

# WATER LIFE

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# White's Tree Frog (*Hyla Coerulea*)

By "AMPHIBIUS"

**F**ORMERLY only infrequently imported, and thus quite expensive, this animal is now upon the market at prices which put it within everybody's reach. It is rather more than twice as large as its European relative, *H. arborea*, but is by no means the largest Tree Frog. Underneath it is pink and white, the eyes are large and golden, and on top it is, under optimum conditions, a vivid and pleasing green. The effect of the film of moisture which always covers it is to render it as smooth and shiny as porcelain or enamel. It is irregularly spotted with white, and the position and number of white spots is varied from time to time. In common with the rest of its genus, it possesses the ability to vary its colour to a considerable degree. So beautiful and pleasing is its general appearance that it is always one of the first animals to attract attention in a collection.

White's Frog is not nearly such an active animal as its charming threepenny relative, and is satisfied with quite a small cage. I do not favour giving this or any other species the run of a greenhouse until tameness has been achieved, and even then it is better to let them live in a case and to let them out under supervision for their crepuscular exercise. Their normal mode of progression is to creep deliberately on all fours, but the introduction of a number of moths or flies into their cage calls forth an exhibition of quite remarkable saltatorial powers. When loose in a greenhouse the danger is not that they will jump out of the ventilators, etc., although these should be covered with netting, but that they will squeeze themselves into a small corner and starve. It only takes about a week to tame them thoroughly, and thereafter one can walk round and hold their food against their noses in forceps, so that the risk of starvation is avoided.

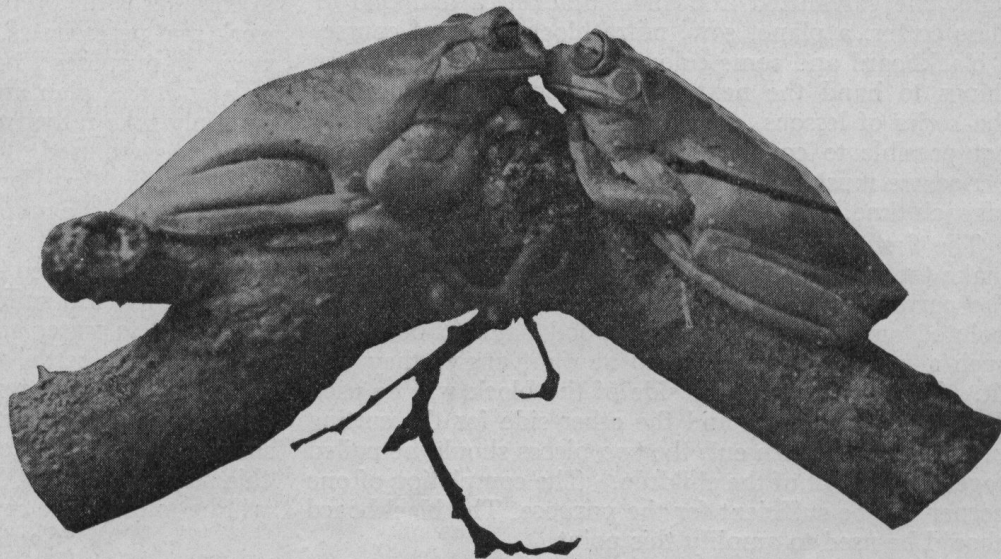
Meal worms may form their staple diet, but Tree Frogs, like any other animal, will tire of them if given nothing else. To feed the dozen or so that I usually have, I set up a few of those wire contraptions known as "fly balloons," in various parts of the garden, having previously baited them with a bit of "high" meat. At the end of the day each of these traps contains a collection of fat bluebottles, which I get into the cage by the following method: A sheet of perforated zinc which accurately covers the top of the cage has two or three holes about  $\frac{1}{2}$ " across cut in it. This piece of zinc is then slid between the top and bottom halves of the "balloon," the flies having been caused to assemble in the top half, and it is a simple matter to replace the zinc above the cage, and to slide the container of flies until it rests over the holes. If a basin is then inverted over the wire cage, the unfortunate insects will crawl into the light of the cage below, where they will be quickly snapped up.

Woodlice, small snails, earwigs, beetles, crane flies, etc., should be given as often as they are available, and during the winter cockroaches and crickets should break the monotony of meal worms. It is exceptional for Frogs of this species to eat earth worms. I should have mentioned that moths and butterflies—the harmful sorts—as well as their smooth caterpillars, are readily eaten. In spite of repeated assertions to the contrary, these animals, if allowed to become at all hungry, will not hesitate to seize and eat not only the European Tree Frog, but small *Rana* Frogs, Newts, and small Salamanders, so that it is advisable to segregate them while getting them into good condition after purchase. I have known odd specimens which made endeavours to seize small Axolotls out of shallow water.

The difficulty experienced by Tree Frog keepers in providing growing plants for *H. arborea* is manifest to an even greater degree with the present species by reason of its larger size, and it is as well to bear in mind that these animals are just as much at home on a branch as on a leaf, and that a fairly terminal branch of such a tree as the oak makes a very satisfactory resting-place for them. The floor of the cage may be covered with thick peat, which holds water nicely and helps up the cage humidity. On the peat small stone shelters should be set and a number of moss-covered bits of wood, on which, if sprayed regularly, the moss will continue to grow. It is soon discovered that Free Frogs are by no means arboreal, as the uninitiated assume, and that only a minority will spend all their time in the "tree." Quite a number will choose each a small cave or hole under one of the bits of wood as his own domain, and in association with which the same individual can nearly always be found.

Unless it is desired to try to breed them, a large volume of water is unnecessary, but they like to be able to immerse themselves completely on occasions, so that enough water for this purpose should always be available.

As regards temperature, they are by no means tropical animals, and their optimum lies in the neighbourhood



of 70° F., although they will feed and remain healthy at 62° F. Thus they are able to live outdoors in the summer, and an ordinary living-room with a fire or radiator is quite adequate during winter. Good light is important, and the case in which they live should be favourably situated in this respect. As with *H. arborea*, prolonged exposure to a high temperature in a glass enclosure will kill them, so that if they are kept outdoors in a sunny position, their cage should be made of wood, "Windolite," and wire gauze or netting, with only the inspection panel of glass. Such a case is portable, and can be stood over a clump of pretty strong-growing plants or a shrub. If and when the plants show signs of strain, the cage can be moved on a bit.

The croak is like that of *H. arborea*, only much louder. It is not at all an unpleasant sound in the garden, but if a number are kept it is perhaps best not to set the cage too near one's own or one's neighbour's house. It is pleasantly audible at fifty or sixty feet.

The beautiful Golden Tree Frog (*Hyla aurea*), an Australian species closely allied to that under review, is at present obtainable, and the opportunity to acquire it should be taken, as there have not been, I believe, any imported for several years. Its treatment is the same as for *H. cœrulea*, and it is a good liver.



[Photographed at Cura's Fish Farm]

## The School Aquarium

### 3.—The Tank

By W. A. H. EDWARDS

**I**N the previous article, entitled "The Scheme," I outlined a list of what I considered to be the most important subjects for consideration and set them out in a definite sequence according to the order in which they should be taken. Before considering the treatment of the first section I think it is as well to point out that whatever method of treatment is adopted it must be concrete and not abstract.

The first essential for the particular study in hand should, of course, be the tank itself. Without this, the main piece of apparatus, the subject cannot be treated properly. In addition, in order to make the lesson as practical as possible, several other things are necessary. These would consist of glass, putty, wood for the base, slate, one galvanized iron angle bracket, a diamond or glass cutter, a plane, saw, mitre block, and, of course, a blackboard and some coloured chalk. With all these things to hand the next thing to do is to commence the series of lessons, proceeding step by step. As it is not possible to cover the whole of the ground in one period we must be sure to recommence where we leave off each time.

The first thing to do is to show the children how to make the base, and this necessitates a demonstration on the correct use of the mitre block. First, it should be pointed out that the pieces of wood have to be cut in such a way that when placed at right angles they will fit. This means that one side of the block will be used for cutting one angle and the other side for the cutting of the other. When cut, the two pieces should be nailed together in front of the children. The completion of one corner will be sufficient for the purpose. The blackboard should be used to amplify this point.

The next step consists of cutting and fitting the glass. In this case also it is enough to cut it into two pieces to show how the corner is fitted. For this demonstration a pliable surface is required, such as a piece of felt, or, failing that, a newspaper. To ensure cutting a straight line a length of  $\frac{1}{2}$ " wood with a straight edge is required. Having scored the glass, pointing out that the cutter must be held upright, it should be placed on a piece of wood with the score along one edge. A sharp press, either with a piece of wood or the hand, will then be sufficient to snap the glass in the right place. With this done the two pieces of glass should be fitted to form a right angle in the angle bracket and the whole then glazed.

This will conclude the construction, and the next point to consider is the preparation, which is in itself a piece of work that necessitates a certain amount of care. For all practical purposes I have found that fine sand is as good as any for a planting medium. The preparation will certainly take rather more time than if a ready prepared compost were used, but I have found that it is this little extra work that keys the children up to a state of expectation. To prepare the sand two things are needed, a bucket and, if it is possible to obtain one, a wooden spoon such as is used in jam-making. Failing this, however, a stick will suffice. Two handfuls of sand should be placed in water and stirred well. The sand should be allowed to settle and the water can then be poured off and the process repeated until the water covering the sand is perfectly clear. This process should be repeated until sufficient sand for the tank has been prepared. At this stage I feel that I should mention that the children will be found quite capable of performing this operation.

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## A "Singing" Toad

IT is characteristic of the water life hobbyist that he is occasionally overwhelmed by the desire to go out and acquire, by purchase or collection, some new specimens. It was in such a frame of mind that we recently paid a visit to a West Hampstead dealer, where we had heard we might find interesting specimens, including a toad of a name new to us, the Emeraldine.

To find that the Emeraldine was only our old friend the Changeable Toad (*Bufo viridis*) was not a disappointment, for the specimens offered for sale were extremely fine, being of good size and exceptional colour. For those who are not familiar with this toad its colour may briefly be described as a marbling effect of green and pale yellow. The male carries a number of red warts about the back. It is rather smaller than the Common Toad.

We purchased a pair and took them home with us. During the night we once heard a distant whistling noise, which, being unlike any toad or frog call we knew, was not connected with the newcomers. In the morning, it was found that they had paired up, and the female was carrying the male around. Visions of them spawning rose before our eyes, but after a fortnight they had not done so, and the female gave up carrying the male, and dug herself a hole in the sand, where she lay with her head sticking out.

The male greatly resented this change of affection, and began to show his disapproval accordingly. In the afternoon we were surprised to hear a loud, rolling whistle of medium pitch, which was maintained for about a quarter of a minute. This was repeated at frequent intervals; on investigation we found the male Changeable Toad sitting in front of his lady, with his throat blown right out, as illustrated, singing his very best. The noise has been compared by visitors to a cricket, though of much lower pitch, and to the sustained roll of a canary, and it is quite unlike any other toad calls, being without the least suggestion of a "croak."

A little experimentation soon revealed that he would readily answer a human whistling the same note, and the same note sustained by any orchestral instrument playing on the radio also set him off. Though quite a pleasing note, it was very penetrating, and could be clearly heard 200 yards away.

So far the singing had been quite a novelty, but a



small child visiting us strongly objected to the sound, and it seemed that if the toad was not stopped, we were in imminent danger of having another "singer." Remembering some advice heard some time ago, "Toady" was put into a jam jar with a lid, and shut up in a dark cupboard; but he still proceeded to sing cheerily at intervals, and, when released after an hour or so, went off again all the merrier.

At eleven o'clock that night he was still going strong, and to prevent disturbing neighbours—for some neighbours have been known to make a great fuss over the singing of Edible Frogs, he was put into his jar, with a saucepan lid on top, and placed by the bedside. After midnight there was a crash as the lid was sent flying, and then again the voice was raised heartily and energetically, much to our discomfort. A piece of stone was placed on the top of the jar, and after a severe talking to "Toady" settled down for the night, but resumed his vocal efforts at the crack of dawn.

For a week he sang all day, and under protest and imprisonment desisted for part, at any rate, of the night. We found one effective way of shutting him up for an hour or two, and—though it may seem a little severe, something had to be done—this was to put him, in his jar, on the bottom shelf of the refrigerator, which was set at its least cold temperature, for about five minutes. Under these conditions he really "froze" up.

By the way, do not be put off the beautiful Changeable Toad by this experience, for they do not all behave this way, and they make very good subjects for the vivarium in or out of doors, feeding readily and becoming quite tame.

# The Care of Your Tortoise

By CHAS. H. HARRIS, F.Z.S.

**M**ANY thousands of Tortoises are imported into England every year, and most of them find their way to some town or country garden. Owing to improper treatment, only a very small percentage of these survive their first winter in this country; but this should not be so, because the ordinary land Tortoise is exceedingly hardy, its wants are few, and it can put up with bad conditions for a very long while.

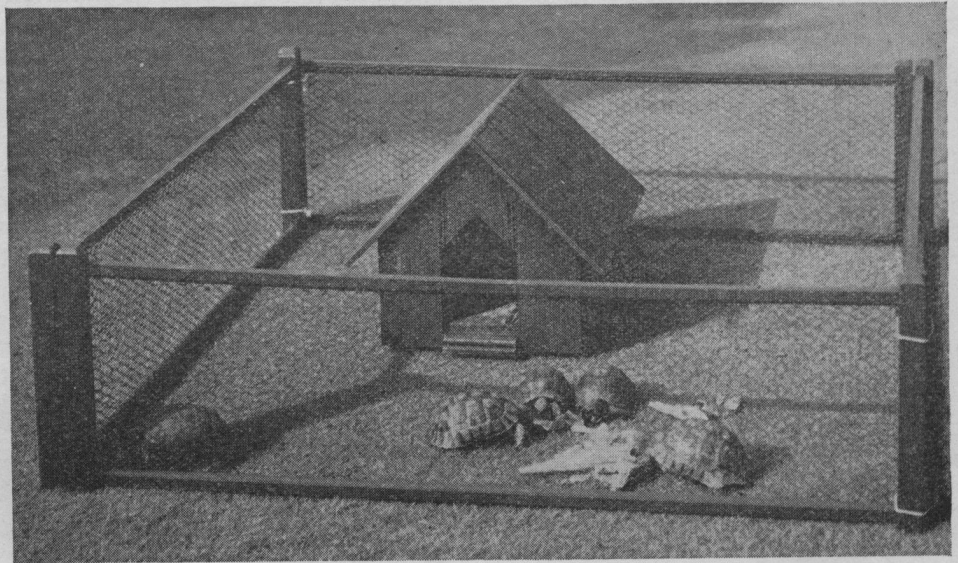
These Tortoises are natives of the lands bordering the Mediterranean Sea—Greece, Palestine, Morocco—and, of course, out there they enjoy more months of summer weather than they can ever have over here. They are cold-blooded, that is, the temperature of their blood is not maintained at a definite level, as is ours, but is always about the same as that of the atmosphere in which they live, so that in hot weather their bodies are hot while in cold weather their blood temperature drops to a much lower level. When they become cold their activities are slowed down, and if the cold is severe they fall into a kind of death-like sleep, from which nothing can rouse them but a rise of temperature. This sleep, of course, is hibernation.

On the other hand, in really hot weather, such as they experience in their native lands, they become exceedingly alert and active—for Tortoises—and their slow, laboured crawl becomes a fast shuffle.

During their active period they are great feeders, but, of course, while hibernating they eat nothing, so that in their native haunts they have a much longer feeding period than they can ever get in England. Our climate forces on them a much longer starvation period, so that the tendency is for them to go into hibernation in a semi-starved condition.

Though they hardly move at all during their winter sleep the heart is beating and other bodily functions are going on, and though all these functions are much slowed down during hibernation, some energy is used up in carrying them out, and this can only come from the food consumed during the feeding period. The ill-fed Tortoise soon uses up its accumulated store of energy and just fades out, or perhaps exists till April, then becomes active but collapses and dies before the weather has warmed it up sufficiently for its appetite to return.

It is obvious, then, that the treatment of such Tortoises should be along the following lines. Induce them to eat as much as ever they will during hot weather and when they start to hibernate keep them as inactive as possible, so that they are not using up more energy than is absolutely necessary. During their winter sleep keep the Tortoises in a wooden box filled with dead leaves. The lid should be securely tied down so that



[Photo by Chas. H. Harris, West End Lane.]

they cannot get out, air being admitted by a number of  $\frac{1}{2}$ " holes drilled in the side of the box. Keep this box in an outhouse, which must be frost-proof and cold and dry in winter.

It is a great mistake to let these creatures out for an airing on fine, warm days during their hibernation. They will never feed at such a time, and any activity induced by the warm day means a loss of energy which most likely they can ill afford. During hibernation keep them continuously cold enough to prevent them moving, as far as possible, but actual frost is likely to be fatal to them.

Land Tortoises are strict vegetarians and will never attempt to eat slugs, snails, insects, and other garden pests. Some people give them the run of the garden, leaving them to find their own food. This is not a very satisfactory plan. There is usually little in a flower garden which a Tortoise finds useful for food, and we do not want it to eat our flowers, even if it would. It is best to pen them with small meshed wire-netting about 1' high, so that we always know where they are and where we can put their food and be sure of their finding it.

Lettuce, dandelion and cabbage are the best foods—with lettuce as first favourite. The yellow "hearts" are not nearly so good for this purpose as the deep green leaves. Food dipped in water just before it is given will stay fresh for some time and Tortoises fed on very juicy food will not need water to drink.

A movable pen can be placed on a lawn without damage to the grass. The pen can be made as in the illustration, in four sections, which are hinged together in pairs; the two pairs are placed together so as to form a square, and the unhinged uprights are securely tied together. To move it one has to step into the square, take hold of an opposite pair of sides and carry it to its new position. The house, of course, should

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# Willow Moss

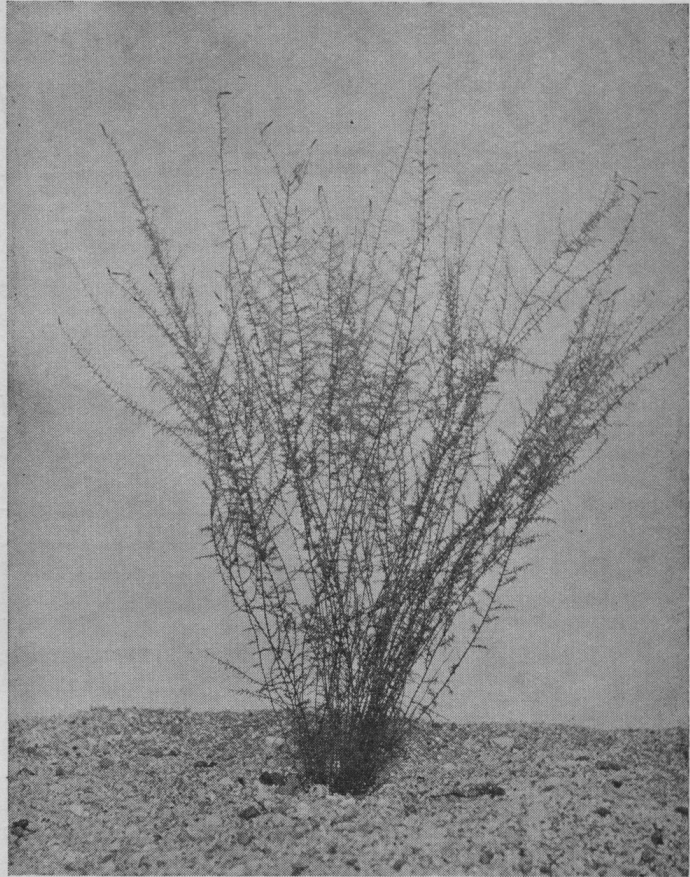
By MARGERY G. ELWIN

WE are most of us familiar with the ordinary Willow Moss (*Fontinalis antipyretica*), which quite closely resembles the plant shown in the accompanying illustration, but is much coarser and heavier in appearance and has considerably larger leaves. It is dark sage green in colour and is commonly found in fast-running streams attached to rocks, the projecting roots of the waterside trees, old tree trunks, etc. It is much favoured by many cold-water aquarists as a means of keeping the aquarium water clear, as the close-set leaves and stalks of the plant catch up and hold the fine swirling sediment, and all that is necessary is to remove the plant every now and then when it gets too dirty and give it a good wash before returning it to the tank.

But as in Nature it lives in running water, *Fontinalis antipyretica* will not thrive for long in either the cold-water aquarium or the pond; it is very difficult to persuade it to reroot when once it has become detached from its stone or log: it will not grow, and eventually turns brown and dies. It will not thrive in warm water, and rapidly rots in the tropical aquarium.

On the other hand, *Fontinalis gracilis*, the species shown in the photograph, does extremely well in both the tropical and the cold-water aquarium. This species also grows wild in this country, but it is comparatively rare, and is found, not in fast-running streams, but around the shallow margins of ponds. Consequently it is accustomed to still water and to much higher temperatures than the related species, *antipyretica*, and therefore naturally adapts itself more readily to aquarium conditions. As can be seen, the stems and leaves are very fine and graceful (as suggested by the specific name *gracilis*); the colouring is also more beautiful than that of *Antipyretica*, being a rich, bright, emerald green. Altogether this is a very desirable plant, since it is attractive to look at and also eminently suitable for the reception of eggs or as cover for fry.

One word of warning; when collecting either of these plants from the wild a certain amount of care should be exercised before introducing them into the pond or



*Fontinalis gracilis*

aquarium as usually they absolutely swarm with live-stock of various kinds—Shrimps, *Asellus*, Tritails, Leeches, small Dragonfly larvæ, etc. While many of these creatures provide most welcome live food for the fishes, the aquarist should, of course, guard against bringing in Leeches and larvæ which are likely to injure the fish. The best plan is to give the moss a really thorough wash in a small bowl before putting it in the aquarium; the live-stock can then be sorted at leisure. If it comes from waters which are inhabited by fish, it is also as well to submerge it for about a quarter of an hour in light pink permanganate solution, which will act as a fairly efficient disinfectant against any germs of disease which may possibly be present.

## The Care of Your Tortoise (Continued from page 29)

be rainproof and it should be raised on four little feet. Cotton reels screwed on to the four corners of the bottom make excellent feet.

House and pen, if moved to a new position on the lawn every day, will not injure the grass or cause it to turn yellow, and when winter comes the tyings can be cut so that the pen is again in two sections, each of which can be folded flat on its hinges. Sections and house can be stored away in a dry outhouse till the next April.

Tortoises should always be penned in a sunny place. When they wish to get out of the glare of the sun or retire for the night they will enter the house, but in the early summer and late autumn, when night frosts are likely, they should be put in the house in the evening if they have not gone in of their own accord.

In normal seasons Tortoises should be put out in their pens in mid-April and put back into hibernation quarters in October. Always put in the hibernation box as many dry leaves as it will hold. Straw is not as good as leaves, it is too long and the Tortoises are apt to become entangled, and I do not recommend using hay for this purpose as I think that the agreeable aroma may become poisonous to animals shut up in it.

If the Tortoise is allowed the run of the garden during the summer it should not be allowed to hibernate by digging itself in. Our winters are too wet for it to hibernate in that way except in a comparatively few favoured places in the south of England, where there is particularly well-drained, sandy soil.

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Chas. H. Harris, 92, West End Lane, W. Hampstead, N.W.6  
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Sisson's Perfect Aquaria, 5, Acton Street, W.C.1  
Waterloo Goldfishery Co., 47, Gt. Guildford St., Boro', S.E.1  
Wigmore Tropical Fisheries, Jason Court, Wigmore St., W.1

## FANCY GOLDFISH

### WHOLESALES

L. Cura & Sons, Baynes Court, Rosebery Avenue, E.C.1  
Chas. H. Harris, 92, West End Lane, W. Hampstead, N.W.6  
Robinson's Fisheries, 19/21, Martin St., Stratford, E.15  
Sisson's Perfect Aquaria, 5, Acton Street, W.C.1  
Waterloo Goldfishery Co., 47, Gt. Guildford St., Boro', S.E.1

### RETAILERS

L. Cura & Sons, Baynes Court, Rosebery Avenue, E.C.1  
Chas. H. Harris, 92, West End Lane, W. Hampstead, N.W.6  
Perry Inman, Northgate, Devizes, Wilts.  
Sisson's Perfect Aquaria, 5, Acton Street, W.C.1  
Waterloo Goldfishery Co., 47, Gt. Guildford St., Boro', S.E.1

## FISHING TACKLE

### RETAILERS

C. Church & Son, 38, Wood Street, Walthamstow, E.17  
Pope & Robertson, 57, Weymouth Street, W.1

### WHOLESALES

Robinson's Fisheries, 19/21, Martin St., Stratford, E.15

## FOUNTAIN PUMPS

### MANUFACTURERS

"The Ryder" (R. R. Sidwell, Ltd.), 68, Brunswick Place, N.1

## HEATING APPARATUS

### MANUFACTURERS

L. Cura & Sons ("Marco"), Baynes Ct., Rosebery Ave., E.C.1  
Dowler Electrical Engineering Co., 57, Weymouth St., W.1  
Putnams Depend. Serv. (Lit. Putnam Stove), Northam, Dev.  
"The Ryder" (R. R. Sidwell, Ltd.), 68, Brunswick Place, N.1  
Waterloo Goldfishery Co., 47, Gt. Guildford St., Boro', S.E.1

### WHOLESALES

L. Cura & Sons, Baynes Court, Rosebery Avenue, E.C.1  
Maryland Engineering Co., 23, Leadenhall Street, E.C.3  
Robinson's Fisheries, 19/21, Martin St., Stratford, E.15  
Waterloo Goldfishery Co., 47, Gt. Guildford St., Boro', S.E.1

### RETAILERS

L. Cura & Sons, Baynes Court, Rosebery Avenue, E.C.1  
Derham Fish Farm, 23, Queen's Avenue, Watford, Herts.  
"The Ryder" (R. R. Sidwell, Ltd.), 68, Brunswick Place, N.1  
Sisson's Perfect Aquaria, 5, Acton Street, W.C.1  
Waterloo Goldfishery Co., 47, Gt. Guildford St., Boro', S.E.1  
Wigmore Tropical Fisheries, Jason Court, Wigmore St., W.1

## LIVE FOODS

### RETAILERS

C. Bechter, 80, Gloucester Street, Victoria, S.W.1  
L. Cura & Sons, Baynes Court, Rosebery Avenue, E.C.1  
L. Haig, 10, Featherstone Buildings, High Holborn, W.C.1  
Sisson's Perfect Aquaria, 5, Acton Street, W.C.1  
Waterloo Goldfishery Co., 47, Gt. Guildford St., Boro', S.E.1

## WHOLESALES

C. Bechter, 80, Gloucester Street, Victoria, S.W.1  
L. Cura & Sons, Baynes Court, Rosebery Avenue, E.C.1  
Robinson's Fisheries, 19/21, Martin Street, Stratford, E.15

## MEDICINES

### WHOLESALES

F. Ditchfield, 65, Albert Street, N.W.1

## PET STORES

H. J. Castle, 823, High Road, Goodmayes, Essex.  
Gay's Fisheries, 96, Waterloo Road, S.E.1  
"Pets," 1, Richmond Road, Twickenham, Middx. (next Twickenham Cinema)  
The Livestock and Food Stores, 5, Burleigh St., Cambridge  
C. Wright, 327, Ilford Lane, Ilford, Essex

## PLANTS—Aquamium

### WHOLESALES

C. Bechter, 80, Gloucester Street, Victoria, S.W.1  
L. Cura & Sons, Baynes Court, Rosebery Avenue, E.C.1  
Robinson's Fisheries, 19/21, Martin St., Stratford, E.15  
Sisson's Perfect Aquaria, 5, Acton Street, W.C.1  
Spratt's Patent, Ltd., 58, Mark Lane, E.C.3  
Waterloo Goldfishery Co., 47, Gt. Guildford St., Boro', S.E.1  
Wigmore Tropical Fisheries, Jason Court, Wigmore St., W.1

### RETAILERS

C. Bechter, 80, Gloucester Street, Victoria, S.W.1  
F. S. Callow, 20, Church Street, Stoke Newington, N.16  
L. Cura & Sons, Baynes Court, Rosebery Avenue, E.C.1  
Derham Fish Farm, 23, Queen's Avenue, Watford, Herts.  
L. Haig, 10, Featherstone Buildings, High Holborn, W.C.1  
M. E. Green, 1-3 & 5, Hobmoor Rd., Small Heath, B'ham, 10  
Perry Inman, Northgate, Devizes, Wilts.  
Capt. R. Lane, West Bergholt, Colchester  
L.P.F.S., 1352, London Road, Leigh-on-Sea  
"Pets," 1, Richmond Rd. (next Twickenham Cinema), Middx.  
Stanley Plater, 92, Umfreville Road, Harringay, N.4  
Sisson's Perfect Aquaria, 5, Acton Street, W.C.1  
Waterloo Goldfishery Co., 47, Gt. Guildford St., Boro', S.E.1  
Wigmore Tropical Fisheries, Jason Court, Wigmore St., W.1

## PLANTS—Pond

### WHOLESALES

C. Bechter, 80, Gloucester Street, Victoria, S.W.1  
L. Cura & Sons, Baynes Court, Rosebery Avenue, E.C.1  
Derham Fish Farm, 23, Queen's Avenue, Watford, Herts.  
Chas. H. Harris, 92, West End Lane, W. Hampstead, N.W.6  
Robinson's Fisheries, 19/21, Martin St., Stratford, E.15  
Sisson's Perfect Aquaria, 5, Acton Street, W.C.1  
Spratt's Patent, Ltd., 58, Mark Lane, E.C.3  
Waterloo Goldfishery Co., 47, Gt. Guildford St., Boro', S.E.1

### RETAILERS

C. Bechter, 80, Gloucester Street, Victoria, S.W.1  
L. Cura & Sons, Baynes Court, Rosebery Avenue, E.C.1  
Derham Fish Farm, 23, Queen's Avenue, Watford, Herts.  
H. Gould, Long Sutton, Taunton.  
M. E. Green, 1-3 & 5, Hobmoor Rd., Small Heath, B'ham, 10  
L. Haig, 10, Featherstone Buildings, High Holborn, W.C.1  
Chas. H. Harris, 92, West End Lane, W. Hampstead, N.W.6  
Perry Inman, Northgate, Devizes, Wilts.  
Kenneth A. Isaacs, F.R.H.S., 13, Mercers Road, N.19  
L.P.F.S., 1352, London Road, Leigh-on-Sea  
Sisson's Perfect Aquaria, 5, Acton Street, W.C.1  
Waterloo Goldfishery Co., 47, Gt. Guildford St., Boro', S.E.1

## SAND, ETC., FOR AQUARIUMS AND PONDS

L. Cura & Sons, Baynes Court, Rosebery Avenue, E.C.1  
D. S. & L. Co., Ltd. (Sea Shells, Pearl Chips), Shore, Perth  
Robinson's Fisheries, 19/21, Martin St., Stratford, E.15  
Sisson's Perfect Aquaria, 5, Acton Street, W.C.1  
Spratt's Patent, Ltd. (Ag. & Pond Compost), 58, Mark Lane, E.C.3  
"The Ryder" (R. R. Sidwell, Ltd.), 68, Brunswick Place, N.1  
Waterloo Goldfishery Co., 47, Gt. Guildford St., Boro', S.E.1

## TROPICAL FISH

### WHOLESALES

Philip Castang, 91, Haverstock Hill, N.W.3  
L. Cura & Sons, Baynes Court, Rosebery Avenue, E.C.1  
Sisson's Perfect Aquaria, 5, Acton Street, W.C.1  
Wigmore Tropical Fisheries, Jason Court, Wigmore St., W.1

### RETAILERS

Philip Castang, 91, Haverstock Hill, N.W.3  
Chalkwell Aquaria, 941, London Road, Leigh-on-Sea  
L. Cura & Sons, Baynes Court, Rosebery Avenue, E.C.1  
Derham Fish Farm, 23, Queen's Avenue, Watford, Herts.  
M. E. Green, 1-3 & 5, Hobmoor Rd., Small Heath, B'ham, 10  
Capt. R. Lane, West Bergholt, Colchester  
R. Scragg & Co., Epsom Corn Stores, South St., Epsom  
Sisson's Perfect Aquaria, 5, Acton Street, W.C.1  
Stanley Plater, 92, Umfreville Road, Harringay, N.4  
H. S. Townsend, 154, South Avenue, Southend-on-Sea  
H. Van Hal, 77, Portobello Road, W.11  
Wigmore Tropical Fisheries, Jason Court, Wigmore St., W.1

# The Clawed Frog of Africa

By L. G. PAYNE

**T**HIS species, *Xenopus levis*, which is now on the market again at a price which will put it within the reach of most lovers of amphibians, is reputed to occur commonly throughout the eastern half of that great continent. This fact alone would serve to give it some claim to distinction, for practically all the species of Frogs and Toads which inhabit our vivaria are European. When I add that the Clawed Frog is tongueless, has periscopic eyes, and is possessed of so smooth a skin that the most experienced keeper of amphibia will probably find himself obliged to use both hands to effect a capture, then we can begin to form a picture of this amazing and amusing Frog.

Ask one of your aquarist friends, in a casual sort of way, to lift one of the Clawed Frogs out of its tank; then note the changes of expression on his face ere he finally admits, in baffled surprise, the difficulty of the task!

The Clawed Frog possesses remarkably strong hind legs and beautifully webbed toes. This web consists of a delicately veined transparent membrane, which fully covers the space between the toes, and which adds enormously to the propulsive power of the foot. The three inner toes of the hind feet terminate in black, horny points, the characteristic from which the Frog derives its name. The front feet are by comparison weak, and are little more than sensory members, mainly used for pushing food into the Frog's mouth.

In coloration the Frog is dark brown above, usually vaguely chequered, and whitish beneath. This contrast is very noticeable with tank-kept specimens, and serves to emphasize the quaint attitudes these amphibians unconsciously adopt. Finally, for purposes of easy comparison, we may say that the Clawed Frog attains to a size distinctly larger than that of the common Frog.

Now what are the requirements of *Xenopus* under conditions of captivity? Here we have to remember that we are dealing with a creature which, hailing as it does from Africa, has not unnaturally always been regarded as requiring, if not a tropical environment, at the very least a total immunity from frost and the ordinary conditions of an English winter. That this is a fallacy which deserves to be exploded is the conclusion to which the writer has come after some years of experiment, and it will perhaps be best in this article to treat the method of keeping in confinement from two entirely different angles.

The Clawed Frog is equally suited to the indoor tank or the outdoor pool. In either "home" it may be left the year round; or pool specimens may be brought indoors to enliven a tank in winter, though I would not advise the converse procedure.

The ordinary 2' x 1' aquarium makes a very suitable tank for up to four Frogs. It must be remembered that it is as fatal to overcrowd amphibians as fish; and, further, that the more individuals there are in a given limited space the less opportunity there is to observe the natural habits of the captive. Two characteristics of the Clawed Frog which have an important bearing on the tank furnishing are that the amphibian is strictly a carnivorous feeder and that it is by nature a bottom feeder. A close-packing white sand is to be recommended for the floor of the tank. This will readily reveal the presence of uneaten food, which should be removed daily; further, as Clawed Frogs are very partial to garden worms, this firm bottom will prevent the latter from burrowing out of sight. My experience is that if a coarse grade aquarium shingle is used, living worms given as food rapidly work their way beneath the shingle, there to die and putrefy the water.

The "rooting" habits of the Frog make it practically impossible to grow water plants in the ordinary way by planting these in the sand, and it will be found more satisfactory to plant some fairly tough aquatic, such as *Elodea* or *Vallisneria*, in a shallow earthenware bowl. This bowl can then be set on the bottom of the tank, its sides being camouflaged with two or three large stones. The stones will help to obviate the impression that the bowl has just been stuck in and will, if irregular in shape, provide that shelter and privacy for the



"Klu Klux Xenopus!"



inmates of the tank which is appreciated by all amphibians.

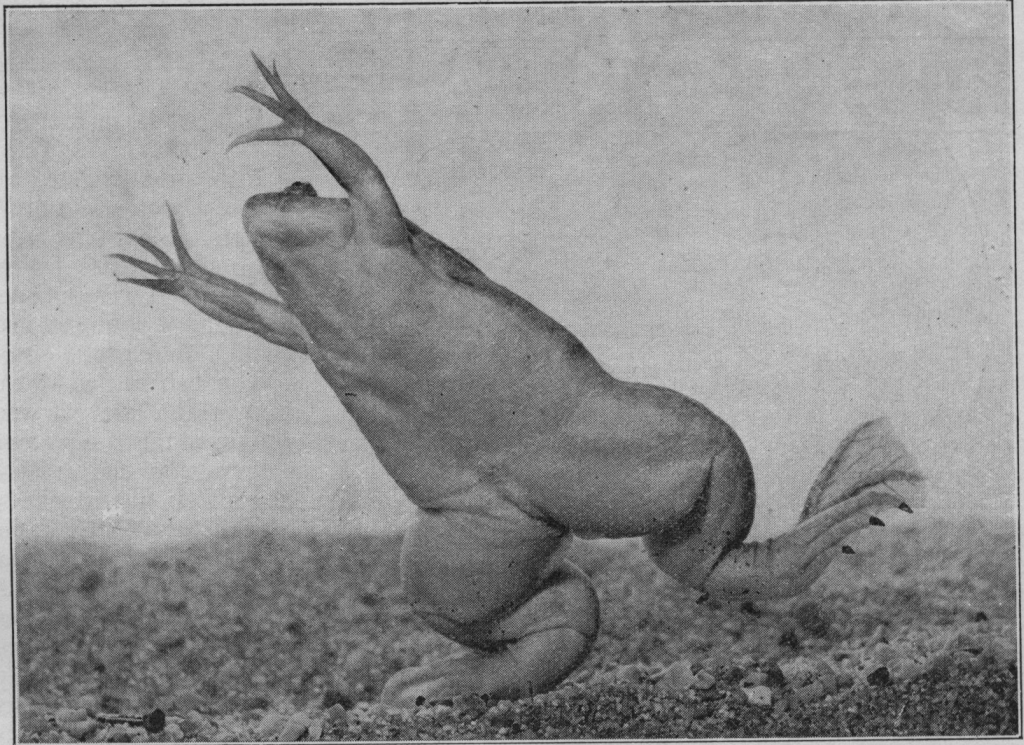
The Clawed Frog is easy to feed, its requirements being satisfied with earth worms and raw meat. As many worms may be given as will be eaten at once. No good purpose is served by leaving unwanted worms to wander round the tank in the expectation that these will be eaten later on; it is better to remove these until the next meal-time. Meals should be served once a day, and if chopped fresh meat is given once in three days the variation will be beneficial. Tadpoles of the Common Frog are also appreciated.

Some simple system of aeration is worth while, and if this is not provided it will be desirable to change a third of the water contents daily. This is, of course, a counsel

of perfection, and there are doubtless many tanks of Clawed Frogs in existence where the water conditioning is attended to much less frequently. If the tank is kept in a living-room during the winter a good pearl electric light bulb suspended between wall and tank will show off the occupants to great advantage. If the daily removal of uneaten food and organic refuse is scrupulously attended to there is every reason to expect your Clawed Frogs to live in perfect health for years in the indoor aquarium.

It is just possible that under these conditions your Frogs may be induced to breed; in which event the eggs will be found attached singly to the vegetation or stones. A fairly constant water temperature should be maintained when the eggs may be expected to hatch out in about two days. The tadpoles are remarkably transparent and, according to one writer, their normal resting attitude is pendent with the heads downward. A few broods have been reared in this country and there would appear to be wide scope for experiment in this direction.

And now what is to be said of the Clawed Frog as an inhabitant of the outdoor pool? For the pondkeeper who is looking for something unusual which he can safely put with his (adult) Goldfish, the Clawed Frog offers a new field. True, the only colouring which will be seen from above is a dull brown, but the queer eyes and delicate front legs will at once attract attention. On first introduction the Frogs will probably be somewhat timid, but, as with most reptiles and amphibians, a certain tameness develops in time, and this is distinctly hastened if the owner will take care never to make sudden or jerky movements within the animal's range of vision. In garden ponds of the less formal type, where grass and vegetation come down to the water's edge, it is quite unnecessary to provide food artificially, as the Clawed Frogs will spend the summer nights at the pond



The Clawed Frog in more frivolous mood—Figure Skating

edge lying in wait for the worms and other creatures which also appreciate the damp conditions.

The Clawed Frog is invariably stated to be entirely aquatic, but the writer feels that this cannot be strictly accurate, as he has frequently seen the Frogs on a warm evening crossing the garden path from pool to pool. They appear to be exceedingly clumsy out of the water, and one cannot but speculate upon the driving force of the instinct which urges them to leave one area of water for another when both pools are, to the human observer at least, equally suitable.

Although they will find their own food, it is an excellent plan if Frog spawn is obtainable to introduce some of this as it will form a basis of food for the early summer months.

With the coming of the first frosts of winter, the Clawed Frogs will burrow into the mud at the bottom of the pond, there to remain in perfect safety until the following spring. The hardiness of the Clawed Frog must appear amazing when we remember its country of origin, but the reader who elects to try these creatures out of doors may rest assured that no thickness of ice nor density of November fog will affect his Frogs provided these have a few inches of earth on the pond bottom below ice level.

A curious feature of the Clawed Frog is that the legs have the appearance of having been sewn on with white cotton. On the pale under side the "tacking stitches" are not very noticeable, but on the dark back they are very obvious as can be seen from the illustration.

\* \* \*

OCTOPUS ON BEACH.—A young octopus, about 3-ft. long, found stranded on the beach at Tankerton, Kent, was sent to the London Zoo.

# Thyroid

## What it is, and its Effect on Tadpoles

I EXPECT most readers have at some time or other heard of the thyroid gland, and possibly wondered what it is. It is a little organ situated in the neck in close contact with the gullet, and it plays a very important part in the metamorphosis and growth of animals. A "scientific friend" of mine suggested that I should perform some experiments in this direction to find the exact effect of over-secretion or hyperthyroidism on tadpoles of the common frog. He kindly obtained for me some thyroid tablets, which are really the actual gland itself made into tablet form for convenience, and which are used for the treatment of hypothyroidism (a condition caused through under-secretion of the thyroid gland), in animals.

I procured some jars, and numbered them, for the purpose of entering results into a note-book, and filled each jar with water. In all jars except one I dissolved thyroid tablets in different strengths. Then I placed in each jar some tadpoles and a small piece of water weed. In the jar that contained no dissolved thyroid I placed a tadpole and a piece of water weed, for the purpose of a control experiment.

After a short time the tadpoles in the strongest solution of thyroid began to get smaller and to show signs of red coloured organs under the skin of the belly. These, I am firmly convinced, were lungs, as about this time the tadpoles were obliged to obtain their air from the surface, a thing the control tadpole did not have to do. The next development of the tadpoles was the production of an elongated head (like an adult frog's), with prominent eyes, and the appearance of a pair of small back legs. The legs grew much larger and the tail began to disappear, while all the time the froglike body was becoming more and more evident.

These tadpoles appeared unhealthy, however, and seemed to have lost the power of remaining at the bottom at will. After a short time, during which the changes continued, the tadpoles died before complete metamorphosis had taken place. The control tadpoles were at this time progressing normally and showed none of these symptoms.

The tadpoles in the lesser strength thyroid solution began to develop more slowly, but died when they reached the "back leg" stage, as the others had done. Having had these results, I performed the experiment again, and took some notes. They are as follows:—

May 10.—I placed a tadpole in the jar. Its length was 2.75 centimetres.

May 12.—Length the same, 2.75 centimetres.

May 15.—Length the same, 2.75 centimetres.

May 19.—Tadpole had become smaller, length 2.3 centimetres.

May 20.—Length rapidly decreasing, 1.75 centimetres.

May 21.—On this date I found the tadpole dead, with back legs, and only 1.5 centimetres long.

During this period of eleven days, in which the thyroid-fed tadpole lost 1.25 centimetres in length, the non-fed tadpole remained the same length, and is still the same, and quite alive, 3.75 centimetres long. So by the results

of these controlled experiments, in which a tadpole under exactly the same conditions as the thyroid-fed tadpole, with the exception of the absence of thyroid, did not metamorphose (and still has not), is shown the active part played by the thyroid gland in the development of various animals. I intend to repeat my experiments, this time on the axolotl, and with an eye to changing them to the Salamander of which they are the larval form.

[The tablets used contained 3 grains of fresh gland; the strongest solution contained 4.5 grains of fresh gland. A solution of a slightly lower thyroid content has slightly better results.]

A. J. EVANS.

\* \* \*

## Photographic Competition

MOST people take photographs during the summer, and the number of "Holiday snaps" taken annually must be enormous. Usually they are shown to a few friends and then put into a drawer and forgotten. Among them there must be many which would be interesting to other aquarists, and we are therefore inviting amateurs to send in photographs which they think will be interesting, and which they would like to see published in WATER LIFE. We are offering a few small prizes.

The subject may be anything relating to water, such as ponds, lakes, streams, marine aquaria, fishes, reptiles, water plants, etc.

There will be two competitions, one closing August 31 and the other on September 30. In each competition there will be a first-prize of one guinea, a second-prize of half a guinea, a third-prize of 5/-, and consolation prizes of 2/6 for every other photograph published. Photographs will be judged by the Editor, the prizes being awarded to the competitors whose entries are the most interesting to other aquarists.

### RULES.—

1. All entries for the first competition must be received by August 31; and all entries for the second competition must be received by September 30. All entries received too late for the first competition will automatically be entered for the second.

2. Entries must be addressed: Competition, WATER LIFE, 7, Milford-lane, Strand, London, W.C.2. The name and address of the competitor must be clearly written on the back of the photograph. No responsibility can be accepted for the loss of any photograph, and no photograph can be returned unless a stamped and addressed envelope is enclosed.

3. There is no entrance fee.

4. In all matters relating to the competitions the Editor's decision shall be final, and no correspondence shall be entered into.

5. All photographs must be taken by the competitor, and must be bona fide his or her own property. Professional photographers shall not be eligible.

6. If possible entries should have titles. Photographic negatives must not be sent.

7. Competitors may send in as many entries as they please, but each entry must be accompanied by an entry form cut from page iii of cover.

# Australian Skinks

By "AMPHIBIUS"

THE family *Scincidae* is well represented in Australia, and many of its members are very suitable as pets, in that they are among the easiest reptiles to keep happy and well in captivity. Quite a selection can be had, as a rule, from the dealers, and the present is a good time to buy them. They cannot be described as cheap, but as some of these Lizards have been known to live upwards of twenty years in captivity, first cost is not of vital importance.

Of the genus *Tiliqua*, the Blue-tongued Skink is too well known to require description, but its relative, the Black and Gold Skink (*Tiliqua nigrolutea*) is less common, both over here and in Australia. It is a large-scaled Lizard, black and lemon yellow underneath and on its sides. Above it is ebony black, and has patches of varying extent and number, of bright orange. The tongue, as in *T. scincoides*, is blue.

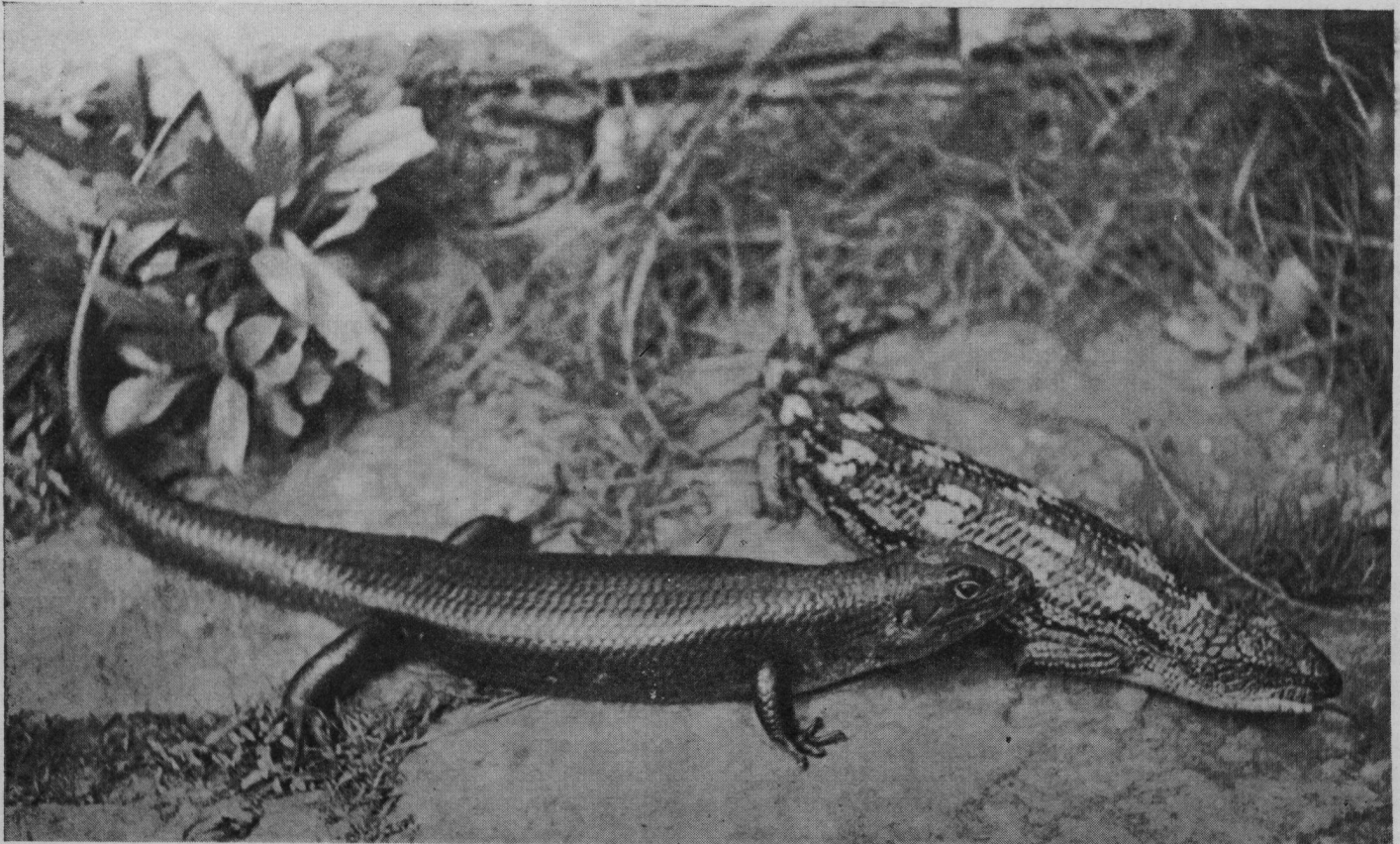
One of the oddest animals imaginable, and the only species in its genus, is *Trachysaurus rugosus*, the Stumptailed Skink, also known as the Shingleback, Fircone, Sleepy, and Double-headed Lizard. Between the lot any person not familiar can conjure up quite an accurate picture of what the beast looks like. The motor-car levies a pretty high toll of this unfortunate animal, and one can count many corpses per mile on the traffic roads in Australia, in those districts where it occurs. Like the two Lizards previously mentioned, it accepts captivity with the utmost tranquillity, and in a very short time. All three will pretend to a great ferocity when newly

caught or bought, intimidating one with an immense, widely open mouth, and hissing loudly; but it is all bluff, and they soon leave off when they find it is not any good.

They will all feed from the first on dead food, which is a great advantage. Chopped meat, fish, banana, other soft fruit, and raw or cooked egg are eaten with apparently no discrimination, in large quantities, and with a good deal of lip smacking.

An aquarium can be made into quite a good home for them if its floor is covered with not less than 4" of dry sand. The Stumptail likes his sand mixed with earth and pebbles, and the *Tiliqua* Lizards like access to a container of dry peat. They all like hollow logs, or arrangements of stone, or even a drain pipe in which to sit, and are also fond of burrowing. Only a very small vessel of water is needed, as they never bathe.

On two occasions my Stumptailed Skinks have bred, one baby being produced each time. I regret that I was quite unable to identify the mother on either occasion, as the baby itself was the only tangible evidence of the great event. The first baby was walking about quite happily when I first saw it, and in a few days took its place with the rest at the food pot. I found the second just after the birth had occurred, since it was not yet free of the foetal membranes. I wanted to be helpful and assist it out of them, but it resented my interference, and intimidated me in great style; so I left it alone. These babies are massive little things, and it puzzles me



Giant Skink and Black and Gold Skink

no end to know how the mother packs them away and shows no signs of being in an interesting condition. One's surprise is increased on learning that this species often gives birth to twins. The two *Tiliquas* have large families of active babies, which are said to be—at least in the case of the Bluetongues—easy to rear on minced meat.

Mr. Boulenger once wrote that the Stumptail is subject to a peculiar wasting disease, but none of mine have ever had it.

For a Lizard the shed cuticle is unusually complete, and all lose their vivacity and bright colours prior to the actual shedding. Appetite, however, is undiminished. They require to be able to rub themselves against a suitable surface, and the actual peeling itself is accomplished in two or three minutes. The limbs and feet are sloughed, as a rule, separately, and often the head, body, and tail.

Another group of attractive Australian Skinks is found in the genus *Egernia*. *E. major* reaches a very large size, but is rare and expensive in this country. Cunningham's Skink (*E. cunninghami*) is the one most commonly seen. It is a smaller, somewhat spiny edition of its giant relative, which it resembles in habit and disposition, but greatly exceeds in speed of movement. White's, King's, and Stokes' Skinks are readily available in Australia, but are not often imported because of their unspectacular appearance. Considerable similarity of appearance and coloration is a feature of the group. All are brown or brownish, highly polished Lizards, hard and glasslike to the touch. They have longer and stronger limbs than *Tiliqua* and *Trachysaurus*, and can move more quickly. Large specimens of *E. major* form an exception to this, and never seem disposed to run other than by an awkward lollop, which curves the body into the most awkward bends. All the others can go like a streak when they want to, and are warm enough.

As regards temperament, *Egernia* Skinks are less tractable, and, when newly come into one's possession, need to be handled with a certain amount of circumspection. They are nervous, and at first hiss loudly on being disturbed; but after a time become perfectly tame, although they never seem really to like being handled. Food is the same as for the other two genera, but they have an especial weakness for earth worms, and can catch and consume small Lizards, as sad experience has taught me.

All these Lizards like to spend as much time as possible out of doors. If it can be managed, a stone-walled or wire-netting enclosure should be suitably set up for them at the beginning of June, after which time they can stay outdoors until September. It is worth while tucking them up warmly at night, in a suitable shelter stuffed with hay. For Lizards they are sensible little things, and will seek shelter at night, and during rain, which they loathe. The *Egernia* Skinks are less robust out of doors than the others, and prolonged abstention from food is an indication that they are not quite warm enough, and would like to be taken indoors again. Only the nights (during summer) are cold enough for this, and no opportunity to stick them in the sun (with access to shade, of course), should be lost. During winter they like to be kept at at least 70° F., although they will feed at a lower temperature than this. They also like an electric light above them, and it is easy to deceive them into believing that the sun is shining.

The picture shows a Giant Skink and a Black and Gold Skink, the former just 2' long, and the latter 6" less. I might have mentioned that the Giant Skink is salmon pink underneath—an unusual colour among reptiles. I do not know whether any of the *Egernia* Skinks have bred in captivity or not.

## Club Reports

**THE WEST SURREY PONDKEEPERS' AND AQUARISTS' CLUB.**—The annual competitive show was held on July 14, 1937, at Stoke Park, Guildford. 125 exhibits were benched, and the club is to be congratulated on the high standard attained. Mr. Alfred Ashford and Mr L. B. Katterns were the judges. The cold stocked and furnished aquariums were outstandingly good. The tropical classes attracted a good entry, and were a credit to those exhibiting. A feature of these classes was that all fish shown in pairs were well matched.

Non-competitive exhibitions were staged at Horsley, Leatherhead, Chilworth, and Bookham flower shows, and proved a source of interest to many of the visitors, and several new members were enrolled as a result of these exhibitions. The non-competitive shows speak well for the interest of the members, many of whom have to travel a long distance to stage their exhibits.

—C. C. PATRICK, Hon. Show Sec.

**DERBY AND DISTRICT AQUARISTS' SOCIETY.** — The second meeting of the Derby and District Aquarists' Society was held on Monday, July 26. It was announced that Mr. C. S. Garnett, the well-known scientist had consented to be the President. He had, moreover, promised

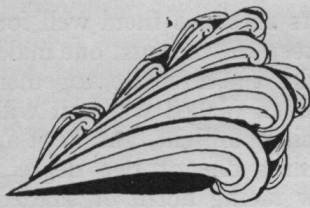
to send the society specimens of aquatic life when he went on his travels in South America. Mr. Gordon White, Chairman, announced that the society was making efforts to provide a public aquarium at the Derby Museum. A library of aquatic books was being formed for the use of members, and Mr. H. Wootton was elected librarian. The evening concluded with the WATER LIFE slides. Next meeting, September 7, at 7.15 p.m. in the Derby Technical College. Short papers will be read by members. General discussion.—H. K. RABY, Hon. Sec.

**THE LEEDS AND DISTRICT AQUARIST SOCIETY.**—The speaker at the last meeting was Mr. Field, Assistant Curator of Leeds City Museum, who gave a very interesting lecture on pond life, and brought with him many preserved specimens of water creatures which are to be found in the majority of local ponds. Mr. Field stressed the fact that pond creatures should be kept together as a community in order to observe their interdependence and their carnivorous habits. The methods of collecting pond creatures was explained, and some of the rarer finds were animatedly discussed. Next meeting, "Question Night." Visitors welcomed.—SPENCER ANTHONY, Hon. Sec., 55, Upland-grove, Leeds, 8.

# The Slipper Limpet

(*Crepidula fornicata*)

**T**HERE are many more mysteries in the sea besides that of the fate of the *Marie Celeste's* crew, and not the least of these is connected with the innocent-looking mollusc known as the Slipper Limpet. Forty years ago it was unknown in British waters; of the fifty or more species spread over the seas of the world not one was to be found nearer than the Mediterranean. The West Indies, West Africa, the Cape, Australia, and, finally, the Pacific coast of the United States of America had, and still have, the various species in their marine fauna.



*Crepidula fornicata*

One day, towards the close of the last century, an oysterman, whilst promenading the shore of the River Roach estuary, near Burnham-on-Crouch, picked up a shell which was later identified as belonging to *Crepidula fornicata*, one of the American species. Little did the man realize that this particular animal was to cost the oyster industry, literally, millions of pounds, for the Slipper Limpet is the greatest of that valuable creature's enemies. This Limpet lives in colonies, one generation on top of the other; I have seen clumps nearly a foot in diameter containing nearly a hundred individuals; from this habit they cause mud to silt over the bottom. Now, if there is one thing an oyster hates more than another it is mud, for the simple

reason that, not being able to move once it has settled down, it cannot rise above that suffocating medium. The result is that the oyster is asphyxiated; moreover, its enemy is abnormally prolific and diverts to its own use the food, in the form of diatoms and minute crustaceans, that properly belongs to the oyster.

The question is, though, how did the Slipper Limpet find its way here? It is a most sedentary creature, and in any case the nearest route would have been across the Pacific, the Indian Ocean, round the Cape, and up the English Channel. A shorter route, of course, would have been *via* the Panama Canal, but that most excellent short cut had yet to be constructed. Obviously, then, it did not find its way here of its own accord, and the set of the currents would prevent the larvæ arriving in the plankton. Scientists tried to keep the larvæ alive on the journey between America and England, but in every instance the immature Limpets died within a few days. The present surmise, possibly the true explanation, is that the larval Limpets were contained within the gut of oysters imported from American layings. The oyster may not open its shell either to take in food or to eject unwanted matter—this may consist of pieces of sand or other undigested material—for a fortnight at a time. Thus, if an oyster had fed prior to being relayed and had opened its shells immediately on being relayed, there is the possibility that Slipper Limpet larva was so introduced to "fresh woods and pastures new," a state of affairs that suited it admirably.

## The Water Tortoise

The Water Tortoise (or European Pond Tortoise) is carnivorous and must be fed only on animal food. This is torn to pieces, before swallowing, by its beak-like mouth and claws. Pieces of lean meat, portions of fish—fresh or salt-water—garden snails, slugs, and worms form the most convenient diet.

Water Tortoises will often take food on land, but their appetites are always much greater when they are in water. A tub or large glazed earthenware pan makes a very good home for them, but some sort of island should be provided on to which they can easily climb—such as a small heap of flat pieces of crazy paving stone.

It is best not to feed them in their permanent quarters, for the shreds and bits of food left in the water soon decay and render the water very foul. For this purpose, keep a deep enamel bowl, out of which the Tortoise cannot climb, containing just a few inches of water. Food and Tortoises can be put into the bowl and left till they have partaken of as much as they will eat. They can then be rinsed in clean water and put back into their ordinary quarters.

If they have fed well during the summer months these Tortoises can safely hibernate packed in wet moss. The moss should be periodically wetted during the winter and be kept in a cold place, but out of the reach of frost.

## Dew Ponds

(Continued from page 69)

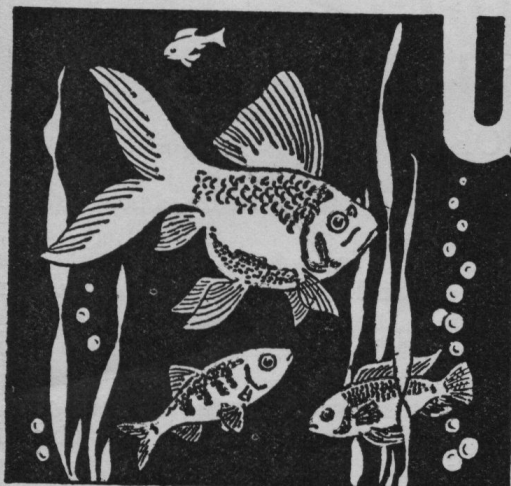
hold water is laid on the straw, which, being a non-conductor, prevents any heat from the earth maintaining the temperature of the clay.

The clay is puddled and made smooth. On summer nights dew falls on the prepared clay, and, as clay quickly becomes cold after sunset, the moisture in the air condenses upon it and forms water, which trickles along the channel, and is conveyed into another deeper pond.

Better results are obtained by covering the straw-lined bed with corrugated sheets of iron. There is then no loss by absorption.

It is interesting to note that straw embedded in a thick layer underground becomes in time almost as hard and impervious as rock; and it is this fact, no doubt, that enables water to be retained in the ponds even in the hottest weather. Thus a pond could be filled by heavy rainfall and its level maintained by the watertight pond bottom; and whatever water was evaporated by the sun would probably be returned in dew and mist. It is quite possible, too, that bracken, heather, and coarse grass stems would take the place of straw in a *natural* dew pond.

H. A. DAY.



# WATER LIFE

A weekly paper devoted to the study of every thing which lives in or near the water

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## Tortoise Eggs

By "AMPHIBIUS"

**Q**UITE a number of Tortoises have presented their owners with eggs this summer, and there is, quite naturally, a wish to have a try at hatching them.

The first point to decide, of course, is whether they are fertile or not, since unattached lady Tortoises sometimes lay eggs. If one has a pair of Tortoises, their behaviour may have been such that fertility can be presumed, and if the eggs have been laid by newly purchased animals—such is the case in those which have come to my notice—then there is *every chance of their being fertile*.

In a state of Nature the Tortoise takes considerable care of the eggs, first preparing a site, and then burying them carefully in the ground. This is seldom done in captivity, firstly because in many parts of this country the soil is not suitable in texture, and secondly because of the vitiation of natural instinct attendant upon the removal of the animal from its normal to an artificial habitat. Adjustment to the latter is a matter of time. Seeing that we cannot depend upon the mother's instincts, we must do what we can for the eggs ourselves.

The Spanish Terrapin (*Clemmys leprosa*), which has been in the market in unusually large numbers this year, is the most consistent layer, and its eggs, like those of the Pond Tortoise (*Emys orbicularis*), are long and oval, and about the size of a Pigeon's. In the wild state *Clemmys* seems to prefer a sandy soil in which to deposit its eggs, while *Emys* chooses a more earthy soil, again in close proximity to water. *Emys* is careful always to moisten the ground before the eggs are buried. Eggs of Land Tortoises are quite spherical, and are buried in dry sand or soil at a depth of only an inch or so. It appears, then, that the obvious thing for us to do is to take the eggs and bury them in a suitable soil either in a box or in the garden itself. For the latter I suggest a sunny and sheltered situation, and that the

Land Tortoise eggs be covered with a sheet of glass raised about 12" off the ground. This is done in order that the eggs do not get wet. If in boxes, these should be stood in the sun as much as possible.

The period of incubation is dependent upon (a) the time of year at which the eggs are laid, and (b) the weather during the development of the embryo. Water Tortoises appear to mate and lay twice a year, first in spring and then again, or alternatively, in the late summer. The spring-laid eggs hatch in summer, but the embryo in the autumn eggs undergoes a hibernation, or period of arrested development during winter, and does not emerge until late spring in the following year. With regard to Land Tortoises, the breeding season is less well defined, and the females will receive the males from spring until summer—at any rate, in captivity. Their eggs hatch in late summer, and after a period of activity the babies hibernate until spring.

This burying of the eggs in garden or box is what I might call the "stock advice" on the subject, and is what I do myself. I have tried with various media, and in all sorts of situations, but have never yet been rewarded with a hatching. Indeed, I know of only two successful hatchings in this country—both Land Tortoises—one being in Kent, about twelve years ago, and the other—a single baby—at the Zoo. I would emphasize that chance of success might be enhanced by putting the eggs in an incubator, and in such not only might they readily hatch, but the very long incubation period might even be somewhat shortened. An opportunity for useful research is afforded, and the value of an accurately recorded hatching would be very great indeed.

This article has been written by "Amphibius" as a result of the many letters we have received recently from Tortoise owners who have discovered eggs.

# Triton *Pyrrhogaster*

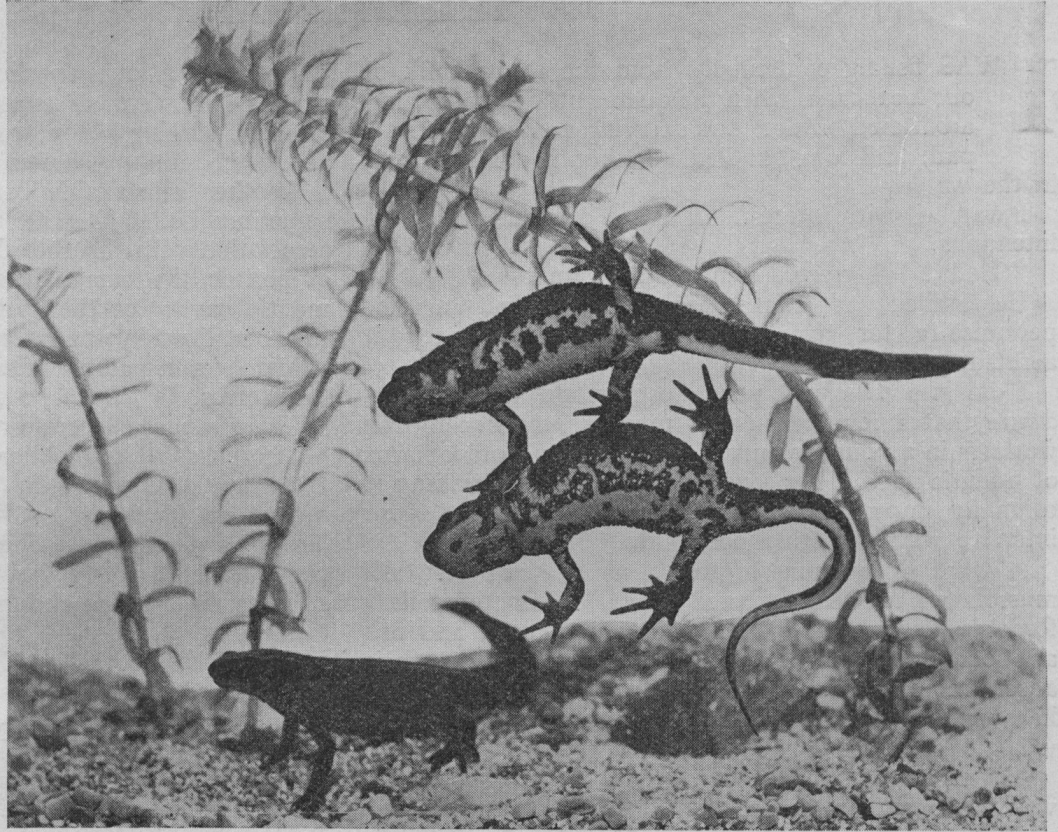
THE Japanese Newt or Red-bellied Salamander is readily obtainable from dealers, is quite cheap, and is very easy to keep. This little newt grows to a length of about 4-in. if fed on a copious diet. The colour is a deep olive-brown above, so that in a pond the newt is almost invisible against a background of decaying vegetation; but the underside, as its name implies, is blotched irregularly with bright red patches, of about the same hue as those of the Fire-bellied Toad. The marking is strikingly similar to that of the Great Crested Newt, but, of course, is red where the latter is yellow.

Fortunately for aquarists there is a difference between the sexes. The female has a red stripe on the tail, whereas the corresponding part of the male is black. The male also has a smoother skin, the female having very pronounced warts. During the breeding season, the male has the habit of standing on the tips of his fingers and toes, elongated for the purpose, and scans the neighbourhood on the look-out for a female. He also has a more pointed tail. When mature, the male has a glandular swelling around the vent, after the fashion of the male Axolotl.

The spring is the best time for buying *Pyrrhogaster*; it will eat anything small enough, and is fond of small chopped earth worms. It is as well to remove any food which remains uneaten for some time, as the newts are not too particular about the freshness of their food. Caution! It is stated on good authority that they do not develop their full red colour if fed on *Enchytrae*.

The food which they most appreciate is a diet of Tadpoles. They are likewise fond of young Axolotls, as I found to my cost when, pressed for accommodation, I put a couple of dozen in a tank containing a pair of *Pyrrhogaster*. The following day none were left, and the newts had crept into a dark crevice with their fat little stomachs almost bursting. They feed mostly at dusk.

The Japanese Newt comes from north-east China and Japan, and is consequently a hardy little beast. It breeds well in captivity, the young larvæ being similar to newly hatched Axolotls in appearance and needs. The adults themselves need very little room in captivity. Three inches of water provide sufficient depth, but rocks must be provided reaching above the water sur-



Japanese Newts

face; on these the newts will occasionally rest, especially if the water gets too warm or is not well oxygenated. A few pieces of *Ceratophyllum*, about 2-in. or 3-in. long and leaded beneath the sand, are sufficient for this purpose in such shallow water, and, moreover, look very fine. If the light is bright, leave crevices between the rocks for the newts to hide in, and preferably darken one side of the vivarium. Japanese Newts can be kept in a pond, but in such surroundings they are not seen to advantage as their undersides are never visible.

Periodically they slough off their outer layer of skin, in order to allow of growth. Previously to sloughing, or moulting as it is sometimes called, they develop white patches horribly suggestive of disease. This suggestion is furthered by their abnormal sluggishness. Within a couple of hours of the appearance of the patches the skin is shed in one piece, perfect except for the break at the head end. They make no attempt to eat the sloughed cuticle as do many frogs.

Their span of life under favourable conditions is remarkable in an animal so small. There is a record of one being kept in captivity for twenty-five years, so they should live several years under normal vivarium conditions.

\* \* \*

## Photographic Competition

An entry form for this competition appears on page iii of cover. The full rules appeared on August 3. There is no age limit for this competition.

# EDITORIAL



**T**HERE is a danger about all hobbies which are taken up with too great an enthusiasm, that they will suffer the fate of a craze, and be forgotten. We have all known people who, suddenly filled with an enthusiasm for some particular hobby, could think of nothing else for weeks, and who a few months later, when asked about the particular hobby, have shrugged their shoulders and said, "Oh, I've given that up now; I really haven't got the time." Even our own hobby of fish keeping is not immune from such disasters. Not that we would dream of disparaging enthusiasm, the salt of any hobby, but if it is to last it must be well regulated.

There are two kinds of enthusiasm—one which is engendered by novelty, the other which springs from knowledge and respect. The man who seeing a tank of fish which happens to take his fancy, rushes off to buy one, knowing nothing of the hobby, seldom becomes a genuine aquarist. After a time something goes wrong, the fish die, the tank is put in the attic, and the one-time fish keeper takes up stamp collecting, poker work, or croquet, according to his tastes. The man who, on the other hand, is prepared to give the matter careful consideration, and who will treat his hobby with respect, almost invariably becomes a keen aquarist and derives a very great amount of pleasure from it.

There are times, however, when we all become a little tired of our hobby. The daily duties become rather trying, and it is hard to find the time for them. There seems nothing new to see, and we begin to wonder what it was we found so interesting when we first took it up. This is a sure sign that our interests need broadening, and that instead of giving it up we must double our attention. There are many directions in which we can extend our interests. Microscopy, breeding, the study of aquatic insects and their habits, foods and feeding, parasitical diseases, and many more besides, are all fields which are full of intense interest for anyone who cares to study them. Fish keeping is, in our opinion, one of the most fascinating studies in the world, and if it bores us the fault lies with ourselves and not with our hobby.

It is, perhaps, one of the greatest advantages of our hobby that there are no holidays. There is no putting away the tanks for a few weeks when we get tired of them. The fish have to be fed and the tanks kept clean and carefully attended to; and we cannot, therefore, get into lazy habits. When our interest begins to flag we must either give it up or stick to it, and if we are worth our salt we stick to it.

Fish keeping is often looked upon as a new hobby, and we are inclined to forget that there are aquarists who have been keeping fish for forty or fifty years, and even longer. It is to these veterans who have gone keenly, but quietly to work, that we owe most of our knowledge of fish keeping.

\* \* \*

## British Reptiles for the Vivarium

By W. G. RUFFLE

**I**F you are lucky enough to live in the country, you will be able to catch three or four very interesting types of reptile for your vivarium. All the reptiles that I am about to describe are quite harmless, in spite of what people may tell you to the contrary.

The Grass Snake is a beautiful creature, and becomes very tame in captivity if given the right conditions. It may always be distinguished from other snakes by the yellow marks round its neck. It is unwise to pick up any snake without this yellow "collar" unless you are told by somebody who knows all about snakes that it is all right. The Grass Snake is very fond of water, and so it should have at least enough water in the vivarium to be able to immerse itself. Like most reptiles, it likes plenty of stones and moss in which to hide, and it likes to bask in the sunshine except when the sun is very hot. Grass Snakes feed chiefly on frogs, and will sometimes eat toads and newts.

If you keep your eyes open while you are walking near a sunny bank, you may find specimens of one or both of our typical British Lizards, the Viviparous Lizard and the Sand Lizard. Both of these Lizards do well in a dry, sandy vivarium, placed in a sunny position. They feed on all kinds of insects, and are also fond of spiders and earthworms, all of which must, of course, be given alive.

There is one other kind of lizard which you may find in England, which is unlike the others in that it possesses no visible legs, and so looks rather like a snake. It may be distinguished by its shiny, hard skin, and, when it is basking, by the fact that it sometimes shuts its eyes, which no snake can do. This is the Slow Worm. If you see a creature that at a casual glance looks rather like a Slow Worm, always look carefully for the type of skin described above, or you may get hold of an Adder, and be badly bitten. The Slow Worm likes plenty of moss in its vivarium, and feeds entirely upon live slugs and earthworms.

All the reptiles which I have described may be kept together if not overcrowded. A safe rule is to allow a quarter of a square foot of space for each lizard (half a square foot for a Slow Worm), and 1½ square feet for a Grass Snake.



fish is subjected to sudden large changes of salinity it may be seriously affected. This is probably also the reason why quite often new fish suffer when introduced into a pond heavily charged with alkali which has soaked out of the concrete or with salts produced from decaying plants; the old fish having undergone the same change *gradually*, are not nearly so seriously affected. Sudden changes of pH are chiefly important in that they usually indicate sudden changes in salinity.

Most people put far too much salt in their ponds. In natural waters, inhabited by fish, the average mineral

content is only about .03 per cent., yet many people continually add tablespoonfuls of salts to their aquariums and pounds to their ponds, in spite of the fact that the salt content will not decrease, as it is all left behind when water evaporates. These quantities may not seem very much, perhaps, but when it is realized that the addition of even one heaped tablespoonful of salt in a 10-gallon tank means an increase of .06 per cent. in the total mineral matter, it becomes obvious that continual additions of it to either pond or aquarium will eventually lead to disaster.—M. G. E.

## Baby Tortoises

Extract from "Water Life" Series, No. III

I HAVE decided to devote a separate section to baby Tortoises and Terrapins, not only because they are imported annually in quite large numbers, and are great favourites with the public, but also because they require very careful and painstaking treatment if they are to grow and thrive.

Considering first the Land Tortoises: these babies of the Moroccan and Greek varieties are a minority always present in the annual consignments of Tortoises which reach us every spring. They are delightful little creatures, and their shell is usually quite round, developing the typical oval shape as age increases. Ossification of the bones has not proceeded very far, and consequently some care must be exercised in handling them. On arriving at their new home, they need the bath and drink as suggested for the large Tortoises, and need to be kept indoors except on warm and sunny days, when the process of acclimatizing them may be begun. A small, sandy enclosure should be prepared for them, as, when they are kept with large specimens, there is the risk that they may be crushed. It is not wise to leave them outdoors at night until the end of June: July nights are usually warm enough for them, and perhaps the first half of August.

They should be offered shavings of raw carrot, tomato, and cut-up spinach leaves, and the *outside* leaves of lettuce to eat. The first three of these foods are relatively rich in calcium and phosphates—mineral salts which are very necessary to young animals. They also contain the chemical substance (activated ergosterol—better known as "Vitamin B") which is necessary for the co-ordination of these mineral substances in the body and their ultimate utilization in the forming of new bone and tissue. The babies will probably like the lettuce best, but every effort should be made to induce them to eat the other foods suggested, as they possess much more nutritive value.

If they have been bought in the spring, and fed well from that time onwards, it is much better to allow them to hibernate in the normal way when autumn comes. At the end of September they will exhibit the usual torpidity and loss of appetite, upon which they should be put into a wooden box on a fairly deep layer of dry peat moss, and covered with a 4" layer of similar material. No lid needs to be used if the box is of sufficient depth to prevent the little

animals climbing out and hurting themselves. The box should be stood for the winter in a cool place, well out of reach of frost and cold draughts. It should be regularly inspected in March, and the Tortoises put into a terrarium as soon as they wake up. They will drink tepid water almost at once, but are usually reluctant to begin feeding until they have been well warmed by the sun. After their first winter and its subsequent spring in this country they may be treated exactly as the large specimens are, although a certain attention to their diet is still to be recommended.

Dealers tell me that they sell a lot of these little Tortoises to flat dwellers, and to such purchasers I recommend that the terrarium in which the little beasts are housed be stood outside a window whenever the weather is fine and warm enough. Due provision must be made for escape from the direct rays of the sun when these are so hot as to cause discomfort, and no lid should be kept on the case. It is advisable to permit hibernation along the lines suggested in preference to attempting to keep up a state of activity during winter by raising the temperature.

"AMPHIBIUS."

\* \* \*

Mr. R. J. Knight, of Mississippi, says that he was fishing when he hooked a giant Sturgeon. It snapped several trout lines and, as it thrashed in the shallows, several men in Knight's party leaped into the water and two of them actually "rode" the fish. Then one man brought a .22 rifle and pumped several shots into the fish's head before it gave up the fight. Knight has produced the Sturgeon—it weighs 198-lb. and is 7' 2" long—and witnesses, but the local anglers still do not believe it.—*Evening News*.

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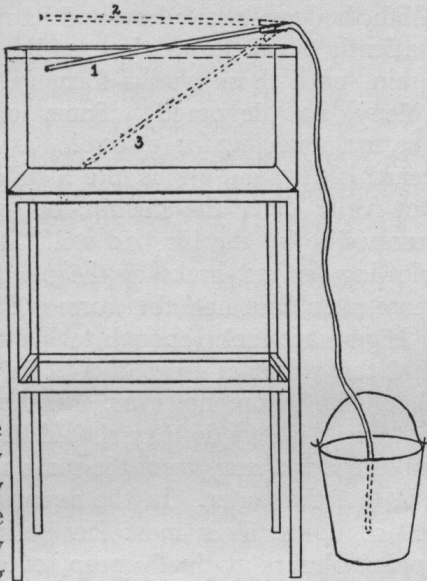
Lord Moyne is planning an expedition to Greenland in his yacht *Rosaura*. One of his objects is to study Arctic marine life. A marine biologist will accompany the expedition, and the special equipment includes four miles of cable for deep-sea fishing. The date of departure is not yet fixed, as this depends on the state of the ice. In the winter of 1935 Lord Moyne spent six months on a cruise to New Guinea and the East Indies. He brought back a varied collection of mammals, birds, and reptiles, including Komodo dragons.—*Daily Telegraph*.

# Two Labour-Saving Ideas

By J. S. HAYES

IT is really surprising how few aquarists make any serious attempt to minimize the work involved in keeping tanks in first-class condition. For instance, it is quite usual to start a siphon by sucking the open end; when one is removing sediment this may not be very pleasant! Filling the siphon beforehand is often recommended. This works all right, but it is apt to result in trails of drips being left all over the house, with subsequent remarks from the family.

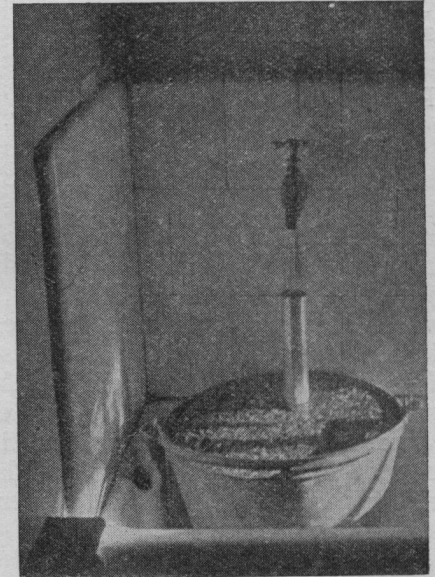
Actually it is quite easy to start any siphon flowing by simply dipping the upper end obliquely under water, raising it quickly a couple of inches, and re-immersing it. The water from the upper arm of the siphon slides off down the tube, and when this is re-immersed the pull of the water in the lower section starts the main flow. A glance at the sketch should make the sequence of operations perfectly clear.



The other dodge is concerned with a less frequent job, that of washing sand and compost. This is invariably scamped by the beginner, and even the experienced aquarist is by no means always as careful as he might be, which sad fact is brought home all too sharply on introducing a bottom-feeder into a "clean" tank.

After muddling along with the ordinary methods for washing for some years, I at last hit upon the stunt described below, whereby a pailful of sand will practically wash itself in half to three-quarters of an hour, with relatively very small water consumption. Apart from a pail or similar receptacle, the only appliance needed is a short length (one to two feet) of zinc tubing such as is used for out-house gutter piping. This can be obtained for a few pence from any builders' merchant.

The pail is filled with sand, the pipe inserted and pushed well in, and the entire contraption stood in a sink, with the upper end of the pipe just under the tap. The water is now turned on, and it will be found that the water level inside the tube rises to a definite point, at which it remains. The only attention necessary is to move the tube once or



twice. The great advantage of this method of washing lies in the fact that every drop of water has to rise right through the sand, washing it uniformly to the very bottom, and making stirring and turning over completely unnecessary. When I moved all my tanks to a new fish house a few weeks ago this method was employed, and its efficiency may be judged from the fact that the whole job was completed in a single day.

## Terrestrial Newts

WE have had several inquiries from readers who are very concerned because newts that were bought earlier in the year as aquatic creatures now insist on leaving the water, or, if this is not possible, make determined attempts to do so.

The English newts in particular are only aquatic during the breeding season, and, though when well fed they will remain aquatic for somewhat longer than when wild, eventually they must leave the water to live more or less entirely on land until the breeding time next year. It will be noticed, by the way, that after the season the males lose their fine crests and begin to look more like the females. In this condition they are not able to swim and manoeuvre in the water with anything like the skill they exhibited earlier in the year.

Whereas the spring quarters for newts should be mostly water, with only a piece of floating bark or something of the sort to land on, now they must have plenty of land with only a small puddle of water in which to damp themselves occasionally. The vivarium should be furnished with a turf or moss and some stones under

which to hide. By day the newts will hide, but will be more active at night, when they will appreciate a few earth worms or gentles to eat.

The English Crested Newt or Triton, Smooth, and Palmate Newts should by now have been given quarters similar to those described. The continental variety of the Crested Newt is more aquatic in habit, and, though inclined to come on land, will also like a fair amount of water, sufficient to be able to swim in when he feels like it. Marbled Newts seem to be rather less aquatic, and do not mind whether they get a bath or not after the breeding season. This also applies to the Alpine species.

The Japanese Newt and the Californian Newt are both very aquatic, and indoors seem to prefer the water all the year round. By the way, do not associate these two species, although they both like the water, for the latter, when fully grown, *i.e.*, about seven inches, is quite likely to make attempts to eat the smaller species, and these attempts are all too often successful. This, of course, applies to all newt communities: you must only associate individuals about the same size.

# More Skinks

By "AMPHIBIUS"

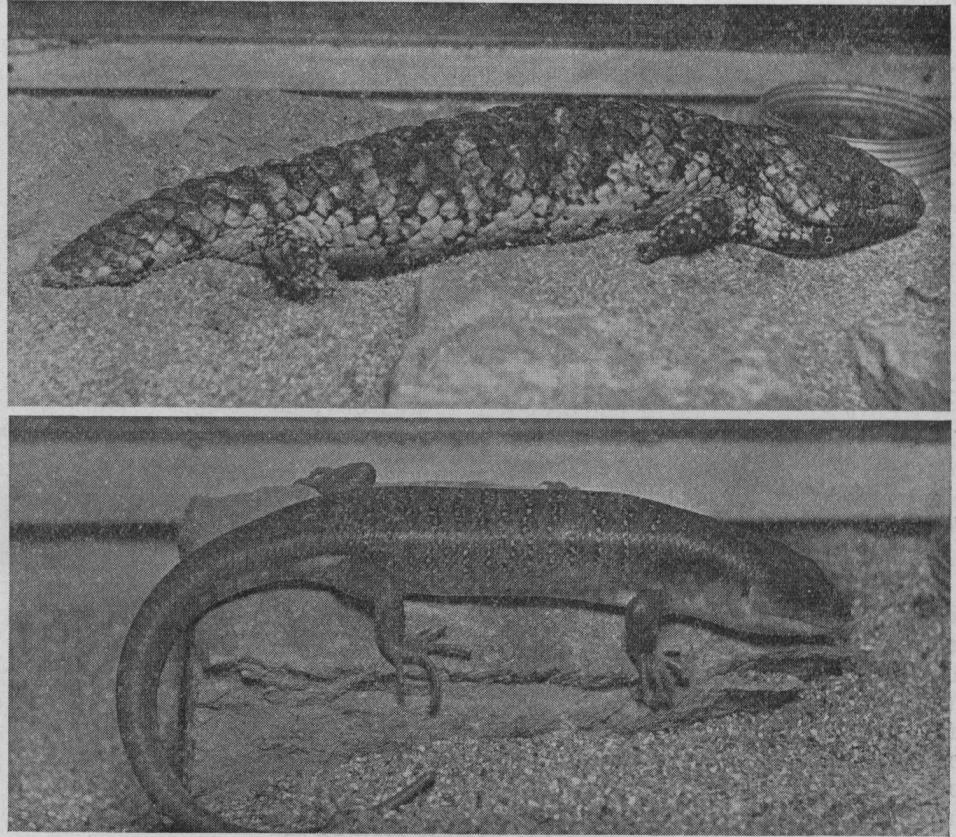
**T**HE fact that several dealers are listing "Schneider's Skink" leads me to write a few notes about these other species, but up to the present careful examination of stocks in London has failed to reveal a single specimen of the named species among them. Every specimen I have seen has been *Eumeces algeriensis*, and not *E. schneideri*. No disappointment need be felt by those who have bought these lizards under the wrong name, for the Algerian Skink is not only larger and more brilliantly coloured than the Schneider, but is also worth nearly twice as much! The price of reptiles is governed entirely by factors influencing individual consignments, so that comparisons from year to year may not be justifiable, but the fact remains that they are now cheaper than ever before.

*Eumeces algeriensis* comes from Morocco and Algeria. The immensely wider habitat of *E. schneideri*, namely, from Baluchistan to Armenia in the north, and across Persia, Palestine, Syria, and Egypt to Eastern Algeria, overlaps that of *E. algeriensis*. Thus it may well be that both species were collected, Schneider's being the first to be identified, and having its name given to the whole lot.

Although very closely related, there is no possibility of mistaking the two species, as the following table will show:—

<i>E. algeriensis.</i>	<i>E. schneideri.</i>
Head very large.	Head smaller.
Cheeks very swollen in adult.	Cheeks not at all or only very slightly swollen.
Body short and stout.	Body longer and slender.
Tail thick and rather short.	Tail very long and tapering.
Back marked with many orange and pearl spots, which may form numerous transverse stripes.	Spots, when present, are small and arranged in longitudinal rows.
No lateral yellow stripe.	A bright lemon yellow stripe runs from below the eye to the vent.

As the Algerian Skink comes from the same districts as the common garden tortoise, it might be thought that both would stand our climate equally well. Such is not the case, however, and it is quite hopeless to keep either of these skinks unless they can be given considerable heat and plenty of light. During summer both may



Above—Stump-tailed Skink; an Australian Skink described by "Amphibius" in his previous article. (Specimen supplied by L. Cura & Sons).  
Below—Algerian Skink. (Specimen supplied by H. Harris.)

be kept outdoors as long as the sun is shining and warm, but they must pass the nights in a case, the temperature of which is raised to 75°-80° F. Not only is heat permanently required, but it must be a dry heat. Neither species can tolerate damp or wet, and neither will voluntarily take a bath. The cases need to be furnished with six inches of sand, so dry that it is always powdery—never caked. Rocks and logs may be provided so that the lizards' claws are kept in order. They will spend the night burrowed below the rocks or deeply into the sand. The temperature of a living-room in which a number of other species of lizard will live quite happily, is quite inadequate for them.

As regards light, if the case cannot be kept in a south window, it should be fitted up with an electric bulb, of which the wattage need not be high unless it is also the source of heat. Switch it on for about eight hours a day.

If the heat and light are adequate, those who have found disappointment in an apparent sluggishness and lack of response in these lizards will be amazed at the swift change into an alert and vital creature in a matter of minutes. I must stress the speed at which these animals are able to move when in good condition. They are persevering climbers, a fact which must be borne in mind when making them an outdoor enclosure. The

(Continued on page 120)

# Tokyo Eats 1,000 Snakes a Day

**S**NAKES are not usually thought of as a gastronomic delicacy. Yet 1,000 reptiles of various sizes, shapes, and colours, are consumed every day in Tokyo, mainly in powdered form after being baked. There is a traditional belief that powdered snake is a sovereign cure for disease, especially for consumption.

Modern medical research discredits the idea that there is any exceptional curative power about snake flesh. Some restrictions have been placed on advertisements which play too crudely on the popular credulity in this respect. Some stimulating value is recognized in powdered snake, and its sale as a tonic is permitted.

Old beliefs as regards cures die hard, and the pulverized snake trade is still lively in the Japanese capital, where there are over 100 shops which deal in this substance. It is estimated that each of these disposes of the remains of at least ten reptiles every day, so that the estimate of a daily consumption of 1,000 snakes does not seem exaggerated.

A large wholesale establishment is the so-called Snake House in the Asakusa district of Tokyo. The Snake House handles 100,000 reptiles every year and keeps 10,000 constantly in stock in its basements in order to supply retail dealers at all times. So intensive has been the hunt for snakes that the supply has visibly diminished, except in the two southern islands of Kyushu and Shikoku.

## More Skinks

(Continued from page 111.)

wall, which should be smooth, need not be more than fifteen inches high, provided that it is smooth and has an overhanging top. Tiles are very good for the last. A wire-netting cage must have a roof, and to my mind never looks at all nice. Both these Skinks rapidly become very tame, feeding from the fingers and making no attempt to escape when handled.

**FOOD.**—They are insectivorous, but some come to like very ripe, sweet fruit, which they will lick with their clean, pink little tongues with evident enjoyment. The yolk of an egg—raw, of course—will be eaten readily, even on the day of purchase, and it is not difficult to get them to eat bits of meat, liver, etc., especially if they are first dipped into the egg. This meat and egg, because of its convenience, may become the staple food, supplemented by meal worms, spiders, and other small creatures, including young mice if available. Not all of them will eat earth worms. It is not advisable to keep green, wall, or other small lizards with them, as these might disappear.

They take copious drinks, and require access to a small, unspillable vessel of water, so placed that they do not have to walk through it in getting from one part of the case to another. The treatment I have described applies also to the Common and Eyed Skinks (*Scincus officinalis* and *Gongylus ocellatus*). *E. algeriensis* grows to a length of twenty inches, and *E. schneideri* to sixteen inches. The other two are smaller species.

Mr. Zenkichi Asami, proprietor of the Snake House, recently became reminiscent about some of his more striking business experiences. One of its early advertising methods was periodically to let loose a few of its inmates. This provided just the kind of "copy" the Japanese newspaper, always in search of a local sensation, desires, and the House became better known as a result.

On one occasion Mr. Asami got into trouble with the police because a customer who had bought some live snakes threw them from the balcony on to the stage when one of the most famous Japanese actors, Sadanji, was performing. Sadanji had been in Moscow; and the snakes were thrown at him as a rebuke.

The police cautioned Mr. Asami to be sure that purchasers of his reptiles were bona-fide buyers of pets.

Someone else once hurled a live snake into the Diet Chamber, accentuating the acerbities of debate and leading to the introduction of the present system under which all visitors to Diet sessions are forced to turn their pockets inside out, and are searched like suspected criminals.

The Snake House also keeps for credulous patrons a large variety of other animals, in whole or in parts, in baked form. Its list of goods includes squirrels, salamanders, weasels, goldfish, snails, larks, frogs, dragonflies, fox tongues, and heads of monkeys and cranes—all the ingredients for a witches' brew.

—Observer.

## Green Water

We have been taken to task by one aquarist for suggesting to readers methods for clearing green water. Green water, it is pointed out, is so healthy for fishes. This may be so. But first let us remember that we bought our fish in order to see and enjoy them, and though they may be healthy hidden away in the depths of deep green water, they are not of much value to the aquarist who wants to observe them. We do not imagine that many "green" aquariums would be kept as drawing-room decorations, and such an aquarium would not have a high commercial value. Fish are, of course, just as healthy in a clear aquarium if it is properly maintained. A further disadvantage of green water is that the floor of the tank cannot be clearly seen. Excess feeding or dead fish may pass unnoticed until the aquarium goes foul, and then, maybe, it is too late.

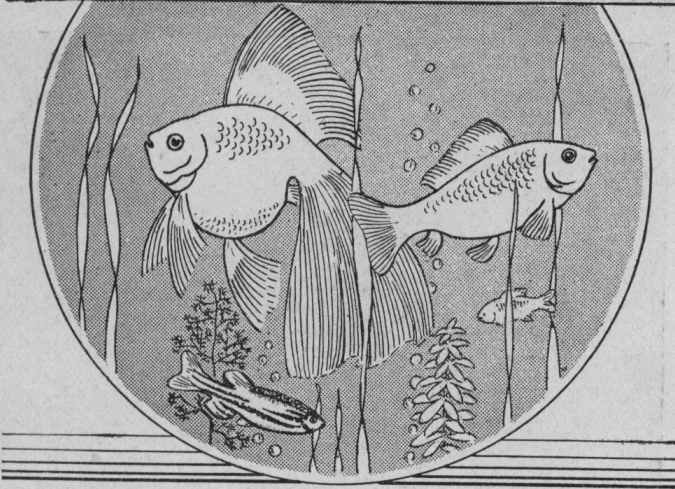
How popular would the Neon Tetra have become were it necessary to keep it exclusively in deep green water?

\* \* \*

An S O S was received at the London Zoo from a firm of fruiterers in Long Acre, who discovered a 4½-ft. snake coiled up in a crate of bananas. Keeper Lanworn secured the reptile—a Brazilian tree snake—by dropping a noose over its head; he put it into a canister and took it back to the Zoo, where it is now on view to the public.

—Daily Mirror.

# EDITORIAL



“**W**E can learn in two ways—empirically and experimentally. We can gain experience without making experiments solely by reasoning appropriately about well-established facts, just as we can make experiments and observations without gaining experience if we limit ourselves to noting facts.”—Claude Bernard.

Claude Bernard was a famous French physiologist living in the middle of the 19th century who knew a great deal about making experiments and gaining experience. His observations on this subject are therefore of considerable value. The above quotation is taken from his writings and it is interesting to consider his statements in greater detail.

First let us define the two methods to which he refers—the empirical and the experimental. The empirical method is the same thing as, in more vulgar parlance, using “rule of thumb.” The person merely observes and notes the results of certain things which happen to occur or which he happens to do. He observes, for instance, that fish are healthier if given plenty of room, or that a fish with fungus improves if given a salt bath. He remembers this and utilizes the experience thus gained on future occasions. *But* he does not know *why* these things are, in fact he probably does not try to reason about them at all.

The experimentalist, on the other hand, is not content with noting the result of events which chance to occur, he is always trying to find out what would happen were he to do so and so, and thus he breaks new ground and accumulates an assortment of new facts.

The man who favours empirical methods usually styles himself a “practical man” and has often a profound contempt for “theory.” “I don’t care a pin about all your pH and water analysis, balanced diet and such scientific rubbish,” he says, “I don’t sit in an armchair and theorize, I am a practical man and I know from personal experience and I get on with the job.”

But to advance we *must* theorize. It is perfectly obvious to anyone that theory depending on too poor a foundation of fact is useless, but on the other hand a mere assortment of uncorrelated facts will not get us

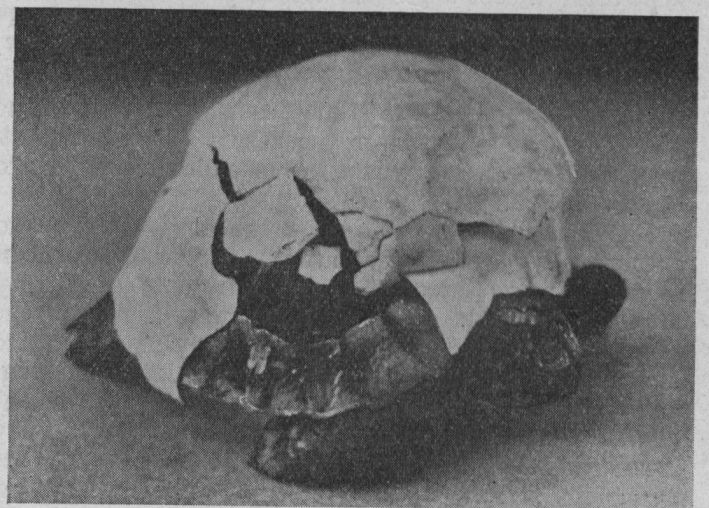
far. The first thing to do is to make accurate observations, and note them down carefully. The next is to try to reason from these observations, so that we pass from the stage of knowing that under certain conditions certain things happen, to having a fair idea *why* they occur. For instance, we observe that fish have gills and we probably are willing to accept the fact that the latter are organs enabling the fish to breathe the oxygen dissolved in the water; we also know that water can only hold in solution a limited amount of air and that fish become distressed with symptoms of suffocation if they are crowded. Correlating these facts, we evolve the theory that the fish are distressed because the oxygen in the water is insufficient for them. We then go a step farther and reason that if our theory is correct, they will be similarly distressed should the water become depleted of oxygen from any other cause—from rise in temperature, for instance, or fouling of the water. But it is possible that our reasoning may be faulty, and there may be some flaw in our argument; so we then proceed to check our theory by experiment; we lower the oxygen content in some way and see whether the result fits in with our expectations. If it does, then we have run the whole gamut—observation, deduction, experiment, and the result is true experience.

Facts and theory cannot be divorced, for just as “high falutin” theory founded on an unsound basis of unproven “facts” is useless to anyone, facts alone will lead us nowhere unless they are correlated or ordered so that they are understood and can be used.

\* \* \*

## Tortoise Eggs

With reference to the article on Tortoise eggs by “Amphibius,” August 17, Mr. Cura has written to say that a South African Land Tortoise (*Testudo angulata*) was bred at his place, and he enclosed a photograph, which is reproduced on this page, of the Tortoise in the actual process of hatching. The egg had been placed on a shelf in the tropical room and given no attention. The baby Tortoise was placed in the charge of the keeper at the Tortoise House of the London Zoo, but it died after a few weeks.



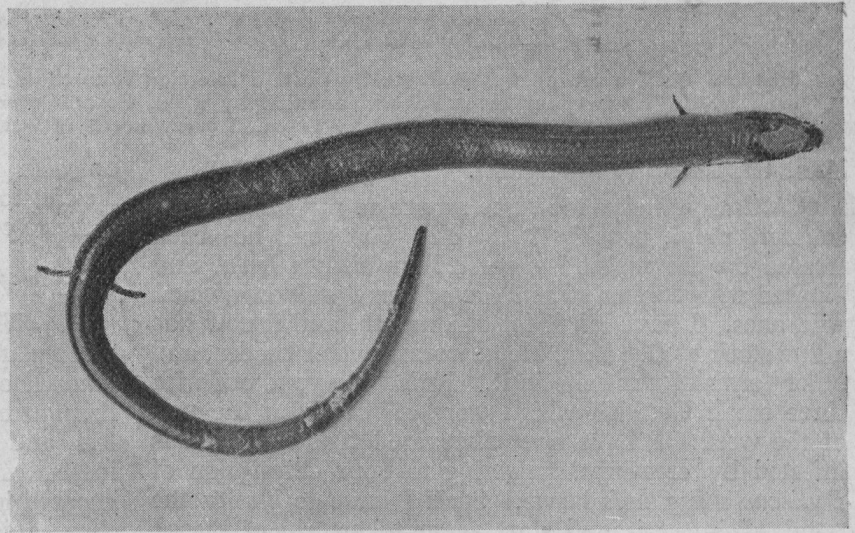
South African Angulated Tortoise, born 10th June, 1930, at Messrs. L. Cura & Sons, Baynes Court, E.C.1.

# "Seps"

By "AMPHIBIUS"

I HAVE recently been writing about Skinks, and before dismissing the subject it will not be out of place to say a few words about *Chalcides tridactylus*, an unfortunate, but apparently popular, little Skink who completely lost his identity about twenty years ago, and has since, as an article of commerce, been mixed and confounded with our English blind worm. This does not really matter to those who, like myself, can remember when its price was 5/- or 7/6 apiece, since, as "Seps" (its old generic name) or Slow Worm, it can be bought to-day for 10d.! Those sent to this country come mostly from Italy, less often from Spain (at any rate in peaceful times), and from the South of France. Although it enjoys the conditions I have described for other Skinks, it is much more hardy and less precise in its requirements. It will thrive outdoors, not necessarily on sand, from early summer to autumn, and will make itself a home underneath a rock or something, from which it will emerge to take a meal worm from one's fingers in a very short time. It must not, however, be condemned to permanently damp surroundings.

A pretty little thing, its colours are silver and black, or brown in alternating longitudinal bands, and, as it glides swiftly about, its four minute limbs are closely pressed against its sides, affording some justification for confusing it with our indigenous legless Lizard, whose young, in addition, it so closely resembles in colour. It is my belief that if maintained in good condition throughout a summer—a perfectly simple matter—"Seps" could



[Specimen supplied by H. Harris

pass an English winter in a state of hibernation. I have several times set out to determine this point for myself, but some factor, usually escape or accident, has intervened to defeat me.

Harking back to the Algerian Skink, I have observed that some link in the catcher to retailer chain has seen fit in a few cases to embellish these already brilliant Lizards with a dab or two of red paint. I hope everybody will refuse to buy such painted specimens, so that the undesirable practice may be discouraged. The same hope is expressed in relation to the unfortunate painted Terrapins and Tortoises.

[EDITOR'S NOTE.—It would appear that the practice of painting decorative designs on the shells of young Terrapins and Tortoises has an ultimate, lasting, and injurious effect, which manifests itself in a tendency for the shell to soften and flake.]

## Club Report

BELLE VUE AQUARIUM AND VIVARIUM SOCIETY.—The society began its second year of activity on Monday, September 6, with a meeting at which several new members were enrolled. The main proceedings took the form of a series of fifteen-minute talks by five of our members, under the heading of "The Incidentals of Fish Keeping." Each talk covered briefly a group of apparatus, equipment, or general subject of importance to the aquarist, and over 100 exhibits were used. The first speaker showed and described various types of aquarium tank, including those made from glass, wood, and asbestos, and gave useful hints on making and repairing them. He then spoke on the choice of sand or gravel for the base, and the maturing of water. Next, came a talk on plants, scavengers, fish diseases, and treatment. Then heaters, thermostats, and sundry small apparatus, such as scrapers, dip tubes, and nets, were described and brought before the meeting. The following speaker showed dried foods of the commercial type, live foods which could be collected or bred in continuous supply, and home-made dried foods. Finally, there was a talk on aerators, filters, diffusers, and breeding devices. Some of the exhibits had been given by

members, and were later auctioned for the society. It was a highly successful evening, entertaining alike to the novice and to the more experienced hobbyist. One outstanding feature was the revelation of ideas for cheap or home-made apparatus—filters made from old accumulator jars, discarded photographic films used for tank partitions, sheet asbestos for tank sides, and so on. The WATER LIFE aerator, made at a cost of 1/6, was a prominent exhibit. Considerable interest was shown in the display of natural live food, and that of fish enemies, such as the diving beetle and water tiger.

On Saturday, October 2, there will be a members' "Exchange and Market" at headquarters, where members' surplus stock can be disposed of or acquired.

The annual general meeting will take place on Monday, October 4, at 7.30 p.m. Miss Wigglesworth, of Manchester University, will lecture on "Water Plants." General business will include the acceptance of the committee's report and balance sheet and the election of officers. All members will be previously circularized with the report and full details of the business. A good attendance is desirable.—J. N. BERNARD, Hon. Sec., "Arden," Woodstock-drive, Worsley, near Manchester.

# WATER LIFE

A weekly paper devoted to the study of every thing which lives in or near the water

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## Curious Frogs of South America

By A. E. ROBBINS

ALTHOUGH I have succeeded in teaching frogs and toads to take food from my fingers, and have come to regard them as harmless—almost lovable—creatures, I have just heard from a friend in South America of certain frogs there which will give their keeper a painful nip if he be so unwise as to place his hand near them. Others, I am told, will squeal like frightened pigs when human beings approach.

South America appears to have many interesting frogs and toads, the habits of which are totally different from those that we find in our ponds and ditches at home. For instance, our own English Toad, well known for its slow, lazy movements and insatiable appetite for insects, can hardly equal the Ant-eating toads of Mexico for sheer gluttony. These creatures have solved the problem of obtaining large meals with a minimum of effort.

Almost as soon as they are born they will find a well-stocked ant hill and, literally digging themselves in, will settle down for the remainder of their lives to do nothing more useful than flick ants down their throats. Day and night the toads remain motionless at their chosen ant hills, only the movement of their tongues, which dart out to catch the insects as they pass and repass, betraying any sign of life. The ants multiply with such rapidity, of course, that the toads never exhaust their food supply. They succeed only in becoming excessively fat. Where the ant hills are abundant, the toads have degenerated into small-mouthed, weak-limbed creatures whose only resemblance to the normal toad is a perfectly sound digestive system.

Perhaps even more remarkable is the evolutionary change which has been brought about in frogs found in certain lakes in Peru. Specimens which had become

wholly aquatic were discovered recently at a depth of sixty feet. The lungs were so small that it could be assumed that they no longer functioned. Skin-breathing appeared to have taken the place of the usual mode of respiration, evidence being found to support this theory in the large amount of loose skin seen upon the bodies of the frogs. The general characteristics of the frogs differed so little from those which abound in the streams adjoining these deep lakes, that it has been concluded that they are descended from these.

Conversely, there are frogs in Paraguay that do not enter the water at all—at least, not after reaching the adult stage. Even their eggs are laid upon the banks of rivers and streams. The overflowing of the banks, which coincides with the breeding season, causes the spawn to be washed into the water, hatching then taking place.

It is in South America, too, that the frogs jump out of the water—not into it—when they are alarmed. Instead of making instinctively for the safety of the pond bed when startled, these frogs from the other side of the world leap into a nearby bush. The presence of alligators and large fish, for which frogs form a staple diet, explains why the cover of dry land is thus sought.

A further instance of self-preservation may be found in the egg-laying habits of certain Brazilian Tree Frogs. Nests made of cylindrical enclosures of mud are built upon the bed of a stream. These are constructed in such a way that no marauding fish can reach the spawn. As the rim at the top of these natural hatcheries extends just beyond the surface of the water, the hatched-out tadpoles are kept in safety until, with the appearance of their limbs, they are able to leave the water for the safety of the trees.

# Reptile and Amphibian

Why They Appeal.

By L. G. PAYNE

I SUPPOSE it must be about twelve years ago that a chance breakdown of the car in a sandy Hampshire lane started me on the long trail which has prompted the present article. I remember I said tentatively to my brother, "You put the car right, and I'll have a look for Natterjacks."

After turning over a number of loose clumps of heather, perseverance was rewarded, for there at last was what I sought—the Natterjack Toad, an alert, bright-eyed little fellow in brown and yellow and olive green; and then another, while yet another ran quickly to the friendly shelter of a gorse thicket. I would take these home, try and keep them in natural conditions, find out why they ran instead of hopped—and lots of other things.

To the man or woman who wishes to take up some field of interest which will probably be a little different from that of the man next door, which may be treated either as an amusing hobby, or as a semi-scientific study, there is much to be said for the keeping of reptiles and amphibians in captivity. The days have long passed when frogs, toads, lizards, tortoises, etc., could all be loosely labelled, reptiles. Without going too deeply into natural history, we may say that reptiles, *i.e.*, lizards, snakes, etc., are born or hatched in the perfect state, while the first stage of an amphibian's existence is passed as a gill-breathing tadpole, such as is seen in the frogs and newts.

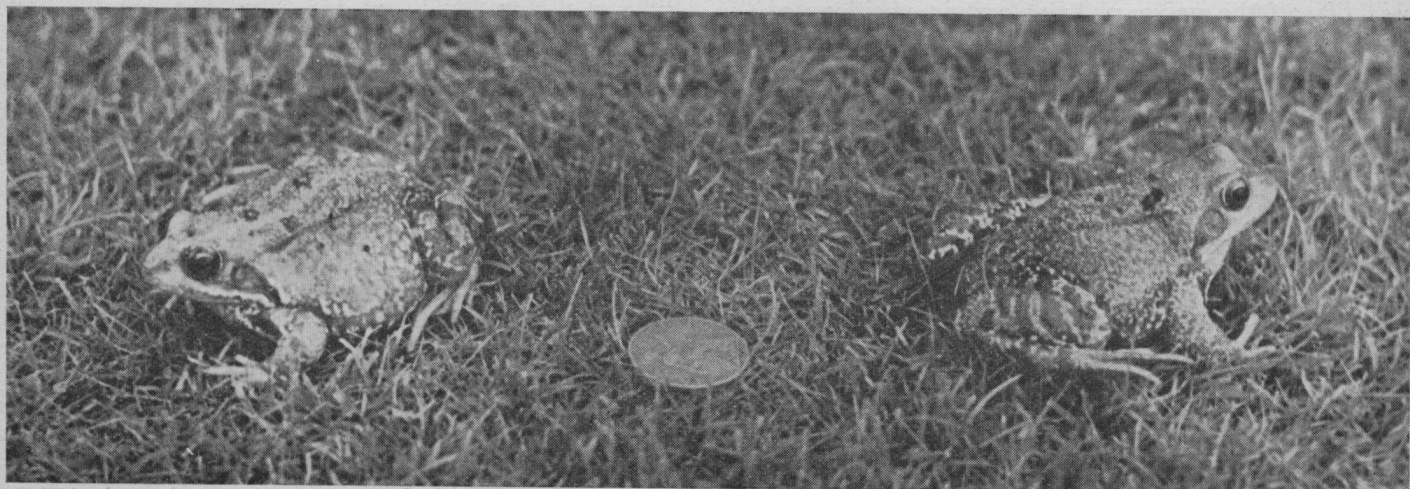
The object of this article is to give advice as to what are the best creatures to keep and where to keep them. We are dealing now only with hardy creatures; that means that we are ruling out the necessity for artificial heating or lighting, though this is not meant to imply that such extras are superfluous.

Now, from theory to practice. Let us decide that we will give our reptiles and amphibians conditions of confinement as nearly natural as possible. Only so can the most lasting pleasure be obtained, and only so can our charges be expected to live long. The small indoor

cage or vivarium has its uses, but frequently ends in disappointment to inmate and owner. Let us try and get out of our minds that we are making a cage or a place of detention for unwilling prisoners; rather should we aim at a retreat where our captives may be safe from harm. Available space must naturally be a determining factor, and while the only limitations to an outdoor reptiliary are those imposed by space and pocket, yet there is perhaps a minimum below which it is hardly worth while to go. Have you a corner of a yard, or a small section of your garden, which you are willing to devote to the accommodation of your reptiles and amphibians? A convenient and practicable area is about 10-ft. by 6-ft. It will, of course, be open to sun and rain, and perhaps to London fog. That will all be quite natural, for there are fogs, too, across the corresponding latitudes of Europe whence many of our hardy reptiles and amphibians originate.

Having fixed the site, we now have to consider what form of impassable barrier we shall use to confine our animals. Remember that most of these will be excellent climbers, and that a low wall of, say, 18-in. will be no real obstacle to the smallest amphibian. The secret lies in the horizontal ledge which must be fixed along the top of the vertical wall, projecting inwards.

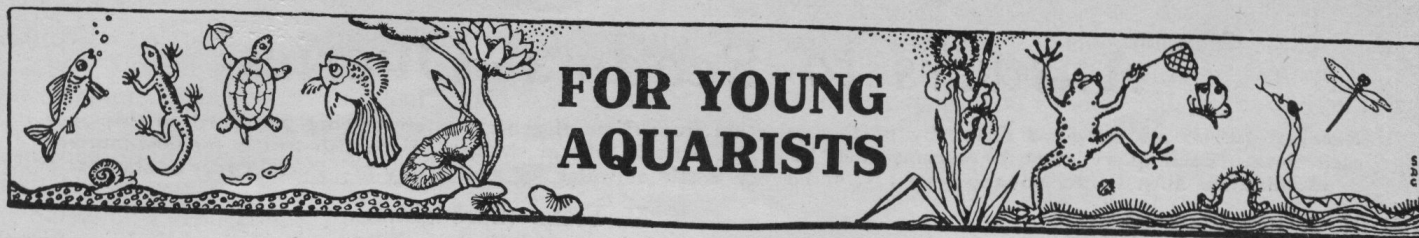
The wall can be built in quite amateur fashion of brick, stone, or cement; indeed, an appearance of un-studied irregularity in the wall work will fit much more naturally into a garden scheme unless this latter is distinctly formal. The retaining ledge can be made efficiently and cheaply of sheet zinc cemented to the wall top in 3-ft. lengths, with a width of 6-in. None of the creatures which I shall recommend will be able to pass this 6-in. projection, as it would involve clinging upside down to a smooth surface. A cemented pool in the enclosure, a few well-chosen large stones placed to overlap, a tiny bush of, say, *Berberis*, and a few low ferns complete the furnishing. The whole erection is quite inexpensive and will always be pleasing to the eye.



[Photo by Mrs. M. A. Wilson

Frogs (male and female) reared in captivity by R. Purdey from spawn brought to the Public Central Girls' School, Plymouth, in March, 1930. Photographed August, 1937, with halfpenny to give scale. In the early stages they were fed with very tiny insects. Frogs are very rarely reared from the egg to maturity in captivity; it is thought that it is a record to have kept them to this age.





## FOR YOUNG AQUARISTS

### Salamanders in Captivity

By W. G. RUFFLE

**S**ALAMANDERS are usually available in shops until quite late in the season, and as they are exceedingly hardy animals, there is no harm in buying them in early autumn, provided that you feed them up in readiness for the time when the cold weather forces them to hibernate, about the beginning of November. It is advisable, however, not to buy them after they have gone into hibernation.

The Spotted or Fire Salamander is the species most often seen for sale. It is a bulky creature, but is very vividly coloured, being conspicuously marked in orange and black. It grows to a length of about 7". Very often this species gives birth to young in captivity, these being born in the form of tadpoles, similar to those of the Great Crested Newt. The babies are usually born in April or May. They can be kept in a tank planted with Anacharis or *Vallisneria*, and should be fed on live *Daphnia*, and also on dried fish foods. No more than two tadpoles should be kept per gallon of water.

This year quite a number of Black or Alpine Salamanders have been imported, and have been sold for as little as 6d. each, although they usually range from 1/3 to 2/6 in price. The Alpine Salamander is a small fellow, growing to about 5". It is quite black in colour, and is a very unusual amphibian, as its young are born as lung-breathing Salamanders, and not tadpoles with gills.

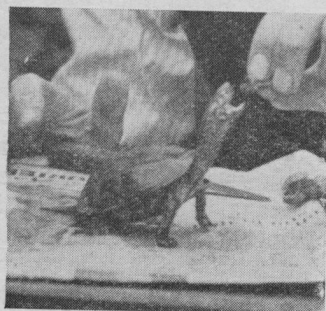
These Salamanders are alike in their requirements, thriving in a vivarium which has a floor covering of damp moss, with a few stones arranged to form caves, and a very shallow dish of water. The best foods are meal worms, spiders, crane flies, wood lice, and earth worms. As far as room is concerned, I consider it is best to allow about 50 square inches of space for each Salamander.

### Feeding Tortoises

With patience it is quite easy to persuade your Tortoises to come and feed from your fingers, and it is a very amusing pastime. It is usually best to start off



"What on earth is this?"



"Gosh!—food!"

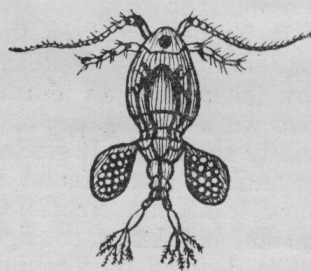
by holding the worm in a pair of tweezers, because then the creature can see so much more easily what you are offering it. He will, however, get used to being fed quite quickly, and then you will be able to dispense with the tweezers and use your fingers, as Mr. Thomas, of Merton Park, is doing in these pictures. Remember, that it will be absolutely no good offering worms or meat to Land Tortoises, which are strictly vegetarian; it is only Water Tortoises which are carnivorous.

### Answers to "Do You Know?"

No. 1.

(1) Milfoil, Maretail in spring, Giant Anacharis, and Starwort.

(2) At first sight, *Cyclops* look very like *Daphnia*, and are, in fact, often mistaken for them; but if you compare the two under a magnifying glass you will find that they are quite different.



Cyclops.

Here is a picture of a *Cyclops*, from which you will see that it has a "pear-shaped" body, with two egg sacs hanging from it. There are also two large antennules with which the creature swims. These little crustaceans are called *Cyclops* because they only have one eye, after the one-eyed giants

of Greek mythology.

(3) The chief differences between Frogs and Toads are:

(a) Frogs can leap high and Toads seldom jump at all.

(b) Frogs are much brighter in colour and have moist skins, whereas Toads' skins are dull, dry, and warty.

(c) Toads live mainly on dry land, only going to the water to lay their eggs in the spring.

(d) Toad spawn is found in long strings and Frog spawn in jelly-like lumps.

(4) A Blenny is a small sea-water fish which is to be found in rock pools left by the sea at low tide.

(5) The Sunfish family likes to feed on live foods, such as chopped earth worms, *Daphnia*, and blood worms. Sunfish can sometimes be persuaded to eat raw meat in very tiny pieces.

(6) The best place to look for *Daphnia* is in a farm pond on which ducks are kept, but where there are no fish. It is usually found in shallow water, and especially collects round partly submerged logs, floating branches, or, in fact, anything lying in the water. The *Daphnia* tend to swarm and travel towards the light. In cold weather they go down to the bottom of the pond.

# Reptile and Amphibian

Why They Appeal

By L. G. PAYNE

LAST week we discussed the question of accommodation for our reptiles and amphibians. Now what of the inmates? The basic idea is to find creatures which will live together in amity, and always to avoid overcrowding.

For the enclosure described I would recommend a few Spade-foot Frogs, Painted Frogs, Fire-bellied and Yellow-bellied Toads, Green Toads, Natterjack Toads, Bell Toads, Spotted Salamanders, Slow Worms, small Edible Frogs, small Clawed Frogs, small European and American Terrapins, and Japanese and other Newts. The choice is, of course, wider than this, depending largely on supply and demand; and my list may provoke criticism, but nothing in this hobby is stereotyped.

The Spade-foot Frogs have a sharp, horny digging shovel on each foot with which they excavate a hole for themselves in soft earth; the Fire-bellied and Yellow-bellied Toads have their under surfaces brightly coloured, and spend hours floating on the surface of the smallest pool; the Green Toads and Natterjack Toads are beautifully mottled green, yellow, and brown, the latter with a distinctive bright yellow line along the back.

Bell Toads are barely  $1\frac{1}{2}$ " in body length, and coloured an inconspicuous olive but their call note is delightful—a clear, tinkling monotone. I well remember the thrill of hearing this for the first time on a remote hillside of the Belgian Ardennes, and the excitement of the ensuing search.

This suggests another aspect of my subject—the joy of obtaining in the wild state new species for the collection. It would be easy, in reminiscent mood, to recall red-letter days in Brittany stalking the Green Lizard—a pastime much more exciting and difficult than it sounds; the day when the first Bell Toad was found in an old Belgian quarry—it was a male, with the egg chain wound around its thighs—and that misty day in the Bernese Oberland when the Black Salamanders peeped out of boulder crannies. These finds will supplement our purchases from the dealers' shops, and a few days' holiday across the Channel may well rekindle our enthusiasm from year to year. Moreover, under these conditions, we see how and where the creatures live, what is their environment, and on what they feed. It is perhaps not always necessary or advisable to advertise one's finds to the hotel guests, but a haversack will conceal a multitude of personal idiosyncrasies.

The Spotted Salamanders, beautifully marked in black and yellow, smoothly glossy, with soft, lustrous black eyes, and growing to a length of about 10", form a welcome contrast to the amphibians described, as do the interesting and inoffensive Slow Worms, which look like snakes, but are really lizards. Edible Frogs, the males of which species glisten in the sunlight like the finest enamel, are of a brilliant green, and are, I think, the most intelligent of the amphibians. It was this frog which was immortalized by Aristophanes in

his Frogs' Chorus, written 400 years before the Christian era.

The Clawed Frog, native of Africa, has always been regarded as requiring sub-tropical conditions. I have, however, no hesitation in including him in the list for the outdoor enclosure, as some specimens which were turned into a small garden pool three years ago have successfully withstood ice on the pool each winter, and have increased considerably in size.

There is one delightful species of hardy frog which no amateur will wish to be without. This is the Tree Frog, at once the smallest, most delicately coloured, and most charming of amphibians which we are likely to encounter. This creature possesses adhesive discs on the toes, which act in sucker fashion, and thus is enabled to climb the smoothest glass. Accommodation for the Tree Frog, therefore, must be of the totally enclosed type. A glass and brick structure, about 8' high by 6' broad and 4' back to front, with a cemented puddle, ivy inside the walls, which are lined with oak bark, sliding windows and electric light will provide endless hours of interest and amusement, and an ideal home for your Tree Frogs. The one I have in mind cost £5, but is as effective now as it was when built seven years ago. With the first frosts of autumn the Tree Frogs hibernate under the oak bark, and in the soil, to reappear about mid-March if the weather is mild.

Hibernation is a natural event in the annual cycle of the life of hardy reptiles and amphibians, and if we forcibly change this order of things by keeping our Tree Frogs and other creatures at high temperatures throughout the winter, as is sometimes recommended, we are at once introducing a new element which will interfere with and interrupt an organism specially adapted for the long winter rest.

(To be continued.)

\* \* \*

HERNE HILL AND DISTRICT AQUARIA SOCIETY.—On September 2, Mr. K. A. Taplin gave the Society an extremely interesting lecture. He covered a wide range of subjects, touching on diseases of fish, and experiences in the importation of fish from the Continent, and giving much valuable advice to pondkeepers with regard to rectifying the unfavourable conditions which often occur in the spring.

Some very interesting experiences were related of research work in connection with fish, and the lecturer gladly answered the many questions put to him. At the close the members were unanimous in their opinion that the lecture had been one of the most absorbing in the programme.

The Annual General Meeting takes place at Herne Hill and District Social Club, 23, Dulwich-road, Herne Hill, S.E.24, at 8.30 p.m., Thursday, October 28, when intending new members should enrol for the coming year.—C. M. Howard, Hon. Sec., "Iffley," Park-road, Dulwich, S.E.21.

# Reptile and Amphibian

Why They Appeal.

By L. G. PAYNE

(Continued from page 175)

**O**F hardy Lizards there are two kinds which merit the beginner's attention, and these well repay a little care and thought in the preparation of a permanent home. Lizards thrive in sunshine, and while the Wall Lizard loves to bask on the vertical surfaces of sun-baked rocks, the Green Lizard will similarly extend himself on the green leaves of suitable bushes, apparently appreciating the value of colour camouflage. Bearing this in mind, the plan we originally adopted was to choose a sunny corner of the garden and there completely enclose the trunk and lower branches of a sumach tree. Two sides of the enclosure are of wood, one is the house wall, and the front is a large glass door. The interior is lined with ivy and oak bark, while the new leaves on the enclosed living branches are a recurring delight each spring.

To allow for normal growth of the trunk, and for wind sway, a large wooden collar was placed at the point of emergence, to which the trunk was attached loosely by casement cloth. Against the house wall blocks of stone and inverted grass turves were placed, and under these the Lizards retire in winter.

Other reptiles may be associated with these Lizards, and the amateur will like to test his theories with various combinations. There is a larger Lizard frequently on the market known as the Dalmatian Lizard, which it would be unsafe to keep with the smaller kinds, but which can very suitably form one of a larger community. It may be associated with the beautiful Eyed Lizard of Southern France, the large East European forms of the Common Toad, and with Grass Snakes.

In the early summer of this year it was decided to experiment with Green and Wall Lizards in an open-air reptiliary. Although it is perhaps too early to advance definite conclusions, certain impressions may now be given which may assist others who contemplate keeping these intelligent reptiles.

With the ledge type of reptiliary it is probable that a minimum gap of 2' must be allowed at any given point between the earth of the enclosed part and the rim of the ledge. In the interests of strict veracity it must be recorded that in my own case a minimum of 15" has been the means of populating the garden rockery with some beautiful escaped specimens! These have mostly eluded capture until a few days ago when I read that boys in Italy catch wild Lizards with a horsehair noose moistened in saliva—the latter refinement being calculated to dazzle the prey. I had previously tried the plain noose idea without effect, but the "dazzle" device instinctively seemed good. Modesty or hot weather suggested a substitute for the lubricant, and bacon fat was used. This appeared to possess the extra advantage of keeping the cotton noose well open. The cotton was suspended from the end of a long garden cane. The intended victims evinced the liveliest curiosity in the dangling noose, and within a quarter of an hour no fewer than four lizards had been recaptured.

Now a few words on feeding. The keeper of most kinds of domestic animals can go into a shop and purchase prepared food for his charges in neat little packets; but the owner of reptiles and amphibians is faced with problems in feeding which cannot be solved in this easy manner.

Broadly speaking, all reptiles and amphibians must see their food move before they will accept it. Actual movement of the hunted stimulates the hunter, and is evidenced in the Common Toad and some others by a definite twitching of the toe joints.

Worms, beetles, insects of all sorts, and the "gentles" of the angler are all readily eaten by amphibians, but these require time to collect. The best standby is undoubtedly the bluebottle and greenbottle flies, which can be caught by the hundred in the old-fashioned globular fly-traps. One or two of these can be set out of doors most days from May to October and opened out under water. The flies will then be eagerly snapped up by the expectant reptiles and amphibians. In the totally enclosed types of house it is, of course, only necessary to open the traps in the ordinary way. Gentles are obtainable most of the year from dealers in fish bait.

There is one further point in connection with feeding. Although reptiles and amphibians will gorge freely under suitable weather conditions, there are, in Nature, periods when food is scarce or unobtainable; and the man who keeps these creatures in captivity need have little fear that his charges will suffer, if he wishes to leave them for, say, a long week-end. For longer periods a friend can usually be persuaded to attend to the feeding.

It has been possible here only to outline some aspects of this fascinating study. The field is wide and now is the time to plan for the future.

(Concluded)

\* \* \*

## Result of the September Photographic Competition

The photographs entered for this competition have now been judged. There were many more entries, and the standard was distinctly higher than in the August competition.

FIRST PRIZE OF ONE GUINEA (Frogs reared in captivity from spawn).—Mrs. M. A. Wilson, 49, Torland-road, Hartley, Plymouth (this photograph has already been published in the October 5 issue).

SECOND PRIZE OF HALF A GUINEA (Rainbow Trout).—Miss V. Burch, Cherry Orchard, Gt Amwell, Herts.

THIRD PRIZE OF FIVE SHILLINGS (Water Lilies).—Geo. L. Bird, 22, Newcourt-road, Topsham, Devon.

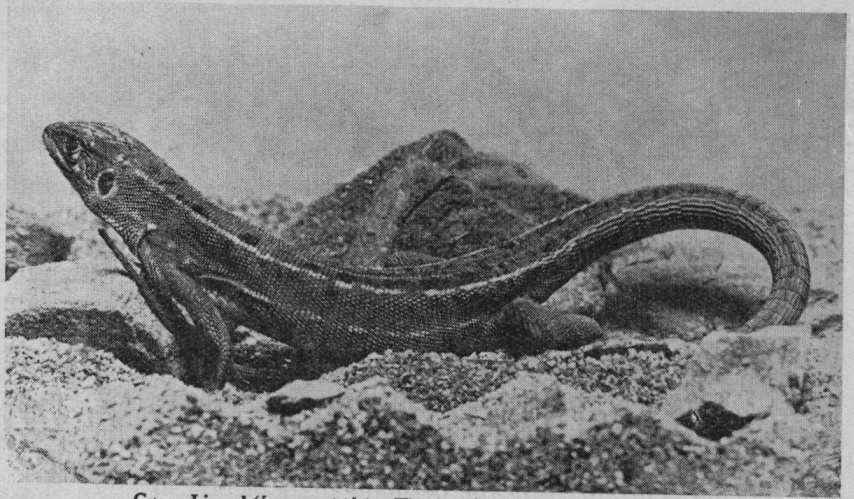
CONSOLATION PRIZES OF HALF A CROWN.—H. W. Castle, 2, Drake-house, Dolphin-square, S.W.1; J. H. Warren, 17, Crossfield-road, Southchurch, Southend-on-Sea; Leonard Norris, "Lendor," Wych Hill-lane, Woking.

# Your Lizards in Winter

By L. G. PAYNE

**A**T this time of the year, when thermometer readings are apt to vary between wide limits, and any morning in the garden may show the Dahlias with drooping, blackened heads, the owner of Green and Wall Lizards who keeps his stock out of doors must prepare for changing conditions.

The Wall Lizard, whose distribution in Europe extends some hundreds of miles further north than that of the Green Lizard, will naturally withstand a harsher climate, but both species must be provided with frost-proof retreats in winter. In these last days of October the Wall Lizards will peep out from nooks and crannies in the reptiliary if the sun gives but the slightest



**Green Lizard (*Lacerta viridis*).** This lizard is bright emerald green and the males frequently have bluish throats. It is a most attractive species.

harm will be done, but poor under-nourished specimens will probably not have the vitality to return to their retreat. These should be put back in their burrow by hand.

The outdoor Lizards will not require food during the winter months, but water should always be available.

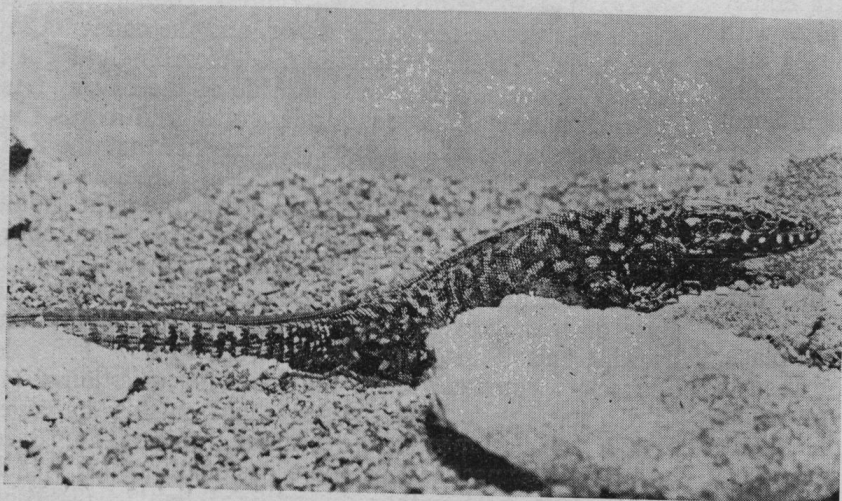
We now have to consider the owner whose Lizards have been confined throughout the summer in the small indoor vivarium. He, too, will wish to keep his charges throughout the winter. Lizards that have thus been kept indoors will probably not take kindly to a sudden and enforced hibernation, and I would recommend in this case winter feeding, an equable living-room temperature, and sunlight whenever this is available. Fortunately, the Lizards' staple foods, meal worms and earth worms, are as easily obtained in winter as in summer. Finally—and this I would stress—do not attempt half measures; the outdoor Lizard must be encouraged in natural hibernation, the indoor Lizard should be given every opportunity to feed and sunbathe. Do not be tempted in mid-winter to put the

vivarium "out of the way" in a shed or cold room, as this will surely be fatal.

By bearing these few hints in mind there is no reason why your Lizards should not live through the coming winter and so repay the appreciative possessor for seasons yet to come. [Specimens kindly loaned by C. H. Harris.]

\* \* \*

A London dealer recently received two poisonous snakes of unknown species. They proved very strong and vicious, but imagine his surprise and indignation when he noticed that the lips of one of them had been sewn together with black thread, effectively stopping the reptile from opening its mouth. In our opinion, this is one of the most cruel acts we have ever seen perpetrated upon a reptile. Agreed the snake might be fierce and have a poisonous bite, but an experienced and humane snake handler would be well able to deal with it for all that.



**Wall Lizard (*Lacerta muralis*).** Perhaps the most active of all lizards and the most widely varying in colour. Usually greenish with yellow, bronze or black markings.

encouragement; in contrast, the Green Lizard will need a ground temperature of about 60° before coming out to feed.

It is vital, if your Lizards are to go through the winter successfully, that they should take as much food as possible before retiring for their long rest. If Lizards are kept out of doors, and underground retreats have not already been provided, a good plan now will be to get a small wooden box—say, a minimum of 12" square and a few inches deep—for half a dozen Lizards—reverse this and place in such a position that an opening of 1" is available between the ground and the side of the box. On top of the box pile sand, or preferably grass turves; by this means the whole box should be hidden from sight and buried below 18" or more of frost-excluding material.

Here I would mention a point which is well worth watching. The Lizards' winter sleep is not a complete hibernation, and an unusually warm winter's day may be the means of arousing temporary activity. If the Lizards have been feeding well during the summer no

# Anaconda

By "AMPHIBIUS"

**T**HIS, the largest of the Boas, and one of the two largest living snakes, is found throughout tropical South America and lives in the same waters with the Piranya, Electric Eel (which is not an eel at all!), and Angel Fish, among a whole host of other interesting animals. The demand for its skin for the manufacture of articles of women's wear is causing its relentless persecution to-day, and it is largely owing to its habit of lying quietly in deepish water all day, and to the enormous number of living young to which the female gives birth periodically that the species is not now verging on extinction.

It is definitely, and for many reasons, not a snake for us amateurs. It is difficult, by reason of its size, to house at all satisfactorily; and to supply the very large amount of warm water needed is not at all easy. Branches which project from the water itself, and which are stout enough to bear the heavy weight of these snakes, are called for. The snake usually lies coiled round the submerged portions of the logs with its head breaking the surface of the water for breath. The temperature should not fall much below 80°. As will be readily seen, the furnishings of the cage are such that it has to be dismantled whenever it is cleaned.

I owned at different times two large specimens—one 11-ft. and the other 13-ft. long—and I found neither of them aggressive. They got knocked about somewhat during the lengthy process of cleaning their den, as they never seemed to have sense enough to get out of the way of brooms, etc., but an occasional hiss was their only protest against such treatment. This indifference seems to be the trouble with the Anaconda. It accepts captivity with a sulky and spiritless resignation, taking an interest in nothing but its food and the deepest and most obscure part of its tank. It exhibits none of the quasi-intelligent curiosity which is such an attractive feature of most of the other Boas.

In common with the Python, Anaconda has acquired the reputation of man—and cattle—killer. It is, of course, nothing of the sort, and feeds upon the multitudes of small and middle-sized rodents which share its habitat, and it also seems fond of birds. In captivity it will take rabbits, pigeons, fowls, covies, and starlings. It might possibly eat fish, but it never occurred to me to find out.

In profound distinction to their parents, three baby Anacondas were absolute little horrors. Their one idea seemed to be to bite someone or something as often and effectively as possible, and they spent so much of their time hissing at me and each other that I sometimes wondered they did not blow their larynxes (or is it larynges?) out of their heads.

Most of the Boas do not mind a bit of cannibalism if they are very hungry, but one of the three mentioned above, put for lack of other accommodation with a very fine and tame South American water snake, devoured its cage-mate during the first night they were together, and this in spite of the fact that a few hours previously it was in a box of damp moss in an aeroplane. I had

not even the satisfaction of knowing that my pet was nourishing the newcomer, for the wicked little thing—it was only about 1-yd. long—resented being looked at the next morning, and proceeded to vomit up its supper. I mention the matter as all the others required some considerable time in which to settle down before they would take food, and it must have been sheer fury that made the Anaconda attack and subsequently eat the other snake. The other two babies possessed similar temperaments and seemed much better doers than their elders. When they had settled down they took dead sparrows, starlings, mice, and young covies very readily if they thought there was nobody about.

I regret that I cannot consider myself at all successful with the Anaconda, neither of my large ones living a year, and I seemed to sense all the time that they were getting less healthy and well. This is never a pleasant feeling to have about animals in captivity, and I hope that my experiences are not typical for this species.

I think I shall try again with them if ever I am able to provide radiant heat and artificial sunshine, with, perhaps, a large outdoor cage in which they can spend the hottest part of the summer.

The colouring of the Anaconda does not appeal to me. For the benefit of those who have not seen them, it is olive or yellowish green above with dark markings which often take the form of rings. Below they are orange or yellowish, again with dark markings. The head is very small for such a large animal. My large specimens seemed peaceful enough, and never molested the Iguanas and Teguxins, which shared their cage for most of their stay with me, but I should not trust little ones with *anything*.

The Yellow Anaconda (*Eunectes notæus*) is found in the swamps of the Chaco belt, and does not grow to nearly the size of *E. murinus*. Of its ways in captivity I know nothing, but the species is well represented at the London Zoo at the present time.

Anacondas are occasionally to be had from dealers in this country, but the price asked is higher than that for a Boa or Python of the same size, either of which makes a much better pet. I do not know whether the Yellow Anaconda has ever been available in this country or not.

\* \* \*

## Club for Uxbridge

Will any aquarists or pondkeepers living in Uxbridge, Ruislip, or the surrounding districts kindly communicate with Mr. C. P. Staples, of "Hedgerows," Swakeleys-road, Ickenham, who is anxious to form a local aquarists' society.

\* \* \*

An interesting addition to the collection in the Insect House is a consignment of giant centipedes from Trinidad presented by General Sir George Macdonagh. These are a foot long and as stout as a man's thumb. They are mainly carnivorous, dispatching small animals by means of poisonous fangs. Even the forty feet have toxic properties, their passage over the human skin producing a form of nettle rash.—*Observer*.

# A Vivarium for Tropical Lizards

By LOUIS C. MANDEVILLE

EVERYONE likes to make things for himself, but all have not the skill, tools, or time needed to construct the more elaborate apparatus used in their hobby. The vivarium or terrarium to be described was constructed one week-end during a violent brainstorm. It has many shortcomings, no doubt, but the following attributes: it was both cheap and simple to construct, and only the most ordinary materials and tools were required.

We aquarists have a habit of buying things that look useful, but for which at the moment we have no real use. The chance acquisition of a 4-ft. tubular electric warmer and a thermostat from a junk shop resulted in the building of the vivarium. The timber purchased was a piece of  $\frac{1}{4}$ -in. 3-ply 6-ft. long and 15-in. wide, and 9-ft. of planed plank 9-in. wide,  $\frac{3}{4}$ -in. thick.

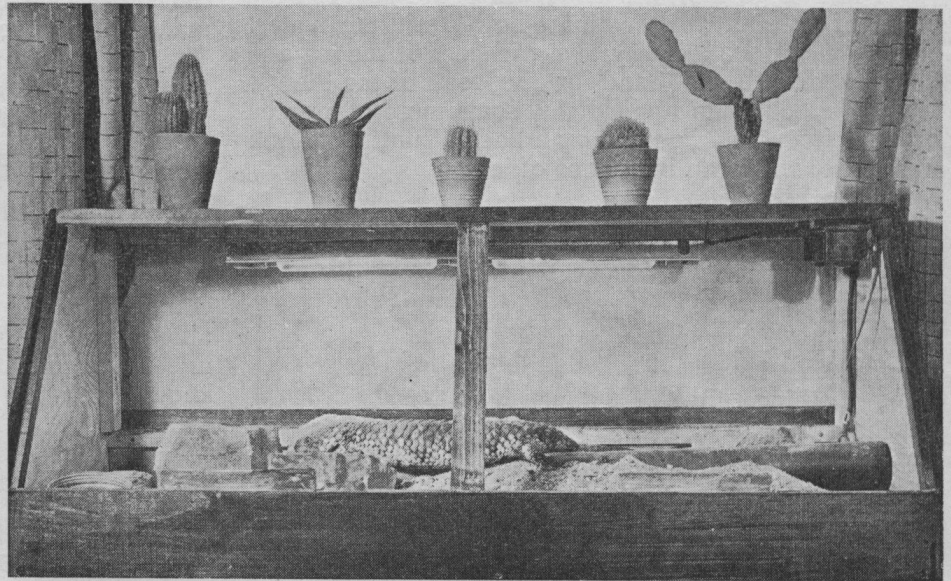
The general shape and proportions of the vivarium will be appreciated from the illustration. It is 3-ft. long, and at the base 15-in. wide. The base is plywood, strengthened by strips of the planking two inches wide. The lizards like a fair depth of sand to dig about in, so the lower part is in the form of a box. The front is made of a piece of plank  $3\frac{1}{2}$ -in. deep, and the back of a piece 5-in. deep. The sides are entirely of the plywood, the back edge being vertical, but the front sloping back from the top of the sand box to a width of only 8-in. at the top, which is again made from a piece of planking. Strips of wood screwed to the front and base, and back and base, inside the lower part, help to give rigidity and to prevent sand falling out.

So far there have been no elaborate joints, the only tools used being saw, screwdriver, and sandpaper block. At this stage the structure is ready for glass fitting. The back consists of a single piece of glass just under 3-ft. long and 9-in. wide. It rests on a ledge made of a thin strip of plank, and is held rigidly in position by two strips screwed on to the insides of the ends tight against the glass. This piece of glass is 32-oz.

For simplicity and ease of opening the sloping front panel was made in two pieces. So a flat strip was set up in the middle of the front, joining the top to the front of the lower part of the case. This forms the centre bearing for the glass. Inside the ends further strips are screwed for the glass to rest on. It was thought at first that the two glasses would be secure lying against these supports, but they tended to slip forward, so two strips, one each side, have been fixed on to the top of the front part of the sand box to prevent this. These can be seen in the picture. The front panels are of 26-oz. glass.

The installation of the heater proved quite simple. The end caps of the steel tube in which it is encased

were removed and the element withdrawn. Some readers may not be aware that the elements of these tubular heaters are usually constructed of independent lengths of approximately 2-ft. and 1-ft. From the heater in question one of the two units of 2-ft. length, of which it was composed, was removed, leaving a 2-ft. heater of 120-watts power (each foot giving 60-watts). The steel casing tube was cut down to a suitable length, the element reinserted, and the end caps refixed. The heater was then laid on the floor of the vivarium with a piece of  $\frac{1}{4}$ -in. asbestos sheet at each end between heater and wood. The thermostat was screwed inside the roof.



An old two-bulb strip light, which had once been used on an aquarium, was fixed to the inside of the roof, and fitted with two 30-watt bulbs. Before filling up with sand and introducing the lizards, the outside of the case was stained to a dark oak colour and given three days in the open to dry thoroughly and lose all odour. The inside was left untouched.

When all was ready the lower part was filled with dry sand and some big stones, completely hiding the heater. The thermostat was set at 80° F., the top of its range, and things left to warm up. The lizards, actually four Skinks, were then put in.

So far it has proved a success, the animals being very active and eating well. On dull days the lights are put on for several hours, but it is intended to wire the lamps, as well as the heater, to the thermostat in the manner recently described in WATER LIFE, so that light will be automatically forthcoming on cold, dull days.

The first difficulty experienced was in lifting the front glass panels. This was overcome by attaching a tag of doubled adhesive plaster to the top edge of each panel, thus providing an easy grip. When first set up the heater was nicely buried, and stones suitably arranged about, but the Skinks, with characteristic industry, in-

*(Continued on page 239)*

## Club Reports

Owing to the manner in which Club Reports tend to encroach on the limited space available in this paper, only notices of future meetings and club matters of general interest to all our readers will be published in these columns. We greatly welcome reports giving interesting points from lectures, but are not prepared to devote space to club business, as this is only of local interest.

**ILFORD AQUARISTS' SOCIETY.**—Owing to indisposition, Mr. Stanley Plater was unable to be present at the meeting held at the Vine Institute on Monday November 1, at which he was to have spoken on Tropical Fishes. The evening was, therefore, devoted to open discussion. Many matters were raised, and the merits of the various heating systems were discussed at some length. A table show of Tropicals drew a satisfactory number of entries of very good-quality fish. Following our recently adopted practice, the judge explained the merits of each of the winning exhibits.

The Annual General Meeting of the Society will be held at the above-mentioned address on Monday, December 6. The agenda is a rather long one, including, in addition to the usual matters, motions for alterations to the rules, garden pools competition for 1938, annual table show awards, apparatus acquisition fund, and so on. At this meeting the officers for 1938 will be elected. All members are earnestly requested to attend, and all interested in the hobby will be welcomed. The Committee will be glad to receive any suggestions for the improvement of the Society, as well as constructive criticism.—S. H. Carter, Hon. Press Sec., 13, Kenwood gardens, Ilford, Essex.

**BRISTOL AQUARISTS' SOCIETY.**—The Bristol Aquarists' Society met on November 26. After the general business and an outline of the forthcoming show, Mrs. Gould gave us an extremely interesting and instructive lecture on the "Structure of a Fish." She said that she approached her subject with diffidence as she had found that the more one studied the more remained to be studied. The main outlines of her lecture were as follows. The upper portion of a fish is called the *dorsal* region and is segmented, with paired muscles. The lower portion is the *pelvic* region, which embraces the body cavity in which are the organs of the fish, and which has comparatively thin walls. The heart has only two compartments, and the blood does not return to the heart after being oxygenated to be pumped through the arteries, but passes on to do its work directly after leaving the gills. The carbon dioxide laden blood is pumped by the heart to the gills where it suffuses the gill filaments and absorbs oxygen from the water, passing out the carbon dioxide. The vitalized blood then passes to the body and the various organs. Water is taken through the mouth and flows over the gills to pass out under the gill plate or *operculum*. The blood comes into proximity with and assimilates the food in the stomach.

The reproductive organs lie directly beneath the kidneys. Fishes' eggs are of two sorts: *Dimersic*, those which are sticky and tend to sink in the water and adhere to plant life, and *Pelagic*, those which float at the surface of the water. Fishes' teeth are not intended for chewing, but for holding prey. They are really scales and have the same structure as scales. The nostrils are used solely for the sense of smell and are simple tubes ending in olfactory sacs. The eye is substantially the same as ours, but specially fitted for use in water. The

ear has horizontal and vertical canals containing a fluid, the movement of which gives to the fish its sense of balance. Fish can feel sound, but cannot differentiate between the pitch of sounds. The uses of the various fins were outlined: the Pelvic fins are accessory steering fins; the Dorsal and Ventral fins assist the fish to keep upon an even keel. The fish derives its motive power from curving the body in a double curve and alternately pressing upon and slipping through the water.

Throughout her lecture Mrs. Gould drew parallels between human organs and those of a fish illustrating the essential samenesses and making clear the subtle differences. She showed large drawings to bring out her points and handed round anatomical specimens in test tubes which she had prepared. A very hearty vote of thanks was passed to Mrs. Gould for one of the most interesting lectures we have yet enjoyed.

The next meeting will be held on November 22, at our headquarters, Y.M.C.A., Colston-street, when the open show will be reviewed by Mr. Phillips.—L. G. BURNARD, Reporting Secretary.

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### A Vivarium for Tropical Lizards

(Continued from page 237)

sist on digging all the sand clear, so that they can flatten themselves right out on the heater, and thoroughly enjoy themselves. A method of discouraging this has yet to be found. A more serious problem is the one of ventilation. The lizards do not seem distressed or inconvenienced, but at times the atmosphere of the case is definitely high. How can adequate ventilation be secured without cooling the inside air and submitting the creatures to cold draughts?

The materials for this vivarium, without heater, thermostat, or striplight, cost between 7/6 and 9/-. If one searches around and is lucky the electrical apparatus may be picked up for £1 or even less, and some enthusiasts may already have some disused apparatus which could be adapted.

\* \* \*

The London Zoo Aquarium has received a specimen of the Remora, a Shark Sucker from Florida, a fish never seen alive in England before. The fish, though not much over a foot or two long, has been famous since the days of Columbus, who first drew attention to its remarkable way of life. The dorsal fin is converted into a series of plates forming a sucking disk of remarkable power, with the result that the fish can adhere to any convenient surface with a pressure of over 70-lb. The Shark Sucker employs this unique organ to attach itself to Sharks, and even ships, and is thus carried from one feeding ground to another without being obliged to exert its not-very-efficient swimming powers.—*Observer*.

### True Story

City Office Boy to News-stand Assistant: "What's this paper 'Water Life'? My guv'nor does nothing but read and talk Water Life, Water Life, Water Life! It fair gets on my nerves!"

# Spotted Salamanders at the Zoo

By the late D. E. SLADDEN, D.I.C., C.M.Z.S.

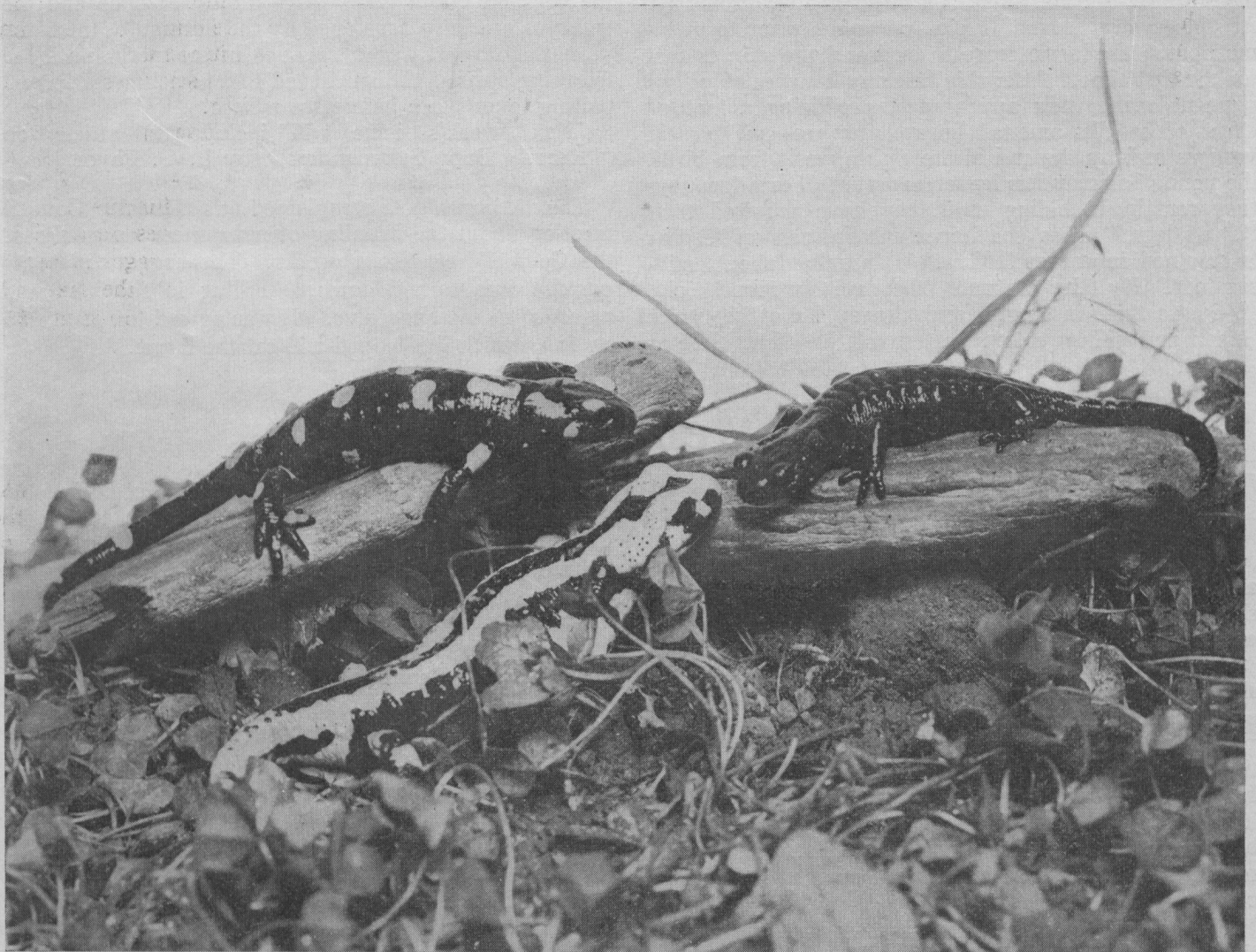
FOR experimental purposes a number of Spotted or Fire Salamanders (*Salamandra maculosa*) have been kept under close observation at the London Zoo for several years. During this time two generations were reared, so that opportunity was afforded for minute observations on their habits and complete life history.

The Spotted Salamander has a wide range extending over practically the whole of Europe with the exception of the British Isles. It is an attractively coloured species—bright yellow, or orange spots on a black ground. There is another form (*Var. taeniata*), in which the yellow spots coalesce to form two bands extending down the back separated by a median black stripe. The under parts are bluish-grey, sometimes speckled with yellow. Adult specimens measure 5-in. to 6-in. in length.

Salamanders make interesting inhabitants for a vivarium or fern-case, for they soon become tame and learn when to expect food. Provided they are given

plenty of space (as in overcrowded conditions they are susceptible to a fungus disease which is highly infectious), they thrive well in captivity and live for years. The best diet consists of earth worms varied with occasional small scraps of raw beef. In spite of their black and yellow livery, Nature's warning coloration, they can be handled quite safely. If, however, an irritant is applied to the skin a milky-white fluid is exuded from cutaneous poison glands situated along the back in a double row. A few drops of this fluid injected into the blood of a small mammal is sufficient to cause its death.

Although Salamanders will occasionally pair and deposit young in an ordinary vivarium, specially designed tanks were constructed for breeding the experimental specimens. These tanks were of the frame-type, with glass sides, slate bottom and perforated cover. The special feature was a sloping cement bank extending the whole length of the tank, dividing the floor space into approximately one-third and two-thirds. The larger area was devoted to soil, with rock-work



THE CONFERENCE. Left, Spotted Salamander (*Salamandra maculosa*); centre, Striped Salamander (*Salamandra maculosa taeniata*); right, Alpine Salamander (*Salamandra atra*).



# Readers' Experiences

## Temperature Fluctuations

IN last week's issue appeared an article on the above, and I wish to say how I, a mere amateur in fish keeping, endorse what is said re varying degrees of temperature. I ran a farm for some years in Southern Rhodesia and can state the following from personal experience. On one side of my farm I had a river and "spruit" frontage of over 2½ miles. The river I never cared to dabble in, but the spruit I have often paddled in. Now it was surprising to find how actually *cold* was the bed of the stream *at all seasons of the year*, and yet the surface area would be pleasantly warm. On the other hand, during the so-called "dry season," *i.e.*, the winter months, May-July, it gets very cold at night, and very often there is a heavy frost.

In the dam used for irrigation purposes I sometimes "took a header," and it always gave me quite a shock—that is the word—striking water. In this dam there were quite a few Minnows, although it was fed only by springs in the Kloof and the overflow simply percolated underground, thus having no direct contact with the river. Also during the rainy season, and especially after continued heavy downpours, it always puzzled me to find in pools—dry for nine months in the year—many Barbels which provided both sport and food for my native "boys." A year of drought never seemed to reduce their numbers. I suppose they embedded themselves in the mud and so survived.

To return to "temperature." It seems to me that "coddling"—for that is what it amounts to—will land "exotic fish" fanciers and breeders in the same disastrous position in which the poultry industry finds itself to-day, and that would be indeed a great pity. Let us copy Nature, and "everything in the tank will be lovely"!—T. M. Petrie.

## Experiences of a "Vivarist"

(If an aquarium keeper is an aquarist, why should not a vivarium keeper be called a vivarist?)

A few years ago I converted a fair-sized greenhouse into a vivarium. At times I have had more than 100 different species of amphibians and reptiles, mostly living together, although, of course, I had to keep snakes in a separate part by themselves. Inside I built up a rockery with ferns and other plants, with a tiny stream which in turn fed shallow pools, and at the end quite a large-sized pool, heated in winter. I bred Edible Frogs in this. I was never successful in breeding Tree Frogs. Newts bred freely. I had English Grass Snakes, Dice Snakes, and a few other European snakes. I had sometimes more than fifty Wall Lizards of various species, *L. muralis* predominating. *L. reticulata* did not thrive so well, yet, strange to relate, those that escaped have bred and increased in numbers, and any day in the summer their descendants can be seen sunning themselves; I have caught many baby ones at least half a mile from my late vivarium. Yet the more hardy and commoner *L. muralis* have never succeeded in establishing themselves.

I have had many Green Lizards (*L. viridis*) up to 20" in length, and allowed some their liberty, but

they do not thrive and die out in about two years, although the first season they are seen basking on bushes and grass plots within 100 yds. of the vivarium. Dalmatian Lizards and Eyed Lizards from Spain are very dull at any temperature under about 80° F.

I had many kinds of Skinks, Geckos, etc., also the Egyptian Matiquire Spiny Lizard, which refuses food if the temperature is under 90° F. Chameleons like high temperatures, so do Alligators. One large Monitor I had would sit on a shelf, and, when I opened the safety door, would always whip his tail across my face, but, after getting caught twice, I was ready for him. The strength of this reptile (which was over 3 ft. long) was amazing, and it was a job to hold him. I have been bitten, but not seriously, as they give you warning by a terrific hiss when about to attack. Their favourite food is chickens' eggs, swallowed whole.

I have had as many as 100 Tree Frogs at one time, and the noise at night (especially before rain) was unbelievable. Once I had a Grass Snake swallow a favourite Changeable Toad, a most unusual thing to do. In my annoyance I rather worried the snake until he disgorged the toad, who was none the worse, and almost immediately fed by swallowing a large cockroach.

Once my Wall Lizards seemed to be escaping, and I only discovered by accident one day that a pair of very large Edible Frogs (Hungarian) were making their dinners off them. I caught one of the frogs with a tail hanging out of his mouth. I pinched the frog and up came a fairly large Sand Lizard, who nipped me in base ingratitude. I have often heard a frog croak after being swallowed. I fed these giant Edible Frogs on cockroaches, young mice, and pieces of raw beef dangled in front of them by steel wire.

I had a fine specimen of Grass Snake 3' 6" long in August, killed by accident on the Downs 600 ft. above sea level. Adders are common, and the largest I have killed was just over 25" long, but they range from 16" when full grown, and the colour varies from olive to slaty, and chestnut to quite black. Slow worms (*L. fragilis*) are common here, and at the moment I have a dozen, the largest being nearly 18", and the smallest about 4". Two are quite golden, a variety new to me. It is not generally known, but I have found that most lizards will eat *bananas*—handy when live food is difficult to obtain, for when one keeps so many creatures buying enough meal worms becomes expensive.—Alex. W. Aitken (Ventnor, I.W.).

\* \* \*

FROGS HOLD UP TRAFFIC.—When a boy cyclist fell off his machine in Camberwell New-road, S.E., a tin hanging on his handlebars burst open, about a dozen frogs hopped out, and traffic was held up until they were caught.—*Daily Telegraph*.

\* \* \*

Blindness, partial or complete, is a condition amongst a variety of widely separated fishes. In nearly all cases extraordinary sensibility to vibrations in the surrounding water makes up for the lack of vision, and some can even communicate with their fellows by means of sounds produced by the air bladder.—*Observer*.

# Rearing Baby Salamanders

By L. G. PAYNE

**T**HE Spotted Salamander makes a regular annual appearance in the dealers' shops, is not expensive, is easy to keep, is hardy, and not infrequently presents its bewildered owner with any number of babies up to about thirty. These are by no means miniatures of their parents, but are completely aquatic, blackish, inch-long tadpoles with prominent gills, demanding no very difficult treatment to bring them to maturity.

It would probably be true to state that more Salamanders produce young in captivity than any other amphibian—with the possible exception of the untransformed Axolotl—a contributory cause being that the female carries the young over a period of many months, hence, Salamanders which in early spring have been captured in remote European localities, may, six months later, produce their young in a small suburban vivarium.

The purpose of this article is to outline three practical ways in which Salamander larvæ may be "brought on."

- (1) In an outdoor pool.
- (2) In a tank in the house or an outhouse.
- (3) In a warm-water tank.

(1) We have to remember, that, in the countries to which the Salamander is native, the winters are not less severe than in our own, and it is therefore quite natural for the tadpoles to be out of doors at any time of the year.

The smallest of garden pools, or a good-sized pan sunk in the ground, will make an excellent nursery provided there is a bottom of earth. There should be a minimum of 8" of water over 3" of mud. The pool must be generously provided with plants that make their leaf growth below the water level. Water plants with entirely floating leaves, or whose growth is above the water, are useless for the purpose in view. I recommend *Elodea* (Canadian Waterweed, any form); *Callitriche* (Starwort); *Eleocharis* (Hair Grass); and *Potamogeton friesii*.

It is perhaps hardly necessary to say that there must be no fish in the pool. If the pool is old-established it may contain *Daphnia*, and probably will contain *Cyclops*. If not, these can be introduced from almost any stagnant pond.

Your tadpoles may now be introduced, and will require no further artificial feeding, with the exception of an occasional restocking of the pond with *Daphnia*.

After about two months the black colouring frequently becomes tinged greenish, and after another two months the distinctive adult coloration begins to appear. A few weeks after this the gills become absorbed and the perfect Salamander 1½" to 2" in length prepares to leave the water. Before this event it becomes necessary to ensure that strict limits are set to the wanderings of the young Salamanders, failing which

the owner who has successfully raised the young to this stage is sure to lose all trace of them. If a margin of say 2' can be spared round the pool, enclose this with a low barrier of vertical glass, zinc, or other unclimbable material. On the soil surface arrange a few large porous stones, or weather-worn bricks. The young Salamanders may now be given very small worms or gentles in the usual way.

In my experience young Salamanders in a normal environment are very prone to hibernate for long periods, these periods not necessarily coinciding with severe weather conditions; the owner therefore will have no need to be alarmed, or write frantic letters to WATER LIFE asking why his Salamanders are "off their food."

(2) Tadpoles confined to a tank should not exceed about a dozen to an aquarium 24" x 12" x 12". 2" of fine shingle should be put at the bottom and in this Hair Grass and *Elodea* planted. To those people who value, and find real joy in the natural appearance of their tanks, I would advise planting *Elodea canadensis*—which is the wild type plant. I submit that the larger forms *Densa* and *Crispa* do not harmonize with the graceful outline of Hair Grass, nor are they suitable for the small tank. The tadpoles will feed on *Daphnia*, *Cyclops*, and small pieces of biscuit or meat. Care should be taken to prevent decomposition of the latter by frequent changing of the water; an alternative plan is to suspend organic food in a small open-top muslin bag. As the tadpoles grow, blood worms will be acceptable. Complete metamorphosis takes about the same time as in (1). As this event approaches, sand and stones should be arranged at one end, and gently sloped to the water to facilitate the young Salamanders' transitional period. Particular care should be taken that direct sunlight does not fall on the tank as Salamanders are essentially shade lovers.

(3) If Salamander tadpoles are raised in a room with a high uniform temperature, growth is hastened very considerably, the perfect animal leaving the water about three months from birth. Contrary to what one might expect no harm appears to result from this procedure. Some larvæ which have been under my observation this year have given the impression of being considerably more lively at all times than their cold-water brothers. The most interesting fact recorded about these individuals was, however, that when the colour developed, instead of the usual yellow it was almost of a rich, brick-red. When the animals abandoned their aquatic habits the colour gradually assumed the normal.

The planting for a tank of this description, where the water will be warm, may include Hair Grass, *Vallisneria*, and the small *Sagittaria*. Feeding is as in (2).

It should be possible, from the above notes, for every reader who may possess, or acquire, Salamanders in the infant stage, to adapt the ideas to his own circumstances, and thus have the added satisfaction of possessing pets which are really home-bred.

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## When the Pond Freezes

**W**ITH the advent of colder weather the upper parts of the submerged plants in the pond show signs of decay, few of the small crustaceans are to be seen and the rushes have ceased to grow. During the early months of the year more severe and prolonged cold spells usually come along.

Following the frosty nights recently experienced in many districts, we have seen pools sealed by a fairly thick covering of ice. When ice appears on the pond there is really little cause for alarm or drastic action, unless the ice is allowed to become exceptionally thick. By fiercely hitting the ice with a heavy instrument we serve no useful purpose, and may damage the cement sides of the pond.

If there are fish in the pond it is a good plan to cut a hole in the ice so that air may be allowed to come into contact with the surface of the water. Beneath the ice the fish are not very active. For this reason they require little oxygen and no harm will come to them if the ice is not dealt with for a day or two.

A block of wood may be allowed to float on the water to relieve the cement of some of the force of the expanding ice when the water begins to freeze again.

Shallow pools may be protected by covering them during the night with lengths of wood laid side by side across them. If there is not sufficient wood available to do this the pool may be protected by laying sacking on strips of wood laid across each other. This procedure will help to prevent the formation of thick ice.

Should cracks in the concrete occur it is a very good plan to fill in the small ones with a bituminous preparation such as Gander Bak. In the case of large cracks, the edges may be cut away, cleaned, and the break repaired with new concrete. A coat of Gander Bak over the repaired portion will protect it and prevent the water from coming into direct contact with the new cement.

Though the ice may make observation of the inhabitants of the pool rather difficult, it serves at least one useful purpose by preventing falling leaves from reaching the bottom of the pond, where they will decay and pollute the water.



## Christmas Greetings to all Readers



## Why not keep a Gecko?

**H**AVE you ever been fortunate enough to own a Gecko? These lizards make charming and delightful pets, which soon become tame and will take food such as flies, moths, meal worms, etc., from your hand. Found in every country which has a warm climate, there are known to be over fifty-seven genera and 270 species, varying very considerably in appearance. The Gecko is the only known lizard that has a sex call, the name being derived from the sound of their cry. Some people say that the sound is made by the tongue and palate, there being no vocal cords, and that the noise is more like a man clicking his tongue urging on a horse. I have had several varieties of Geckoes, but have never had the good fortune to be close to one when it was "geckoing." In various countries the Geckoes make the night quite lively and astonish new-comers, not only with the concert, but by suddenly flitting out from behind a picture and running up the wall and across the ceiling upside down like a fly—in fact, their feet have pads and claws very similar to some flies. Geckoes have thickish bodies, broad, flattened heads, and stumpy tails, and a round disk, or sucker, on each toe. The skin has a soft appear-

ance, coated with minute granular scales—almost like that of a toad.

Never brightly coloured, these creatures are very good at changing colour to match their immediate surroundings. The majority have no eyelids, but the eyes are protected and move readily under a cap, like a diminutive watch glass. The eyes have elliptical (cat-like) pupils indicating, as is the case, that these creatures are nocturnal, those few that have ordinary eyes mostly live in sandy places and are diurnal. The tongue is thick and fleshy, and viscid. Geckoes lay eggs, usually only one each season. The males can be distinguished from the females by their larger size.

In many countries the natives consider Geckoes to be extremely venomous, and think that they poison every object over which they run. They are, of course, absolutely innocuous. They are, however, very pugnacious and always ready for a scrap with a rival, and are not above eating smaller brothers and sisters.

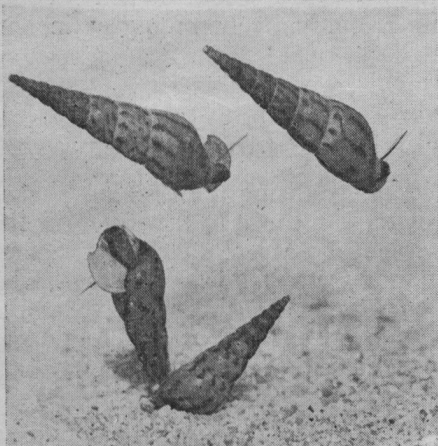
I have found Geckoes very hardy, but under 70 deg. F., they become listless and will not feed. Lots of them come into this country as stowaways in bunches of bananas.

ALEX. W. AITKEN.

# What's New?

**L**AST week two creatures quite new to English enthusiasts for water life were imported. The first was a small mollusc and the second an amphibian—to be more explicit, a small toad.

The mollusc, an exotic water snail named *Melania tuberculata*, will be welcomed by a wide circle of tropical fans, as it becomes generally available. Fully grown specimens are about 1¼-in. long, they are live bearers and have an operculum. The attractive shape of the snail



Above—  
**Pseudophryne**

Below—  
**Melania tuberculata**

can be seen from the illustration, and the colour in the better specimens is a sand yellow with brown flecks. Some specimens are very dark, the brown markings becoming indistinct.

These snails are very prolific and are distributed throughout tropical Asia and the greater part of Africa. The forbears of the specimens in Europe were accidentally brought to Holland with a shipment of Blue Gouramies. They are very good scavengers and have a large capacity for dried foods, but they do not attack aquarium plants. A disadvantage from the decorative point of view is that they prefer moving about the tank after "lights out," and during the hours of bright light they remain with the mouth of the shell buried in the sand. A Dutch correspondent tells us: "When they climb to the surface at day-time be sure that your water will soon be short of oxygen."

The toad, which alters altogether our ideas on these creatures, is a veritable little jewel. It is a species of the

Australian genus *Pseudophryne*. In general shape it resembles closely the popular Fire and Yellow-bellied Toads of Europe, but this little fellow is a real miniature, only reaching a length of a little over an inch when fully grown. It is the coloration which is so very remarkable, and which gives the creature the appearance of a very small painted ornament. Referring to the accompanying picture, we will give the colours. The ground is a dark brownish black. The large patch over the head is a deep orange, as is also the line from the end of the vertebræ forward. The skin is warty and the warts are picked out in red. The junction of each limb with the body is marked by a pure white patch and the underside of the body is marked with large white patches on a black ground.

The conditions suited to these toads will be a matter of some experiment for those who have purchased them. Gadow, speaking of Australian reptiles and amphibia, tells us that during the season of drought they bury themselves in the caking mud and remain shut up until the rains come and soften the mud, thus facilitating their release. This is rather like the African Lung Fish.

Of the spawning of *Pseudophryne* he says: "The numerous ova of *P. australis* and *P. biboni* are laid separately, not in the water, but under stones, or in the debris of reed and grass tussocks on the edge of a pool. The larvæ have often to depend upon the next shower of rain, sometimes waiting for months to be released from the eggs, wherein they have so far developed. But the tadpoles, once hatched, probably do not bury themselves; they either metamorphose or die."

In many ways, then, this toad is a unique and fascinating addition to the amphibia kept in the amateur's vivarium. A number have been acquired by the London Zoo and will be on view in the Reptile House there later. (See Amphibia and Reptiles—Gadow, in the Cambridge Natural History Series.)

\* \* \*

## Association for the Abolition of Round Fish Bowls

A new society has been founded in the United States. It is the A.A.O.R.F.B.—the Association for the Abolition of Round Fish Bowls. The movement has a powerful recruit in the person of Mr. Fred Orsinger, Director of the Bureau of Fisheries. "It has been said," Mr. Orsinger stated, "that curved aquaria make the occupants dizzy physically and lopsided mentally. I do not know about that, but I do know that they make me cross-eyed." Approving the Association's efforts heartily, Mr. Orsinger added: "Globular bowls are distressing to folk who want to view both sides of a fish and do not have all day to spend at it. Try to walk around a round bowl. Why, the fish will follow you, and all you see is the side towards the outside of the bowl."—*Evening Standard*.

\* \* \*

Two men on the Thames waterfront in Greenwich Reach the other day were surprised to see a Seal swim to a raft moored near the bank, where it stayed for several minutes. The men tried to feed it, but it swam away.