.

I do not let my females become too heavy with eggs before I use them, as I believe that an over-ripe female experiences some difficulty in parting with eggs at the commencement of the spawning procedure. This difficulty of the female often interferes the males to such an extent that they kill their mates. The ideal female is not too heavy with eggs, quite lively and just as eager to spawn as the male.

The simple method of introduction is the best. The male is already in a 18 in. by 12 in. by 12 in. or 24 in. by 12 in. by 12 in. tank with old water, some good surface cover plants (one or two floating ferns or any floating plant except duckweed) and without snails, if possible; the temperature is 70°F. (21°C). Introduce the female into this tank in a 2 lb. jam jar containing enough water for it to float. The male will commence building his nest at once. When he has built a good nest (1 in. in diameter and 3 in. high in the centre, at least) and his fin-spread display has become really frantic, tip out the female gently so that the nest is not disturbed. I cannot give you a time limit for the nest-building and courtship. This bit of knowledge of when to put the female in with the male, you must acquire yourself. But don't let it worry you unduly if you see the female get a terrific beating; should the beating be more than she can stand she will take cover (remember the plants) and remain in cover until the great lover's frenzy has worn off. She seems to know when it is safe to try again, I think, better than we do. If you have a really rough male, put in two or three ready females. He then will wear himself down on these three and finally will spawn with one of them.

The spawning act has been portrayed and described many times, so I won't attempt to describe it. It's better to see it than to read about it.

I have dealt with the spawning and care of fry by the male parent. We now come to the care of fry by the third parent—the aquarist. Before the fry start to swim the aquarist can begin to play his part. At this stage there is very little to do, but you can float a black banana skin in the tank. This rotting vegetation helps to produce small Infusoria, which are very helpful to the fry when they start to swim. I have also found that sun-dried lettuce leaf powdered on to the surface is a very useful culture medium in the tank itself. As well as this, when the fry are swimming they need one 2 lb. jam jar of a good thick Paramesostoma culture poured into the tank (Continued at foot of facing page).
How Many Fishes?

by PETER DENDY

The aquarium in the living-room or the lounge is a good idea, and if well maintained comes in for much praise and seems the heart of the owner. A well-lighted, well-filtered, well-planted and nicely planted aquarium with a constant movement of water in the tank creates a focal point in a room. Given an easy chair and a good view of a well-organised community tank, I must admit that I can be left for hours just watching and enjoying.

There’s really got to be an aquarist to keep a living room tank, of course, and I know one or two people who are not. For some reason, a community tank kept purely for decoration without too much attention being taken in the fishes themselves and the space they require, with the result that the tank is not properly maintained. I also know one or two people who don’t see a clue about how many a tank should hold and who simply cannot exist without something else adding to the community and a tank needs to work so that the piscine population is in good order.

The question of how many to a tank and the allied question of absorbed oxygen available in the water is one that many people, who should know better, seem to give little thought to at all. It seems such a pity when there are so many fishes in the tank, so they drown the poor fish. Under these conditions when trouble arises, and it always happens, the owner usually adds a couple of small diffusers to try and keep the surface turning round and happily assumes that if the fish can’t see it, they can’t smell it. Of course, it helps, but its actual value in increasing the oxygenation of the water is very limited indeed.

Aquarium Proportions

The proportions of the aquarium can be important and it is much better to have a relatively shallow tank in proportion to the plan area than to go in for a deep tank that has a low volume to surface area ratio. As a general guide the depth of the tank does not want to be greater than one and a half times the width.

Fishes that have been badly stunned in early life by overcrowding never achieve their proper size even if optimum conditions are provided for them later. I recently carried out an experiment on some very stunted stock to find out what could be done to rehabilitate a small fish, and found that the size could be increased a little, but nothing like that of a decent fish could be achieved. The results were satisfactory and the offspring developed to normal size. It would obviously take several generations of stunting to affect permanently the size that a fish could grow to when again given good conditions.

Anabantids

continued from facing page

every day without full until they are 3 weeks of age. I said
poured into the tank but a better way is to immerse the
ejellyfish into the aquarium and let the Infracorpus swim or
flow out gradually. This tends to cause the fry to con-
centrate around the jar and gives you a good chance of
counting and observing the growth of the babies.

After about 21 days the babies should be on the usual
fish diet of graded Daphnia, micro worm, fine dry food
etc. At 80°F (27°C) their growth, if they are well fed, is
really fast. The few odd ones who don’t grow are soon
eaten by their larger brothers and sisters. If you have
many that do not seem to grow then they are not getting
enough to eat, or double your quantities of foods. Plenty
of food is the rule for anabantids, and temperature too
is important: keep 80°F (27°C) all the time for babies.

Do not allow cold air to reach the surface of your tank.
Use close-fitting covers and keep out cold draughts for
anabantids of any age.

Well, as most of you will have realised by now, fighters
are a bit of a fetish of mine, and I could go on with quite a
lot more about them. I am making a study of inherited
fighting abilities in animals; I have found a relative
sustained ferocity in the game fish, the Betty, the Spanish
fighting bull and the Malay domesticated fighting partridges.
But all this is another story.
The Puffer Fishes

by R. E. MACDONALD

PUFFER fishes are a genus of the family Tetraodontidae, belonging to the order Tetraodontiformes, and are called by this name because of their ability to puff themselves up like balloons with either water or air. There are about 80 different species to be found throughout the tropical waters of the world, particularly the Indo-Pacific region and central Africa, and while the majority of this number are strictly marine species a few are to be found in fresh or brackish waters. As marine fish-keeping is not yet established in this country reference is made only to those that may be kept in fresh-water tanks, although the habits and qualities are more or less general for all species. The fresh-water species that are briefly described below can sometimes be purchased from dealers in this country and most of these generally prove to be imports.

The leopard puffer (Tetraodon shoalmania) is native to the Belgian Congo and is a sprightly little fish. Its body is covered with very small spines or prickles and it has dark spots on the back area and a plain, yellow belly. It grows to about 4 inches in size.

The figure-eight puffer (T. vulcanus) is quite a rare fish for aquarists in Britain and is native to Thailand and Borneo. It has the usual spotted back and light-coloured belly but the spots join in places to form figure eights, hence its name. It is a rather shy fish even though it may grow to a length of some 8 or 9 inches.

The valve puffer (T. madrasianus) is a fish that grows in shape from town to town, the body is flattened, with both eyes on the upper part of the body. The colouring of this fish is yet another example of the natural camouflage that Nature provides for its creations. The puffer will turn itself in the sand so that only its eyes and mouth are showing and as the back of the fish is a speckled, sandy colour, detection is possible only at close quarters. It is native to the Belgian Congo, grows to about 6 inches in length and is rather partial to small fishes à-la-carte for lunch!

The green puffer (T. funebris) is a fresh-water species found in India and Malaya and sports the usual spotted back and light-coloured belly; it also has peculiar "whiskery" appendages sprouting from the nasal pit. A length of 7 inches is sometimes reached and the female of the species is said to eat her young with the utmost relish!

The common puffer (T. cristatus) is typical in shape and characteristics and is exceptionally adaptable, for it may be found in the coastal region of the Malay Archipelago or in fresh and brackish waters. In a good-sized tank the fish may grow to about 8 inches in length.

The size of puffers varies a great deal with the different species. Some fishes of this genus (particularly the marine varieties) may grow to 36 inches in length, which is pretty good going!

The most prominent feature in the appearance of puffer fish is the size of the head in relation to the rest of the body. In the common caudal peduncle, the head represents nearly half the total size of the body! Another feature is the presence of spines on some species which are similar to "goose pimples" in appearance, although they bear no comparison to the magnificent spines displayed by the marine porcupines and burrfishes. By far the most remarkable feature is the ability to puff themselves up with either water or air.

This phenomenon is performed quite voluntarily by the fishes and is achieved by retaining gulps of water or air in the abdominal cavity. As one would expect, the surrounding wall of the belly is elastic, to prevent serious internal injury. Mature fishes can puff up without causing any harm to themselves but young specimens have been known to die if they perform this feat too vigorously at an early age. When the fish is inflated with air it will then upside down at the surface of the water and present the observer with a spectacle not often seen in the home aquarium.

Some puffers like to inflate themselves just for the sheer luxury of it, and on other occasions it may be performed to discourage other fishes from ingesting it! A further reason for Tetraodon inflation is that of blunting. This is where two fishes face each other and put on a show of aggression (without actually fighting) when someone's territorial rights have been infringed. Puffers are very sensitive to territory ownership and will sometimes fight in a most determined manner to retain their favourite corner or hiding place. If a number of puffers are placed together in a tank it is essential for their welfare to provide enough room and hiding places for all the inhabitants otherwise the odd man out will find his life hardly worth living.

Puffers do not make very good additions to the general community tank, for they possess a very nasty nature, although the smaller species are sometimes better tempered than their larger cousins. Baby fishes are more sociable but once they reach maturity they rapidly become irritable and extremely touchy and will let the slightest inconveniences upset them. It is also wise to keep puffers well clear of expensive vegetation, for they show no respect in most cases for delicate plants no matter how treasured they may be.

The mouth of a puffer is bony and has the appearance of a budgerigar's beak, and can cause serious damage to
other fishes if a scrap takes place. The skin is hard and mucus and locomotion is achieved by the sole use of the muscular fins (a method rarely practised by any other fish) and is probably the result of the acute stubbliness of the body, which prohibits effective use of the caudal peduncle or after-part of the body. The eyes are rather large for they can be used independently of each other for great extent and are quite large.

As puffers spend most of their time resting in the sand in their hide-outs, the sand in the tank should not be too fine. When the fish leaves its lair it is nearly always found inhabiting the upper regions of the tank, where it should soon learn to recognise the hand that feeds it and quickly remember feeding places.

Puffers are essentially warm-water fishes and do not take readily to low temperatures. The best temperature lies between 80° and 85°F (26.6°-29.4°C). Puffers are not too fussy about pH and hardness but should be imported and not too acclimatised to fresh water a percentage of salt water must be added to the fresh water in the tank at the beginning and gradually reduced each day until the tank is only pure fresh water. The dealer supplying the specimens will provide the necessary information about the percentage of salt water required.

As with most other fishes, the problem of feeding is important. Puffers are slow eaters and extremely fickle about the food they eat. If they are not given the food of their choice they may refuse all other foods and eventually starve to death. When first introduced to a new home the fishes will probably subject themselves to a strange diet but as they become accustomed to their new surroundings their appetite will return.

Puffers are carnivorous and generally reject all prepared dried foods offered to them, so Taphos, mosquito pupae, earthworms, earthworms, brine shrimp and may be tried in an attempt to find the most acceptable food. These fishes undoubtedly prefer marine foods, but in some cases it may be found that even vegetable foods are accepted.

Value puffer fish (Tetraodon microps)

Hand-rearing the puffers should not prove to be too difficult if the fishes are conditioned first and given the living conditions. Conditions, for instance, to close lines and (if acceptable by the fish) varied feeding.

Abnormal conditions are enhanced by covering each other. E.g. Tetraodon. The female makes her choice from the male present and both of them prepare a spawning bed by clearing it with their mouths in typical fashion. The male will then seek the female by swimming in circles about her until the excitement induces her to release and deposit the eggs on the spawning site, where they are fertilised by the male. When all the eggs have been laid the male will guard and "fan" the eggs until they hatch. "Fanning" the eggs is a ritual performed by many fishes and is used to cause a circulation of water over the spawn, thus preventing fungus spores from attaching themselves to the eggs and at the same time washing away any sediment that may settle on them and promote bacterial infections. Should any danger arise during this period the male will completely cover the eggs with his body to protect them from harm, the most probable reason being—out of sight, out of mind! When the eggs have hatched the male will dig a depression in the sand and keep the newborn fry within its limits for the next few days. After the female has spawned she should be removed from the tank, as she possesses few scruples about infanticide (c.f. T. shoemachi). In this case the female may have two males attendant upon her instead of just one. The males may be described as "hunger-cats", for indeed that is just what they do. Taking a firm bite on the belly skin of the female they will rarely release their hold until she has completed spawning. In this manner, they will be dragged around the tank as the female scatters up to 300 eggs aimlessly upon the scene. Fertilisation by the males is achieved when the eggs are released from the body of the female. From this it can be deduced that fertilisation of the eggs is not thorough.

Puffer's eggs hatch after 3 to 8 days, according to the species concerned, and the fry food first from a very large yolk sac that disappears after about 3 days. When this yolk sac has been consumed the fry may be fed with powdered egg-yolk that has been strained through a fine sieve, followed by Infusoria and brine shrimp nauplii.

Should the puffers become too much of a problem they may be prepared in a special way and cooked to form a rare dish known as "fugu". Warning should be given, however, that unless the fish are prepared in the correct manner a fatal food poisoning will probably be the result for the organs of many puffers contain a deadly poison known as tetrodotoxin.

Puffer fishes are a most amusing genus and for me the day when these fascinating creatures lose their interest will come only when guppy-breeders acknowledge the value of the stock as food for large, carnivorous fishes, when people wearing two monocles cease to make a spectacle of themselves and when Mr. MacMillan leads three rousing choruses of "The Red Flag" from the steps of St. Pancras Town Hall!
our readers

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 it is not responsible for the opinions expressed by correspondents.

Large Brine Shrimps

I HAVE read with some interest an article by R. E. Macdonald in your January issue, on hatching brine shrimps.

Here in Mombasa, most of the live foods used with such success in the United Kingdom are unavailable, mainly because of climatic factors. For this reason I make regular use of large brine shrimps, up to 1 inch, for conditioning any fish.

I grow the shrimps in a tank 36 in. by 18 in. by 9 in. and use ordinary sea water, to a depth of 4 ft. They are fed 3 times a day on a tubed liquid food sold for the fry of tropical egglayers, and do very well indeed on it, providing me with a steady supply of large shrimps.

I have often wondered why U.K. aquarists do not make use of large Artemia, during hard weather when other live foods are difficult to come by. They are certainly easy enough to rear and the fish certainly lap them up.

J. BALDWIN,
Mombasa.

Shark, Fan-Cat

SOME time ago, I started keeping tropical fish. Taking advice, I commenced by keeping guppies, platys etc. I then proceeded on the usual community tank set-up of neon, angelfish, zebras etc.

Then, quite by chance, whilst thumbing through a book on tropical fish I came upon the name red-tailed black shark; accompanying the brief summary on the fish was a photograph. I have always been intrigued by sharks, that is the type whose dorsal fin horribly and menacingly rises out of the water, and so decided to purchase one.

On acquiring the fish I found it had none of its namesake’s characteristics (except for its shape), but on the other hand I was delighted with its colouring, being jet black with a vivid red tail and a white tip on its rather large dorsal fin.

It was placed in the community tank, where it was quickly joined by another member of its species. There they remained for a few months, proving good community fish, easily fed, very hardy (surviving a couple of heat losses without any ill-effects whatsoever) but remaining rather shy.

After a while I decided to find out more about this group—and presently came upon the ordinary black shark. Two of these were quickly purchased and placed in a large tank by themselves. When I bought the fish I was very disappointed indeed. I could see were a couple of dull brownish catfish-like objects skulking in the corner of the tank. I lost one after a very short time, but the other proved to be even easier to keep than the red-tailed sharks. To my amusement and delight it simply grew and grew. In a few months it had grown to about 7 inches long, has changed from the dull brown to an attractive black and possesses enormous fins.

I have since bought another pair of black sharks and also a pair of red-tailed sharks (of which I know little about as yet).

If anyone is interested in keeping these fish they can gladly be the benefit of my meagre knowledge.

H. Greenwood,
Grimsby, Linco.

Correspondents Wanted

THE Aquarist Club of Kenya are anxious to contact clubs in the United Kingdom who have films or slides covering the hobby of tropical and marine fish-keeping.

A number of members have considerable success in collecting and rearing marine fishes off the East African Coast, where a magnificent selection abound in the near-shore reefs. Scans, puffers, clown, sergeant majors, damselfish, dragon and butterfly fish are comparatively common, and fairly easy to naturalise to the indoor aquarium.

Although Nairobi is 5,400 feet above sea level, and 530 miles from the coast, the fish travel well and settle down fairly quickly. If any club is interested in exchanging notes on marines or tropicaIs, the secretary is Mr. W. F. Jefferis, P.O. Box 9065, Nairobi, Kenya.

F. W. JEFFERIS,
Secretary, Aquarist Club of Kenya.

European Salamanders

In the article “European Amphibians” (The Aquarist, May) it is said that “There are only two species of salamanders in Europe”. This is not so. There are Salamandra salamandra, Salamandra pasculana and Ambystoma wartini besides the two mentioned in the article.

W. M. WAITE,
Godalming, Surrey.

Robert Boustead writes: The words “newt” and “salamander” are lay terms which are used very loosely. In North America the word “salamander” is used to describe all species of urodèles including what we would describe as newts. Alfred Leutensch, writing on “salamander” in Vivarium Life, says, “In European species the word is

THE AQUARIST
The Garden Pond in Summer 

By Astilbes

During the summer months the garden pond should be almost self-supporting. Provided that care has been taken with the water plants and the fish have been introduced with caution, all should be well. The water lilies should have grown well and provide plenty of shade, not only for the fish but also to help keep the water free from green algae. If the water is very shallow it is the worry of many pondkeepers to keep the lilies afloat during the wet season, as it is very difficult to move and stock a pond without a very green water once the sun gain power. The lilies will be kept in the shade but if the pond has recently planted it does give the water plants a chance to become established.

The most frequent causes of green water are the absence of lilies in the pond. This necessitates frequent blending in of fresh tap water. This encourages the formation of green algae very quickly. The remedy is to see to it that there are no cracks early in the year. A pond that can stand the summer with an occasional top-up with fresh water is more likely to remain clear than the pond which is repeatedly given fresh doses of tap water. A large amount of plants in the pond also has a strong bearing on the clarity of the water. A good crop of Elodea canadensis or Potamogeton major will do a lot towards keeping the pond clear and judicious feeding will also help. The presence of duckweed on the surface of a pond helps considerably to shade out excess of sunshine and it also provides food for the goldfish. Occasionally the duckweed will grow at a rate that the whole surface of the water becomes completely covered. The fish will like this condition but this will not occur if they are kept from seeing the surface.

The duckweed becomes too plentiful it can be removed manually from the small pond and even removed with a rake from the other sides. This method is in some case to play a strong jet of water from a hose on one side to the other of the surface. It is possible in some cases to still the duckweed into a mass that can be dug out with a rake from the other side.

F.B.A.S. Standards

Recently I have heard of some aquarists discussing Mr. A. Board's work on the Chalcosoma and its relationship, one of the remarks made was "what a pity the Federation of British Aquatic Societies does not produce standards for tropical fishes." They were quite surprised when I informed them that such Guides and Standards were available.

If any other of your readers wish to know more about them I would be pleased to send them a complete list of all Guides and Standards available, upon receipt of a stamped and addressed envelope.

J. A. Horner,
19 Beddwell Road, London, S.E.19.

New Coldwater Fishes Wanted

On looking through Otto Schneider's 'Guide to Freshwater Fish' I came across several European fishes which would seem suitable aquarium inmates, notably stronger, zippers, and other names, and yet, to the best of my knowledge, these species are unobtainable in British pet shops. Why should this be so? Surely, if as seems likely, European aquarists keep them, it should be an easy matter for some enterprising British dealer to arrange for some to be imported from the continent via one of his opposite numbers over there. After all, it is not as if they were in some remote place as is the case with some of the tropics. I know that I, for one, would welcome the appearance of these fishes on the market.

T. Pennington,
Ormskirk, Lancs.
THE death is reported from Bradford and District A.S. of Mr. A. E. Eyre who was one of the older members of the club and last year was elected president. He had also served on the committee for a number of years during which time he held the office of Secretary and his death is a great loss to the Society. The Society has recently reported the loss of Mr. N. F. Skeffington who had been a prominent member for some time. A copy of his obituary is included in this issue.

The Aquarist’s Badge

Produced in response to numerous requests from readers, this attractive silver, red and blue enamel medal emblem for the aquarist can now be obtained at cost price to all members of the Society. The design is pictured here (actual size). Two themes of the badge, one featuring the liped button-hole and the other having a branch-type finning, are available.

To obtain your badge send a postal order for 2s. 6d. to The Aquarist, 84, Bowes, Half-Acre, Brentford, Middlesex, and please specify which type of badge you require.

THE results of the Chelsea Aquarium Society Show were as follows: 1st, Mr. A. J. Cox (Gage); 2nd, Mr. J. R. Goss (Carlow); 3rd, Mr. F. C. Turner (Holland); 4th, Mr. J. W. Smith (Taylor); 5th, Mr. F. A. Jones (Greener); 6th, Mr. J. E. Gurney (Taylor); 7th, Mr. J. H. Williams (Taylor). Other awards included the Best in Show, which went to Mr. A. J. Cox (Gage), and the Best in Class, which was awarded to Mr. J. W. Smith (Taylor).
A joint meeting of the Northampton and District Aquatic Society and the Leicestershire and Rutland Aquatic Society was held at the Carlton Hotel on June 15th. The meeting was called to order by the President, Mr. E. F. Wright. The Secretary, Mr. T. L. Adderley, read the minutes of the previous meeting and the Secretary's report for the year. The President then introduced the guest speaker, Mr. J. R. Green, who gave a talk on the care and maintenance of goldfish. A vote of thanks was passed to Mr. Green for his talk. Following this, the meeting adjourned to allow the members to enjoy a buffet dinner at the hotel.

The next meeting of the Northampton and District Aquatic Society is scheduled for November and will be held at the same venue. The Secretary requested that members please mark their calendars for this important event.
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MIDLAND OPEN SHOW
AND TRADE EXHIBITION
Bingley Hall—Birmingham
August 22nd-25th 1962
Tropical and Coldwater Attractive Exhibits—Trade Stands
REFRESHMENTS, BAR AND COACH PARK
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Tropical and Coldwater
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WHITE ORANGES. 6s. 10s. 15s. 20s. 30s. 40s. 50s. 60s. 70s. 80s. 90s. 100s.

WHITE FISHES. 2s. 4d. 6d. 8d. 10d. 12d. 14d. 16d. 18d. 20d. 22d. 24d. 26d. Each.

WHITE ORANGES. 6s. 10s. 15s. 20s. 30s. 40s. 50s. 60s. 70s. 80s. 90s. 100s.

WHITE FISHES. 2s. 4d. 6d. 8d. 10d. 12d. 14d. 16d. 18d. 20d. 22d. 24d. 26d. Each.

WHITE ORANGES. 6s. 10s. 15s. 20s. 30s. 40s. 50s. 60s. 70s. 80s. 90s. 100s.

WHITE FISHES. 2s. 4d. 6d. 8d. 10d. 12d. 14d. 16d. 18d. 20d. 22d. 24d. 26d. Each.

WHITE ORANGES. 6s. 10s. 15s. 20s. 30s. 40s. 50s. 60s. 70s. 80s. 90s. 100s.

WHITE FISHES. 2s. 4d. 6d. 8d. 10d. 12d. 14d. 16d. 18d. 20d. 22d. 24d. 26d. Each.

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10.6 | 150 watts

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2.6 | Floating Spirit Thermometer
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3.0 | Shank Type

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### KILLIFISHES

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<tr>
<th>Species</th>
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<tr>
<td>JORDANELLA FLORIDAE</td>
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<td>APOLOCHIELUS DAVI</td>
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<td>APOLOCHIELUS LINEATUS</td>
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<td>EPIPLATYS CHAPIERI</td>
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<tr>
<td>EPIPLATYS GRAHAMII</td>
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<tr>
<td>EPIPLATYS SEXFASCATUS</td>
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<tr>
<td>PACHYPANCHAX PLAYFAIRI</td>
<td>7.00</td>
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<tr>
<td>APHYOSEMEON AHIH</td>
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<td>each</td>
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<tr>
<td>APHYOSEMEON ARNOLDI</td>
<td>7.00</td>
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<tr>
<td>APHYOSEMEON AUSTRALE</td>
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<td>APHYOSEMEON BIVITATOMUS</td>
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<td>APHYOSEMEON CALLURIUM</td>
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<td>APHYOSEMEON FIIALENTOSUM</td>
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<td>APHYOSEMEON SJOESTEDTI</td>
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<tr>
<td>NOTOBRANCHIUS GUNTHEI</td>
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<td>NOTOBRANCHIUS PALMQUISTI</td>
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<tr>
<td>NOTOBRANCHIUS RACHOVI</td>
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### DWARF CICHLIDS

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<td>APISTOGRAMMA RAMIREZI</td>
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<td>GOLDEN RAMIREZI</td>
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<tr>
<td>APISTOGRAMMA REITZEGI</td>
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<td>APISTOGRAMMA AGASSIZI</td>
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<tr>
<td>APISTOGRAMMA TAENIATUM</td>
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<td>NANNACARA ANOMALA</td>
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<tr>
<td>PELMATOCRUS KRIENISI</td>
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<td><strong>TOTAL</strong></td>
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### DISCUS

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<td>CARDINAL TETRAS (LARGE)</td>
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<td>each</td>
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<tr>
<td>NEON TETRAS (LARGE)</td>
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</tr>
<tr>
<td>GREEN SAILFIN MOLLY</td>
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<td>each</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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