

are granular, bounded by a thin outer coat (ectosarc) of great transparency. The whole of the creature is composed of protoplasm which, as everyone knows nowadays, is the basis of all living material, plant and animal, and its power of differentiation is shown by the difference in character between the ectosarc and the endosarc.

Two bodies form the main elements of internal structure. There is the nucleus, which is associated with reproduction, and is a sort of animating or vitalising centre of the cell, as any protoplasmic body with the nucleus removed is powerless to reproduce, and soon ceases to live. There is also the contractile vacuole, a very interesting body, which has, particularly in the past, been a great bone of contention amongst biologists on the question of its actual function. It appears at regular rhythmic intervals like an expanding bubble, reaching a maximum of size, then suddenly contracting and dispersing the liquid contents.

The alteration in the shape of the *Amœba* is associated with its movement. If it be moving in a definite direction, the protoplasm progresses in flowing lobes. If it be stationary, smaller lobes will flow out in different directions in quest of food. These lobes are called pseudopodia, which means "false feet," and is not to be confused with wooden legs!

The *Amœba* has neither mouth nor anal orifice. Food is taken in by the creature flowing over the desired object, the ectosarc at any part of its surface being sufficiently viscous to permit of the object entering the endosarc. Likewise indigestible particles are disposed of through any part of the body.

The most general method of reproduction is for the *Amœba* to pull itself in half. The urge to propagate is accompanied by a division of the nucleus into two. A portion of the protoplasm streams in one direction carrying with it one nucleus, the remainder streams away in a directly opposite direction with the other nucleus, until, ultimately the attenuated thread of protoplasm holding them together is broken under the strain, and two individuals result.

Apart from simple division there is also periodic fusion of two individuals with the formation of a cyst, or resting stage—a period, as it were, for rejuvenation, as constant simple division is apt to lead to deterioration.

This, I think, is enough about the structural details of the *Amœba*, and in general may be taken as true for all those forms to which I refer hereafter.

(To be continued.)



"FANCY MEETING YOU!"  
(Left) Moorish Toad. (Right) Common Toad.  
Photo.] [Copyright

### "TERRIBLE" TOADS

**T**OADS are terrible creatures in the opinion of most people, yet to those who are familiar with them they are quite the reverse. Much of the aversion to toads is, no doubt, due to the fact that these batrachians are capable of exuding an acrid fluid from the skin as a means of defence. Even Shakespeare refers to this as a compound of the witches' cauldron in "Macbeth."

Fortunately toads know nothing of the nasty things which have been said about them or they would never wear that serene expression which is characteristic of them. This does not apply to meal times, however, for, judging by the facial contortions, the repast seems to be a very troublesome affair. But the manner in which a toad stuffs a wriggling worm into its capacious mouth is really comical, though very vulgar from our point of view. But I suppose it would be difficult to deal with such an awkward morsel in more polite fashion!

It is these absurd antics, together with their intelligence, docile disposition, and inquisitive habits, which make toads such amusing pets.

There are, of course, many kinds of toads, ranging from the Giant Toad (*B. marinus*), which may attain a length of nearly a foot, to some Dwarf Toads of South America which are little more than half an inch long. (The above-mentioned Giant Toad should not be confused with the large variety of the Common Toad, generally referred to as "Giant Toads" in dealers' catalogues.)

It is sometimes difficult to gauge the size of a toad as, when alarmed, it is in the habit of puffing itself out to proportions far beyond the normal—which affords protection if seized in the jaws by some animal—though the acrid exudation from the skin usually deters an animal from retaining such an unpalatable morsel in its mouth. A. E. H.



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Notes from the

# Zoological Society's Aquarium

BY E. G. BOULENGER  
(Director of the Aquarium)

THE advent of spring always causes additional activity in the Zoo Aquarium, where many of the boarders are embarking on courtship as a preliminary to experiencing the joys and sorrows of family life.

Those strange aquatic South American toads, known as Pipas from their call note, have given visitors an opportunity of witnessing their courtship and the extraordinary method in which the eggs and young are nurtured. The

eggs, about fifty in number, are deposited with the help of the male upon the back of the female, where they sink into the skin, which as the breeding season approaches, becomes spongy and yielding. The cavities so formed, become, after a few days, covered with a horny lid. About three months later the infants lift up the lid and emerge as perfect little toads, having spent their entire tadpolehood in holes on the maternal "bagatelle board."

A crustacean of very exceptional interest has recently been acquired. The creature in question, a fresh-water crab, about the size of our own shore crab, is of orthodox appearance, but has a very lurid history. Recently imported into Germany and now common in the Elbe, it has become an article of diet. It is not eaten with impunity, however, for it is often the chosen host of a fluke which causes tubercle-like disease in human beings. The life cycle of this fluke, like that of all its kin, is an amazing chapter in the annals of natural history. The fluke, a trematode worm, opens its career in the form of an egg floating in the stream inhabited by the crabs and certain

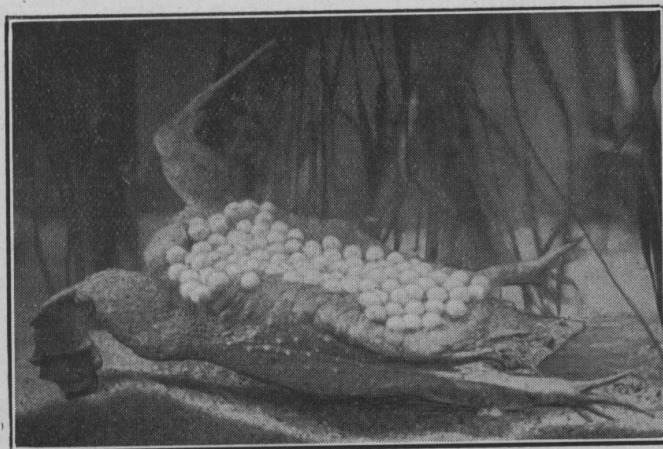
snails. The egg hatches into a larva which, enters the body of the snail, develops in the mollusc's liver. Here it undergoes a metamorphosis and is presently discharged by the snail as a very different looking creature with a long spike upon its head.

With this spike it bores through the armour of the crab and establishes itself in the muscular tissues of the crustacean. In due course the crab may come to market and the fluke passes into a human interior, where despite the action of the gastric juices it gives rise to a dread disease which often culminates in death. Though discovered as long ago as 1880

by Sir Frederick Manson, the fluke's true significance has only lately been appreciated fully.

A number of Golden Trout have been presented by the Duke of Bedford, who reared these fish in his hatcheries at Tavistock. The fish in question is a variety of the Rainbow Trout and combines a pale golden tint with a vivid pink lateral band. This trout originated from an elevated waterway known as Whitney Creek in California.

After an interval, the Zoo is once more able to boast of being able to exhibit an octopus, a number of specimens having just arrived from the coast of Madeira. Octopuses are difficult to transport from the sea to an inland aquarium as they not only require a greater amount of oxygen to keep them alive than almost any other aquatic animal, but they are apt to foul the water of the travelling tank by discharging a black inky fluid from a special gland, which serves as a "smoke-screen."



Surinam (or Pipa) Toad, carrying eggs

Photo

[F. W. Bond



# The Stump-Tailed Lizard

BY C. E. COLE  
(of Australia.)

OF our Australian reptiles the best known and most frequently met with is the Sleepy or Stump-tailed Lizard (*Trachysaurus rugosus*). One has only to drive along a stretch of country road during the Spring to see numerous carcasses



Stump-tailed Lizard (*Trachysaurus rugosus*).

Photo]

[C. E. Cole

of those unfortunate individuals that have attempted to cross the highway at the same time as it has been required by man and his mechanical life-destroyer, the automobile. Being run over by a motor is not always fatal to the Sleepy, as a number have been brought to my notice that have survived the ordeal and, although somewhat out of shape, have lived for some time in apparently the best of health.

The Stump-tail is the most bizarre member of the Skink family, the *Scincidae*, which is almost world-wide in distribution, and includes such well-known South Australian lizards as the Blue-tongued and Water lizards, the Spiny-tailed, White's, and the Morning Skinks, and numerous other small, but none the less interesting, members of our lizard population.

The late Mr. Edgar Waite, in his "Records of S.A. Museum," gives an interesting account of this species, and illustrates a young albino, which condition is comparatively rare among reptiles; and also a female with the foetuses *in situ*—in this case two; but it does not always follow that this number are produced, there being many cases of a single young. I have heard more than once of three new arrivals being found by the owner of a vivarium, and Le Souef, in "Wild Life in Australia," gives four as the usual number born at a time, which I think is rather high, but the number may vary in different parts of Australia. Mating may occur in the early Spring, during which time great numbers are to be seen abroad, but, although I have had a number of specimens for

some time, I have not been able to verify this. The young are produced during the late Australian autumn, the first appearing in my vivarium on the 30th April.

Waite states that he has removed an example of this lizard from the stomach of a py-

thon. This snake in the wild state may have a Sleepy now and again for breakfast, but, in captivity at the Adelaide Snake Park, the two share the same enclosure without any loss on either side. It does not, therefore, appear that the lizards or snakes are very ill-disposed towards each other, as has been stated by some writers.

Although usually very slow in movement, quite a mild exhibition of speed can be given by this reptile when in a hurry. It usually does not go far when pursued, but turns to face the danger with open mouth and distended body, which is deflated with a hissing noise. The jaws are powerful, and capable of giving a nip which will not want to be sampled again in a hurry.

During the time I have had this species in my possession, I find that it is the favourite pet amongst the reptiles, and is to be found in a great many gardens, kept under almost as many conditions, some being free to roam at will and fend for themselves, while others are kept in a small box with hardly room to extend the body fully. If treated well and properly fed, a more hardy and interesting lizard would be hard to find.

Feeding is a very simple problem, and if given small pieces of a great many of the items of the dinner table menu in a raw state, with the addition of a few garden snails and a supply of fresh water, the reptile will be in good condition for its winter inactivity. Unless food is taken in abundance during the summer,



disaster will overtake the lizards before the Spring. I have found that this lizard is fond of the red berries of the African Boxthorn, and will devour these before any other food offered. Of course, this may be because of the bright colour of the fruit as compared with other fruits offered.

The swimming powers of the Stumpy are very limited. My specimens were, during summer, in an enclosure containing a small pond inhabited by the long-necked tortoise (*Chelodina longicollis*), and I have been called upon on a number of occasions to rescue an unfortunate lizard that had fallen in. On one occasion, on returning home after being absent for about three hours, I found the apparently lifeless form of one at the bottom of the pool. After having got rid of all the water possible from the reptile's interior, I proceeded to apply warmth, and to work the legs—as is practised with the arms of human beings for artificial respiration in similar circumstances. Within half an hour I had the satisfaction of observing a slight movement, and within an hour was able to return the then partly revived Sleepy to its usual place. By the following morning it was again in the best of health.

#### Notes for Novices

(Continued from page 36)

thus dispensing with the need for screens, whilst the excessive top light can be effectively coped with by providing a floating screen of *Riccia*, which thrives well under such conditions proves most valuable for oxygenating purposes.

In recent years it has been found that electric light provides a reliable substitute for daylight, the plants responding to its action almost as well as under the influence of sunlight. But if you are so cramped for space that a tank has to be placed in some gloomy spot it is better to do without aquatic plants altogether as they will not function properly under such conditions, but decay, thus doing more harm than good. In such circumstances, you will need to reduce the number of fishes accordingly as the oxygen content of the water will be obtained solely by absorption from the atmosphere.

The effect of light should be considered when selecting fishes for an aquarium. Those with transparent scales, such as the so-called "scaleless" varieties of Goldfish, and Golden Tench, are not shown to advantage against the light, nor are such kinds as Bitterling, Sunfish, Bass, etc.

(To be continued.)

#### NOTES ON SKINKS

AS an Australian subscriber, Mr. C. E. Cole, has, on page 45, contributed an article that queer Skink known as the stump-tailed Lizard—which, on account of its caudal appendage, has sometimes been regarded as having two heads, I will add a few notes on a few other Skinks.

Skinks are a cosmopolitan crowd, but found mostly in Australia, S. Asia and Africa. The majority inhabit dry, arid districts, so their vivaria should be supplied with a deep bed of sand—in which they love to burrow—and receive a maximum of sunshine.

It should be remembered, however, that glass vivaria, in such a position, need adequate ventilation, or the inmates will be suffocated. With plenty of air, Skinks revel in high temperatures, but I have lost several through overlooking the former requirement.

Of European Skinks the Three-toed Skink (*C. tridactylus*) is most commonly upon the market; its glossy, snake-like form and almost unnoticeable legs resulting in its sometimes being sold as a Slow-worm.

The Ocellated Skink (*C. ocellatus*) is, too, often stocked by dealers. Growing to a length of 10in., it is quite handsomely marked with black and white ocellar spots on a brown background, the lower parts being yellowish-white. This reptile should not be kept with lizards smaller than itself or it might make a meal of them.

The Blue-tongued Lizard (*T. scincoides*) comes from Australia and has earned its popular name on account of its purplish-blue tongue. Its smooth, shiny, flattened body is yellowish-brown, with dark transverse bands. Needing but a moderate amount of heat and withstanding captivity quite well, it is very suitable for a vivarium. Mr. E. G. Boulenger (Director of the Zoological Society's Aquarium) records the case of a specimen which lived for over 13 years in quite a small cage in the Reptile House.

Though two specimens of the Japanese Skink (*E. latiscutatus*) were sent me from Japan, I was not able to find out much about them, as both escaped within a few weeks. They were beautifully coloured, with longitudinal stripes of metallic blue, whilst the under surface was pale blue. Should any reader have the chance of obtaining Skinks of this species, he should not miss the opportunity.

Skinks usually feed upon insects and worms, but some, including the "Blue-tongue," will partake of banana. As they do not bathe, they require but a small pan of water for drinking purposes.

A.E.H.



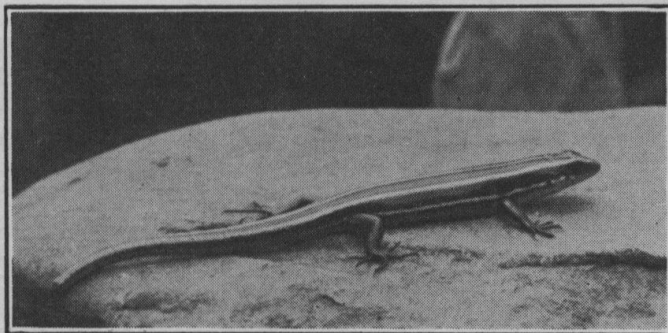
# SKINKS



Photo]

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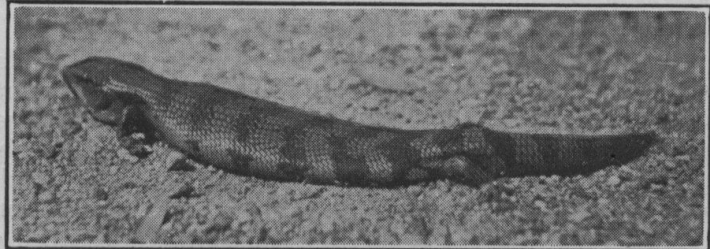
(Above) **Three-toed Skink**  
(*Chalcides tridactylus*), com-  
monly known as "Seps."



Photo]

[Copyright

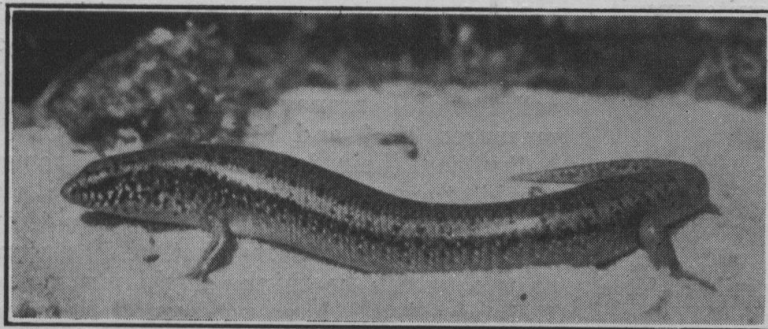
(Above) **Japanese Skink**  
(*Eumeces latiscutatus*)



Photo]

[C. E. Cole

(Above) **Giant Skink or**  
**Blue-tongued Lizard** (*Tili-*  
*qua scincoides*)



Photo]

[Copyright



(Left) **Ocellated Skink**  
(*Chalcides ocellatus*).





# BREEDING AXOLOTLS IN A GARDEN POND

By  
W. E. Teschemaker, B.A.

A native of the Mexican Lakes, the Axolotl has hitherto been regarded as insufficiently hardy to withstand winter in the open in this country, but this article shows that it can be bred under such conditions.

SOME years since, I had the pleasure of contributing a short article to this magazine on the subject of breeding Axolotls in a heated conservatory. The old pair, consisting of an albino male and a black female, were subsequently turned out in a pond measuring 12 ft. x 9 ft. with a depth

varying from 1 ft. 6 ins. to 2 ft. 6 ins. The young were also liberated in another pond, at the age of rather more than 6 weeks, and (as mentioned in "The Aquarist") some of these grew well. The point that remained to be settled was whether young of this species could be entirely bred and reared in cold water.

In the following spring, fertile ova were found in the pond and some of them were placed in an untenanted concrete tank, which could hardly be called a pond. It measured 12 ft. x 12 ft., but had a maximum depth of 1 ft. only, shallowing to 8 ins. This had formed part of an aviary and had been used for growing Bamboos and reeds. At the end of summer I netted this tank and took out several young Axolotls, but they had made very little growth. The tank, however, was quite unsuitable. It was in too sunny a position and much too shallow. Had I put in a quantity of waterweed, to afford cover, no doubt the inmates would have done better.

Later on in the year I netted the tank again and, to my great surprise, I hauled out the old melanistic female. The distance she must have travelled was more than 15 yards and I asked myself how she could possibly have escaped from the pond, in which she had been placed, seeing that the latter had an overhanging coping. A close examination showed that



Photo]

Albino Axolotl

[Copyright

two long sprays of a Himalayan Black-berry had grown over and touched the water with their tips.

Of course, we all know that Axolotls are amphibious creatures and, under compulsion, will adopt a terrestrial habit and absorb their gills; but I have never known one to leave the

water voluntarily, even when it had facilities for doing so. Yet, in this case, an Axolotl must have climbed a long, narrow swaying bridge, thickly set with formidable thorns!

I replaced the female and, during the past two years, have frequently examined the pond, but have never seen an Axolotl. A big mass of Anacharis has grown there, but I have often turned this over with a rake and at last I could only conclude that they must either have escaped or died.

But a few days since (14th December), my man told me he could see several large Axolotls. It had been bitterly cold here and the pond was covered with two inches of ice. Just under the ice three large specimens could be seen—two albinos and one most curious piebald, the upper parts being all white and the lower all black. On the following day we could see seven white ones. We broke the ice carefully and I managed to net three, which measured  $8\frac{1}{2}$ , 9 and 10 inches, and were very bulky for their length. Though somewhat torpid, they could swim strongly and seemed in no way distressed by the freezing temperature. My man declares that he has seen one or two, which he thinks would measure quite 12 inches, but I have not seen these monsters myself. I may add that, since the Axolotls were first liberated, I have never fed them;



but each summer a large number of Newts and Dragon-fly larvæ have been bred in the pond and, in wet weather, worms find their way into the water. Also, it is significant that I have not seen any small specimens, so presumably they have devoured the whole of this season's batch of young.

I think the above is rather an interesting experience. A few years since I could not ascertain that any Axolotls had been bred in cold water in this country, but I hope I have now adduced enough evidence to show that this species will breed freely in a garden pond; that it can entirely support itself; that it will grow quickly and will stand a temperature of 32 deg. Fahr.

(It is possible that the Dragon-fly larvae accounted for the loss of the batch of young referred to above. —ED.)

### How to Breed Goldfish in Pools and Aquaria

(Continued from page 41)

the open air (it must be the natural conditions) that puts wonderful growth on young fish. Feed with prepared foods as before mentioned, but include chopped earthworms and *Daphnia*. It will soon be seen which food they prefer as they gather round it in shoals and soon clear it up.

The fish should be sorted several times during the season, choosing those with very special points, viz., length of fins, good colour combinations and body shape, for favoured treatment. I have already given, in the first chapter, a brief resumé of the different varieties, which will help fanciers to class their fish; but our school of fry will no doubt include a number of monstrosities which can be well eliminated unless they can be classed as a new breed.

As winter approaches, arrangements should

be made to keep the youngsters in good health during the trying times ahead. The smallest and very light coloured fish should be brought indoors as they will not stand the very low temperatures, but the largest and dark coloured fish can be wintered in the pond quite safely if the following precautions are taken. When all leaves have fallen, thoroughly clean the

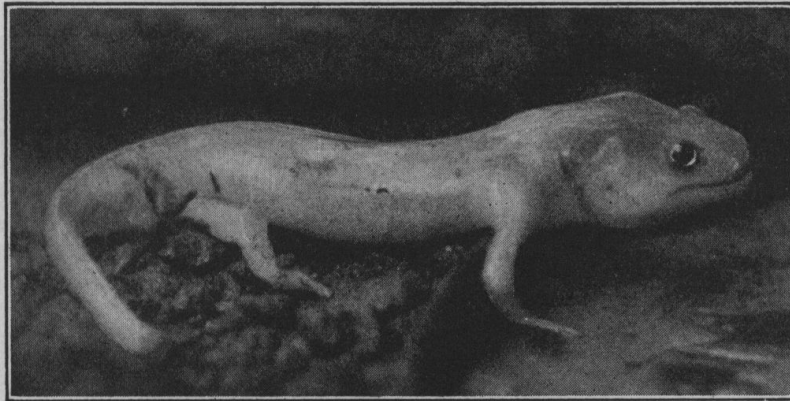
pond, shovelling out all leaves, dirt and mud, when the pond can be refilled with fresh water and the fish replaced. Start a very slow trickle of water through the pond in early February, when fungus usually first appears. The fish will get into this current and keep themselves clean. During this

period, feed only on warm, sunny days and give live food only, such as Gnat larvæ, "Bloodworms" and chopped earth-worms, the two former for preference.

Prices of Shubunkins vary according to supply and demand. Blues are very scarce and are naturally expensive, when available.

To those of my readers who have patiently followed this article and are the owners of a school of fry, I wish success; to those who, at the moment, have not been quite so fortunate, I will say "don't lose heart"; there is still plenty of time and if there be any little point which I have not covered I shall be pleased to answer on receipt of the query and a stamped, addressed envelope. Readers are also cordially invited to come along and see the fry (all sizes at the moment) any evening, or week-ends, at 302, Whitehorse Lane, South Norwood, S.E.25.

To prevent withered leaves—now falling as a result of the drought—from littering or choking a garden pond, a good plan is to cover the latter with fine-meshed wire netting so that the leaves can periodically be removed bodily by lifting and shaking the netting or, if the pond be large, they may be scooped off the surface by the aid of a flat piece of perforated zinc fixed to the end of a pole.



Albino Amblystome  
(Terrestrial form of the Axolotl)

Photo]

[G. W. Weller



# Romance of the Salamander

BY JACK HEMS

SINCE the beginning of the nineteenth century, salamanders in captivity have been relegated to their correct places of detention, namely, the indoor vivarium or cool garden rockery. But during the fifteenth, sixteenth, seventeenth and eighteenth centuries, when numbers of persons purporting to be witches and wizards lived largely upon the credulity of an ignorant and superstitious population, the salamander figured prominently in their conjurations.

The salamander has always been closely connected with those arts directly relating to black magic; and necromancers, seeking to discover that supposed specific for the renewal and perpetuation of everlasting youth, viz.: the Elixir of Life, perceived in the salamander that Something which savoured not only of immortality of the soul, but of the physical body. So into their alembics and crucibles, along with many other strange and terrifying ingredients, went the shrivelled remains of the little batrachian.

Earlier, in the fourteenth century, alchemists had already "discovered" the supposed procreative powers of the tiny batrachian, whilst disciples of the German mystic Rosencreuz, considerably enhanced the occult reputation of the creature by crediting it with a number of spurious magical virtues. Many of the more learned "astrologers" (that is, those who looked upon astrology not as a positive science, but just one of the many arms of necromancy) and alchemists, although publicly denying that they dabbled in the black art, were in actuality the chief disseminators of the many credulous tales and superstitions which we may find propounded in early works upon demonology and witchcraft.

The salamander lived in fire, said these savants, and because the whim suited the exigencies of the moment, they consumed thousands of these harmless batrachians to the flames. The idea that salamanders frolicked in every fire was dispelled from the minds of ordinary men and women only after these "learned" gentlemen were compelled by astute disbelievers to prove their theories not in the

solitude of their cellars, but in the company of their fellow practitioners.

Now for the commonplace facts that patient observers have learnt about salamanders. In a vivarium, they spend most of their time hiding out of view beneath the rockwork or moss which should always be provided them as shelter. But at night, they will issue forth from their retreats in search of food. Dragging themselves laboriously over most obstacles, they will seize upon, and devour with evident relish, any worms, flies, or "gentles" which they may come across.

Salamanders descend to the water only in the Spring, during which time the females of *Salamandra maculosa* bring forth the young tadpoles, this species being ovoviviparous. These tadpoles are furnished at birth with fully developed gills, which disappear only when the time has arrived for the tadpoles to leave the water for the land. Except in the spring, salamanders favour cool, moist situations, abounding in insect life. There are no true salamanders inhabiting the British Isles, although the Spotted Salamander (*Salamandra maculosa*), which attains a length of six inches—abounds in most parts of Europe.

There are a number of salamanders distributed throughout the world; some, like the Night Salamander, of comparative rarity. But next time you look upon one of the salamander family, think of its historical associations, and the part it has played in the advancement of natural science.

---

AN OCCASIONAL SUBSTITUTE FOR LIVE FOOD.—There are several species of "Tropicals" that refuse to accept dried food and must be fed entirely on live foods. These species are of course more trouble to the aquarist, but in most cases they are more interesting. In this class can be included most of the Cichlids, several species of Panchax, the Snakeheads and the Bettas. Once or twice a week they can be fed on fresh raw beef. In scraped or shredded form, fry can swallow it, while larger fish will eat small chunks.—LESTER L. SWIFT.

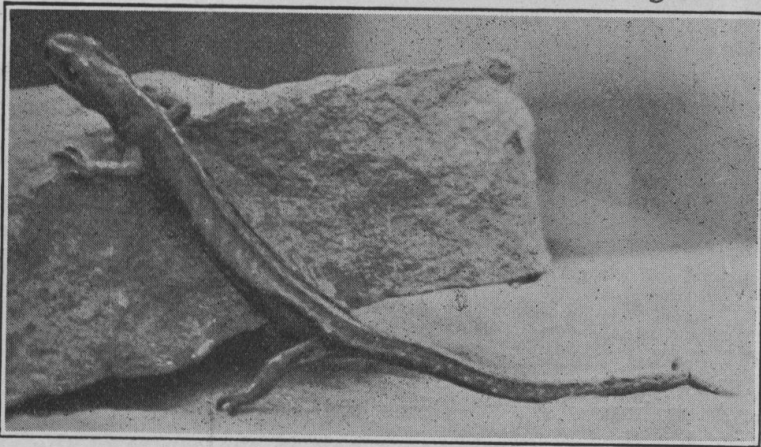


# SALAMANDERS O' SORTS

(See page 65)



(Above)  
**Ambystoma Opacum.**  
A sluggish creature with  
a livery of black and  
white.

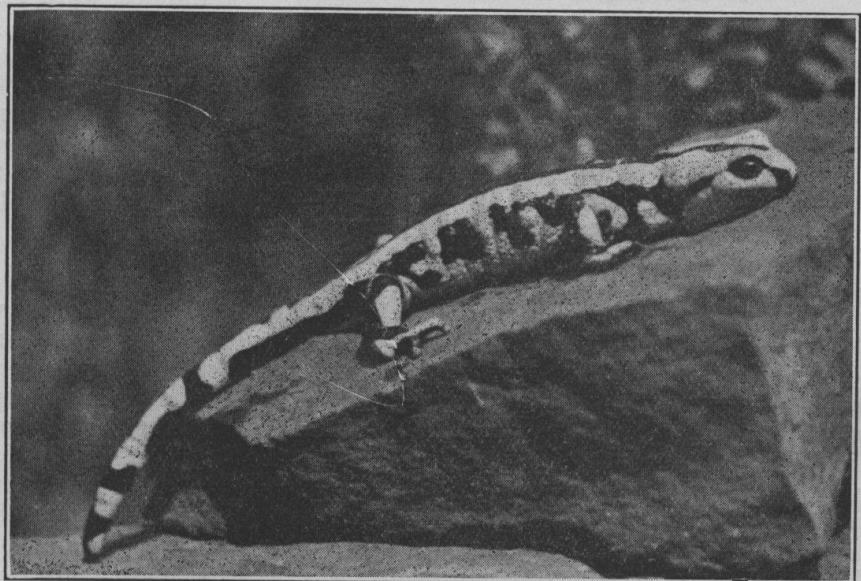


(Left)  
**Spectacled Salamander**  
(*Salamandra perspicillata*)

A blackish Batrachian  
of attenuated form with  
quaint spectacle-like yellow  
marking on head and  
vivid red underside to  
tail.



(Right)  
**Spotted Salamander**  
(*S. maculosa*)  
The kind commonly  
imported. Conspicu-  
ously adorned with  
yellow and black.



Photos]

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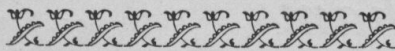
**THUNDERFISH** wanted in exchange for Goldfish Fry, Snails or Rock Plants.—Fleming, 15, Church Street, Dorking.

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**"AEROFROTH" AERATORS ARE SELF-OILING.**

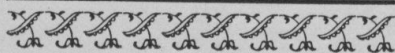


# CLEVER CLIMBERS



(Left) Dwarf Chameleon (*C. pumilus*), whose opposable bundles of fingers and toes enable it to climb a cord with ease.

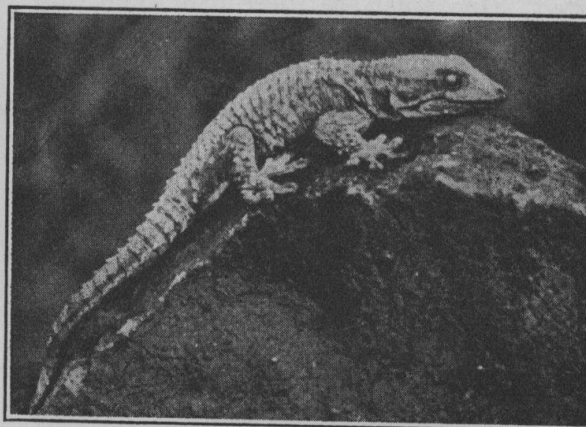
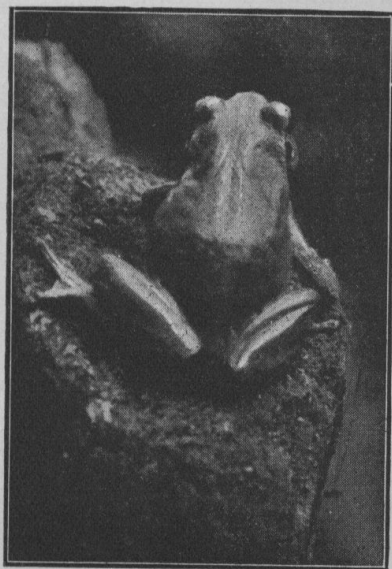
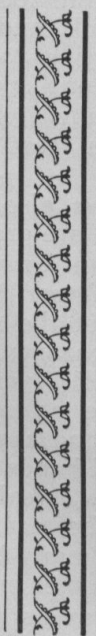
(Right) Anolis (*A. carolinensis*). An arboreal lizard of surprising agility.



(Right) European Green Treefrog (*H. arborea*), which can not only climb a polished stick, sailor fashion, but can scale perpendicular glass



(Below) Moorish Gecko (*T. mauritanica*) whose toes are so adhesive that this nocturnal lizard can scale smooth, perpendicular walls and even run across the ceiling.



Photos]

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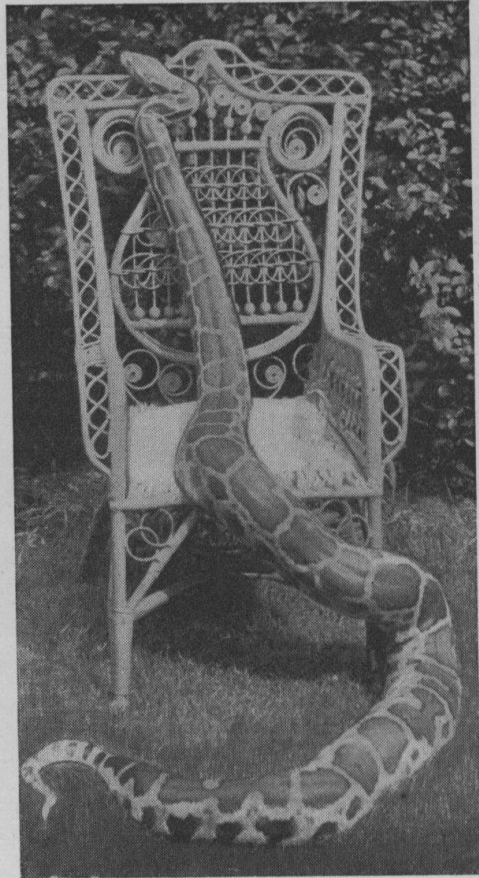
## PET PYTHONS

“WHAT about a Python as a pet?” I am not, of course, suggesting a “thirty footer,” which would need a sort of strong-room to accommodate it. (I have small staff of assistants to handle it. (I have seen sixteen sturdy “Zoo” keepers swayed like yachts in a gale when shifting one of these monsters.) Such a snake, though not venomous, is, nevertheless, dangerous; as it can strike at a distance half as far as its own length and, when once it has got a hold, it throws, with lightning rapidity, coil after coil of its enormously muscular body around its victim and crushes it to death. As will be appreciated from the photograph reproduced on this page, even a 12 ft. Python is not the sort of companion to share an arm chair with—it might prove too embracing! But a young one, say, 4 ft. long, makes a most interesting pet, Pythons and Boas being the most intelligent of all snakes, soon becoming quite tame. Constrictors of this size are so tractable that they are handled with impunity by even strangers; at the “Zoo.”

Two of the hardier kinds are the common African Python (*P. sebae*) and the Indian Python (*P. molurus*), whilst the Royal Python (*P. regius*) is noted for its docility, even freshly captured specimens making no attempt to bite. Amongst the Boas, the Boa Constrictor (whose scientific name is just the same) is to be recommended, being a good feeder and soon becoming tame.

Though these snakes could be kept in an outdoor case warmed by the sun during hot summer weather, provided that they were free from draughts, at other times they would need artificial heat to maintain a temperature of not less than 65 deg. F., increasing this to about 80 deg. during feeding times.

As food, Pythons and Boas need mice, rats, guinea-pigs, rabbits or birds. They prefer to do their own killing, though they may be induced to take freshly-killed prey (as is the case at the London “Zoo.”) Personally, I do not think that one could put such live food to death more expeditiously—and, therefore, humanely—than does a constricting snake. Fortunately, these big snakes do not feed very often, a fast extending over weeks or months



A 12 ft. Indian Python

being quite common, especially during winter. One of the largest Pythons at the London “Zoo” (about 30ft. long) refused all food for 2½ years, and then recommenced to feed as though nothing unusual had happened. As snakes are such erratic feeders, a good plan for making the most of a meal has been suggested by the Rev. G. C. Bateman, in his excellent work “The Vivarium.” “When the reptile has fairly commenced to eat,” he says, “other dead animals, or even pieces of raw meat, may be tied to the creature that has been seized, and in this way the snake is induced to consume a meal which will last him for a considerable time”—a “table d’hôte” arrangement which is a very practical rendering of that popular dance number; “I’ll string along with you”!

Pythons should be provided with stout branches, for climbing purposes, and with a large tank of water. A. E. H.







# CHAMELEONS AS PETS

## Benefits of Fresh-air Treatment

By WINIFRED BAKER

In this article the author records an extraordinary instance of hardiness on the part of a North African Chameleon, whilst she contradicts the prevailing belief that chameleons will not drink out of a dish.

CHAMELEONS may well be ranked amongst the most delightful of our reptilian pets, much of their attractiveness being no doubt due to the fact that they can be so freely handled and carried about without fear of their suddenly making a jump for freedom.

There is certainly no doubt that Chameleons are delicate, but I believe that they would live longer and be far healthier if given free access to the open air and sunshine, in warm weather, than is usually accorded them. I always give mine ample opportunities to be outside on fine days, either "loose" on a bush (where they must be closely watched) or else in a large cage which has the front covered with small mesh wire netting through which both fresh air and the sun's rays can penetrate. To be continually behind glass is, I am sure, very enervating. Care must be taken, however, to see that there is no draught, and that cold winds do not blow directly on the little creatures. Chameleons will usually take mealworms readily in summer, and a few should always be left in a vessel from which they cannot readily crawl out. They generally prefer flies, whilst butterflies are particularly relished.

Captive Chameleons often suffer from thirst, because they do not usually drink from a vessel. To say that they never do, is, however, erroneous, as a friend of mine had one which always helped itself from a dish, putting its mouth directly to the water. It is a good plan to place wetted cabbage or lettuce leaves



Chameleons "at large"

[Photo]

[Copyright

in the cage, but I prefer to "water" my Chameleons by hand, from a medicine dropper. One knows then exactly how much they have had. It is surprising what a lot they will drink in hot weather.

Last autumn I had a dreadful experience with a little North African Chameleon of which I was very fond and proud. He was in splendid health, caught flies freely and seemed likely to "pull through" our horribly sunless winter. (His companion was frail and died during December.)

In warm weather I have a wire door fixed to the studio in which my pets live when not out in the garden. The Chameleon was sitting—apparently quite contented—on some branches in the studio and I came away, forgetting the little creature was "at large" with

the wire door in place—but the "solid" one open. Returning later, I found him missing from his twigs and after a search inside the studio I decided he must have escaped through the wire door! This was on Saturday, October 13. The day was warm but sunless. Had the sun been shining the Chameleon would probably have been easily visible, basking on some plant or bush near the studio. All that afternoon I searched in vain. Night fell and still no sign of my pet. I hoped he had found some warm retreat in our out-buildings nearby—but even so, he would miss his snugly heated cage, in which he always slept at night. A long search on Sunday was unavailing and a gale of wind arose that night, with torrential showers of cold rain. Monday  
(Continued on page 120)



genera, of which I have illustrated one species of each, are strictly colonised in that the group of bells spring from a common stalk.

The Vorticellids are the most commonly found of the group, and will repay a little close observation as to their structure and habits. The long stalk of the *Vorticella*, previously mentioned, is hollow, its most prominent feature being its remarkable contractibility. With oblique light, there can be seen a muscle-like thread, which actuates the violent movement of the organism. The contraction is very sudden, into a closed spiral. The expansion is much slower, so that its movement can be followed much more easily. The stem slowly straightens from its contracted spiral position, then the centre of the bell body rises up, the edges curl over outwards and the cilia are set in motion.

When fully expanded, the body of the *Vorticella* is campanulate. It is structurally simple, being a unicellular organism, and consists of a definite cuticular layer or cell wall containing the protoplasmic cell contents in which are imbedded the contractile vesicle and a nucleus. There are usually several vacuoles present. The rim of the bell which is fringed with cilia, is not continuous all the way round, but depresses inwards and at the bottom of the depression is situated the mouth and the anal orifice, which latter is only visible when ejecting food particles. The constant movement of the cilia produces a vortex around the outside of the bell, drawing food particles down into the mouth depression, where they gather in a small pellet and eventually enter the body for digestion.

(To be continued.)

## CHAMELEONS AS PETS

(Continued from page 107)

morning dawned with a stinging Nor' Wester, which continued all day. Still I kept "hoping against hope" that my pet might possibly be alive, attempting, perhaps, to hibernate somewhere, sheltered from wind and rain. Days past, and then I despairingly sought at the roots of trees and shrubs, half expecting to find a little dead body, frozen from the branches above. But there was no sign of him—dead or alive. The month sped on, with varying kinds of weather, including winds and rain. I had practically abandoned hope. On Monday, October 29, the sun shone brightly. It was warm and still. I happened to pass a rockery

in the garden, facing south, with a wall sheltering from the north winds. The sun poured down upon it. Suddenly my eye fell upon — unbelievable! My lost Chameleon! He was basking, with his chin drawn down to the sun's warming rays, after the manner of Chameleons. I made one rush at him, seized and held him in my hands once more. Safe! And apparently in good health. Where could he have been all those days? He held a secret I could not wrest from him. Joyfully I carried him back to the studio, where, extraordinary to relate, he has remained until now (mid-January). He never seemed the worse for his alarming experience. Only those who have had a long apprenticeship in the keeping of these delicate and "temperamental" little creatures will fully appreciate my delight and astonishment at finding him alive. Equally amazing was the fact that he continued to live, when I fully expected him to succumb to some form of lung trouble. That he *did* live, I attribute to the fact that his course of "open air" treatment had hardened him sufficiently to resist the chill air of autumn.

So I say—give your Chameleons outdoor sunshine and fresh air. But do not try any experiments in "hardening" such as my pet, inadvertently, experienced.

## READERS' RECORDS

"UNCLEAN WORMS."—In a recent article on *Enchytrae* in "The Aquarist," it is said: "For some unknown reason *Enchytrae* seem to benefit if some chicken manure be mixed with their mould." The reason is not far to seek; in a state of nature *Enchytrae* originate in sour ground which has become contaminated with an excess of bird droppings, and, therefore, in adding this substance you are providing them with their natural food. I think your readers should be warned not to feed *Enchytrae* to their fish until they have been thoroughly cleansed by feeding them on a pure food such as oatmeal and milk, as it seems to me that the tendency to transmit certain diseases to fish is most probably caused by the use of "unclean" worms.—

J. C. CHESHIRE.

"JUNE IN JANUARY."—It may be of interest to record that at the present time (January, 1935) I have a water hawthorn in full bloom in my pond at my Cheltenham address. The flower is a very fine specimen.—

S. GOBURN.



# THE EFFECTS OF pH ON BREEDING

## How Spawning was induced by Acidity

By F. L. VANDERPLANK

• The Author here deals with the biological aspect of pH values (which symbolises the comparative acidity or alkalinity of water.) His original observations should prove of great scientific value to breeders

A GREAT deal has already been written concerning the pH problem, but usually by chemists who have ignored the biological aspect or by authors who have attempted merely to enlarge on vague theories.

There is no doubt that the study of pH

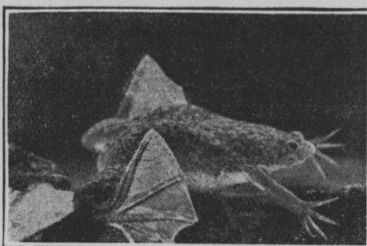
values can be extremely useful to the keen aquarist and of utmost importance to the professional breeder. I have already stated in an article published in the last issue of "THE AQUARIST" the effects of pH on plant life and the best methods of setting up an aquarium with a definite pH value, and I propose here to give an outline of the methods of determining the pH value of aquarium water, together with some helpful notes to fish breeders.

The usual method of determining the pH value of aquaria water is to make use of what is known as a mixed indicator. A mixed indicator is a mixture of special dyes. This mixture when dropped into a small tube of water that is to be tested changes colour according to the approximate pH of that particular sample of water. The majority of these mixed indicators that are on the market have a range from pH 4 to 11 and can be obtained either in tablet form or liquid. It is a matter of personal choice which form is used, but I have always found that the liquid form is quicker and more convenient to use; it also keeps somewhat better. Since the pH of an aquarium should always be between 6.6 and 7.6, with certain exceptions, the British Drug Houses made up a special indicator to aid me in my experimental work. This indicator proved so useful that it has since been placed on the market, and is known as the 6676



Clawed Frogs (*X. laevis*) in characteristic attitude below water.

Photos] [Copyright



indicator and is made specially for aquarists, measuring the pH for each one-tenth of a unit between 6.6 and 7.6. A colour chart for comparison can be obtained for each indicator, and is helpful to the beginner. Usually, full

directions are supplied with each bottle.

### Striking Results with Clawed Frogs

During the last ten years several Universities and Zoological Gardens have tried to breed the Clawed Frog (*Xenopus laevis*), but without success. This batrachian—a purely aquatic creature, by the way—hails from South Africa. It is very ugly but, nevertheless, fascinating, and is of special interest to the biologist, since its young develop somewhat differently to other amphibia. It was successfully bred and reared at Bristol Zoo last year. Bles, a well-known zoologist, who was the only person who had previously succeeded in breeding Clawed Frogs, wrote a detailed account of the methods he used, but he failed to discover the real point, and although numerous other zoologists carried out in every detail his methods, which were published in the Proceeding of the Royal Society (Edin.) in 1904, they were unsuccessful. The reason, no doubt, was that Bles carried out most of his work at Glasgow, where the water is naturally soft (pH about 6.7), whilst other zoologists repeated his methods in their own districts where the pH value of the water was above 7.

It has been discovered, during course of experiment, that *X. laevis* will spawn, providing that they are in fit condition, any time when the pH of their water is lowered under 7. In April, 1934, when this species was first



bred at Bristol Zoo, they spawned 12 hours after the pH of their water had been lowered, although previously they had been kept seven years together without attempting to mate. Again, in December, 1934, *X. laevis* mated about 12 hours after they had been placed in water of which the pH value was under 7, similarly again during March this year. Try as we may, we have, so far, failed to get them to mate by any other method except lowering the pH of their surrounding water. It is probable that the Clawed Frog is unable to spawn in an alkaline water.

These results proved so interesting to me that I started a series of experiments of a similar nature on fish, and am still working on them. So far I have learnt that, although most fish will spawn in either acid or alkaline water, each species of fish has its own most favoured pH value for spawning, and spawn more readily in water which has this particular pH value.

#### Successful Experiment with Goldfish

It was discovered that Goldfish (all varieties) which were obviously ready to spawn but, for some reason, would not, and others that were obviously spawn-bound, could be readily induced to spawn by lowering the pH of their surrounding water to 6.7. No doubt the action of lowering the pH value of the aquaria water causes the female fish's oviducts (the tubes through which the eggs have to pass in order to be ejected) to swell, which they should naturally do to a certain extent before spawning.

Most "tropicals" breed better and more prolifically if kept in water which is slightly acid (pH between 6.5 and 6.8). Most fish diseases occur more frequently in alkaline aquarium water, and the infected fish can in most cases be cured by placing them in slightly acid water. I should mention that by "alkaline water" I mean water with a pH above 7 (generally between 7 and 7.6). Aquarium water should never be allowed to rise above pH 8.5. Similarly by "acid water" I mean water with pH value below 7 (generally between 7 and 6.4). Aquarium water should not be allowed to fall below pH 5.8.

(The methods adopted by Bles, in breeding *X. laevis*, were to keep the frogs, during summer, in a well-stocked aquarium at about 80 deg. F., allowing the temperature to drop to 40 deg.—55 deg. F. in winter and, in spring, raising it to about 70 deg. F., when water, taken from the tank and cooled, was returned through a spray, thus simulating rain.

An advertisement of the B. D. H. Indicator referred to above appears in this issue.—Ed.)

## CORRESPONDENCE

Subscribers receive postal replies to their queries provided a stamped addressed envelope is enclosed, but in cases where the answers are of general interest these are, nevertheless, published, when space permits, for the benefit of other readers. Postal replies cannot, in any case, be sent to readers who are not Subscribers.

**AQUATIC SNAILS.**—You cannot expect to rear young snails in an aquarium containing fishes, as the latter greedily devour them. They should be removed (by means of a diptube) to a separate receptacle containing water-plants, allowing it to get plenty of light so as to induce development of *Algae*, on which the young snails will feed.—(To D. Poynton.)

**BULLYING DOGFISH.**—Dogfish are prone to bully defenceless fishes not larger than themselves, but their habits are so interesting in an aquarium that they are worthy of a tank to themselves.—(To H. Sperret.)

**REARING TRAYS.**—Shallow, enamel bowls would serve as rearing trays, but galvanised metal receptacles, unless well coated with bath enamel are injurious to fishes.—(To V. R. Hodgetts.)

**ICHTHYOPHTHIRIUS.**—A convenient cure for this is to gradually raise the temperature of the water to 85 deg.—90 deg., maintaining this for a few days, when it should be reduced to normal.—(To E. W. Sloggett.)

A VINDICATION OF TUBIFEX WORMS AS LIVE-FOOD.—In the article on "Feeding of Tropicals," by Mr. Jack Hems, in the last issue, the author likens *Taenia solium*, the parasitic worm found in the intestine of man and swine, to *Tubifex*, suggesting parasitic behaviour of the latter. *Tubifex* and *Taenia* are wholly unrelated and have no parallels in structure or habit. *Taenia* belongs to the *Platyelmlia* (flat worms) and is a *Cestodian* (all parasitic). *Tubifex* belongs to the *Annelida* and is an *Oligochaete*, as are also Earthworms and *Enchytrae*. No *Oligochaetes* are parasitic. Why the rumour originally started is in doubt—probably someone got the facts muddled. The point is that *Archigetes appendiculata*, a parasitic worm closely related to *Taenia*, spends the whole of its life in the coelum of *Tubifex*, but it has no other host and definitely has no ill effect whatsoever on any fish eating the *Tubifex*. Experience has taught me that *Tubifex* is one of the finest of all fish foods.—  
LOUIS C. MANDEVILLE.

**BOOK REVIEW.**—Readers interested in marine life and who pay periodical visits to the seaside will find "A Seashore Calendar," by L. R. Brightwell, F.Z.S., useful and interesting, as the author, writing in popular style, deals with the seasonal changes of the sea and shows us what to expect at any particular period. The book, which is profusely illustrated by the author, is published at 6/- (net) by Messrs. Thomas Nelson & Sons, Ltd.



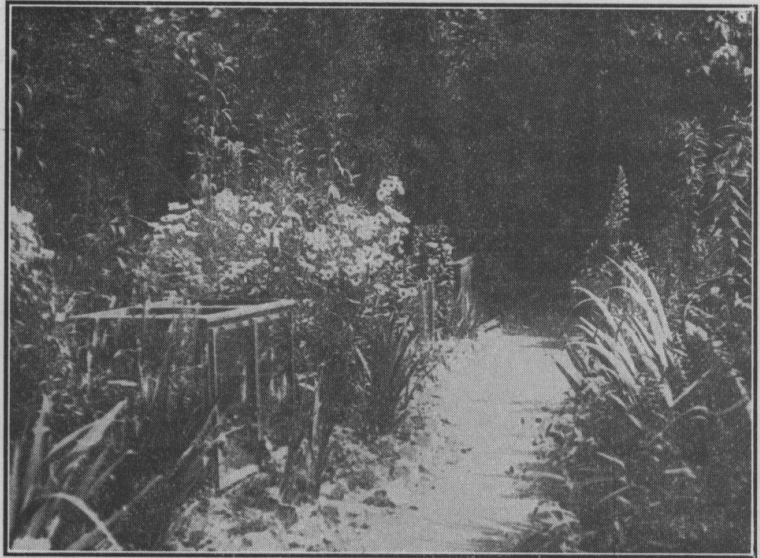
# How to Enliven Your Garden

**H**OWEVER beautiful a garden may be, it is apt to be dull at times, without animation of some kind, and the most convenient way of doing this is to introduce a few hardy reptiles and batrachians, as they give scarcely any trouble (see pages 138 and 139). I do not mean, of course, that they should be liberated as, in that case, you would not be likely to see much of them—though the neighbours might! They should be confined in suitably formed vivaria (or “terraria” as they are sometimes called), so arranged amongst the vegetation as not to mar the scenery.

In the illustration, depicting some of my garden vivaria, three large lizards cages can be seen on the left of the path. Between them—though not visible in the picture—is a small enclosure and pool for Terrapins, whilst at the end is a tall case for snakes. On the right are several vivaria for batrachians, but these, too, have escaped the camera. It will be noted that the lizards and terrapins are accommodated on the sunny side, whilst the Batrachians are in the shade. This is as it should be, though Tree Frogs love to bask in the sunshine, when not too hot.

It should always be remembered that whilst reptiles, with few exceptions, like dry conditions, Batrachians need a permanently moist atmosphere. The vivaria for the latter, therefore, batrachians need a permanently moist for the former, this being provided by covering a portion of the sides, as well as the detachable roof, with perforated zinc or wire-netting of  $\frac{1}{2}$  in. mesh, according to the size of the occupants.

The cases themselves, with glazed front and sides, are bottomless, for drainage, and sunk deeply in the ground so as to prevent the inmates from effecting their escape by burrowing underneath. In such vivaria, of course, numerous kinds of plants may be grown to



[Photo]

Some Garden Vivaria.

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beautify the interior, but the selection of these must depend upon the situation of the case and the nature of the occupants.

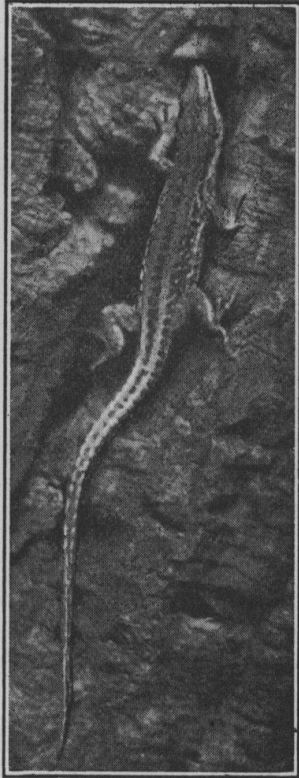
A stroll around a garden arranged in the fashion suggested will never fail to provide interest, amusement and, perhaps, excitement. Terrapins will be popping their heads out of the water to greet their owner, or, on sunny days, the baby ones may raise a laugh by their habit of ranging themselves in rows, resting on each other's backs, only to break up this queer formation and plunge helter skelter into the pond at one's approach. Lizards are always full of action, when the day is warm, scuttling around with amazing speed, or eyeing an intruder in quaint, bird-like fashion. Sinuous snakes provide an exhibition of grace and symmetry, but, for sheer entertainment, the Tree Frogs will claim attention by their wonderful acrobatic feats and climbing agility.

Start with a few Green Lizards, some gaily-coloured *Chrysemys* Terrapins, and a “troop” of Tree Frogs, and I'll wager that before the season is over you will be a confirmed Reptile Fan. Now is the time to get them. A.E.H.

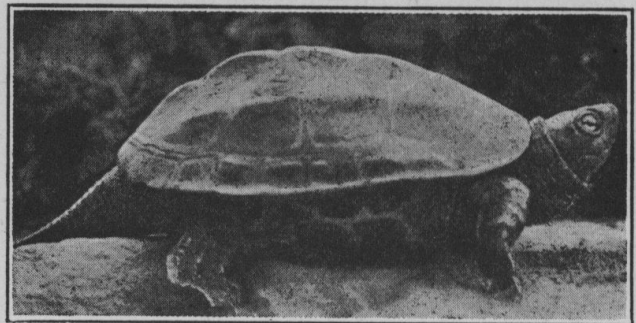


# ENLIVEN YOUR GARDEN

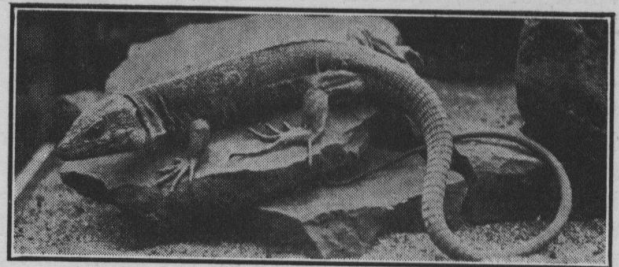
All are, more or less, hardy and easy to keep, whilst providing a continual source of interest. (See page 137 for advice on management.)



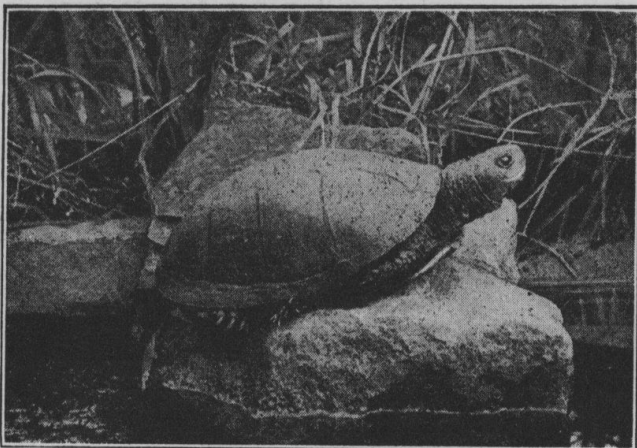
WALL LIZARD  
(*Lacerta muralis*)



CHINESE TERRAPIN (*Damoniea reevesii*)



GREEN LIZARD (*Lacerta viridis*)



EUROPEAN POND TORTOISE  
(*Emys orbicularis*)



SLOW-WORM (*Lacerta fragilis*)

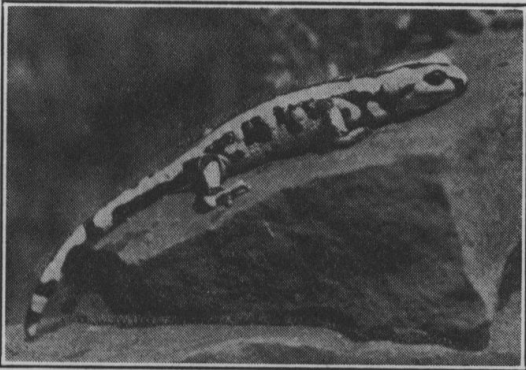
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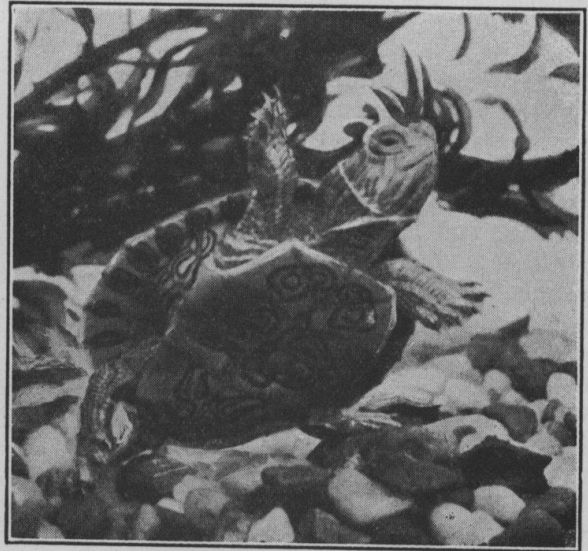


# WITH THESE CURIOUS PETS

Some are exceedingly lively, and others intensely amusing. The Batrachians come out and "carry on" when the others have retired for the day.



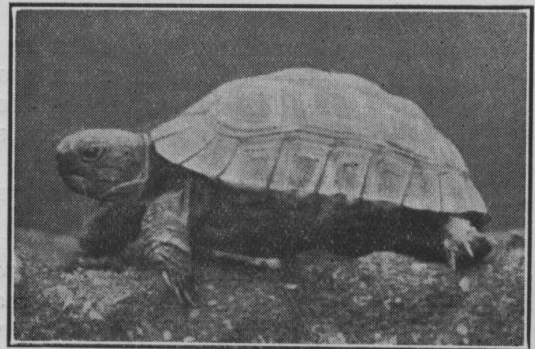
SPOTTED SALAMANDER  
(*Salamandra maculosa*)



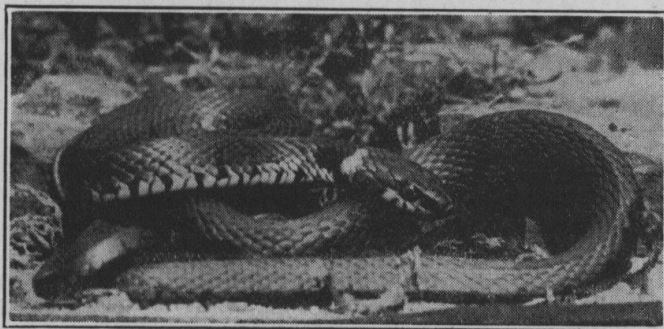
ELEGANT TERRAPIN  
(*Chrysemys elegans*)



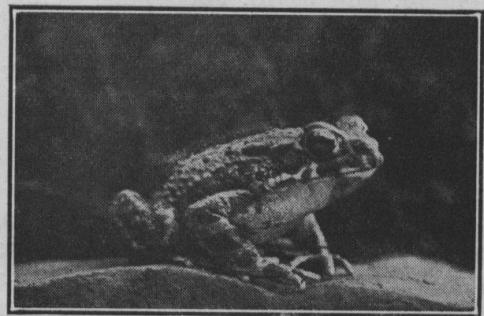
EUROPEAN TREE FROG (*Hyla arborea*)



COMMON TORTOISE (*Testudo ibera*)



GRASS SNAKE (*Tropidonotus natrix*)

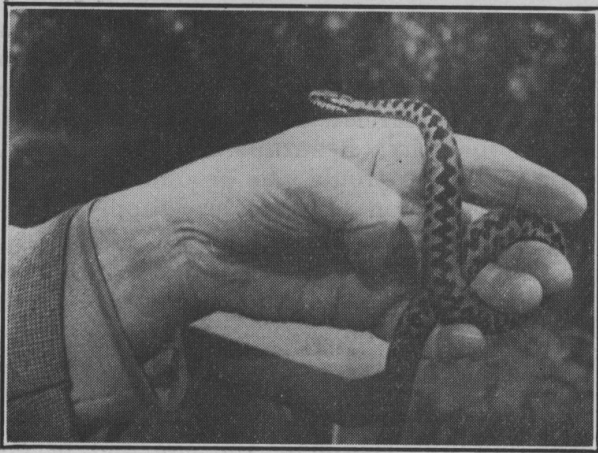


GREEN TOAD (*Bufo viridis*)

Photos]

[Copyright





A tame Adder—complete with fangs!

Photo]

[G. B. Gooch

current, and any reader wishing to adopt this method must be sure the motor he intends working is suitable.—C. F. HALL.

**HARDY ADDERS.**—To-day (26th February, 1935: shade temp., 38 deg. F., and 49 deg. F. in sun), after a heavy fall of snow and a sharp frost during the night, I watched a male and female adder basking together near some ponds at Sticklepath, Devon, on a patch of ground from which the snow had melted. Looking at the dazzling white mantle that covered Dartmoor's rugged heights, it was curious to think that here and there in sunny hollows even cold-blooded reptiles were feeling the urge of the coming spring. I enclose a photograph of an adder in my wife's hand. (See illustration above.) It is a male I caught on Dartmoor, and tamed. I did not remove its fangs.—G. B. GOOCH, F.Z.S.

“CATALOGUE OF AQUATIC PLANTS”:  
**CRITICISM AND CORRECTION.**—Mr. F. L. Vanderplank's Catalogue of Plants suitable for tropical and cold water aquaria, will no doubt prove very useful to aquarists, but upon glancing through the “List of Incorrect Names in Common Use” I noticed that *Sagittaria pusilla* should read *S. guayanensis*, and that *Alisma natans* should read *Elisma natans*, which he calls by the English name of Japanese Spatterdock. Now the *Sagittaria pusilla* which I know of is a tiny grass-like plant, not unlike the Dwarf Rush (*Acorus japonicus*), but with slightly wider leaves, curving outwards and downwards. The *Sagittaria guayanensis* has been described as follows: “The mature leaf is lanceolate in form and a rich light green colour. Three or five veins, one through the centre and the

others dividing the remainder of the leaf in equal parts, are lighter in colour . . . In large aquariums they grow to a length of six or seven inches (about two and a half to three inches wide), and the supporting stems are usually about four or five inches high.” Thus the “Home Aquarium Bulletin” (U.S.A.) Surely there is some mistake here? Regarding Japanese Spatterdock, I must again quote the “H. A. B.”: “The leaves are six inches across and substantial. Heavy stems support the leaves about six or eight inches from the bottom, an ideal depth in an aquarium sixteen to eighteen inches deep.” *Alisma natans*, which Mr. Vanderplank says is really *Elisma natans* or Japanese Spatterdock, is described in that excellent manual issued by “Perry's Hardy Plant Farm,” as having “slender grass-like foliage floating on the surface of the water, freely spangled with small, star-like snow-white flowers.” What is the seeker after truth to believe? Also, Mr. Vanderplank lists Red *Cabomba* as *Cabomba car. var. roseafolia*—it is usually spelt *C. rosæfolia*, but I believe the true spelling is *C. rosæflora*.—  
**JACK HEMS.**

Mr. Hems's letter clearly points out the difficulties that confront the aquarist in selecting plants; also some of the many difficulties that I was “up against” when compiling the list. If Mr. Hems was to glance through the Index Kewensis he would notice that plants such as *Sagittaria pusilla* and *Alisma natans* do not exist, the names being simply redundant for *Sagittaria guayanensis* and *Elisma natans*. As I pointed out in my article, the superfluous names arose through misinformed botanists and careless authors. Many catalogue descriptions, although accurate as to the plant described, are incorrectly labelled; thus *Alisma* may be described, but labelled *Sagittaria*. In England, Index Kewensis is the only recognised authority and, by convention, used for reference and correction by all botanists. I do not know what standards or methods are used in America, but, apparently, any old name seems to suit them. It is practically impossible to describe plants accurately in general language, and botanical terms, which again are confusing to the layman, must be used. In regard to *Cabomba car. var. rosæfolia*, it should read *rosæfolia*, not *rosæflora*. This was a slip on my part; also *Azolla* should be described as a fern, and not a moss. These are, I believe, the only two errors present, and for which I apologise.—**F. L. VANDERPLANK.**



## SEASONAL NOTES



A water-lily pond

Photo] [(Miss) Shirley White

**PONDS.**—Plant water lilies and other aquatics in new ponds, and transplant or divide water stocks this month.

**CULTURAL NOTES FOR WATER LILIES.**—(1) *Position*: Open and sunny, protected from the north by a wall, hedge or trees. (2) *Depth* (for most artificial pools): 2ft. to 2ft. 6in. (exclusive of soil). (3) *Compost*: Good, turfy loam, free of fibre, mixed with coarse bone meal and crushed charcoal. (4) *Time of planting*: April, May and June. (5) *Planting*: Plant *very* firmly up to the crown and just cover with water for a few days. Fill very gradually, taking about a month to really fill the pool.

Prick out germinated aquatic seedlings into shallow pans of sifted loam mixed with a little crushed charcoal. Start tropical *Nymphaea* bulbs in small pots of a similar compost, and keep just covered with water in a house with temperature not lower than 60 deg. Plant rhizomes of *Nelumbiums* in tropical house tanks and keep covered with water. Propagate submerged oxygenators by means of cuttings into deep bowls containing about 2in. fine sifted loam and charcoal. As soon as the frosts are over, move out half-hardy subjects, *e.g.*, *Limnocharis*, *Thalias*, *Callas*, *Cyperus papyrus*, etc., to outside pools.

**AQUARIA.**—Thin out old plants of last year—if not already done—leaving ample space for the spreading of young stock. With the increase of light, Algal growth will now be developing on sides of tanks. If the latter

May-June, 1935

USE A

clean

**BALLAST**

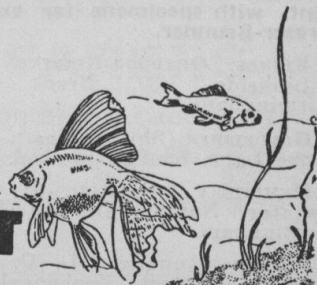
The ballast you use has an important bearing on the health of your fish. Take no risks—choose Caperns. It is free from all activated material and nicely rounded to permit your fish cleaning themselves without fear of injury.

Used and recommended by Harold Cotton, the Birmingham Pond and Aquatic expert.

In bags, 1s. (post paid 2s.) and 2s. (post paid 3/3)

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Thirty different species for delivery from April to October. First-class healthy specimens guaranteed. Suppliers to Institutions, Aquariums and fanciers. References. Catalogue (post free) Istituto Zoologico Adriatico, Zara, Italy.

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Firms advertising in "The Aquarist" and other periodicals are earnestly requested to **KEY THEIR "COPY"** and **CHECK RESULTS**, as it is upon this "acid test" that we rely.

be near a window the outer side may be left covered with this growth, as it is most useful for oxygenation, and serves as a screen against excessive light. For cleaning other sides use a wire brush, safety razor blade stuck in a cane, or a piece of coach builder's sandpaper. Fishes may now be fed more frequently.

**VIVARIA.**—See that all reptiles and batrachians awakening from hibernation are given water to drink, as well as food.



# A Pleasure Garden For Tortoises

By \_\_\_\_\_

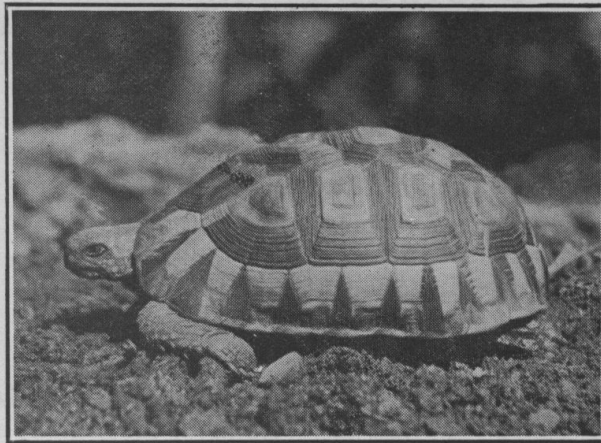
WINIFRED BAKER

● The author describes how she converted a piece of waste ground into a flowery "park" for tortoises and terrapins.

HAVING about a couple of dozen tortoises (of various aquatic and terrestrial species) and a piece of waste ground surrounding the outdoor studio in which I keep the reptiles, I, in January, 1934, decided to convert the waste plot into a really pretty enclosure for my pets, where they could disport themselves and be "at home" during the summer months.

So the gardener and I set to work upon the unpromising ground, which was full of cinders and rubbish. He assured me that, once it was thoroughly dug over, the garden would "blossom like the rose," as the soil beneath the rubbish was good. The gardener was right; by July the little "Park" was a blaze of flowers, mostly annuals, as I knew there would not be much time for perennials to make a show that year. Let me remark here that the tortoises did practically no damage to the plants at all, although several of them are very large and heavy.

The diagram shown above will probably give a better idea than long and tedious descriptions of my little "playground." As the gravel portion is sunk 6 inches below the level of the grass part, the earth dug from it was thrown up on a heap on the north side, to give shelter from cold winds. The miniature sum-



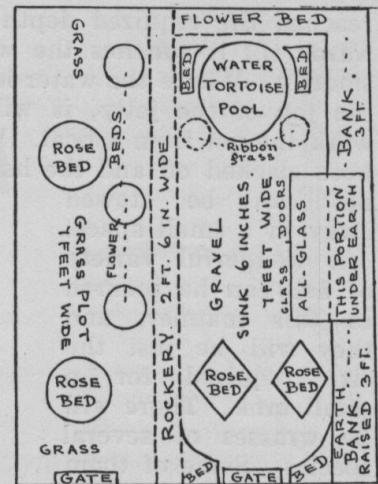
Angulated Tortoise

Photo]

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mer house is built right into this earth bank, after the manner of a war time dug out. This prevents the house from becoming too hot at mid-day, but helps it to retain its warmth in the early evening. About tea time I close the glass doors and the tortoises keep quite comfortable tucked into bundles of warm hay until I am ready to take them indoors for the night. (As many of them hail from tropical regions I never leave them out at night or on rainy days.) They seem delighted with their little "summer house" and both land and water ones go in, frequently, of their own accord, as the afternoon draws on. The "house" has a concrete floor, but over this wooden boards have been placed as concrete is so cold and uncomfortable. Tortoises hate cold in any form and will always choose to bask on the warm earth, in preference to the grass.

The pool is quite a miniature affair and holds, roughly, about twelve gallons of water. It slopes to a "deep end" in which the water tortoises (Terrapins) can swim quite freely—even large ones. Water plants grow, placed in large pots, on which the tortoises often sit and bask in the sun. Round the little pond are



Plan of Tortoise "Park."

(It is 24ft. long by 16ft. wide, and surrounded by 1/2-in. mesh wire netting. Midway on the right is the tortoise "dug-out," the all-glass portion facing south.)

mer house is built right into this earth bank, after the manner of a war time dug out. This prevents the house from becoming too hot at mid-day, but helps it to retain its warmth in the early evening. About tea time I close the glass doors and the tortoises keep quite comfortable tucked into bundles



beds containing Irises, and ribbon grass grows—all too freely—to give shelter and privacy, so loved by the shy water tortoises.

The little rockery slopes from the gravel level to the grass. Being so shallow, the tortoises can climb it easily. It contains various small plants, but none of the rare "Alpine" variety. Although, as I have said, the tortoises seem to do very little damage, I would not advise planting valuable flowers in their garden. Although not planted till February, the rose trees bloomed the same summer, whilst the Mallows and Godetias grew splendidly, flowering until the frosts cut them down. I found that some of the land tortoises were very partial to the fallen flowers of the mallow and ate them freely.

If one cares at all for gardening it is much more interesting to house one's pets in a little enclosure such as I have made and described, than merely to "rope them in" on a waste piece of ground. If any reader is in doubt I would say—"just try it."

(Illustrations of other suitable tortoises and terrapins were published in the last issue.—ED.)

## POND LIFE IN THE HOME

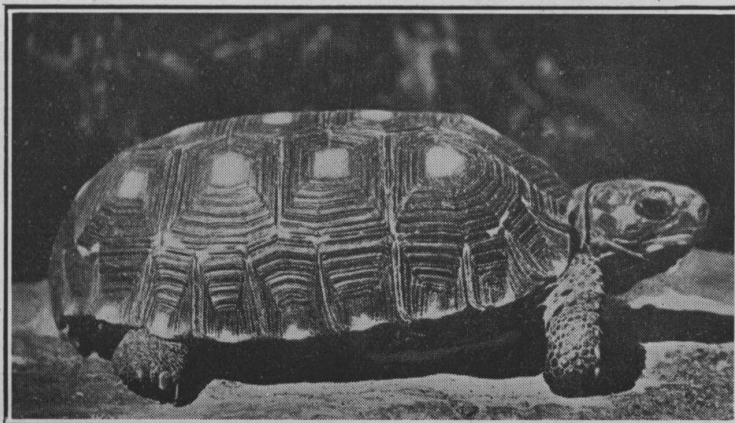
### Thrills of a Cabinet Aquarium

(See pages 160 and 161 for illustrations.)

**B**ENEATH the placid water of a pond, tragedies of the most gruesome kind are continually taking place—acts of stealth and treachery unsurpassed in the animal kingdom—whilst, to protect themselves from the dangers around them, other creatures have learned to excel in camouflage and self-constructed armature.

To collect a heterogeneous assortment of creatures from a pond and place them in an aquarium would be to court disaster, for, under such conditions, the defenceless ones would soon fall victims to the predaceous, whilst the latter would probably meet the fate of the

famous "Kilkenny cats" by exterminating one another! But, by means of what is known as a "Cabinet Aquarium," we may yet study at home the lives of various pond creatures, and see for ourselves the parts they play in "The Drama of the Waters"—watch how the treacherous Dragon-fly larva, with its extensible "mask," manages to secure its victims; how the Water Scorpion, camouflaged as a dead leaf, lies in wait for prey; how the Water Spider perseveringly builds up its fairy-like



Tabulated Tortoise

Photo]

[Copyright

home of submerged air-bubbles, and how the larva of the Caddis-fly protects its soft abdomen from the jaws of hungry fishes by building itself a portable abode of sand, shells or other substances according to the habits of the particular species. After witnessing these marvels of Nature, I think

you will agree with my remarks, in Editorial notes, that life as we find it is much more thrilling than the cultivation of "something new."

Those not acquainted with a "Cabinet Aquarium" are probably visualising something elaborate and expensive, whereas it is quite the reverse, for it comprises merely a collection of jars and similar receptacles in which aquatic specimens can be confined and kept separate from one another. A little sand at the bottom, and a few sprays of *Anacharis* (*Elodea*) completes the "furniture" of these miniature aquariums, though, in most cases, a cover of perforated zinc (which may be gilded or enamelled), will be needed to prevent the escape of the occupants. The water should seldom require changing, unless allowed to become fouled by rejected food. The receptacles should be stood on shelves, after the style of a bookcase, and kept out of the direct reach of the sun, or the water will become green with Algae.

As most aquatic insects breathe atmospheric air, coming to the surface for fresh supplies, one has not, in such cases, to trouble much

(Continued on page 163)



# Collecting in Syria

BY W. H. PAYN, M.B.O.U.

THE objects of the Syrian expedition in which I took part were mainly ornithological, but any reptiles or fish which we might be able to obtain were to be sent to the British Museum.

In this direction our second camp, situated about 5,000 feet up in the Lebanon Mountains, proved highly productive. On account of bandits, who were said to be operating in the vicinity, we had been advised to camp close by a post of gendarmerie which, with one or two cave-like dwellings, hollowed out of the mountain side and inhabited by a family of dirty Arabs,

comprised the entire settlement. Barren red mountains rose steeply on three sides of the camp and, down the valley between, flowed a tiny snow stream, which from its source, at an old Roman well-head just above our camp, until it finally lost itself in the desert below, was scarcely three miles in total length.

Among the mountains, grilling hot and almost devoid of vegetation, we found little of interest except a large black and purple snake which led us a pretty dance before it was finally captured. I discovered it curled up under a large boulder with a heap of bird and insect remains scattered round it, and, eventually, I pinned it down with the stock of my gun on its neck while my companion lassoed its jaws with a piece of cord, thus preventing it from biting us. Writhing and struggling, it was carried back to camp and thrust, by main force, into the alcohol tank. Two hours later, when it seemed quite dead, we took it out of the spirit to examine it. Directly it touched the ground a spasm seemed

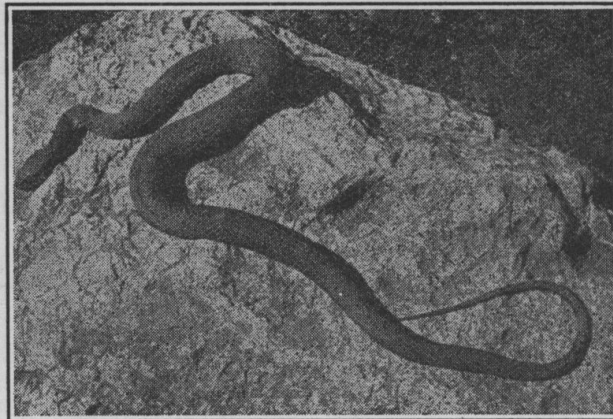
to pass right through its body and next moment the snake disappeared like a flash beneath one of our tents.

With some difficulty we recaptured it and this time gave it a good twenty-four hours in the spirit jar. It measured nearly five feet in length and, after all, much to our regret, proved to be of a non-poisonous species.

Apart from this, the mountains yielded little of interest and so it was to the streamlet that we turned our attention. Though hardly three miles in total length and at no point more than two feet wide, it harboured several

shoals of fish, besides water-tortoises, frogs, fresh-water crabs and various smaller forms of aquatic life. The fish proved extremely difficult to capture and we were finally glad to accept an offer of assistance from the Arab urchins, who plunged naked into the cold water and, by stirring up the mud with their feet and by grabbing right and left among the darting shoals, managed to procure us half a dozen specimens.

Our first night's slumber had been disturbed by a babel of noises, of shrill brayings and bleatings, which seemed to come from all points of the compass, and it was some time before we discovered the disturbers of the peace to be a party of frogs in the spring-head cistern. Even with the aid of our electric torches we failed to capture any or to quieten their music for more than a few minutes on end, and in consequence most of us got very little sleep that night. Next morning, however, we had our revenge, for, as soon as it was light, the entire encampment turned out armed with



The Ophidian Victim

Photo]

[W. H. Payn



every receptacle it could lay hands on—cooking pots not excepted—and searched that cistern from end to end, capturing from among the weed and rock crevices seven enormous frogs, ranging in colour from emerald green to red, which duly joined the select company in our spirit jars. Thereafter we slept in comparative peace.

Yet, in the end, it was the crabs—previously regarded with mild contempt—which caused us the most trouble. They were artful creatures to catch, for they spent the daylight hours sunk in the centre of a patch of weed, with only their eyes exposed to view. We tried to catch them by leaning cautiously over the pool and making a quick snatch, after which the would-be captor generally found himself on all fours in two feet of ice cold water with nothing but a handful of weed and gravel to show for his pains. When we knew them better we discovered that, though water was their natural element, the crabs were perfectly at home on dry land, and the first one we handled was found in a tuft of grass fifty yards from the stream. In addition, they suffered from a form of kleptomania. One morning the bread, left overnight on top of a specimen case, was found on the ground with a large piece eaten out of it. Naturally, a rat got the blame, but the following night, hearing a noise, one of our party discovered a large crab busily eating its way into the interior of our last loaf of bread. The disappearance of a sock, hung out on a guy rope to dry and found next morning caught up in some brambles by the stream side, was also attributed to the crabs! In the end we managed to obtain three specimens, but, even then, the crabs had the last laugh, as after breaking camp and travelling some hundred miles over mountain and desert to a fresh camping site, one of the party, upon unrolling his sleeping bag, disclosed a small green crab—which swiftly made its escape into a nearby streamlet!

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## THE PERCH IN CAPTIVITY

*(Continued from page 166)*

Perch seem to be a sociable type of fish and generally swim about in shoals, choosing the deeper parts of the river or lake. During summer afternoons, shoals of Perch can be seen swimming towards the reedy shallows at the edge of a river or lake, where they remain resting among the shadows of the vegetation,

always on the lookout for some unsuspecting worm or fish. In nature, the Perch is not without enemies, since birds and Pike will devour small Perch in spite of their spines. If a Pike should miss a Perch on its first attack, the Perch, however inferior, will put up a good fight and a larger specimen will often escape uninjured.

Young Perch can be kept in an aquarium with other fish providing that their companions are larger. They are really beautiful fish and if it were not for the size they reach in four or five years it is probable they would be kept more often by aquarists. It is more interesting to commence with very young fry, which can easily be caught in the upper regions of most rivers during May. Still more fascinating for anyone who is keen on experimenting is to obtain some adult fish during the spawning season, which is from March to May, and artificially spawn these fish and rear the fry. This is done by placing a female fish in a bowl of water and carefully working one's hands, with a backward movement, on the ventral surface towards the anus, taking care to avoid the spines of the fish. Immediately after ova have been obtained from the female fish, a male should be treated in the same way and the spermatozoa squeezed into the same bowl as the ova. It is advisable to treat two males to each female, and then the water containing ova and sperms should be slightly stirred and left in the shade for two or three hours, when the ova can be taken and placed into shallow trays or tanks to hatch. It is very helpful to have very slowly flowing water through the shallow tanks. The fry should hatch within three to four days. (A year old Perch attains the average size of 3-4 in.)

In nature, during the spawning months, which vary according to locality and weather conditions, the Perch make their way in shoals up the river to sandy or gravelly shallows, where the female attaches to the stones strings of spawn, which are then fertilised by the attendant males. About 150,000 eggs are laid by each female.

Perch will readily spawn in an aquarium but the eggs are often devoured by other fish before fertilised, whilst they seldom develop in deep water. Nevertheless, adult Perch can easily be induced to spawn by placing them in shallow tanks with gravel bottoms at the correct season and slightly lowering the pH of the water to about 6.8 or 7.0.



# The Eyed Lizard as a Pet

READERS who have a liking for lizards as pets should not miss the opportunity of including a specimen of the Eyed Lizard (*Lacerta ocellata*) amongst their collection, as this species is once again upon the market. It was, in fact, for this reason that I decided to include some notes about this fine lizard in the present issue.

The Eyed Lizard is decidedly a handsome reptile, especially when young, the green background being relieved by black and yellowish network, whilst the sides are ornamented by dark-blue eye-spots, a form of decoration more common amongst butterflies and birds. Specimens from North Africa, however, are not so conspicuously marked, so, if possible, those coming from the reptile's European habitats—Southern France, North-West Italy, and Spain—should be obtained.

Apart from its beauty, this giant amongst European lizards (it grows to a length of 2 ft., of which the tail forms two-thirds) has other distinct advantages as a pet. On account of its size, it is not so likely to elude capture if it should manage to escape in the garden, whilst it does not, as a rule, attack or bully smaller lizards which may be associated with it. Another point in its favour is that, unlike most lizards, it will take dead food such as chopped raw meat soaked in milk, as well as bananas, strawberries and grapes. Under natural conditions, it preys upon mice, small birds, etc., but captive specimens may be fed on lob worms and snails, as well as mealworms, beetles, cockroaches and other insects.

When untamed, the Eyed Lizard is apt to be savage and shy, so a freshly purchased one should be picked up warily, a large specimen being able to bite with the strength of a rat.

If you look at the broad, formidable head of an adult male you might deduce this disposition, but if you like "something snappy" you will not be disappointed! However, like all animals, the lizard, on finding that no harm comes to it when handled, soon becomes quite

tame and, instead of scuttling off at one's approach, comes out to greet you—or, at least, meet you. As "the quickest way to an animal's heart is through its stomach" you should encourage this exhibition of trust by giving

the reptile a tit-bit of some kind on such occasions. It will then soon learn that it pays to be friendly.

In his excellent book "The Vivarium"—now, unfortunately, out of print, I believe—the Rev. G. C. Bateman states that occasionally an Eyed Lizard goes on a sort of hunger-strike and, in these circumstances, he advises artificial feeding in the following way:—"The animal should be gently and carefully held in the left hand, so that its forelegs are pressed backwards against its sides. In such a position as this, it can neither bite nor struggle very much; but in its endeavours to bite, it will open its mouth widely and so give an opportunity for inserting, with the right hand and the help of a piece of smooth wood, some raw meat down its very capacious throat. This artificial feeding should be repeated about every third day until the reptile begins to eat of its own accord."

As an Eyed Lizard needs a fairly large vivarium and plenty of sunshine, I recommend an outdoor enclosure of wire-netting, of sufficiently small mesh to prevent its escape and with a close-fitting cover. To allow for adequate drainage in wet weather and the

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The Eyed Lizard  
(*Lacerta ocellata*)

Photo]

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fish by feeding with artificial foods. Amongst these, in common use, is vermicelli. Vermicelli, as an occasional diet change, is an admirable food, but it should not be used persistently, as this and similar cereal foods tend to cause constipation, leading to bladder trouble. Food that is uneaten will often cause as much, if not more, trouble than eaten food. Here again the fault is more common in aquaria than ponds. Decomposition that arises from quantities of uneaten food is accompanied by greater putrefaction than that which takes place in organic decomposition. Bacteria and fungoid growths are thus encouraged.

The surroundings of a pond, and sometimes rockwork used for islands inside the pond, may lead to sudden and fatal illnesses. In the first place, where there is surface drainage into the pond, rain-water may enter which has dissolved poisonous substances used for garden fertilisation, weed-killing, vermin extermination. Secondly, rocks which are not water-worn, or impervious to water naturally, may decompose when the pond is filled and lead to changes in the mineral content of the water, expressed possibly in terms of excessive acidity or alkalinity. I have in mind that soft white spar used for rockery work. This will crumble to fine powder if used for islands. The water becomes excessively alkaline and fish and plants are destroyed. Rocks which are not absolutely natural should always be viewed with suspicion, for I well remember a small piece of rock placed in an aquarium for decoration which destroyed all fish life by producing cyanide of potassium. It turned out to be a chemical slag, and did much damage before it was traced down.

More in country districts than in towns, there is a danger of sewage pollution, which might arise from a pond situated at a lower level than cattle-shed drainage, allowing percolation and drainage into the pond. Certain types of Algæ accompanied by fungoid growths and decompositions will result from this with a high ammonia content, and the discomfort of the fish.

Any rough handling of a fish will cause the growth of fungus, or severe internal bruising. Netting with as little fright as possible should always be resorted to in removing fish from one place to another. "Frightened to death" has happened to many fish and may come about by loud noises and bright flashes (fire-works), chasing, or by the association of large

bullying fish with smaller, or by pawing of a cat or dog. I have known all these cases.

Fungoid growths will always attach themselves to cuts or scratches on a fish, so that anything of a sharp nature, such as protruding wire reinforcement, pieces of glass, etc., should be carefully removed from a pond. Cats also should be discouraged, for, if they cannot catch the fish, they have a nasty habit of scratching them.

In my next article I will deal explicitly with the diseases and illnesses and their cures. In the meantime, however, if your fish droops its tail or dorsal fin (the one on top) for a few seconds, do not unduly worry, for it is only when it is persistently bedraggled that it is ill. It is quite customary for a fish to droop its fins occasionally. What counts, actually, is the alacrity with which it re-erects them when it has done so.

In Comets and large-finned fish there is a more marked natural tendency for a slight droop of these appendages, and it must not be confused with the symptoms of sickness.

*(To be continued.)*

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### **The Eyed Lizard as a Pet.**

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beneficial effects of bacteria in the soil, there should be no bottom to such an enclosure, the corner stakes being driven well into the ground and, of course, taking care that the netting is sufficiently deep to prevent the reptile from escaping beneath it. As lizards do not bathe, a small pan of water for drinking purposes is all that is needed in this direction, but there should be some rockwork so that the occupant can display itself, as lizards do, to derive the full benefit of the sun at all times of the day. Arrange the rockwork so as to form a cave of some kind into which the lizard can retire when so disposed. Failing rockwork, a hollow piece of cork bark will serve.

Whenever the weather is sunny and warm, miss no opportunity to give the lizard all it can eat, as, in our fickle climate, dull days may come at any time, when the reptile will lose its appetite, and, unless well nourished, it will not survive hibernation during the winter. At the approach of the latter season, the best plan is to pack the lizard away in a well-ventilated box of dry moss, kept in a cool place secure from frost. A. E.H.







# The European Pond Tortoise

By \_\_\_\_\_

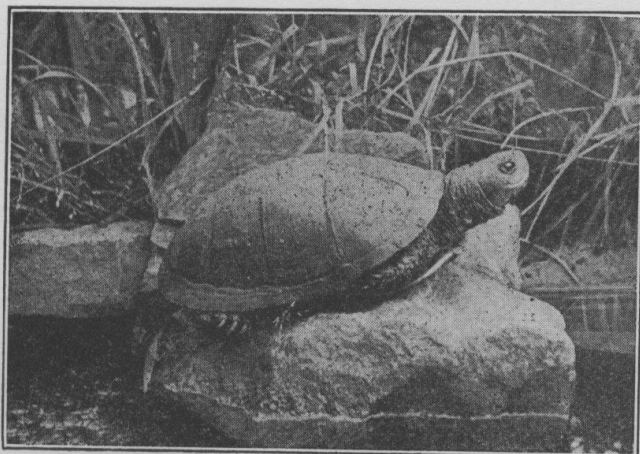
JACK C. R. AISTROP

ALTHOUGH the European Pond Tortoise (*Emys orbicularis*) is not now found in Northern Europe, evidence in the form of fossilised remains show that it was once common in this region, including England.

The colouration and even the shape of these creatures change as they get older. At first the shell is quite round and of a uniform dark brown, but, as the young one grows, yellow spots appear. The shell of the half-grown specimen is more oval, and striped with yellow. The head, legs and tail are of a dark colour, striped with yellow. A really old specimen loses all markings and becomes darker.

When first born, the Pond Tortoise is about the size of a shilling. Unfortunately, these tiny tortoises are almost impossible to rear successfully. They eat tiny worms, insects and any small creatures they can find. Even in captivity they will feed readily enough, but, in spite of this, they die just the same. One egg has been hatched in this country, and the baby lived until its fourth year, to my knowledge.

The diet of these creatures is entirely animal, the chief food being fish, frogs, worms and various insects. When a Pond Tortoise is feeling hungry and decides to catch a fish, he lies motionless on the bottom until one comes close enough. Then the motionless creature slowly leaves the bottom, where he has been watching the fish, and floats gently to within striking distance of the unsuspec-



*Emys Orbicularis*

(The specimen depicted has lived in a small garden pool for over twelve years, throughout all seasons, and on several occasions has been frozen in solidly without harm.)

Photo

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ting quarry. Then, with a sudden dart, he bites the victim in the belly and tears the flesh from its bones with the front claws. The bones are allowed to sink and the air bladder to float away. Frogs are caught in a similar manner. Even grass snakes suffer the same fate. In captivity, raw meat, insects, and an occasional frog form the staple diet of the Pond Tortoise. Before very long, meat will be taken from the fingers, providing

the reptile is hungry. Mine seems to know my hand and will all come and inspect it if I put it into their enclosure.

In the late Autumn they hibernate in the mud at the bottom of the pond and do not reappear until late Spring. (I always bring mine indoors and keep them in a warm room, which prevents hibernation.) They wake once or twice during the period of hibernation, in order to drink and, if they are on land, to soak themselves.

The breeding habits of the European Pond Tortoise are extremely interesting. During the mating season they swim together, uttering piping calls. The eggs are laid on land. The female selects a spot, clears it of grass, and then, in order to soften the earth, passes her water on it. Stiffening the tail, she digs it into the earth until she has made a conical hole. This is enlarged with the back legs, until a hole about five inches deep is made. Into this are placed the eggs, when the hole is filled

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cent. peroxide of hydrogen, together with a camel-hair bush or cotton wool swab. A brush or swab is unnecessary if the tail only be attacked, as the fish can be dipped "tail-long" into the liquids.

Firstly, the turpentine must be applied to the affected portion for ten seconds, and then for a further ten seconds the peroxide is applied. Immediately afterwards both solutions must be washed away with fresh warm water. Neither solution must be allowed to come into contact with the gills or eyes of the fish.

Strong-minded aquarists need not hesitate to cut away the frayed portions of fin or tail with either scissor, scalpel or razor blade, but the cut must be swift and clean.

Fish diseases form a vast and, as yet, little explored subject, of which I have but touched the fringe. There is much to be done in following out the life cycle of various protozoan and infusorian forms of microscopic life which may have a bearing on fish illnesses. The common Fungus, also, is not so simple a matter as it may seem, as its method of attack and rate of progression is very variable. The various species have yet to be worked out, so there is ample scope for the microscopically inclined aquarist who wants to do a little original research.

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### The European Pond Tortoise

(Continued from page 210)

up with soil. The loose earth is stamped into position by the female, who raises up on her legs and lets herself flop down on to the caché. The eggs hatch late in the Autumn or the next Spring, according to the temperature of the locality.

There are many species of Terrapin, but I prefer the one dealt with, for it is extremely hardy and it also seems to be slightly more intelligent than others. It also has the advantage of being the cheapest.

If you decide to add some of these interesting creatures to your collection, do not neglect to cover any fish tanks or pools which might be accessible to them. I remember a fancier asking me to come and have a look at his selection of goldfish. Unfortunately, someone had placed their Terrapin in the huge fish tank, and we found that every fish had been bitten to death and abandoned. Apparently the terrapin had not been hungry; he merely wanted some hunting.

### Tropical Fishes

(Continued from page 214)

Owing to her long abstinence from food, the female is now beginning to appear somewhat emaciated. The fry are now quite capable of taking care of themselves, as there are no other fish in the aquarium; therefore it is wise to remove the female to a separate tank lest she should overtax her strength or be tempted to eat her children. Her removal without any of the fry can be accomplished only by waiting until they are all out feeding, and then quickly and suddenly swooping on her with the net. If there is the least hesitation or indecision in the process she will begin to pick up the babies, and it will be some time before she lets them out again. Having caught her, place her in a tank away from the male and feed her well.

Once they begin to take *Enchytrae* and finely chopped Earthworms, growth is very rapid. At six weeks they begin to colour, and at five to six months the best specimens will be ready to breed. The rearing does not call for any particular skill on the part of the aquarist, whose chief concern should be to get the over-worked female back into top condition. Owing to the great demands made on the females, pairs should not be allowed to spawn more than once in four months.

This is one of the most fascinating methods of breeding that can be observed in the aquarium, and every "tropical" enthusiast should try this species, which demands a minimum of care and attention in all its phases.



A NOTE FOR YOUR DIARY.—Don't forget the Display of the Aquarium Trade Guild at the Crystal Palace Bird Show, on 23rd, 24th and 25th January, 1936. It will be found in the Tropical Bird Room, and will provide an excellent opportunity for making a choice from the stock of the various dealers.