WATER LIFE

Articles on Herpetology
from Volume 7

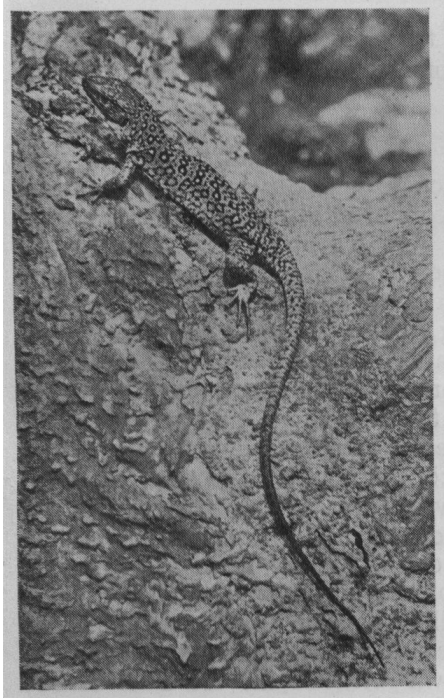
VOLUME VII

London:
The Marshall Press Limited

Field Notes on the Eyed Lizard

By JOHN ARMITAGE

DURING the course of my wanderings as a naturalist in the south of France, Portugal, Southern Spain, and Morocco, it has been my good fortune to meet with various forms of the Eyed Lizard (*Lacerta ocellata*), living undisturbed in a wide range of habitats. This fine intelligent reptile is unique among European lizards, both for size and colour, often attaining a length of 2-ft., while the colour is green above and yellowish below, with pretty blue spots ringed with black on the sides. Adult males in spring are gorgeous creatures, and, as may be seen from the illustration of a youngster from the Algarve, South Portugal, richly spotted juveniles are even more attractive than their parents. Some African forms, however, are much less ocellated, the more uniform green of the body and blue throat of an adult male reminding one of an outsize in green lizards.



[*Photo: J. Armitage, A.R.P.S.*
Young Eyed Lizard from the Algarve

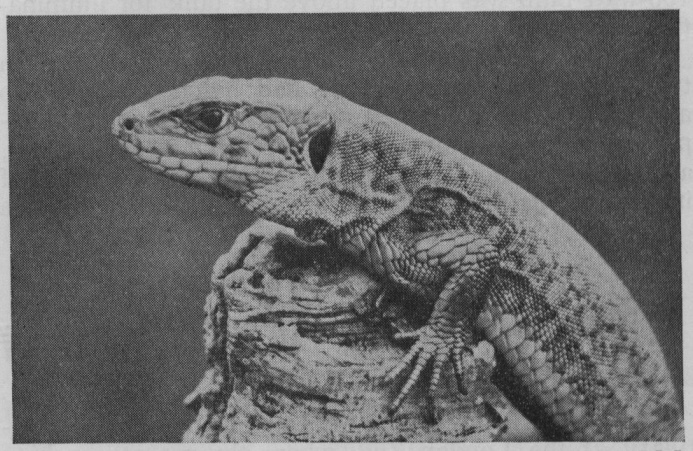
In a wild state, the Eyed Lizard eats various ground-haunting lizards and sand-runners, small rodents, including very young rabbits, and the contents of birds' nests. Some appear to infest burrows and scarcely travel beyond easy running distance of their retreats; but others undoubtedly travel far and have few enemies to check them. When disturbed by a human intruder out in the open, the Eyed Lizard usually stands in defiance, but only for a fraction of a second. The next moment, it has turned tail and crashed off through the sunbaked herbage at top speed. Once I saw a domestic cat successfully stalk and kill an adult lizard, and the same day I dislodged one from a tree and caught it.

Near the Rio Tinto copper mines in Southern Spain there are some barren hills sparsely dotted with old ilex trees, where Woodchat Shrikes have their look-out posts and build their nests of Cudweed. Approaching one of these trees, I noticed a big Eyed Lizard at the foot, intently peering into a hole, possibly attracted by a Lobe-footed Gecko, which are numerous in such places. On seeing me, it darted up the tree and along a slender branch. Out there I pictured its little brain turning over a very awkward situation. Some clods were speedily kicked up, and following a few wides, a better-directed tuft swept the reptile from its perch. I rushed towards it as it struck the ground, grabbing it well forward, and holding it in spite of furious scratchings and bitings. Bearing it in triumph to the house where I stayed, I discovered that my friends were absent, but being anxious to exhibit my prize to someone, I ambled into the kitchen.

Two Spanish servants were at work. They looked up together, screamed simultaneously, dropped their utensils and fled. Later, when they returned, I noticed that their fingers were crossed: an attempt to remain immune from the evil influence of the great *Lagarto*. My captive was so ill-tempered and caused so much consternation, that I was glad to release it in a nearby dried-up watercourse where others of its kind had been seen.

In the Spanish sierras beyond Ronda and Grazalema, Eyed Lizards were abundant, and while their haunts proper were in shady, bushy places, with lush vegetation and running water, many were seen on scrub-clad and stony hillsides, where esparto grass mingles with low, aromatic scrub. In spring I spent several days among the mountains searching for nests of Rock Buntings, and quite frequently Eyed Lizards were disturbed and noted in noisy, headlong retreat.

The countryfolk in Morocco could never fathom my interest in reptiles; and seeing me lying on a bank or poking about the Palmetto scrub—noosing stick in hand—they were firmly convinced that it was a weak-minded attempt at snaring rabbits! Young Eyed Lizards are not difficult to catch; they are ideal for sending through the post to England enclosed in tubular cylinders; and as pets they are without equal, taking readily to artificial conditions and a variety of foods, they are quick-witted, and often live for many years.



[*Photo: J. Armitage, A.R.P.S.*
North African Eyed Lizard

At large, I have always found adults much too clever for me; but with a cane at least 15-ft. long, something might be done, particularly in early morning before the sun has invigorated them. Of course, a well-infested

haunt must be found, and one of the best and most accessible haunts known to me is by the roadside between La Linea and the village of Campamento, on the Spanish mainland near Gibraltar. Standing with one's back to the Rock, and looking to the right, it will be seen that many parts of the ditch-banking parallel with the road are full of holes, and here at any time of the day during spring and early summer, Eyed Lizards of all sizes may be seen. It is possible that specimens representing each stage of growth could be collected here by someone endowed with the necessary skill and patience, and with plenty of time on his hands.

Breeding Prize-Winning Goldfishes

By R. J. AFFLECK

LAST November I bought a pair of Blue Scaleless Orandas and decided that I would spawn them this year. They had good colours, but were not particularly fat, so I decided to see if I could improve their figures. Accordingly, they were placed in an unplanted tank, the temperature was raised gradually to 70 degs. by day and 65 degs. by night, and they were given as much food as they could eat. With such heavy feeding the water had to be changed at least once a week. This continued until the beginning of January, when their colours had improved considerably, and their bodies were almost unrecognizable. Instead of their heads being larger than their bodies, when viewed from the top, they now resembled a sausage (*i.e.*, parallel sides with semi-circular ends). By this time the male was showing some interest in the female, and so the temperature was reduced, over a period of three weeks, to that of the unheated tanks, and the fishes were separated.

I decided to spawn them at the end of May, so, three weeks before, the temperature was raised to 70 degs. by day and 65 degs. by night. One Friday night a 24 x 15 x 15-in. concrete tank with glass sides was set up with tap water, and bunches of *Myriophyllum* were placed at one end. The fishes were introduced about 8 p.m. with a temperature of 70 degs., and a 100-watt bulb was placed above the tank for illumination, as the tank was in a dark corner of the room.

The next morning the fishes had spawned, and in two and a half days the fry had hatched, while two and a half days later they were swimming. The temperature after spawning varied from 65 degs. to 74 degs., and I am unable to account for the short period of incubation, as the temperature was taken at the surface and at the bottom of the water, in different parts of the tank, and the thermometer was tested to see if it was registering properly.

The benefit of care and attention given to the parents was shown by the spawning, because out of several thousand fry that hatched, only fifty-nine were infertile. The fry were fed on yolk of hard-boiled egg, and a non-stop catering service was set up. In a fortnight's time, tummies were beginning to bulge nicely, and some of the fry were much larger than others.

I believe in raising a few hardy exhibition fishes every year rather than a lot of rubbish, so now I decided to kill off some of the stragglers. An old tablespoon was used to catch those that were not very active, while a greater fluctuation in temperature found out other weaker ones, and they were destroyed. At the end of three weeks the fry were picked out one by one and examined under a powerful magnifying glass. Those with double tails, double anals, good dorsals, etc., were picked out from the larger ones, and after another culling at four weeks my thousands were reduced to eighteen fish. All others were destroyed.

Many aquarists will criticize me for such drastic treatment, and say that I ought to have kept them as long as possible in the hope that some of the smaller ones might have developed into prizewinners. If I had had an unlimited supply of tanks, then I might have kept a few more, but a 36 x 15 x 15-in. tank is not large enough for more than eighteen fry when they are a month old and over half an inch long. The ones that were destroyed would have eaten good food and restricted the growth of the good fry. I shall be satisfied if I have four good fishes from this spawning at the end of the season.

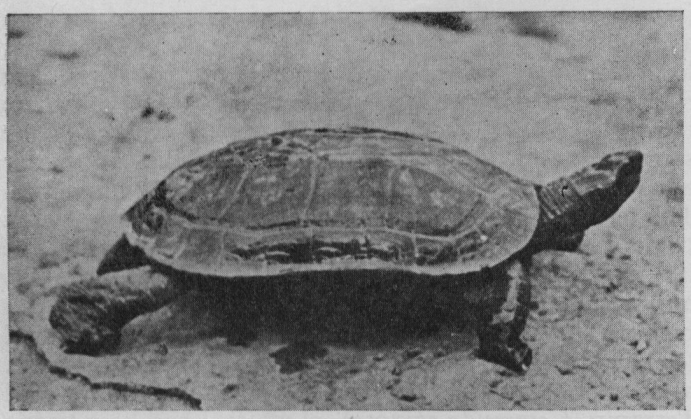
Vipers in the Sun

Large crowds have been attracted to the outdoor reptiliary at the London Zoo, where the recent sunshine has lured forth Vipers, Grass Snakes, and Aesculapian Snakes, besides Green Lizards and Wall Lizards. One Viper, lately received from the Zoo's collector in the New Forest, is entirely black. Melanism in these snakes may be due either to a predominance of black pigment throughout the epidermis, or a complete merging of the central zigzag line with the series of blots and blotches on either side. Vipers which owe their blackness to a merging of the markings are always males. When, as happens, chiefly with females, the black is the result of a gradual darkening of the ground colour, the typical markings can be seen in certain lights, just as the spots may be detected in a black leopard. The Aesculapian Snake of Central and Eastern Europe is of interest, since it is associated with the "God of Healing." Its frequency on the sites of ancient Roman thermal stations has given rise to the suggestion that it was imported to such places when the snake was an object of worship.—*Observer.*

The Ceylon Terrapin (*Geoemyda trijuga thermalis*)

By "AMPHIBIUS"

TO many readers one of the most interesting animals at present available in London will be the infant Ceylon Terrapins, the first of their kind, I believe, to be offered in this country since before the War. On receiving intimation that there were "arrivals" I hurried at once to the shop, having learned long since the danger of delay in these matters. The babies were a mystery to me, although I was able



The Ceylon Terrapin (male)

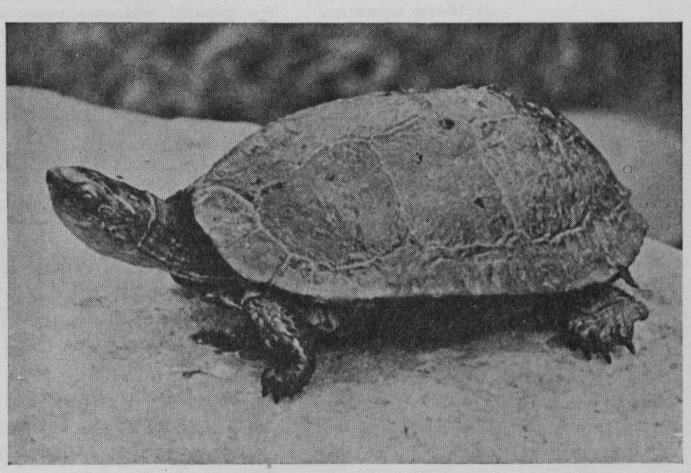
at once to place them in their genus. Diligent application to various keys has satisfied me that they are immature examples of that black subspecies of the Indian Pond Tortoise which is confined to Ceylon, the southernmost tip of the Indian Peninsula, and the Maldive and Chagos Archipelagos.

Geœmyda, as its name suggests, is very much a terrestrial animal when well grown, and is accordingly able to feed both under and out of the water, and upon a mixed diet. In Ceylon this animal is known as "Thumba ibba," and is highly valued as a scavenger. I have had an old male now for a number of years, and he is no trouble at all. During the winter he lives in any tank that happens not to be too overcrowded in the greenhouse, but when accommodation has been scarce, or for other reasons, he has never minded being carted indoors, and has, indeed, spent an entire winter on the kitchen table, where he took an apparent interest in everything that went on, and proved beyond all doubt that "omnivorous" is no exaggeration when used to describe the nature of his diet.

Officially he lives on raw meat, young mice, fish, mealworms, soft fruit, and, when the inclination takes him, on lettuce, but unofficially he likes a little ripe Gorgonzola cheese, currant cake, marmalade, and other untortoiselike oddments. I think I can safely say that he doesn't like raw dough, but otherwise it would be a difficult matter to tabulate all the different foodstuffs that have, at one time and another, found their way into this animal's stomach. As the picture shows, he is all black, except for the region round his mouth, which is a slate colour. He is a lightly built tortoise, and his bright, beady eyes are set in such a way as to give an impression of intelligence which is not, I fear, borne out in his behaviour. The babies, as exemplified by those at present available, differ very markedly from their parents in appearance. Their dark brown heads are elegantly marked with bright orange spots and lines which are in no two specimens quite the same, and all of which disappear with age completely. The three long keels to the carapace are yellow, and the lateral edges of the plastron, which are on old specimens a lemony-grey, are in these babies a bright yellow.

In common with the other members of the genus, the babies are almost entirely aquatic, and so far mine have refused to take food out of water. They first fed under water an hour after leaving the shop, and are now doing well on chopped meat, worms, mealworms, and lettuce. I offered them some Sewer Fishes, but they didn't seem keen on them. I shall expect them to take to chopped grapes and bananas, which seem to be the first favourites with the genus.

The Ceylon Terrapin is neither delicate nor temperamental, and, as I mentioned before, can pass the winter quite happily in a constantly heated room. Under such circumstances its appetite, as is to be expected, never reaches the gargantuan proportions that it does in specimens kept under tropical conditions, but as its energy output is proportionately lower, that doesn't matter at all. During the summer mine lives in a small but sunny enclosure outdoors, and which has a pond which is extremely shallow over most of its area. I returned from my holiday last year to be told, in reference to the tortoises, that a "black one" had escaped. Since a large proportion of tortoises are black or blackish, I had to take stock, and found that it was the



The Rough Terrapin (male)

Ceylon Terrapin which had thus taken mean advantage of my absence. Experience has taught me that the best thing to do when an active animal escapes is to wait for it to come back again, and this is precisely what I did. There was no sign of it until October 23, when it walked unconcernedly out of the axolotl pond,

appearing none the worse for an outing of three months' duration, but with apparently three months' arrears of eating to do! I have recorded that there occurred several light frosts during that part of October which had elapsed before the animal's return.

There appears to be no courtship worth the name in the genus, and the old male about which I am writing pays his apparently unpremeditated attentions to females of this and other genera with such ardour during the winter that their necks are sometimes badly scarred. This behaviour is really the reason why he has to spend a celibate winter in the kitchen. A female of the Indian Pond Tortoise (*G. trijuga trijuga*) (of which the species under review is a sub-species) recently laid me an egg. It was hard, ellipsoidal, and rather smaller than that of a pigeon.

There has been a second member of this genus, namely, the Rough Terrapin (*Geœmyda punctularia punctularia*) (fig. 2), available in the market during the last three years. This again is a species having several subspecies, nearly all of which, moreover, are brighter in coloration than it is itself. The pointed snout, rough shell, usually rather shabby looking, and horizontal yellow lines on head and neck are sufficient to render identification easy, and in captivity it needs much the same treatment as that afforded the Ceylon Terrapin. It is less well able to accommodate our climate, and does best if taken indoors during all but the warmest nights, and during overcast weather. Like the Ceylon Terrapin, it enjoys access to very shallow water in which to bask, and also a warm shelter to which to retreat when the mood takes it. During the winter indoors, it spends much of its time half buried in the peat or leafmould with which its tank should be generously floored. Curiously enough, I cannot recall ever having seen a member of this species completely submerged; they always swim with their backs out of water. Both males and females have the plastron flat, but the males—in my experience invariably the smaller of the two sexes—can be told from the females by reason of their possession of a tail as thick at the base as it is long. The tail of the female, although not shorter than that of the male, is very much more slender.

The curious distribution enjoyed by this genus is worthy of mention. Naturalists will have seen that it is very like that of the tapirs, and is, on fossil evidence, explained in just the same way. The ancestral *Geœmyda* lived in North America, and its descendants migrated along two quite different routes. One lot went south and colonized South America, then newly joined to the northern part of the continent, and hitherto a stronghold of the Sidenecked Tortoises, while the other lot passed across the land bridge into what is now Siberia, and thence into Southern Asia. In both these regions evolution of the genus has followed much the same lines: in both can be found forms that are partly aquatic, and others which are almost entirely terrestrial. The terrestrial group, perhaps because of its habits, has come to offer a close superficial resemblance to the land tortoises proper. This similarity was once the means of my acquiring an example of one of the rarer members of the genus. I had bought what was offered to me as the Burmese Brown Tortoise (*Testudo emys*), and upon arrival it proved to be the Spiny Hill Terrapin (*Geœmyda spinosa*), of which I had been trying for years to get a specimen. Needless to say, this was an occasion upon which no complaint was made to the dealer about a mistake.

Club Reports

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

THE NOTTINGHAM AND DISTRICT AQUARISTS' SOCIETY. —The June meeting was held on the 21st, at University College, Shakespeare-street, Nottingham, when Mr. A. H. Walker gave a talk on the life, habits, keeping, and breeding of Axolotls. The talk was illustrated by a map of Mexico, showing the habitat of these amphibia, and two specimens were also shown. The interest in reptiles and amphibia is spreading amongst members of this society, and it is hoped that a good show will be made in this direction at our forthcoming annual show. —A. H. WALKER, Hon. Sec.

LEEDS AND DISTRICT AQUARISTS' SOCIETY. — Under the heading of " Plants for Pond and Aquarium," at its last meeting, the society was addressed by Mr. A. Snow, who spoke at some length on the *Cryptocorynes*. Although it is said that over fifty species of this plant are known, those usually available to the aquarist are *Willisii, cordata, Beckettii, and ciliata;* specimens of these were exhibited. Though of comparatively slow growth, the *Cryptocorynes* are plants of great individuality. Some exceptionally fine specimens of *Pistia stratiodes,* the Water Lettuce, were shown. This plant, to be grown to perfection, requires shallow water at 75-80-degs., plenty of mulm or other feeding matter, and abundant top light. *Eichhornea crassipes,* also well shown, requires similar treatment, except that it will thrive in lower temperatures. In this district it is necessary to remove the plant from outdoor pools in early autumn, as frost is fatal. Propagation of both these plants is simple, by means of offshoots. *Calla palustris* was also shown and discussed, together with *Ranunculus grandiflora,* a plant not very common in this area. Next meeting, " Tropical Fish Breeding," Mr. S. Anthony, July 19, Church Institute, Leeds.

TO CLUB SECRETARIES

We are always pleased to supply specimen copies of "Water Life" to Club Secretaries for distribution to members and other interested people. If you are able to use any, please send a postcard, stating how many you would like, to The Circulation Manager, "Water Life," 7, Milford Lane, Strand, London, W.C.2.

Albino Tadpoles

By MARGERY G. ELWIN, B.Sc.

READERS of WATER LIFE will probably remember the albino frog which caused such a stir last year and was christened the "Walthamstow Wonder" by Professor J. B. S. Haldane. This frog was a beautiful light golden colour all over, with some slightly darker markings but absolutely no trace of black or brown pigment. The eyes were the peculiar translucent pink which is so characteristic of the albino and which is due to there being no pigment in the iris to mask the colour of the blood.

Albinism in the common frog is very rare indeed, only three other cases having been recorded in this country in the last fifty years, so this specimen naturally aroused considerable interest in scientific circles and it was greatly hoped that he would breed. This hope has now been realized. Unlike most albinos, the Wonder has proved very hardy and has survived unscathed the severe winter which took such heavy toll this year of other members of his race, and he is now in the pink of condition and the proud father of a large family by a normal-coloured female. Incidentally, this frog seems to be rather exceptional altogether, for not only is he quite as hardy as the normal type, but also his visual powers, which are usually very poor in pink-eyed animals, seem to be quite up to standard.

The tadpoles are, as is to be expected, practically normal in appearance, though somewhat lighter than the average. They are, however, probably carrying a recessive factor for albinism, derived from their father, and if mated together, which unfortunately cannot be done for at least three years, as it takes this time for a frog to reach maturity, will probably produce a proportion of albino young.

Two of the albino tadpoles

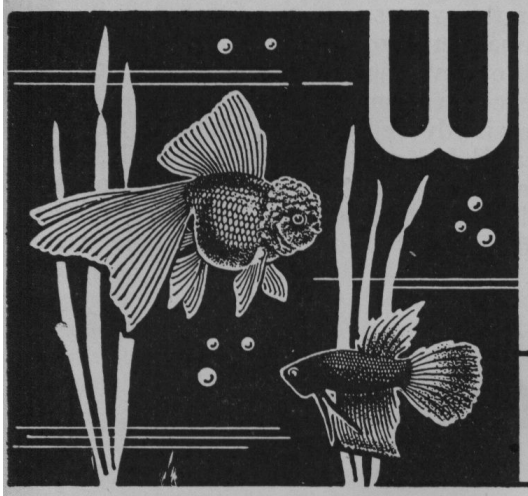
Recently, however, there have been startling new developments, for a whole batch of albino tadpoles has now turned up in the same garden! These cannot be the Wonder's offspring, and no other adult albinos have been seen in the neighbourhood. As the original albino has just reached sexual maturity, his brothers and sisters are now probably breeding for the first time, and it is quite possible that these are the parents of the albino tadpoles. It seems unlikely, as no other albinos have been observed and these are too remarkable in appearance to be easily overlooked, that the parents of the albino tadpoles were themselves albinos; it is much more likely that they were normal in appearance but were carrying a recessive albino factor—like the offspring obtained this year by mating the Wonder with a normal female. In all probability 50 per cent. of the batch which contained the original albino frog would be of this type.

The pond where the albino tadpoles were found

It has been suggested that there may be other albino frogs in Epping Forest, but none have so far been discovered, and these specimens have all turned up in a small suburban garden quite a long way from the Forest.

The albino tadpoles are very remarkable in appearance. Like the frog, they are an attractive golden colour and they have pink eyes. Black pigment is almost entirely absent, although a few very widely scattered melanophores can be seen under the microscope. Owing to the absence of pigment cells the skin is extraordinarily transparent and the internal organs can be plainly seen. The main blood vessels appear like red lines running down the limbs and the heart is so plainly visible that it is even possible to watch it beating! The main muscle bands, the skull, intestines, liver, lungs, etc., are all quite distinct.

It is to be hoped that a number of these unique creatures will be successfully raised to maturity as they are of exceptional scientific interest. We understand that the owner has considerably more than he can deal with and wishes to dispose of his surplus. What an opportunity for the enthusiast! Incidentally, these



WATER LIFE

INCORPORATING AQUARIA NEWS

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

VOL. VII. No. 167. AUGUST 15, 1939. *Offices:* 7, Milford Lane, Strand, London, W.C.2. Temple Bar 9361-2-3

SUBSCRIPTION RATES: 15/- per annum, 7/6 for six months, 3/9 for three months for the British Isles, or places abroad

The Reptiliary in August

By L. G. PAYNE

ALTHOUGH, as I write this, the immediate prospect is a continuance of the rainy days which we are now experiencing, we anticipate or, at any rate, hope for a return to the warm, sunny conditions which are normal at this time of the year. In the reptiliary then the lizards of various species will be much in evidence, and continuously in search of food. It is probable that August is the month of their greatest activity, and their well-being through the coming winter may depend upon the amount of food available this month and the consequent storing of nourishment against the long dormant period. Under conditions of captivity I find that mealworms are the food most readily taken. This diet may be varied with small earthworms and caterpillars of non-hairy varieties.

Lizards need water to drink, and though in a state of nature they may find all the liquid they need in the form of dew, yet it is certain that they will drink water from bulk when it is available. In my own reptiliary it is a charming sight to watch a Green Lizard leap lightly over the stones to the pool level, and lap up the water with curling pink tongue very much in the manner of a cat.

Talking of cats, it is surprising how much damage they may do in a reptiliary, and how difficult they are to keep out. The only way I know of keeping cats out of an open reptiliary is by some form of wire netting covering. This is certainly effective, but greatly increases the artificiality of the enclosure, and—to me at least—the necessity of gazing at one's creatures through a mesh of netting is irritating and distracting. Lizards seem to be a great attraction to cats, and to this I attribute the fact that many of my lizards are now tailless. Lizards kept in closed vivariums do not have this enemy to contend with, but I am not at all convinced that, could the captives speak, they would express their preference for the small vivarium with tail safety rather than for the comparative freedom of the open reptiliary with its attendant risk!

The noisiest member of the frog community, the Edible Frog, will not be causing much trouble now, for the mating season is past, and all amphibians are concentrating their energies on feeding.

The Tree Frog, too, which produces so insistent a note in May and June, utters only a feeble echo of this in August. The softly mournful notes of the Yellow-bellied and Fire-bellied Toads continue intermittently throughout the summer months because their mating is spread over this period. I have had eggs deposited every month from April to September. The fly traps, which I have always strongly advocated, will now be proving their value. For use in the open reptiliary these should be opened up under water, and held under for about a minute before reversing.

The enthusiast who breeds the various frogs and toads will now have different types of tadpoles rapidly maturing. Given a sufficiently large water area, and plenty of vegetable and organic food, the various species can be kept together with reasonable hope of success, but the amateur should beware of expecting his tadpoles to mature in a tank full of water, however well this may be provided with food. The tadpoles may look very attractive swimming about in deep water, but that is not Nature's way. Think of a natural pond in summertime. This almost certainly will have, on at least one side, a shallow, shelving, semi-exposed part—perhaps several square yards covered only by an inch or so of water. Here you will find maturing tadpoles whose growing legs and developing lungs make easy access to solid ground and air a necessity. Such conditions encourage metamorphosis, therefore our tadpoles in captivity should be provided with a sandy slope in their tank by way of which they can finally make their exit.

The amateur who has been successful in raising young frogs and toads from the egg stage will be justified in feeling a certain amount of satisfaction, but he should beware of the temptation to "grow on" too many. This will naturally depend on time and space available,

the door, I drilled a hole in the top centre, and on the inside I placed a piece of glass to observe the light. Then into the centre of the door I screwed a block of wood 2-in long, ½-in. wide and ½-in. thick. This was the handle of the door. Turning to the frame again, I cut away a portion in the back 4-in. long and 2-in. deep in the bottom centre, and into each side I drilled three holes; these were to allow air to pass into the chamber. Next I got a piece of asbestos, which I had left in soak for some hours (this assists greatly in cutting, sawing, or drilling, and lessens the risk of breaking), and cut it to the dimensions of the frame, namely, 17 x 12-in. This was to form the top of the chamber.

Into the centre of this and in a circle about three inches in diameter I drilled eight good-sized holes, and at each corner, at about 2-in. from the edges, I drilled another four holes. These were to allow the heat from the chamber to circulate on the underside of the aquarium; holes were also drilled round the edges to allow screws to be placed for fixing into the frame.

I might add that provided the asbestos has been well soaked, it is possible to drive nails through without fear of breaking the asbestos sheeting. To the bottom of the heating chamber I fixed a flame-resisting three-ply wood. I now fixed the top to the frame, after which the door fitted flush, and did not require any hinges or fasteners. After sandpapering the outside of the frame I painted it green, the same colour as the aquarium.

In this case the aquarium protrudes a little over the edges of the chamber, so to obviate loss of heat I affixed to the underside of the aquarium at each end a strip of three-ply wood about 2-in. wide and the length of the inside measurement of the sides. This three-ply is about the same thickness as the angle-iron, so that the aquarium stands quite level when placed on top of the chamber.

Albino Salamander Tadpoles

IN a recent issue of the "Wochenschrift," Dr. Karl Nath relates how he has had a number of albino salamanders born in his vivarium. In the spring of 1938 he was given a female Fire Salamander (*Salamandra maculosa*) which had been caught in a meadow near a stream. She was a fairly typical specimen, black ground colour, with rather narrow yellow stripes. She passed last winter in company with a number of other specimens, whose coloration was especially rich in yellow.

This spring the salamanders were all put in a large, open terrarium. On May 10 he noticed that the female was giving birth to young. The next day he caught up the tadpoles, and found to his astonishment that of sixteen, four were albinos. They were taken home and placed in a shallow aquarium. The female also was taken back and placed in a glass aquarium containing 1-in. of water, and a flat stone, part of which just rose above the water surface.

On this stone the female took up her position. On May 12 two normal larvæ were born, on the 13th one albino and two normal, and on the 18th two more albinos and eight normal tadpoles, making a total of seven albinos and twenty-four normal specimens.

A number of the larvæ were of low vitality, and would not feed. These, now dead, have been preserved, and include three albinos. At birth the albinos were just over 1-in. long, and were of a white colour, with a golden tinge in the skin. The sclera of the eye is brown, with golden spots, and the pupil is white with a reddish reflection.

On June 4 the four albinos had an average length of nearly 1½-in., which was appreciably larger than the normal specimens. The lucky owner is, of course, anxious to metamorphose and eventually breed from his extremely unusual salamanders.

L. C. MANDEVILLE.

Astilbes for the Waterside

(*Continued from page* 99.)

where there is plenty of moisture available. Another point to remember is the provision of an early spring top-dressing of well-rotted manure or leafmould, which will act as both a food and a mulch to conserve moisture.

Propagation is best effected by division of the fibrous roots in early spring; although, provided the clumps are flowering well, they should be left undisturbed for as long as possible. Sometimes, if you examine the plants after the foliage has died down in autumn, you will notice one or two rooted offsets growing on the outside of the clump. These can be removed and replanted, when, by the following year, they will have made good plants.

Although a well-prepared bed will support a group of Astilbes for many years, there comes a time when the old clumps will have to be lifted, divided and replanted either in a fresh spot, or after the old rooting medium has been enriched by a liberal dressing of old manure or a sprinkling of bone meal. Early spring is the best time for this.

* * *

QUERY SERVICE. — Although Readers' Queries have been squeezed out of the paper recently, they are still being answered by post. Whenever possible, we shall continue to publish a selection of those of general interest. The charge for this service is sixpence, and all queries are answered by post, whether published or not.

Concerning Anolis Lizards

By JOHN ARMITAGE

IN the great family of pleurodont lizards known as the *Iguanidæ*, the genus Anolis is an important member. Anolis lizards are slender and long-tailed reptiles occurring in tropical and sub-tropical America, including the West Indian Islands. They are chiefly arboreal and are distinguished by the partial dilation of the middle phalanges, which carry a series of transverse adhesive *lamellæ*. Males possess a large gular appendage, which, under excitement, can be distended by the hyoid bones so that, in some species, the suddenly inflated sac resembles the gorgeous petal of a flower, bright yellow, orange, or scarlet.

Some eighty different kinds are listed for the Antilles alone; but no two authorities are in agreement about certain forms. Two, with distinctive characteristics at extreme points of an island, such as Cuba or Haiti, may show intermediate variation and actually blend into one form in certain areas, so that one can never be sure which are recognized species and which are varieties.

Anolis lizards are extremely active and playful creatures, leaping among tree branches, trellis work, and house walls with amazing agility, and they feed upon insects. I have been assured by observant West Indians that they will nibble at ripe fruit and lick the sweet juice; and on several occasions I was told that the lizards would eat breadcrumbs, although actual proof was lacking.

At one time, *Anolis carolinensis* of the south-eastern States was offered for sale in great numbers in U.S.A., and later *Anolis porcatus* was added from Cuba and the Isle of Pines, both kinds being popularly known as chameleon lizards on account of their ability to change colour rapidly. Some live specimens have reached the continent of Europe, where experts have succeeded in keeping them alive and breeding from them.

Of the several species inhabiting Jamaica, the Venus lizard (*A. garmani*) is the most delightful. It is a large woodland form of wide distribution, bright green in colour with an orange-tinted gular appendage. It will assume a barred appearance and then turn quite dusky. An elegant form with a pearly underside (*A. opalinus*) is much more local and mainly confined to the extreme west of the island; but two others (*A. iodurus* and *A. grahami*) are quite common in most parts. I never tired of watching their playful antics and extraordinary colour changes. As some were desired for the British Museum, I tried noosing them, but with little success; and coloured urchins came to my aid, simply by making a grab with lightning-like rapidity.

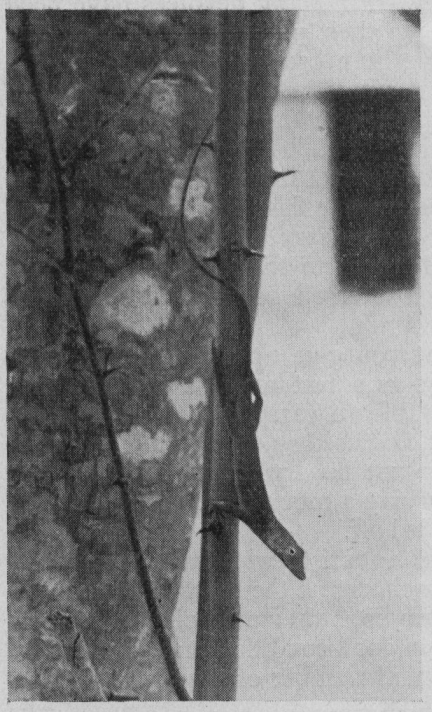


Photo John Armitage, A.R.P.S.
Venus Lizard

The Zebra Anolis or Fence Lizard (*A. lineatopus*) is confined to the dry Liguanea Plain about Kingston. Although so local, it is quite common on the fringe of the town, and particularly in Hope Gardens. Resting on a fence or among dead herbage, the pale buff lizard, strongly barred with brown, blends admirably with its surroundings. Among sunflecked green vegetation, however, it is readily seen; and my illustration—secured in Jamaica's largest park, shows the lizard in such a situation, in a typical attitude, with head raised, ready to snap up an unsuspecting insect.

Photo John Armitage, A.R.P.S.
Jamaican Zebra Lizard

* * *

MORE SCHOOL AQUARIUM EXPERIENCES

(*Continued from previous page*)

Minnows, and Sticklebacks. The small troughs contain cultures of such creatures as Hydra, which are used for lessons.

I hope that this article may present useful ideas to those who are concerned with the teaching of biology in schools. It is most important, however, to keep all live stock in a separate room from the main laboratory, for two reasons. First, the presence of fish swimming about in tanks is a bad distraction from lessons, and, secondly, in the open laboratory they stand a risk of interference by well-meaning, but often clumsy, pupils, who enjoy putting the tadpoles in with the Sea Anemones, and other similar diversions.

future pond in mind; our digger observed, " two birds with one stone, sand bags come out, and some day a nice bit of cement, and all's ready for fish to go in." The French frogs, which we thought had died in the frosty weather, have, alas! left many representatives to carry on the spring croaking. They were, however, much less noisy this season. Watching the ponds as we do and removing the spawn to serve as a feast for the Terrapins, we are mystified by the frog population—it should not be there at all! We suspect an evacuation from the carefully stocked ponds of our friends to the wider stretches of our water garden.

Looking back on flowers of outstanding merit this season, *Iris kæmpferi* was the star performer—it always seems too good to be true. The common " rose bay " willow herb also made a fine show. I really think that if your gardener can be squared, this plant and its paler friend, " hemp agrimony," should be planted in masses wherever there is water. The common yellow loosestrife is another lovely plant. We had a most successful group of Astilbes, deep crimson, white, and a brighter red. I must do more of this, and wish the dogs had not chewed up the labels of the new red. I am wondering if there will be a call for the many surplus *Nuphar lutea* roots, which pervade a corner of the large pond. They have, I believe, a war-time use, but whether it is as flour or munitions I know not; I also have no idea of the recipe for converting said roots into the required substance. Thrown with force, they would do considerable damage in their natural state, as they attain an enormous size!

I hope next year to remove several of the border plants to one of the bog gardens. *Acanthus,* Plume Poppy, and some of the Michaelmas Daisies will do well there and will give colour at the appropriate season. I shall also plant more and more irises in every spare corner of the water garden. They fit into the landscape so well and always look just right.

The Fire-Mouth Cichlid

(*Cichlasoma meeki*)

By LOUIS C. MANDEVILLE

IT is likely that there will not be any further importations of tropicals for some considerable time, so it is all the more pleasing that the last cans received just before the war included some especially interesting and colourful fishes, among them *Cichlasoma meeki,* which, though it has been previously imported in small numbers, has never been very plentiful.

This species has the typical Cichlid shape and large mouth. Fully grown specimens are about four or more inches long, but those imported were quite small, though they feed heavily and grow rapidly. The ground colour is a typical bluish-green with five black bars and a black line along the side. The centre of the body bears a spot with light edges, rather like a Jack Dempsey. At the lower edge of the gill plate is a dark green spot with a light shining border. From the mouth stretching back along the throat and abdomen the fish is a rich orange red. Mature fish up to 3-in. are quite easily sexed by the prolonged and pointed dorsal fin of the male.

Like most Cichlids, this species feeds readily, and likes a lot. Like most small Cichlids, too, they are adept at catching white spot if there is any about. While small they live peaceably with other fishes, but they are not good mixers once sexually mature.

The breeding is quite typical of the Cichlid family, but the coloration of the male is extremely striking and makes the species one of the showiest of aquarium Cichlids. The spangled blue scales about the head become intensified. The blue edging of the dorsal, and flecking of the anal, is much brighter, and accentuated by the zone in the fin immediately next to the blue border, becoming a dense black. The red of mouth and abdomen is as brilliant as a glowing coal. The female's colouring is intensified, and though very fine, is not comparable to the extreme showiness of the strutting male.

As further supplies from abroad are extremely unlikely it is to be hoped that those who have been lucky enough to obtain specimens of the Fire-Mouth Cichlid will have successful spawnings in due course, and so increase and spread our stock.

* * *

LIVE FOOD!

A very nice hedgehog made his appearance in our garden the other day, and being anxious to watch him for a few days I put him in the enclosure with my Australian Lizards. He was very active at night, naturally enough, but settled down well. I noticed he was especially " affectionately " disposed towards my Stump-tailed or Two-headed Skink (*Trachysaurus rugosus*) and when " Stumpy" had retired for the night into his drain pipe, just leaving his great fat tail outside, the hedgehog was to be seen sitting quite close by.

Imagine my surprise the next day when I saw that Stumpy had a small raw patch on his tail, looking as though it had been filed. There was some dirty work in progress. That evening I waited at dusk by the enclosure until the hedgehog appeared. After some preliminary perambulations he sat down by Stumpy's tail and proceeded to nibble it with his tiny insectivorous teeth!

Stumpy paid no attention, presumably the tail, which is chiefly a store of reserve fat, is relatively insensitive. The hedgehog, with his natural liking for fat and enmity for reptiles, no doubt was very pleased with himself, but his pleasure was cut very short.—M. G. E.

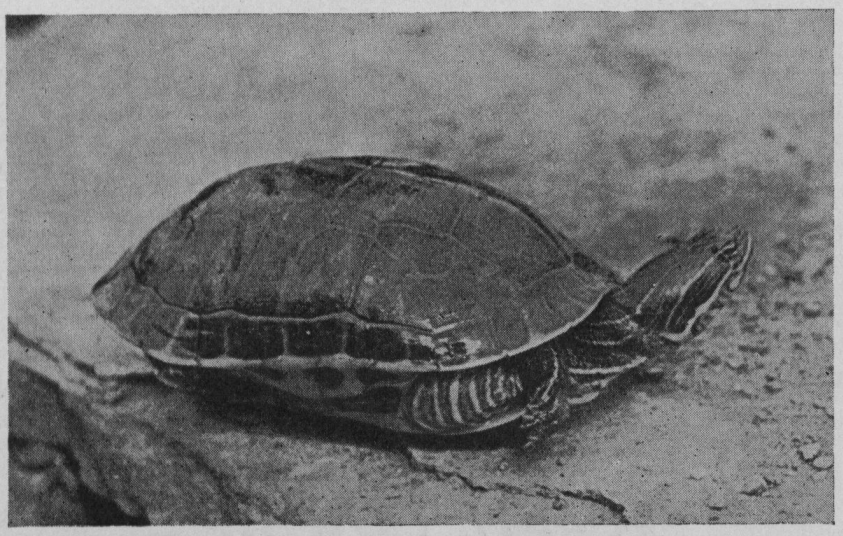
The Chicken Tortoise (*Deirochelys reticularia*)

By "AMPHIBIUS"

As the Chicken Tortoise has appeared in the lists issued by our principal dealer at least twice during the past year or two, it may be well for a few notes about it to be placed on record. The only mention of it in British literature seems to be a bald mention of its existence in Bateman's "Vivarium."

This is by no means a foolproof animal, and I would not advocate its purchase by other than persons with quite an extensive experience of the keeping of reptiles in captivity. Quite a small group of them will exhibit the most astonishing variation in temperament. Some will, after only a little coaxing, settle down nicely and thrive, while others, imported at the same time and kept under identical conditions—often, indeed, in the same tank—will steadfastly refuse all food and will sit in unmoving sullenness in a corner doing their utmost to die.

For a long time *Deirochelys* was included with the Painted and *Pseudemys* Terrapins in the genus *Chrysemys*, which is nowadays restricted entirely to the first group mentioned. The characters which separate the Chicken Tortoise from the Painted Terrapins on one hand and the *Pseudemyds* on the other are very slight in spite of the apparent distinction in shape and proportions of the species under review. Nevertheless, the establishment of the mono-specific genus *Deirochelys* seems quite justified according to modern conceptions of systematics. The Chicken Tortoise grows to a much larger size than do the Painted Terrapins, but is dwarfed by most of the adult *Pseudemyds*.



Chicken Tortoise (Deirochelys reticularia)

The species exhibits very little variation in colour, the shell being brown above with a network of thin yellow lines—hence the trivial name *reticularia*. The yellow network becomes obscure with age and the shell also tends, from being quite smooth and polished in youth, to become slightly rough and furrowed. The plastron is yellow or orange, with large black markings at the margins. Limbs, head, and neck are brown or perhaps greyish with prominent yellow lines and striping. I favour for this species the alternative name of North American Long-necked Terrapin instead of the rather foolish "Chicken Tortoise," since its most striking feature is its long neck, the length, equal to that of the entire carapace, being coupled with great flexibility and rapidity of movement. A group of these tortoises basking in the sun is very pleasing, since they all sit with their long necks fully outstretched and raised. Unfortunately, because of the extreme alertness and nervousness of the species, I have never been able to photograph them in this state, the slightest movement within range of their sharp eyes being enough to send them instantaneously scuttling to the bottom of their pond.

In the water their movements are elegant, swift, and graceful, but on land they are prone to shuffle about clumsily and seem reluctant to move their extremities any further from the shelter of their shells than is absolutely necessary for minimal locomotion. No doubt they walk quite well when at their ease, but so far they've always proved sharper than I when I've set out to observe them without being observed.

As regards their treatment, difficulty number one arises in relation to food. American books describe them as eating the "usual" terrapin food, *i.e.*, insect larvæ, fish, worms, etc., and plants. So far the only direct evidence I have met of herbivorous tendencies in this species is the note in WATER LIFE some months ago stating that the writer's Chicken Terrapin would eat only duckweed. All mine are and have been confirmed carnivores, and from an initial diet of earthworms and infant mice could fairly readily be persuaded to take chopped meat and fish. I keep mine in an aquarium in a greenhouse for the first few months after their arrival in this country, and they thrive on meat and fish to such an extent that their nervousness is soon overcome and every approach to the tank elicits a scuttle of anticipation. Nevertheless, they seem never to get really tame and always resent being handled.

After one is satisfied they are feeding well, Chicken Tortoises may be put outdoors, and under such conditions, given fine weather, they may be seen at their best. It is, however, difficult to ensure that they get enough to eat since they will not, unlike almost all other terrapins, present themselves once a day to be hand-fed. They can sometimes be seen at feeding times hovering in the background, but not breaking surface, and will then eagerly snap up any bits of food that the

first line of clamouring creatures fails to retrieve. They seem not to lose weight while outdoors, so I presume they get enough.

Hibernation is a very difficult question. I put six well-grown and fat females in a small shed full of bracken for their first winter here and only one survived. The next winter I put a further six—also females—in the same shed, but they had spent one and a half summers outdoors and a winter in a greenhouse. In this case only one died during actual hibernation, although two subsequently got pneumonia during the May frosts which occurred that year. As they stand the winter perfectly well in heated quarters, it seems best to take them in when autumn's getting under way, and this is the procedure I now adopt.

The eggs of the Chicken Tortoise are like those of a pigeon. I have had odd ones laid on several occasions, but always in the water except once, and on that occasion the egg was broken when I found it.

Deirochelys is, among tortoises, one of the least tolerant of concrete, and their pond must be perfectly smooth and coated with a suitable bituminous preparation. On raw concrete they are liable to develop ulcers on the plastron, which may spread to such an extent that the animal dies. The condition is not difficult to cure during its early stages, it being only necessary to remove the diseased creature to an aquarium of warm water, the latter being changed every day. If well fed the animal soon repairs the damaged tissues. I consider euthanasia to be the kindest thing if the condition is at all advanced when first discovered.

The species is very susceptible to pulmonary complaints, and one frost while the animal is unprotected (*i.e.*, not in the water or in a suitable shelter), almost invariably causes pneumonia. Chances of a cure, if the animal is at once removed to warm and draught-proof quarters, are about even. Signs of pneumonia are difficult and audible breathing, extension of the neck and hyoid apparatus and, later, the appearance of mucus or froth at the corner of the mouth and the nostrils.

To bring this rather melancholy relation of potential destroyers of Chicken Tortoises to a close, I must mention that they occasionally suffer from a most peculiar disease of the carapace and plastron, in which whole shields peel off, leaving the underlying bone patent, but apparently quite healthy. The peeling is progressive, and so far I have been unable to relieve, let alone cure, the condition. There is an unpleasant odour emanating from the animals suffering from this complaint—evidence of diseased or neurotic connective tissue between shields and bone, but I cannot give any hint of its cause or pathology. Healthy and vigorous animals are not affected so far as my observations go, so the disease is probably more deeply seated than its superficial manifestations lead one to believe. Here, again, I recommend euthanasia.

As with lots of other tortoises, males are much scarcer than females, and until this year, when I succeeded in getting two, all of mine belong or have belonged to the latter sex. The two males were small and had flatter heads and shells than the females, and the yellow colour of the stripes and plastron of the latter was replaced by a brilliant orange in the males. The claws were not unduly long and the tails were, in proportion, only very little larger than those of the females. Both died soon after their arrival in this country, one from pneumonia and the other from the carapace disease that I have already mentioned. The example in the picture is a half-grown female. The largest specimen in my collection had a shell measuring 11-in. and is now, alas, represented only by it!

I cannot give offhand the precise distribution of the Chicken Tortoise. It is confined to the most south-eastern states of U.S.A.. being most commonly found in Florida, but how far north and west it goes before petering out I cannot just remember.

Keep Going

WE are sorry to hear of so many aquarium clubs deciding to cancel their programmes indefinitely. While we agree that meetings on a large scale are definitely contra-indicated, we think that every effort should be made for small groups to keep in close touch with one another and that the various societies should be to all intents and purposes carrying on their activities on a reduced scale.

We must not let the present excellent organizations slip out of our hands, for we may find that later much of our experience has gone, too. The hobby did not reach its pre-war stage of development in a day or two, and every effort should be made to preserve all existing organizations, so that they may return to full activity immediately normality returns. It is particularly to be regretted that the present unpleasant events have occurred just as the Federation of British Aquatic Societies was getting under way.

In safe areas small meetings of enthusiasts should continue to be held, and we especially hope that small shows for specialist breeders will be arranged by enthusiastic secretaries, so that the present upward trend in fancy goldfish and Guppy stocks may be firmly maintained.

The present dark nights bring many of us in much closer and lengthier contact with our creatures, owing to the restriction of our other activities, and interest in the aquarium is likely to be considerably increased. Fellow club members will have much to tell one another and may be able to assist one another considerably. Small groups meeting in one another's houses in town have many happy hours before them, and this type of meeting has everything to recommend it during the present times. Carry on, aquarists!

[An interesting letter on this subject from Mr. E. F. Evans appears in "Aquatic Opinion" this week.]

A Useful Vivarium

By L. C. MANDEVILLE

IT is essential that every bit of space in the aquiary be used, so that heating and maintenance costs may be as economical as possible. The space on the floor, between the supports of the aquarium shelves is usually wasted or at the most a dump for all kinds of junk. Such space can with a little adaptation be used for housing many kinds of half-hardy creatures, and in the cool aquiary, hibernating creatures during the winter months, and at the same time the resulting compartments can be made pleasant to look upon. Such compartments should, of course, be reasonably draught-proof and also, where active creatures are to be kept, escape-proof.

The two accompanying illustrations show the adaptation of one of a series of three spaces. The dimensions are approximately 3-ft. 6-in. by 2-ft. This particular enclosure is used for amphibians, so the first task was to make a small pond in which the creatures can immerse themselves and move about reasonably well. The pool was made by raising a continuous wall of small flat pieces of garden stone cemented together. The depth about 4-in. and the diameter about 1-ft. By shelving the pieces of stone, suitable landing-places and shallows are easily arranged. Where the fish-house floor is of concrete, such a pond can be made straight on to the floor, which should be previously well wetted. On a boarded or other floor the pond may be separately constructed on a piece of slate, plate glass, or asbestos cement sheet. The latter should have a layer of half an inch of cement mixture over it, otherwise the pond is not likely to prove absolutely watertight.

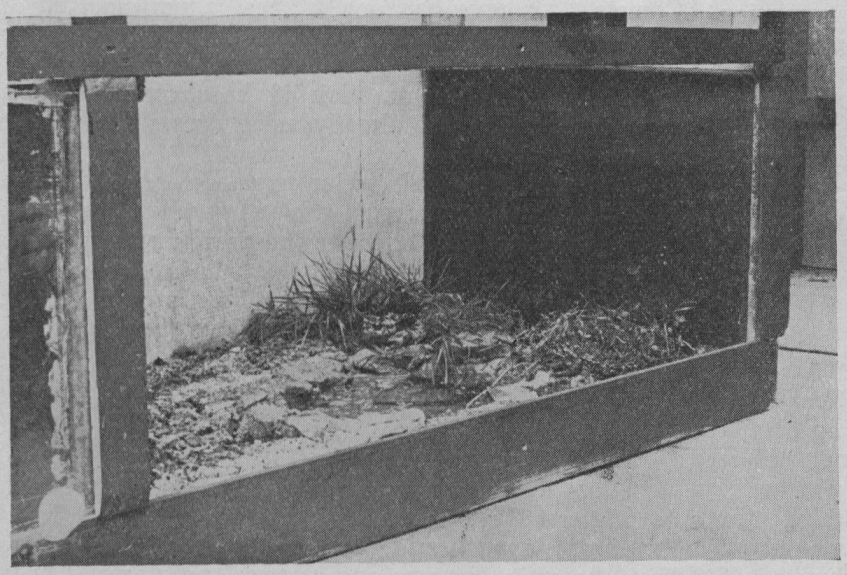
"Building" the Pond.

The walls of the house in the illustration are lined with asbestos cement sheeting, so only the sides and front needed special preparation. The sides, too, might be made of asbestos, but actually sheets of second-hand greenhouse glass were used, these being held in position by laths tacked to the bench supports. The front called for a little more thought, as an all-glass front continuing down to floor level was likely to be frequently broken. Instead a 4-in. plank was fixed along the bottom and the glass mounted on top of this. Careless boots then strike wood and not fragile glass. The top edge of the glass all the way round was also protected by strips of 2-in. wood, which also serve to support covers if such are needed.

Sand and earth flooring the vivarium are likely to work out through the crack between the bottom board or sides and the floor. To prevent this, a small mound of cement was built up all along the inside. Now, after painting and other small items of finish, all that remains to do is to floor the vivarium with sand and loam or earth and arrange suitable plants.

By the way, to keep the pond clean, have it surrounded by grass or other tight, low-growing plants, then the animals passing through this on the way to the water will be cleaned of all adherent sand, etc., and will not muddy the water.

The effect of keeping all the creatures "under one roof," as it were, is not only to reduce the cost of maintaining them, but to improve the general appearance very considerably.



The Finished Vivarium.

IT has been a disappointment to us, as it must have been to other aquarists, to hear of so many clubs suspending their activities on account of the war. We do not suggest that they have done so without good reason, or that these clubs could, in the present circumstances, have carried on normally; we do, however, suggest that it is of vital importance that we should use all our energies to preserve the communal basis of fishkeeping which the clubs have built up in the past. If we are to do this we must have some means of personal contact with fellow-aquarists, even if the best we can do is to have a half-hour talk with the fellow down the road. Vast meetings are neither practicable nor desirable, but in almost every neighbourhood a few aquarists are to be found who will be able to meet every now and then and discuss aquatic matters.

. . . . . .

If you have been evacuated, try to discover other aquarists in your new district. If you care to, you can write to WATER LIFE and we will insert a notice in the paper asking people in your district to communicate with you. We must remember that the number of aquarists is not so much diminished as scattered about the country; this means that we now have fresh people to talk to and fresh ideas to discuss. It is up to us all, therefore, to find other aquarists and to do what we can to arrange informal meetings.

. . . . . .

There are already signs that the hobby is beginning to look up. Visits to the trade in London and the suburbs has shown us that a little more business is being done, and although it would be absurd to pretend that business is good, it is certainly better than it was in the opening weeks of the war. This is no doubt due to the fact that life is settling down to more normal conditions, but it may also be due to a realization that fishkeeping can be an extremely economical hobby, in which the yield of pleasure and satisfaction is out of all proportion with the expense. In view of the increasing cost of other things, this may well be a reason to recommend the hobby.

. . . . . .

Talking of recommending the hobby, we are rather surprised at the apparent lack of enterprise on the part of the trade. While other people are seizing every opportunity to recommend their particular wares—books for the "black-out," brighten your "black-out" with pictures, games for the dark evenings—we expected to see aquarium dealers' shops blazing with brightly coloured posters recommending the ideal hobby for the long, black evenings; economical, fascinating, easy, attractive, unusual, there is no end to the things which we could say about our hobby to recommend it to the public. As far as we have observed, there seems to have been no attempt to seize the opportunity of getting a little trade back. However, the trade is carrying on under very difficult conditions, and it is not our intention to try to tell them how to run their businesses.

* * *

A USEFUL VIVARIUM

In relation to the article on "A Useful Vivarium," which appeared in the issue of WATER LIFE for October 10, the advantages of a wooden floor over the concrete have been pointed out to me by "Amphibius," and I am in complete agreement with him. Unless a concrete floor has a very thick layer of heavy earth upon it, it is likely to strike through very cold to any animals resting thereon, and they may suffer from chilling. A floor of thin matchboarding on 2-in. battens is all that could be desired, while in a dry vivarium just a sheet of plywood resting on battens or small bricks will be enough. Such an extra floor could be quite easily built around any pool in the vivarium. As "Amphibius" has previously pointed out, tortoises should never be kept directly on concrete as damage to the shell is almost certain to occur, especially in some species.—L. C. MANDEVILLE.

* * *

AUTUMN IN THE AQUARIUM

Now that the amount of daylight is considerably reduced, it is necessary to take care to see that the plants are not decaying. A certain amount of dying down is inevitable, and any parts so affected must be removed before they foul the water. It is a good idea to remove floating plants, as by doing so you will considerably increase the amount of light which penetrates to the submerged ones.

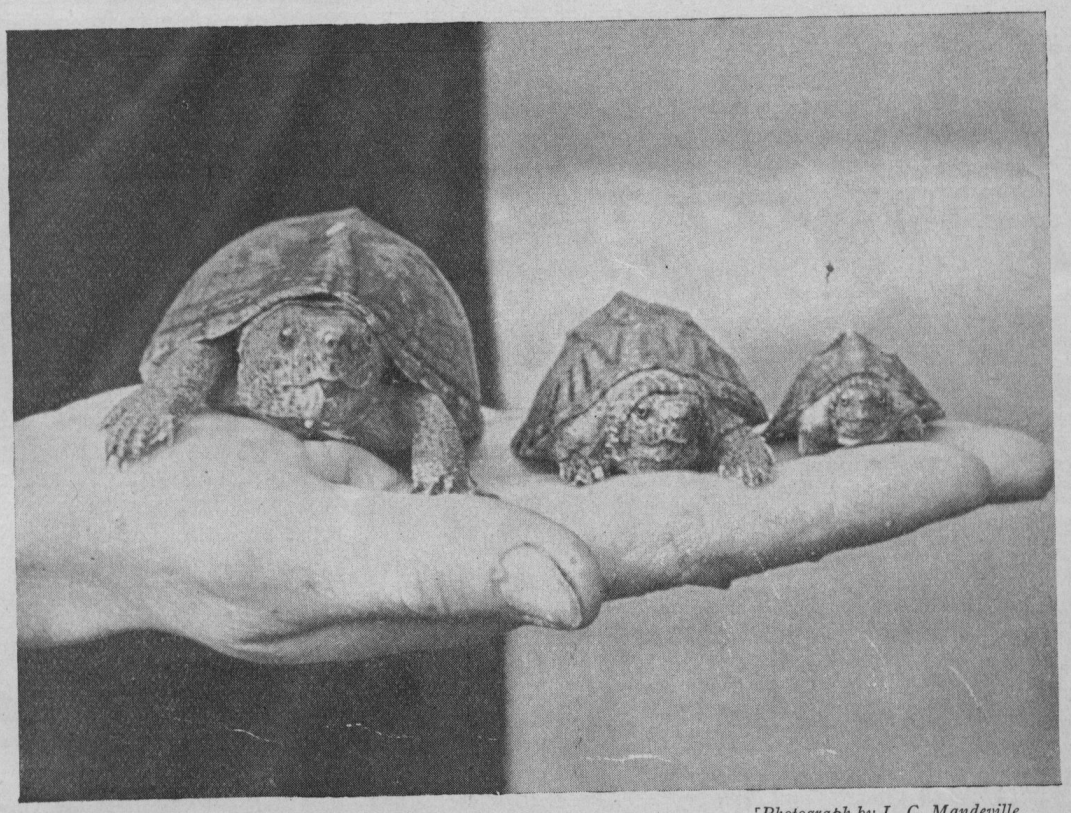
* * *

COLOURED LAMPS

Coloured lamps can be used for illuminating aquariums with excellent effect, but in case anyone should be tempted to try to combine lighting with heating by immersing the bulbs in water, it should be remembered that some bulbs are painted and not "dyed in the glass." The result is disastrous. The paint comes off in the water and poisons the fish. Only the best quality bulbs should be used, and should be well washed before use.

Stinking Jenny

By "AMPHIBIUS"



[Photograph by L. C. Mandeville

IN America the name of "Stinkpots" or "Stinkpot Terrapins" is given almost indiscriminately to members of the two genera *Sternothærus* and *Kinosternon* (formerly *Aromochelys* and *Cinosternum*). They have achieved this slightly unpleasant label by reason of their possessing glands secreting musk, a perfume which was, and I believe still is, much sought after by women. These little terrapins are not a commercial source of the substance, however, one is glad to say. I have never been aware of the smell, and should not know it positively were I to smell it, but, as my friends very kindly point out, lack of a sense of smell is among the least important of my personal deficiencies. Hence a problem which might prevent some people keeping these animals does not arise in my case. I might say, however, that persons to whom I have addressed quite anxious appeals have also been unable to report any unpleasant olfactory reactions after handling the little beasts. The truth probably is, since the profuse manifestation of the scent is described as a means of defence against enemies, that the creatures are so accustomed to being handled, etc., by the time they reach us that they have ceased to employ it.

It would be more dignified to refer to Stinking Jenny by its proper name of Carinated Musk Terrapin, and the species is the least unattractive of a genus which cannot be said to have much in its favour from our point of view. I do not think any member of the genus *Sternothærus* will ever achieve even mild popularity as a pet: they lose by comparison with other tortoises on almost every count. They are neither active nor graceful swimmers, preferring instead to creep about on the bottom of their pool or tank, and in shape they are very ungainly once extreme youth is passed. They develop a head so large that once it is withdrawn one wonders what must happen to the rest of the creature's organs, and the enormous head, furthermore, is carried on a long neck of extreme thinness. It is possible to distinguish males from females from extreme youth onwards. The tail in the former is very long and thick and is carried curled on one side, while in the females the tale is very reduced and sharply pointed.

Among characters in their favour may be stated their relative hardiness, the great ease with which babies can be reared, and the very ripe old age which examples will attain in captivity.

Dr. Ditmars states in one of his books that the tortoises in this group will live happily in a tank of quite deep water and that they do not require landing facilities. This is no doubt perfectly correct in the case of Dr. Ditmars' examples, but my own experience, which embraces the majority of species in the group, shows to my complete satisfaction that they all appreciate shallow water, adequate landing and basking facilities, and a cave under the water to which they can retire at will. They are not particular about temperature, require no artificial heat if in tanks during the summer months and only such as is available in a constantly heated living room during the winter. Alternatively, I have kept them outdoors in an aquarium during the summer and left them to hibernate in it on an open loggia facing south.

The baby Jennies are most delightful little things of pink, silver, and brown. They quickly become sufficiently tame to gallop up and feed on chopped mealworms, earthworms, and meat from one's fingers. I would say, without hesitation, that members of this group have babies which are the easiest of all tortoises to rear in captivity.

As regards temperament, I fear that these terrapins are possessed of an independence of spirit quite out of all proportion to their size. This is the most euphemistic manner in which I can convey that they bite whenever they can, sometimes each other or other kinds of

tortoise, but always as opportunity presents itself, their fosterer. They most actively resent being handled and make darting sallies at imprisoning fingers with a pair of extremely competent jaws. Personally, I do not object to such a spirit, but persons feeling otherwise, by refraining from handling them, run no risk of getting a bite.

Small ones are, of course, quite harmless and can be kept with any other baby tortoises, but great care must be taken to see that they can get to the top of the water to breathe. Vigorously swimming terrapins will quite inadvertently brush these creeping terrapins to the bottom of the tank, and I have on two occasions known the unfortunate little creatures to be drowned by such means.

As they grow up they should be thinned out and ultimately be kept in pairs. Even so, there should be sufficient rocks in the tank to provide shelter, as at times the males pursue the females quite relentlessly and may inflict wounds which are not easy to heal. They should not be trusted with terrapins of other kinds. A species of *Kinosternon* recently attacked in a tank a species of *Pseudemys* forty-eight times its own weight! It seized her hind foot and I had considerable difficulty in causing it to let go without doing it an injury.

If let out in the garden—which they like, of course—I would recommend that they be kept under constant observation, for, in spite of their awkward build, they can scuttle away like a beetle, and they look so like a lump of dirt that searching for an escapee is a long and exasperating job. Chiefly because of the incompatibility of temperament to which I have already alluded, I have not been able to keep them in outdoor enclosures over long periods, but three spent this summer in a pond quite happily, emerging to bask on the bank whenever the sun shone.

All the members of the family seem to me to be most strictly carnivorous, and they are not at all particular about the quality of their food.

Stinking Jenny is *Sternothærus carinatus* and comes from the south-eastern corner of the United States. The picture shows a fully-grown male—*i.e.*, one with a shell 4-in. in length—next a female about half grown, and, lastly, a baby rising one year old.

* * *

To return to the Chicken Tortoise about which I recent wrote a note, I find on looking it up that its range is all the territory south and east of a line drawn from halfway up the coast of North Carolina to Oklahoma in the west and the Texas coast in the south.

Aquatic · Opinion

Nothing is more helpful and invigorating for a hobby than free discussion. We invite aquarists to write to us, giving their views on all matters of current interest to fellow-aquarists. A selection will be published each week under this heading. The Editor does not accept responsibility for the opinions stated by readers.

A HOME FOR YOUR FISH

I have heard of several cases in my district alone where aquarists have been forced to give up their aquariums owing to present conditions, and who have destroyed their fish. That this is a very great pity cannot be too strongly emphasized, and it has occurred to me that there must be many hospitals, schools, and other institutions which would be glad to have the complete aquariums as a gift. They have proved of wonderful value both to patients and staff, and there can be few hospitals where someone cannot be found to spare the little time needed to maintain the aquariums. Although it might not be possible for schools in evacuation areas to cope with an aquarium at present, there are many in neutral areas where the gift would be greatly appreciated. I would therefore urge my fellow aquarists who are forced to give up their aquariums for the time being, to look round for someone who would appreciate and look after our finny friends. —H. E. PARRY (Birmingham).

. . . . . .

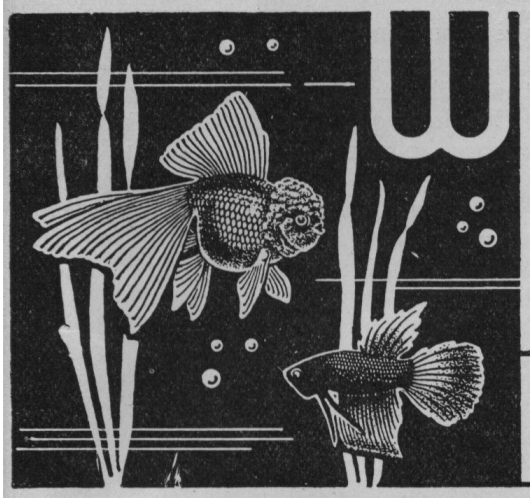
CARRYING ON

I thought it might be interesting to you to hear how some of us are carrying on in spite of somewhat difficult conditions. My firm was moved to "somewhere in the country," and my wife and I came to stay as boarders in a private house. Of course, this meant that the aquarium and the pond would both have to be left. The aquarium was given to a friend "for the duration," and the pond was left to its fate. For the first few days down here we were so busy settling in that we hardly missed the fish at all. After a bit, however, we began to find time hanging heavily on our hands, and so we began to wonder what we could do about a bit of fishkeeping. It was quite obvious that we could not keep an aquarium in our digs, so we made a few inquiries to see whether we could find any other aquarists. The local pet-shop keeper put us in touch with three very keen local aquarists, and since then we have had no lack of friends with whom we can talk fish. We meet once a week in one of the local hostelries, and have most interesting discussions, and next week we are to have an informal lecture by one of our "members." These meetings are extremely enjoyable, and I can thoroughly recommend other evacuated aquarists to make similar arrangements. —E. P. HARRISON (late of S.W.5).

. . . . . .

THE MATING OF DRAGON-FLIES

I read with disgust the article in this week's WATER LIFE on the mating of Dragon-flies. I fully realize that when dealing with scientific subjects a certain amount of licence must be granted, but I consider that the article in question transgressed all the bounds of decency. I shall certainly cease to subscribe to your paper if this sort of thing is repeated. — (Miss) D. JENKINS (Liverpool).



WATER LIFE

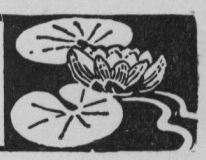
INCORPORATING AQUARIA NEWS

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

VOL. VII. No. 177. OCTOBER 24, 1939.

Offices: 7, Milford Lane, Strand London, W.C.2. Temple Bar 9361-2-3

SUBSCRIPTION RATES: 15/- per annum, 7/6 for six months, 3/9 for three months for the British Isles, or places abroad



The Ringed Snake (*Tropodonotus natrix*)

By ALFRED H. SCULTHORPE

ALL that is required to provide for our attractive Ringed Snake is sufficient interest and enthusiasm to hunt out the reptile in its natural habitat, and to note and collect samples of the vegetation, soil, and so on, that can be found in the immediate vicinity. The scenic effects obtainable in a vivarium or enclosure are limited only by the space available, individual taste, and ingenuity.

I think the two most important points to consider, to ensure the comfort and well-being of captive snakes, which, after all, are necessary if their health is to be maintained, are: (1) plenty of sunshine, and (2) access to water. Incidentally, in closed vivaria sufficient ventilation must be provided, for obvious reasons.

T. natrix is essentially a moisture-loving snake, and can usually be found on the sunny banks of forest ponds and ditches, around rivers and reservoirs, or basking among warm, damp, bracken in woodland clearings. Its food consists mainly of Batrachians, with the possible exception of the toad (*Bufo vulgaris*), but the common frog (*Rana temporaria*) is the food, *par excellence*. Snakes in my possession have often partaken of live minnows and bleak, which I slipped into their pool, with apparent relish. Their speed and agility during the process of capturing them is truly amazing.

In common with most other ophidians, the Ringed Snake is capable of holding its breath, and remaining submerged for a considerable time without any apparent discomfort. This faculty is a distinct advantage when the snake is hunting for fish, and is brought into use with startling success when the creature is pursued.

It may seem almost ridiculous to state that a difference of temperament may be found to exist between one Ringed Snake and another, but, imaginative as it may first appear, my experiences with these creatures in captivity have convinced me beyond doubt that such is the case. I have caught and kept specimens that have taken but a few weeks to become quite tame and resigned to close confinement and frequent handling. Other specimens have proved to be literally the reverse, remaining untractable and nervous throughout a whole season. Generally speaking, large females are the best for captivity, accepting food readily, and quickly becoming docile.

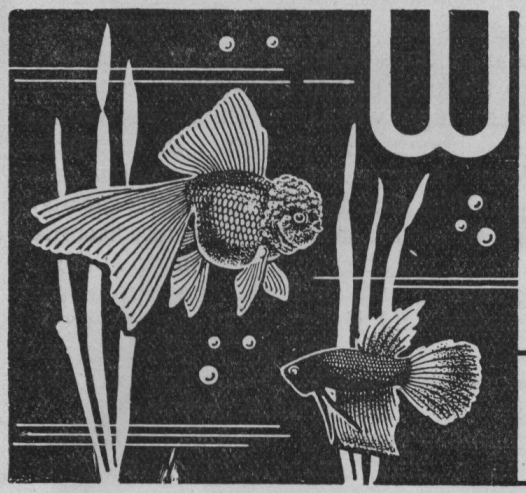
Feeding becomes somewhat of a problem during hot, dry summers, when frogs are difficult to obtain; not that the last few should have presented any difficulty in that respect. They can, however, sometimes be tempted to accept sprats and dead mice, especially if they are wriggled about in the vivarium with the fingers or a pair of tweezers to simulate life.

A few years ago I watched a 3-ft. female, in my snake case, with a head measurement of about $1\frac{3}{4}$-in., completely dispose of a fully grown dead sparrow! This amazing accomplishment shows the extent to which a snake can temporarily dislocate and distend its jaws to swallow large prey. It can be appreciated that the digestive juices must be of an exceptional character to dissolve uncrushed, whole bones.

The method of drinking, too, is very interesting, the head being held parallel with the surface of the water, and then gently lowered until the mouth is just covered. The sides of the upper jaw are then extended outwards, and rhythmically moved up and down, sucking the water through the sides of the mouth.

It is not an uncommon occurrence for Ringed Snakes to breed in captivity, if the conditions are suitable. Pairing usually takes place in spring, and both sexes are slightly more alert and nervous at this time, showing resentment to interference by giving vent to loud hisses, and struggling when handled. I have observed that the actual mating generally occurs during the earlier hours of a bright and sunny morning.

Eggs are subsequently laid some weeks later in a single batch which rather resembles a bunch of white grapes, each egg adhering to the others where they touch after being laid. They immediately begin to absorb moisture from their surroundings, and swell from an inch to about one and a quarter inches, the soft parchment-like shell allowing for this increase in size. The



WATER LIFE

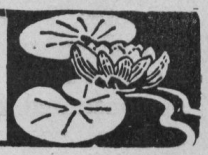
INCORPORATING AQUARIA NEWS

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

VOL. VII. No. 178. OCTOBER 31, 1939.

Offices: 7, Milford Lane, Strand London, W.C.2. Temple Bar 9361-2-3

SUBSCRIPTION RATES: 15/- per annum, 7/6 for six months, 3/9 for three months for the British Isles, or places abroad



Tropical Plants for the Terrarium

By "AMPHIBIUS"

THE association between plants and animals in captivity has been brought to a very considerable degree of perfection by the aquarist of to-day, and although such an association, combining as it does beauty and utility, is always present in the mind of the terrariophile, I fear that we must confess to lagging far behind the aquarist in the degree of success that we have achieved. This is not altogether our fault for, in the first place, the necessity to "balance" chemically our tanks or cases does not arise, so the utilitarian stimulus is absent: then we are concerned with animals whose size, weight, and activity are of such a nature that the employment of the vast majority of cultivated tropical plants is at once ruled out. Most important of all is the fact that bottom heating of tanks results either in the withering and death of plants, or at least in their failure to thrive.

The amateur possessing a greenhouse, however small, enjoys a decisive advantage over one whose cases are, so to speak, self-contained, for not only is it far easier to maintain the requisite conditions of temperature and humidity, but there can also be cultivated the main stock of plants whose offsets, bulbils, or seedlings provide a permanent supply for the furnishing of the actual cases, as well as constituting an interesting framework for the last.

Of the interest inherent in the plants themselves, I need say little, except that it is an interest which grows with experience of them. Vanilla is much more interesting when one finds that it is a graceful climbing plant with beautiful flowers and not only a dark brown fluid in a bottle. Many other commodities from the kitchen, such as arrowroot, ginger, pineapples, to name a few, are products of plants which are decorative, interesting, and suitable for our purpose. Odd as many of the plants are and distant though their homes may be, many of them are relatives (opulent ones, shall we say?) of native plants with which we are all familiar. The candle plant and succulent palm are both relatives of the daisy; the sempervivums of the curious œoniums from the Canary Islands and the south borders of the Mediterranean, and, after all, Morning Glory, for all its beauty of colour and abundance of flower, is only a bindweed, in warmer countries every bit as much a pest to the gardener as is here our native convolvulus.

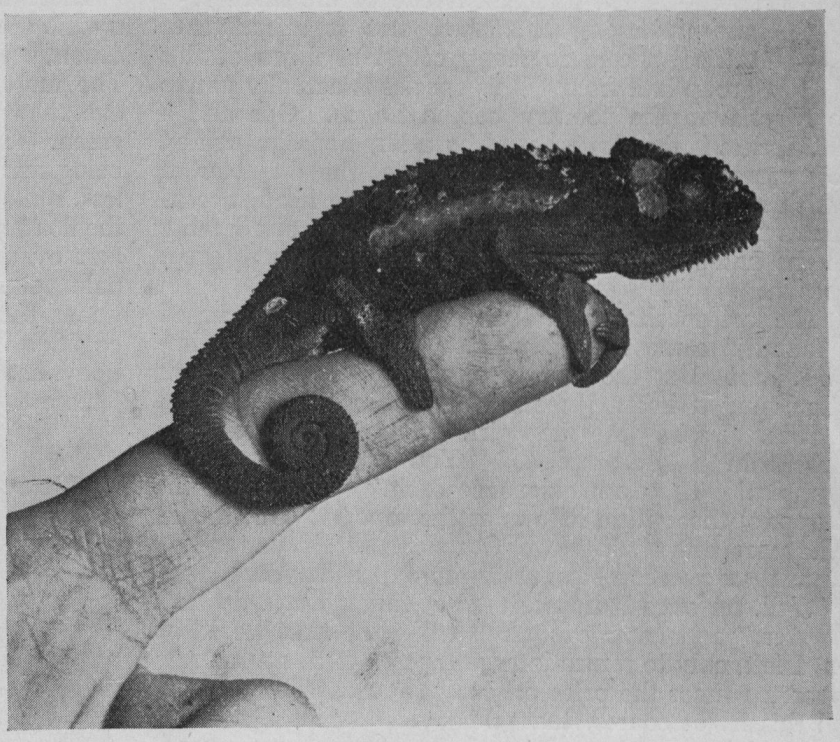
The plants of which I shall write are chiefly what horticulturists call "stove" plants, but as a stove house is one whose winter temperature is maintained at 65 degs. F. only, it is clear that temperature is no barrier to their successful cultivation. A temperature of 65 degs. F. is uncomfortably low for most of the reptiles we keep in activity during the winter. Space is a factor to be considered, and here I fear difficulties do arise, for, under optimum conditions, many of the plants grow with remarkable rapidity and to a most embarrassing size. They push off, with cheerful vigour, the lids of the cases in which they are growing, and one has frequently to uproot and replace them either from a ready reserve or with their own offsets or cuttings. I do not aim, with many of the plants, at getting flowers. It seems rather difficult to achieve the correct cycle of temperature and humidity which is necessary to bring about the consummation of the plant's existence. With cacti and many succulents, for example, it is recognized that the plants must be given a dry rest for about half the year if they are to flower, and it is obvious that a case or greenhouse cannot be given a six months' rest for the sake of the plants alone. Unquestionably the absence of flowers is partially compensated for by superb size and vigorous vegetative reproduction, and since many are what are known as "foliage" plants, the flowers are small and inconspicuous.

It would in any case be possible here only to give a very small idea of the range of plants in cultivation, since the number is literally immense, but I propose only to mention such as I can include within my own personal experience, and which I have found to be of value. My knowledge of plant systematics is very vague, I am sorry to say, so I accept the names given to plants by Kew, although these sometimes differ

Difficult Beasts—The Chameleon

By "AMPHIBIUS"

THE fact that an animal appears with fair regularity on the market, and often in considerable numbers, does not necessarily mean that it makes a good pet. Because of its peculiar habits and extraordinary appearance the Chameleon secured a hold on the public fancy last century, and has maintained it ever since. It remains, however regrettably, one of the most difficult of reptiles to maintain satisfactorily in captivity. One of the reasons for the lack of success lies in the fact that there apparently exists no good account of the habits and life-cycle of the creature in a state of nature: this in spite of its being commonly found all along the northern coast of Africa from Morocco to Egypt, and even more commonly in Palestine, Sinai, Syria, and the southern coast of Turkey. It is found on several large islands in the Eastern Mediterranean, but its distribution in Continental Europe is restricted to a band of territory bordering the banks of the Guadalquivir River, in Southern Spain. Over much of its range it lives under semi-desert conditions, but seems equally able to thrive in cultivated areas. Give it a "desert" in captivity, however, and it sits still and starves to death. The reason is probably lack of available water, since Chameleons are great drinkers. I have found during the last few years that they will thrive better if kept in a planted case in which the vegetation is well sprayed every morning. By suitably arranging the ventilation it is not difficult to provide that the whole case then dries out fairly rapidly, and remains dry for the rest of the day. The Chameleon will apply its snout to the pendant drops of water and suck them up. There do exist records of Chameleons which drank in a more "normal" way from dishes of water, but such behaviour has never come under my observation.



Dwarf Chameleon

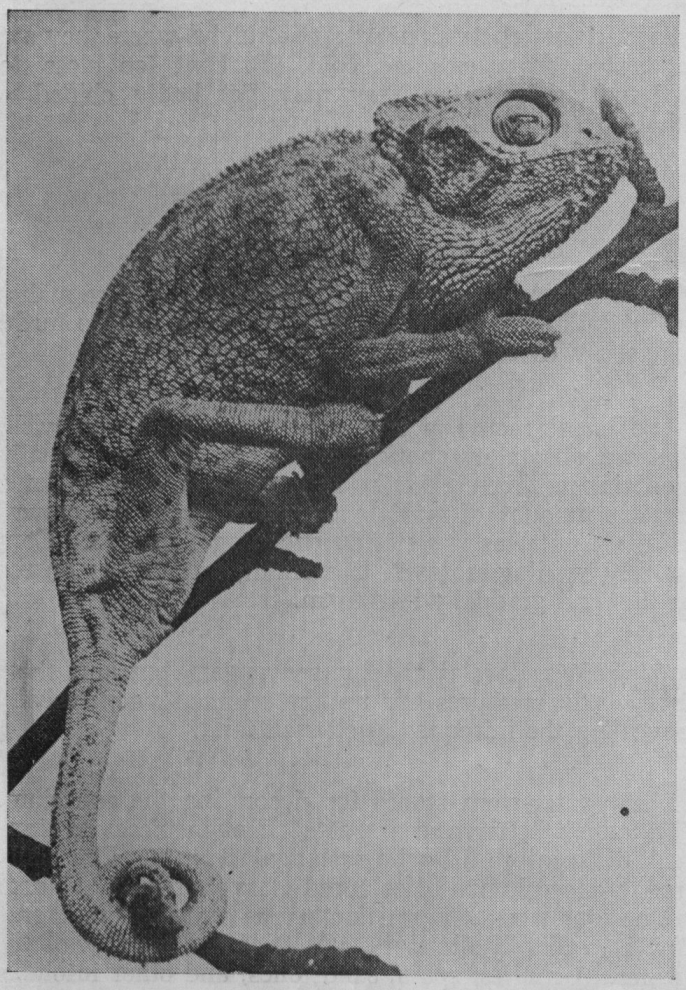
From drink to food. And here it is soon found that, unlike most lizards, which really will seize on anything moving, the Chameleon is a most conservative feeder. Its attention is quickly caught by any flying or leaping insect, and hence it is easier to keep them going with butterflies, moths, flies (other than bluebottles, see below), and above all, grasshoppers. Under pressure of extreme hunger the animals will take mealworms; but, unless these are first perforated, they pass through the Chameleon's digestive tract almost unaltered. This inability on the part of the Chameleon to deal with thick chitin is one of its peculiarities. If only it would chew its food more thoroughly, and thus break it up into segments, the digestive fluids could get at the insides; but it seems that its jaws are not strong or efficient enough. I have examined recently dead specimens, described by their owners as "excellent feeders," which had the stomach distended with masses of bluebottles and mealworms, all wholly undigested. Similarly the intestine, which should normally contain liquid or semi-liquid food, was in nearly all cases blocked at intervals by solid lumps. Emphasis should therefore be laid upon the desirability of soft-bodied animals as food. These include moths, butterflies, house-flies (not bluebottles), grasshoppers, crickets, and cockroaches. I obtained a few crickets early this summer, and am endeavouring to culture them as a Chameleon food reserve during winter, a season during which I have had previously to rely almost entirely on mealworms and woodlice. So far they are doing fairly well, but the spiders—which I also encourage—take heavy toll of the young ones. There are two serious drawbacks to their culture, however. The first is the noise they make. If one's greenhouse is not sufficiently far away, this noise may upset one's neighbours. Second, they will eat seedling plants down to the ground if they can get at them. They are, however, of extreme value as food, and have also the advantage of being clean and inoffensive to handle.

The question of hibernation is more difficult of solution. When wild they undoubtedly hibernate over a good part of their range, but I have only succeeded on one occasion in getting one through the winter in a state of hibernation. Even in this case I do not regard the circumstances as at all normal, since the creature sat extended along a dead elm twig, apparently sound asleep. It made no attempt to bury, and apparently never moved once from October until March. Its awakening was sudden and very complete,

and by the end of March it was again feeding well. One day, six weeks later, I forgot to replace the front of its case, and I found it drowned in the Necturus tank underneath. The animal was an exceptionally large female, and the shed in which it hibernated had an arrangement which did not permit the temperature to fall below 40 deg. F.

However trying they are during the summer, it is then at least possible to put them out in the sun, a procedure which I believe they thoroughly enjoy. I use a discarded aviary which has become very overgrown by hops and honeysuckle. I would issue a warning against any belief in the statement that it is safe to leave a Chameleon in a shrub in the garden, " as they never come down to the ground." In proving the absolute wrongness of this statement, the Chameleon will also effectively give the lie to the one which says that he can't run. A Chameleon's run may be different from all other animals', but he streamlines himself and gets to an effective hiding-place in a very short time, and if there is anything more tiring than looking for an escaped Chameleon in a thickly planted flower-bed, then I don't want to experience it!

During winter—assuming that the general practice of keeping them going is to be followed—an electric light seems to be absolutely essential, and one must be prepared to war consistently, by January, against the creature's active desire to starve itself to death. If one wins the race with time, and the spring sunshine finds Chameleon still alive, then all will probably be well until the ensuing autumn. A late or cold spring, however, is accompanied by a steady sinking in of eyes—the only visible sign of emaciation—and decreasing activity, which more often than not are followed by the loss of one more Chameleon.



Common Chameleon

Needless to say, one should—during the period when they are available in large numbers—feed as many grasshoppers as possible, so that the animal has reserves upon which to draw during the winter.

I would sum up the Chameleon's requirements as follows:—

1. Plenty of available water.
2. A daily cycle of wet to dry conditions in the case.
3. Soft-bodied and preferably flying insects as food.
4. As much sunshine and fresh air as possible, with due precaution against nocturnal chill.
5. Artificial light during the short days.

It will be observed that I have made no mention of the much over-rated powers of colour change possessed by the Chameleon, nor of the peculiarities of its limbs, eyes, and lungs. All these features, as well as what is known of the reproductive habits of the creatures, are admirably set out in the " Amphibia and Reptiles " volume of the Cambridge Natural History, with which all WATER LIFE readers are doubtless familiar.

Mention might be made of the Dwarf Chameleon from South Africa while we are on the subject, and it seems on the whole quite true to say that it displays more tolerance of captivity than does its larger relative, and, if a suitable supply of flies can be arranged, it is not nearly so difficult to bring through the winter.

It differs from the Common Chameleon in that its eggs are retained within the oviducts until the young are fully developed, and it is thus in effect viviparous. I have heard of numerous cases of females giving birth to young in captivity, but have never had the good fortune to own such females myself. The example in the picture had a history worth recording. She was bought one Sunday morning, and fed freely on the same day while sitting on her owner's finger, and subsequently. Eight days later she gave birth to two young ones and a number of incompletely developed eggs. She fed well on the same day, but died on the next, I suspect, myself, from a chill.

The two babies are active at the time of writing these notes, and through the kindness of their owner will shortly come into my possession.

I will send a note of my experience with them to the Editor together with a report on the winter diet of crickets for the Common Chameleon.

* * *

BULBS AND THE WATER GARDEN

(*Continued from page* 182)

The noblest of all bulbs for the water garden and the one that is most at home there is the African Arum Lily. It is known under various names, the correct one being *Zantedeschia æthiopica*, but it is more usually called *Calla æthiopica* and *Richardia africana*. In this country it is usually grown in a greenhouse, where it reaches a height of about three feet, with eight-inch flowers. If the bulbs are put in a pot of rich loam and submerged in the pond below frost level it will be found hardy in all but the most exposed positions.

although, when shifted to the larger tank, they were down to 60 degs. for almost a fortnight until a heater was installed. Incidentally they all developed white spot owing to the low temperature, but I then lost no time in raising the temperature to 85 degs., and after two or three days the white spot vanished more quickly than it appeared, without any casualties being sustained.

I disposed of some to a London dealer. When he saw them, he exclaimed, " What whackers!" and said that he liked them smaller, but I must not think that he was complaining!

I may explain that I culled the young fish very vigorously. All undersized ones and any the slightest degree unshapely, including some with extremely flattened backs, went down the ready mouths of my Bass, so that, out of possibly 200 fish, I was left with about fifty perfect specimens. And what a glorious display they made, ceaselessly swimming up and down the 3-ft. tank. You need a tank of goodly dimensions to show these fish to advantage. Their appetite was very hearty, and at feeding time the surface of the water appeared to boil with Danios.

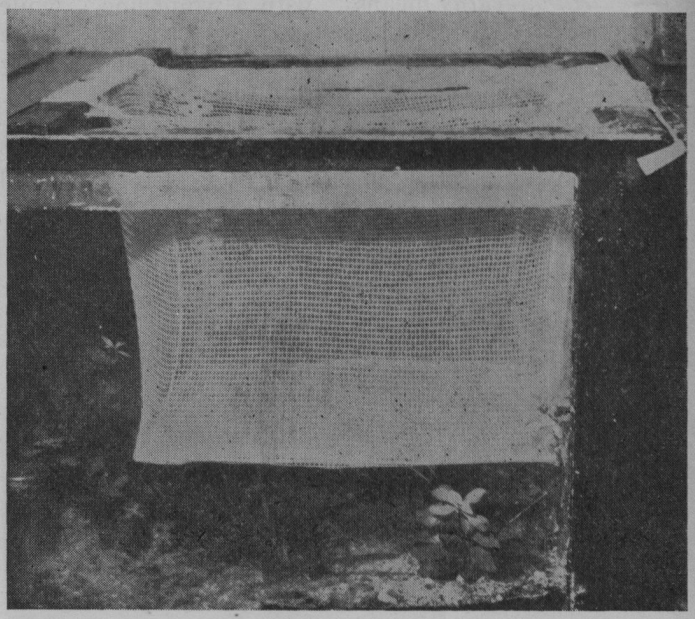
A curious thing was that, although the male Zebra fish took a prominent part in the spawning drive, all the fry developed into true *albolineatus,* and I obtained no hybrids as I had hoped.

For hardiness, beauty, and ease of breeding I can confidently recommend the Pearl Danio.

One last point. Why does this fish wear such comparatively long barbels? They are about $\frac{1}{4}$-in. long, which seems strange for a surface-feeding fish.

The accompanying illustration shows a spawning net in use. It is approximately a cube of one-foot dimensions. Made of $\frac{1}{8}$-inch mesh curtain netting, it has two laths at the top to keep it spread taut, the laths being held in turn by the cover glass of the aquarium. The writer of the article above suggests hanging a weight in each of the bottom corners, but we have found a frame of light galvanized iron wire dropped into the bottom does the job much better. The top edge may also be strengthened by wire if the maker so desires. It does prevent sagging, and keeps the net close to the cover, an important point, as Danios can be very active and will often jump out. We remember vividly the antics of a male *B. nigrofasciatus,* who jumped out of the spawning net and back again just as the fit took him.

New netting should be well soaked before being put into use, lest the dressing in it have any ill-effect on the



fish if the aquarium in which it is used is small. Unfortunately, these nets do not seem to have a long life, and after about a fortnight's continuous use, begin to rot and tear easily. They are, however, cheap and easily replaced.

Finally, some breeders prefer to make a spawning net rather shallower than described. A shallow net often deters fish from spawning, while in a deep one there is greater opportunity for eating the eggs before they fall through the mesh to safety. Individual experiment and experience will enable the reader to decide his own preference.

Hibernating Reptiles

REMEMBER if you are attempting to hibernate any reptiles—and this year some of the species that would normally be supplied with heat and kept active through the winter will be " put to sleep " by their owners on the grounds of heat economy or, in the case of carnivorous creatures, the difficulty of obtaining meat—that it is essential that the temperature of their surroundings should be dropped sufficiently to induce them to go soundly to sleep and not just remain in a condition of semi-activity. If they are kept too warm to hibernate properly, yet not sufficiently warm to feed, they will quickly use up their food reserves and die of starvation. This does not mean, of course, going to the other extreme and allowing them to freeze! A garage, shed, or unheated room, where they will be cold but protected from the frost is suitable for this purpose, and, of course, some sort of " bedding " material, such as hay, straw, or dried bracken, should be provided for them to burrow into.

Incidentally, most of the reptiles which normally hibernate, such as the common tortoise—can be kept awake and active through the winter by keeping them in a warm place, but even if they feed properly, the loss of their normal resting period has a very adverse effect on them. Of course, it is absolutely essential before a reptile can go into hibernation that it should have fed well and built up adequate reserves of fat to last it until the following spring. If for any reason it has been unable to do so, it is better kept warm and feeding.