

# Hardy Reptiles

AND  
AMPHIBIANS

By L. G. Payne



16

# PHILIP CASTANG

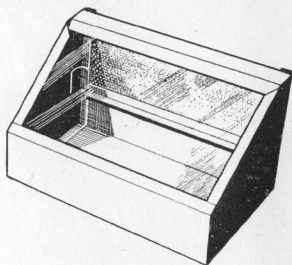
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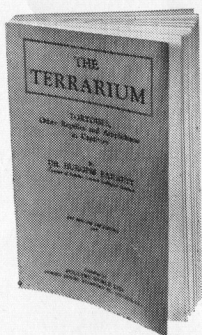
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## CHAPTER I

### INTRODUCTION

FROM earliest times mankind has subjected the humbler creation to confinement—for experiment, for material benefit or for mere pleasure and relaxation. The development of commerce and medicine owes not a little to discoveries, planned or accidental, resulting from the observation of wild life in captivity.

In the modern breeds of domestic animals the utilitarian aspect has been fully developed; the present popularity of cage birds and goldfish testifies to the craving for æsthetic beauty which is latent in most human beings.

It would be futile, and indeed invidious, to attempt a comparison of the merits of the various living creatures which are commonly kept in captivity, but the purpose of these chapters will be to present the claims of Hardy Reptiles and Amphibians in a form both practicable and attractive.

The amateur who decides to take up reptiles and amphibians as a hobby will have a field of interest at his disposal on which comparatively little has been written and in which much still remains to be learnt.

The intelligent owner who possesses an outdoor reptiliary containing Terrapins or Toads will find full scope for interesting and original observation, while the amateur who desires merely the visual pleasure of rapid movement, combined with beauty of form and lustrous colour, is amply catered for in his vivarium of Tree Frogs or Lizards.

In this connexion, however, the author would make a plea for the keeping of a diary, or at least a rough jotting of notes, relative to any event concerned with your reptiles and amphibians. Dates of acquisition, spawning and hibernation, effects of temperature, and many other details which will suggest themselves, will become of permanent interest and may be of real value in scientific research.

### Types of Accommodation

As it is obviously of major importance in the keeping of any livestock in captivity to prepare the abode before obtaining the inmates, it is proposed to describe here the construction of five different types of accommodation which have been tested over a period of years. These enclosures have been designed, where possible, on lines suitable for "communities," *i.e.*, the system of keeping together in the same enclosure different species which may reasonably be expected to live in amity.

The author believes that more natural conditions can be provided, and more useful pleasure and interest obtained, from the larger enclosure than from a number of small vivaria accommodating only the same number of individuals in separate species. The five types of enclosure suggested are: (1) INDOOR VIVARIUM; (2) OUTDOOR VIVARIUM; (3) OPEN-AIR REPTILIARY; (4) LIZARD OR SNAKE HOUSE; (5) WATER VIVARIUM. Considerations of expense and available space will be factors in deciding what type of accommodation shall be utilized, but too strong a plea cannot be made that natural conditions be imitated as far as possible.

### 1.--The Indoor Vivarium

This is usually purchased ready made, and consists of a glass-fronted zinc box with perforated zinc back. The front and back are made to slide out, thus giving easy access to the vivarium for cleaning, etc. In some models the bottom is constructed to hold water, this feature being a desirable refinement. These small vivaria are neatly enamelled in black or green, are portable, and suitable for indoor use. As they are not usually available beyond a maximum length of 18-in. it will be realized that a somewhat severe restriction is placed on reptile keeping indoors unless a number are used.

Perhaps the best use of the small vivarium is as a temporary observation cage when desiring to study at close quarters some new or interesting specimen brought in from the outside vivarium. It is also valuable as an isolation cage in the event of one of your creatures becoming injured or otherwise ailing. A few days' solitary confinement may prevent an epidemic amongst your stock.

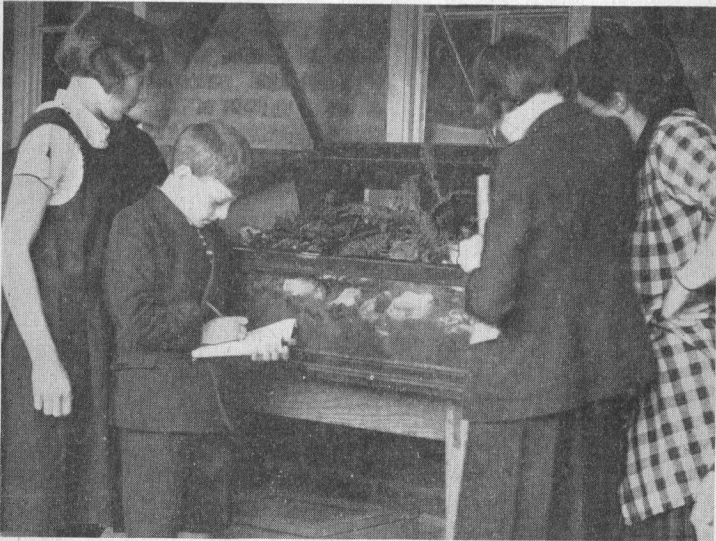
The small indoor vivarium does not allow of much scope in the way of "furnishing," this perforce being limited to a pan of water with a surround of sand, a few pieces of bark irregularly arranged to form cavities for retirement, and a stout piece of twig; this will then be suitable for most of the hardy reptiles and amphibians. The beginner should remember that changes of temperature will be more rapid with the indoor vivarium than with an outdoor enclosure, especially if the vivarium is kept in the winter in a room which is heated during the day but not at night.

A consideration which must not be lost sight of is that the inmates of an indoor vivarium kept in a warm room will need winter feeding. The normal habit of most reptiles and amphibians is to hibernate through the cold season, and if we attempt to interfere with this resting period in their life cycles our captives must be assured of sufficient nourishment. If this cannot be arranged, or if the vivarium is likely to be subject to violent fluctuations of temperature, it will be far more satisfactory to move it to an outdoor shed or garage when the

first frosts of autumn appear and to place it in some position free from damp and draught. The vivarium should not receive the direct rays of the winter sun, but normal daylight is desirable. The water should be removed and the vivarium carpeted with a six-inch layer of dead leaves, preferably oak, the remainder of the available space being loosely filled with bark and bracken.

When once the inmates have disappeared into this hibernating material on no account be tempted to disturb them until a warm, sunny day in early spring induces them to begin their new year; then they will need feeding. The temperature of the vivarium should be raised gradually and the pan of water reintroduced.

A point of major importance is to avoid overcrowding.



Photograph]

Young students at a London school taking notes on happenings in their outdoor vivarium.

[WATER LIFE

Apart from the increased difficulty of feeding, reptiles and amphibians in close confinement are peculiarly liable to contagious infections; one or two healthy, well-nourished specimens will give more satisfaction to their owner than a larger number of poor ones.

## 2.—The Outdoor Vivarium

This is the natural development of the indoor vivarium to which the enthusiastic keeper of reptiles and amphibians will almost certainly aspire. It is more satisfactory because it is more permanent, more natural, and gives a maximum scope for community grouping.

An outdoor vivarium erected in the manner described

will be found to give every satisfaction, and will allow of minor alterations and improvements which are sure to suggest themselves to the amateur constructor.

A site in the garden which receives a medium amount of sun should be selected—not the sunniest portion; that will be required for the Lizard House. The outdoor vivarium can, of course, be built to any dimensions, but a convenient size for a small garden will be about 8-ft. long by 4-ft. back to front. The height may be about 8-ft. at the back and sides. These should be built of brick, the front wall being only 4-ft. in height. The resultant enclosure is then filled with 3-ft. of hardcore or ballast topped with 1-ft. of soil. This gives an artificial level which has the great advantage of enabling the owner to watch the inmates in greater comfort than would be the case with the natural ground level. When this surface has been well watered and rammed down, a small oval pool should be built at the 4-ft. level. This is constructed of sand and cement in the ordinary way to a maximum depth of 12-in. A light covering of sand, occasionally renewed, will improve the appearance of the small area between the pool and the front of the vivarium. At the back of the pool, and towards the wall, large stones may be coarsely cemented to form rough but firm rockwork.

On the interior of the side walls large slabs of oak or elm bark should be nailed. The arrangement of this bark, though at first sight of small importance, may yet make or mar the final appearance of the vivarium. Care should be taken to see that the bark neatly overlaps, and that the slabs are placed with the corrugations in the natural position, *i.e.*, vertical. A few cuttings of ivy should be planted in the soil at the base of the bark, which will soon become pleasingly covered.

Ivy possesses the merits of being evergreen, easily trained and pruned, as well as affording a natural foil for the inmates. Amongst the stones, and on the back wall, cemented pockets may be made to hold hanging plants, ferns, or clumps of growing grass, the latter being amazingly effective.

The top of the vivarium should slope slightly forward, the rear half being of glass and the front half of perforated zinc for ventilation. Natural rain falling on the glass section will trickle forward and splash pleasantly into the pool below, the overflow from the pool soaking into the surrounding soil. The top half of the front of the vivarium should consist of two large sheets of window glass sliding easily outward in the grooves of  $\frac{5}{8}$ -in. matchboard and meeting in the centre on opposite sides of a 2-in. by 2-in. post cemented into the brickwork. The exterior of the side walls and back of the vivarium may be masked, if desired, by bushes of privet or climbing plants.

Electric light from a bulb partially concealed in the ivy, and a trickle of water from the main, are refinements which will commend themselves to the enthusiast.

If a smaller and cheaper outdoor vivarium is desired this can be made of wood, but the principal features of ventilation, planting, and a large pan of water in lieu of cemented pool should be borne in mind. Any wood used in construction should be painted annually. Interior painting should be done in winter as at this season fumes from paint or creosote will not harm the hibernating inmates.

Reptiles and amphibians kept in an outdoor vivarium must



*Photograph]*

**A profusely planted indoor vivarium specially constructed to house Salamanders.**

*[J. Th. ter Horst*

be allowed to hibernate naturally. There will be numerous crevices between the stones at the back of the vivarium, and it will be found that the inmates will soon burrow frost-proof retreats into the soil and under the cement of the pool.

### 3.—The Open-air Reptiliary

A very satisfactory method of keeping hardy reptiles and amphibians is in the open outdoor enclosure. This may seem at first to be a contradiction in terms; the reptiliary, however, is "open" to wind, rain, and sun, and "enclosed" by a continuous wall.

A site which receives a fair amount of sun should be chosen for this, and, if the two ends of the enclosure are higher than the centre, this will add to the naturalness of the finished



article. If soil is removed from the centre to form a shallow pool, and slightly heaped at each end, this result will be achieved. A reptiliary which I have built is 9-ft. long by 5-ft. wide and the small pool  $2\frac{1}{2}$ -ft. by 2-ft. by 1-ft. deep. The continuous wall is 18-in. high. This was made of odd bricks and granite slabs cemented together, the whole being washed over with cement and sand solution. This very soon tones down and appears "weathered."

Between the pool and one end of the enclosure it will be well to remove soil to a depth of 18-in. or more. This cavity should then be filled in very loosely with old bricks or stones, and these may be of any shape or colour, for they will not be exposed to view. This stratum is important and serves the double purpose of draining the overlying surface and of forming a frost-proof refuge in winter. Above this some pieces of porous sandstone of pleasing shape should be carefully arranged. These should rise from below the surface of the water, each stone being placed slightly at the back of, and above, the preceding one. This stonework can be built up to within 9-in. of the top of the wall and the whole pressed—not cemented—firmly into position. It is possible to do this, and yet leave runways and bolt-holes below. Sand can then be sprinkled amongst the crevices, and in this can be placed some dwarf but free-growing plant; the white form of *Linaria cymbalaria* is good and uncommon for this purpose. A dwarf bush of *Berberis* by the pond is effective and for the pool itself *Glyceria aquatica* and *Elodea canadensis*.

The sloping bank on the other side of the pool may have a covering of dead leaves, moss, and bark. A short, thick piece of tree trunk will add to the studied carelessness of the reptiliary, and will form a useful breeding ground for woodlice and worms, which in turn will feed the reptiles. One or two low-growing ferns will be ornamental and useful amongst the leaves and moss.

The final item in construction is the horizontal ridge designed to prevent escape of the inmates. This is the peculiar and distinctive feature of the reptiliary, and may be of any material smooth enough to effect this purpose. Sheet zinc possesses the merits of cheapness and pliability. Strips of this, 6-in. wide, should be cemented lengthways round the continuous wall, but before fixing into position each piece should have the inside edge turned downwards to improve the appearance, and as a further check on the climbing capacities of the inmates. This ledge may be painted grey to tone with the wall.

#### 4.—The Lizard or Snake House

To say that lizards and snakes require a maximum amount of sunshine is true, but at the same time the provision of a little cool shade must not be overlooked, and as it is difficult to lay

down hard-and-fast rules when it comes to enclosing a living tree, the author feels that he cannot do better than describe his own enclosure. The reader who intends to work on similar lines will readily adapt the ideas to his own circumstances.

It was decided to enclose the lower portion of a Sumach tree, and as the main branching was at about 7-ft. from the ground this allowed a convenient height for the house. The overall front length is 6-ft. 6-in., and the two sides and back about 5-ft. wide. Four wooden posts 9-ft. long were creosoted, and cemented 2-ft. into the ground. Battens 3-in. x 3-in. are used for the framework, between two of which appears the all-glass door. The two other posts are at the back of the enclosure, and this back was made solid by nailing across  $\frac{7}{8}$ -in. tongued and



*Photograph*

**Two Wall Lizards (*Lacerta muralis*) showing typical dark reticulations on a green body.**

*[W. S. Pitt*

grooved creosoted matchboarding. This was taken 1-ft. below ground level in order to prevent escape of the inmates by burrowing.

The right-hand side is similarly constructed, with the difference that the top 2-ft. is fitted with a sheet of glass. The left-hand side consists of the wall of the dwelling-house. The upper part, to the left of the door, is of glass, and the lower part consists of perforated zinc to allow bottom ventilation.

The front aspect is south, and so the coldest winds are excluded. The roof is constructed half of glass and half of perforated zinc, this latter admitting natural rain. To allow for wind sway of the tree trunk at the point of emergence from the

roof, a square frame of wood 10-in. x 10-in. was fixed therein, between the limits of which the tree is free. Casement cloth was tacked to the frame, and tied loosely round the trunk, to ensure confinement of the reptiles.

The door is 3-ft. wide and consists of two glass panels framed in 2-in. x 2-in. battens. A small pool, 18-in. x 12-in. x 9-in. deep, was cemented on ground level; round this grass was planted with a *Funkia* in the background. Blocks of stone and inverted turves were placed against the house wall, for it is amongst these the inhabitants make their retreats. Oak bark was then nailed over the back and right side of the enclosure so as to hide the matchboarding entirely, and ivy was thinly planted to mask the bark. The exterior is painted with one coat of green *Solignum* annually.

Two refinements were recently added, one ornamental the other useful. A rough wooden box 4-ft. long, 6-in. deep, and 4-in. wide, was securely screwed on to the back of the house and faced with bark. The box was filled with soil and planted with anything dwarf available from the garden. The second improvement was to cut away a square of 8-in. in the perforated zinc to the left of the door and arrange a sliding wooden shutter over this, through which, when in the "open" position, the fly traps could be inserted and the "catch" released. The latter always fly upwards towards the glass and the expectant lizards. With the earlier method of opening the door in order to release the flies a large number of these invariably escaped.

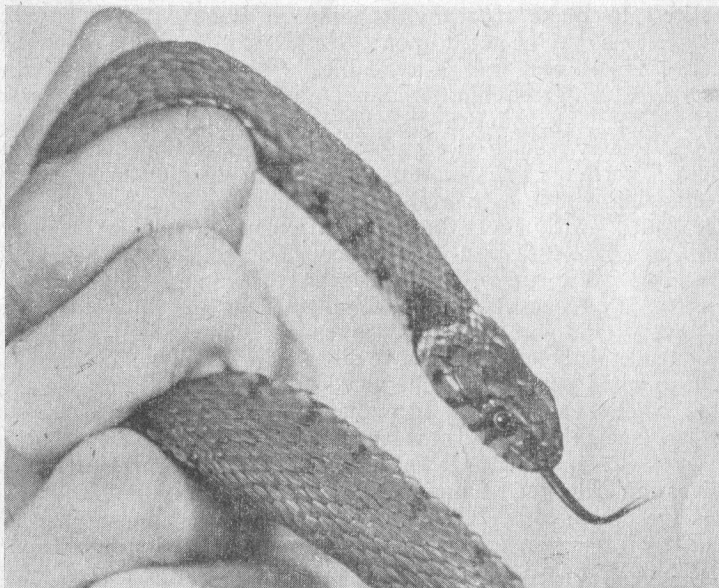
Throughout the spring, summer, and autumn the short enclosed branches of the tree are delightfully green, and the lizards seem perfectly happy, at rest amongst the leaves, darting at incredible speed up and down the oak bark or occasionally descending for a drink.

## 5.—The Water Vivarium

There are certain types of creatures within the scope of this book which require a considerably larger area of water than land, and which lend themselves peculiarly to all-the-year round indoor conditions. For these, the water vivarium will be found very suitable.

A well-made standard aquarium up to 3-ft. long, x 15-in. high, x 15-in. wide should be set in a permanent position indoors. This may well be in a living room, for the underlying idea should be to render it sufficiently attractive, in population and planting, as to be worthy of its place. A recess in the wall near a fire makes a good site, provided there is a satisfactory amount of daylight, but continuous direct sunlight should be avoided. If placed back to a wall, arrange to leave a space of 6-in. between wall and tank; this will add tremendously to the apparent width of the tank when viewed from the front, and is also invaluable for arranging a background of rocks.

The tank should be surfaced with fine grade shingle which can be purchased at a few pence a pound. A depth of 2-in. is advised as this not only adds to the natural appearance but greatly assists the roots of growing plants. The shingle should be well washed before using. If you are handy with cement and sand mix this in the proportion of 1 to 3, and fashion two right-angled slabs of imitation stone with a few scratched vertical fissures. When the cement is well set, wash the blocks in running water to remove any alkaline poisons the cement may possess, then fit them close up to the two rear corners, burying the bases securely in the shingle. Another block may be made, or a natural stone selected, to rest partly against the face of one of



Photograph] Snakes are fascinating subjects in a protected enclosure. Here is a Grass Snake (*Natrix natrix*) displaying its tongue. [Peter Green

the first blocks; but the setting up of the tank, both in stone and plants is, of course, a matter of personal taste.

When planting we have to remember that this is for cold water and not tropical conditions, and therefore a large proportion of the plants advertised for aquariums will not be suitable. The following are practical and recommended:—*Elodea canadensis* (Canadian Water Weed), *Myriophyllum verticillatum* (Whorled Water Milfoil), *Potamogeton densus* (Opposite-leaved Pondweed), *Sagittaria graminifolia* (Grass-leaved Arrowhead), *Eleocharis acicularis* (Hair Grass). The first three should be bunched loosely, their roots tied to a piece of lead and this sunk

below shingle level ; *Sagittaria* should be planted separately, and Hair Grass in thick natural clumps.

Eight inches of water may then be put in the tank. If tap water must be used it is a good plan to expose this to the action of sun and air for twenty-four hours beforehand. When filling the tank pour the water slowly on to a rock so that the resulting trickle will not disturb plants and shingle.

The tank will now be slightly more than half full of water, and a fair proportion of stone will be above this. The stone may be draped with *Helxine solierolii*, a small-leaved creeping plant, the slender roots of which should be pushed into a stone crevice filled with sand.

The water vivarium is now ready for occupation, but if it is desired to make it really a thing of beauty the following suggestions may be acted upon. We will suppose the 6-in. cavity between tank and wall is available. Obtain two or three large sheets of sea-green blotting-paper and fasten this to the wall behind the tank with drawing pins ; then build up in this space stones loosely resting on each other, taking care not to hide more than a portion of the blotting-paper from view. Next make a rectangular frame, 6-in. high, which will stand exactly on top of the tank ; partly cover the frame with matchboard, but leave an unfilled space 2-ft. x 1-ft. A sheet of glass, slightly larger, is then allowed to rest on  $\frac{1}{2}$ -in. blocks over this space. Arrange two electric light sockets on opposite sides of the inside of this " cover " and wire these to a convenient common switch. Paint the inside of the cover with two coats of white or yellow enamel. Cheap wood beading may be glued on to the outside angles and the whole varnished. Into the light sockets fit two 40-watt bulbs, switch on, and the result is well worth the trouble. Viewed from a comfortable chair, the cavity behind the tank gives an illusion of unexpected width and the blotting-paper background completes a hazy perspective. If lamps of higher wattage are used, a pleasantly soft light will be diffused over the whole room, enabling you to dispense with the ordinary room light.

Once weekly, sediment which may accumulate on the shingle should be removed with a siphon, and a jug of water taken away and replaced with fresh.

## CHAPTER II.

### Grouping of Communities

ONE is frequently asked which species of reptiles and amphibians can be associated in the same enclosure, and the amateur who has built one of the foregoing types of accommodation will probably desire to keep several different sorts of creatures together. We must remember, however, that although, in a state of Nature, different kinds of animals do in fact thrive on a common territory, yet in captivity we are artificially limiting their freedom and placing the weaker at the mercy of the stronger. Therefore a good rule is to aim at establishing a community in which the individuals shall be approximately of the same size, and in which hunter and hunted are not intended companions! Thus it is hardly necessary to say that snakes should not be kept with frogs if the latter are desired as a permanent acquisition!

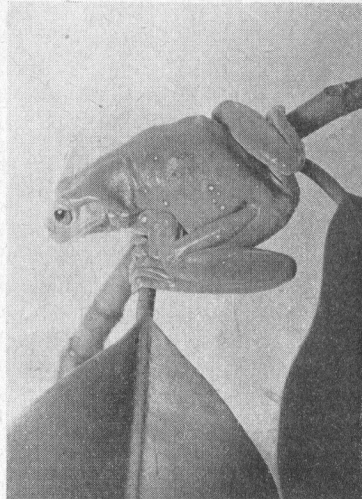
Suggested capacities and groupings are appended:—

*Small Indoor Vivarium.*—1 Snake, or 2 Lizards, or 6 Tree Frogs. Other species of inmates in proportion, according to relative size.

*Outdoor Vivarium.*—For the outdoor vivarium of dimensions given in Chapter I the following will be a satisfactory grouping:—24 Tree Frogs, 4 Mud Frogs, 6 Fire-Bellied Toads, 6 Yellow-Bellied Toads, 4 Midwife Toads, 4 Natterjack Toads, 4 Spotted Salamanders.

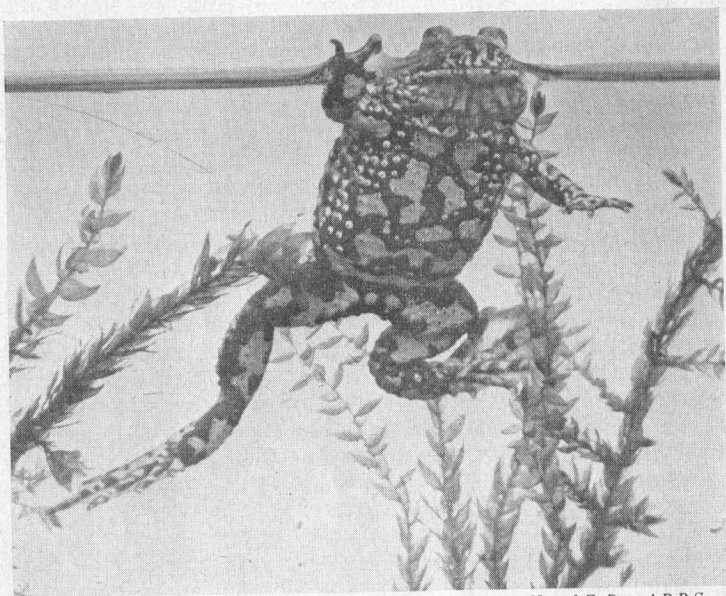
*Open-Air Reptiliary* of capacity described:—4 Slow-worms, 4 Mud Frogs, 8 Fire-Bellied Toads, 8 Yellow-Bellied Toads, 8 Midwife Toads, 4 Natterjack Toads, 4 Midwife Toads, 4 Spotted Salamanders, 2 Alpine Salamanders.

*Or, if larger inhabitants are desired:*—4 Slow-worms, 2 Painted Frogs, 2 Edible Frogs, 2 South African Clawed Frogs, 4 Green Toads (adults), 4 Natterjack Toads (adults), 2 Dalmatian Toads, 4 Spotted Salamanders.



Photograph] [W. S. Pitt  
White's Tree Frog, one of the attractive  
members of the genus *Hyla*.

Yet another group can be accommodated, if the owner makes his reptiliary boundary wall about 2-ft. 6-in. high and provides on the inside of this a continuous narrow trough of water, thus rendering the actual reptiliary an island. Such an enclosure should be twice the area of the former. Grouping for this might be:—12 Green Lizards, 8 Wall Lizards; *or* 1 Glass Snake, 1 Grass Snake, 4 Dalmatian Toads, 2 Greek Tortoises, 2 European Terrapins, 2 Painted Terrapins.



[Photograph] [Lionel E. Day, A.R.P.S.]  
 A Fire-bellied Toad (*Bombina bombina*) with its head just breaking the surface of the water.

*Lizard or Snake House.*—Grouping may be:—8 Green Lizards, 8 Wall Lizards, 8 Common Lizards, 2 Dalmatian Toads, 2 South African Clawed Frogs (in pool).

*Or* 3 Dalmatian Lizards, 3 Eyed Lizards, 3 Dalmatian Toads, 1 Grass Snake, 1 Glass Snake.

*Or* 3 Grass Snakes, 3 Glass Snakes, 1 Dice Snake, 1 Garter Snake, 1 Æsculapian Snake.

*Water Vivarium.*—For this the following would be suitable:—2 Elegant Terrapins, 2 European Terrapins, 2 Painted Terrapins, 2 Japanese Newts, 2 Alpine Newts. The Terrapins should be specimens not exceeding 2½-in. carapace.

A desirable association of larger species of Newts would be:—2 Marbled Newts, 2 Californian Newts, 2 Crested Newts (*var.: karelinii*).

### CHAPTER III

## Foods and the Art of Feeding

THE keeper of most kinds of domestic pets can go into a shop and purchase prepared food for his charges in neat little packets, but the owner of reptiles and amphibians is faced with problems in feeding which cannot be solved in this easy manner.

In the first place some of our captives will require small live food, for the provision of which special arrangements have to be made. It will be convenient at this stage to describe in some detail the provision of food for LIZARDS, TOADS, FROGS and SALAMANDERS. In general terms we may say that anything small which shows movement will be accepted as food; but the main items will be earthworms, flies, and the "gentles" of the angler. Earthworms are, of course, easily obtainable in the garden during damp weather, and it is advisable to establish a reserve supply of these against the dry spells of summer when it becomes almost impossible to obtain them except by deep digging.

The red worm often found in manure heaps and decaying vegetation should not be used as food. While not definitely poisonous it appears to be extremely distasteful to certain species.

Living flies are eagerly accepted by most kinds of small reptiles and amphibians, and it is worth taking some trouble to provide these. This is best done by setting two or three of the old-fashioned globular fly-traps in sunny positions in the garden. Twopenny-worth of coarse liver, boiled, will be ample bait for a week, and the traps may be in continuous use from April to October. When releasing the flies in the vivarium, especially the larger outdoor types, it is desirable to open the trap under the water of the cemented pool. The two halves of the trap should be kept below the water level for one or two minutes before reversing both to allow the flies to float to the top. These will then be snapped up by the aquatic and terrestrial inhabitants of the vivarium, while flies which escape this fate will be eagerly seized by arboreal species, such as the Tree Frogs.

The third main item of food is gentles, and these are obtainable in small quantities, most of the year, from dealers in fishing tackle. It is, perhaps, hardly necessary to state that these gentles are small, whitish grubs about  $\frac{1}{2}$ -in. in length. After a few days, the time varying with weather conditions, the grubs turn into cocoons and these latter into the bluebottle flies. The gentles should be put into small receptacles, such as tin lids,



and these sunk into the soil of the vivarium to rim level. Your captives will soon learn the position of these feeding tins, and it is amusing to see them waiting patiently for the tins to be replenished.

Mealworms are larger and tougher grubs than gentles and are greatly appreciated by Lizards. These are obtainable throughout the year from pet shops and may be kept available for long periods by storing in a large tin filled with bran. If it is desired to maintain a stock of these a reserve of mealworms must be allowed to pupate in a tin containing bran and bread, where they will become small beetles, these in turn producing hosts of small mealworms.

Other living food which may be thrown into the vivarium, or fed by pincers or even with the fingers, as time and inclination permit, are suggested as follows:—Caterpillars (except hairy varieties), beetles, spiders, woodlice, and wasps. The reaction of a toad to a wasp is interesting to note. The toad will seize the wasp in the ordinary way and then either swallow it direct, in which case the meal is appreciated, or will disgorge the insect with every appearance of discomfort. It is reasonable to infer that in the latter case the wasp has been able to use its poison before being effectively swallowed. The toad, however, soon recovers and it is worthy of note that it has sufficient intelligence to avoid risking another meal of wasps for days afterwards.

Many of the foregoing kinds of living food disappear from view with the advent of autumn ground frosts, and it is an interesting commentary on the provision of Nature that when the natural foods are no longer available most of our hardy reptiles and amphibians are also in hibernation.

*Snakes.*—These feed intermittently, and not at all when about to change their skin. The principal items of food for the harmless snakes described in this book are small frogs and mice, and it is not necessary that these be offered alive. A simulated wriggling or movement is advantageous, but the method must be left to the discretion of the owner. The Grass Snake is also partial to newts and small fish.

*Tortoises.*—Hardy species of tortoise are vegetarian and easy to cater for. Principal foods: lettuce, dandelion and cabbage leaves.

*Terrapins.*—These should be given small worms and tiny pieces of raw meat, also tadpoles. To avoid contamination, the meat should not be left in the water more than twenty-four hours.

*Newts.*—The easiest food to provide for newts will be small earthworms, but tadpoles, aquatic insects, and dead flies will be greedily accepted.

*Axolotl.*—These feed readily on small earthworms, tadpoles, small newts, and raw meat.

## CHAPTER IV

### Some Hardy Species for the Amateur

At the outset of this chapter it may be opportune to offer a few hints to the prospective purchaser. All reputable dealers in reptiles and amphibians will allow you to choose your stock, if you so desire, for they know that a satisfied customer is likely to return.

In a general way importations begin in the early spring and prices advance with the summer. While, theoretically, newly-imported creatures should be at their best, specimens offered for sale which have been bred in this country are acclimatized and should prove hardier.

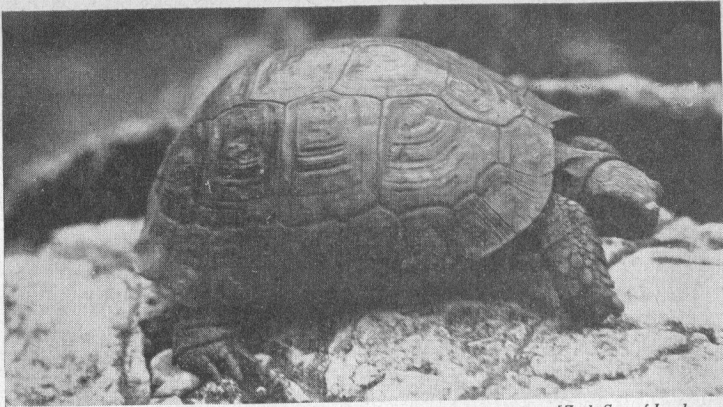
Many imported reptiles and amphibians used to be sent over closely packed and were liable to arrive with a damaged eye. Nowadays, importations are limited, and those which arrive are treated with great care, but it is wise to ensure that creatures you buy are free from gangrenous body sores. Lizards, when held firmly and slightly shaken, should not drop or waggle their heads, and the tail should be complete and tapering. Frogs and toads should be free of sores at the tip of the snout, and the shells of tortoises and terrapins firm and unbroken.

#### Tortoises

It should be clearly understood that the true tortoises are land creatures and vegetable feeders, and that they will not clear your cellars or gardens of cockroaches or beetles. This latter misconception is widely established, and many people who possess a tortoise fondly believe that their garden pests are being eradicated, whereas, in truth, it is the seedlings and plants which claim the tortoise's attention.

GREEK TORTOISE, *Testudo graeca*, possessing a horny tubercle on the back of the thigh, and HERMANN'S TORTOISE, *Testudo hermanni*, without this spur, are the two kinds most commonly available. The carapace (shell) is brownish or yellowish, marked with black in both species. The ideal accommodation for these tortoises is in the garden, where a small portion may be discreetly "fenced." Any sort of vertical barrier, which need not exceed 6-in. in height, will be a sufficient obstacle.

As with all outdoor enclosures for hardy reptiles and amphibians a natural arrangement is greatly to be desired, and for tortoises this should include a small patch of rough grass and a permanent low growing bush. Under the bush a small box shelter should be placed. The tortoises will probably retire to this at night time and on dull days. Water should always be available in a shallow bowl, or better still a small cemented



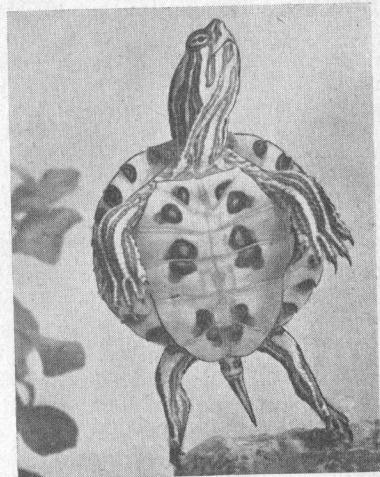
Photograph] [Zool. Soc. of London  
**Greek Tortoise** (*Testudo graeca*), specimens of which are being imported again in limited quantities. Prices are higher than pre-war but the specimens are selected.

puddle may be provided. Tortoises must be allowed to hibernate from early autumn to spring, and although it may be more convenient, in some circumstances, to pack the creatures loosely in boxes with a blanket of hay and store in a frost-proof shed, it is much better to provide a small heap of leaf mould and sand into which the tortoises will burrow when weather conditions tell them that the time has arrived. Once they have commenced their hibernation it is a good plan to add a few inches more of compost to the heap as a greater protection against the frosts of mid-winter.

### Terrapins

Frequently referred to as Water Tortoises, these little creatures are of considerable interest to the reptile keeper.

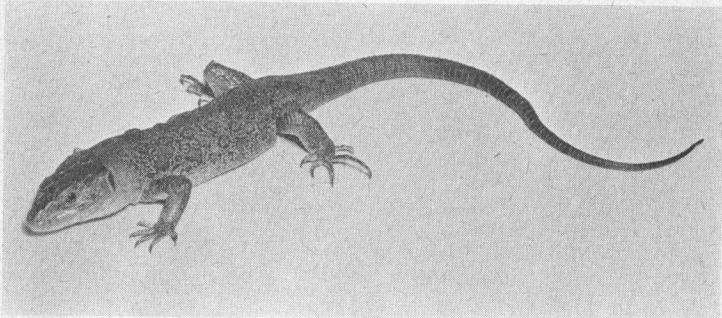
EUROPEAN TERRAPIN, *Emys orbicularis*. This is perhaps the most hardy species, and the one most commonly on sale. The carapace is dark brownish, lined, or dotted yellow. Small specimens are rather attractive and may be kept in the community water vivarium. Adult terrapins will be at home in the garden pond, but if this latter contains choice fish it will be better to accommodate the terrapins elsewhere.



Photograph] [W. S. Pitt  
**Elegant Terrapin** (*Pseudemys elegans*), a colourful specimen from North America.

An enclosure, similar to the one described for tortoises, may be made, but the pool should be relatively larger and deeper. Terrapins appreciate the presence of growing water plants, amongst which they will hide and dive. They are carnivorous and feed on tiny fish, worms and tadpoles; scraps of meat may be offered as a change of diet. Special care should be taken to prevent fouling the water with uneaten food, and if time permits it is a good plan to remove the terrapins temporarily to a shallow bowl for the purpose of feeding. Some of them will readily take their food on land, and this may be encouraged. With the first cold nights of autumn the European Terrapin will need to hibernate, and if the outdoor pool has a sufficient depth of mud he will pass the winter safely embedded in this.

ELEGANT TERRAPIN, *Pseudemys elegans*, is a North American species, a gem in bright green and yellow when young, and an excellent inmate of the indoor water vivarium.



Photograph]

An Eyed Lizard (*Lacerta ocellata*) seen at a West End store in London, one of a number received in the first post-war consignment from the Continent.

[WATER LIFE

This terrapin likes to lie close to the surface of the water amongst the growing plants. From time to time he will thrust his head above the water and peer around in ludicrous fashion.

PAINTED TERRAPIN, *Chrysemys picta*. Another attractive species; this terrapin has a dark carapace, frequently marked with a bright yellow vertebral stripe, border shields scarlet. It feeds readily, and is suitable for confinement indoors or out. It will pass the winter safely out of doors in conditions suitable to the European Terrapin.

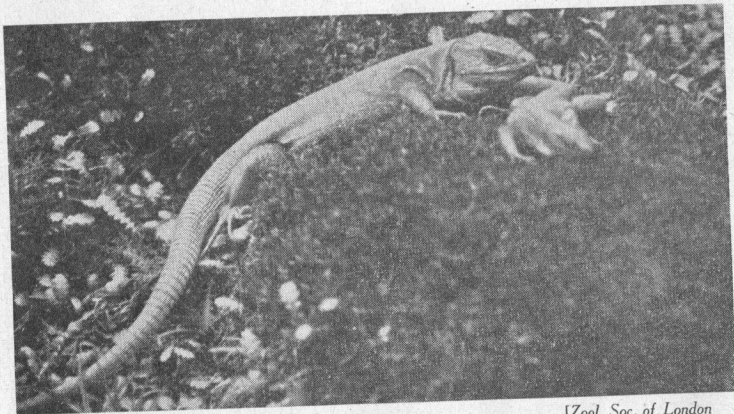
### Lizards

Brilliantly coloured reptiles from Central and Southern Europe; these form charming subjects for the amateur. The metallic lustre of the colouring is best appreciated when seen in sunlight. Lizards change their skin periodically; this is usually seen lying about the enclosure in scaly fragments, and the

presence of these fragments in the Lizard House may be taken as evidence of good health.

When handling lizards they should be grasped firmly but gently round the body, as near the front legs as possible ; never attempt to hold the tail, as this organ may easily become detached. No apparent harm accrues to the lizard, and another tail will grow in course of time ; this second tail, however, is considerably shorter and usually remains a dull brown.

COMMON or VIVIPAROUS LIZARD, *Lacerta vivipara*, max. length 6-in., shaded brown and yellow, is a native species abounding on heaths and commons. As its name implies the young are born alive.



Photograph]

Green Lizards (*Lacerta viridis*) photographed in their enclosure at the Regent's Park Gardens of the Zoological Society of London.

[Zool. Soc. of London

GREEN LIZARD, *Lacerta viridis*. Lustrous green, males frequently with bluish throats ; one of the most attractive species. Amongst the living tree branches of the Lizard House it is a perpetual source of delight.

DALMATIAN LIZARD, *Lacerta viridis*, var. *major*, may be unscientifically described as a double size Green Lizard. It takes kindly to captivity, but should not be associated with the smaller types.

WALL LIZARD, *Lacerta muralis*. Perhaps the most active of all, and the most widely varying in colour forms. Usually greenish, with yellow, bronze, or black reticulations. Max. length 8-in. On the Continent these are caught separately by means of a horsehair noose tied at the end of a stick.

EYED LIZARD, *Lacerta ocellata*. About 18-in. in length, this is a handsome species possessing darker markings over the prevailing green, with attractive eye spots, definitely bluish, on its flanks. Reputed to be one of the hardiest of the lizards.

SLOW WORM, *Anguis fragilis*. Though snake-like in appearance this is a true lizard in that it possesses eyelids, whereas

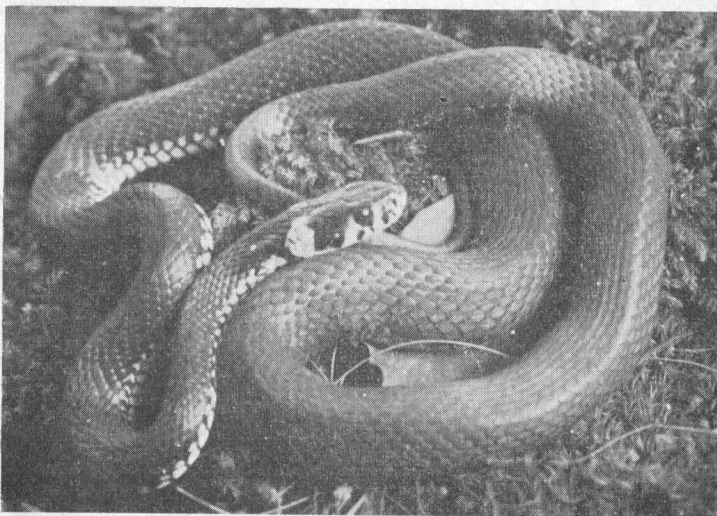
the snake does not. Attaining a length of 18-in., this gentle creature feeds mainly on the small white garden slug, though worms will be accepted. The slow worm seems very susceptible to weather variations, but is usually in evidence in the open-air reptiliary after a warm rain. This lizard is very prone to part with its tail if roughly handled, and the secret in holding this creature is to allow it to wind itself round your hand just as it wishes. Never attempt to straighten the slow worm.

**GLASS SNAKE, *Ophisaurus apus*.** Popularly described as a giant slow worm, this is another legless lizard, though possessing rudimentary evidence of hind legs. Growing to a length of 3-ft., this reptile may be fed on snails and dead mice.

## Snakes

Of all reptiles which are available to the prospective keeper none is so apt to be looked askance on as the snake. Tradition mingles with fact, and all snakes are branded as dangerous, or at the least slimy. A snake in health is never slimy; and the poisonous species do not come within the scope of this book.

Snakes appreciate sunny conditions, and their slow and sinuous movements amongst the branches of the tree in the Snake House, or along the ground in the open-air reptiliary, are



[Photograph]

A specimen of the Common Grass Snake (*Natrix natrix*), a native of England.

[Peter Green

fascinating to the observer. They periodically shed their outer skins, a sure sign of preparation for this being the whitish swollen appearance of the eyes. The old skin will be sloughed

in its entirety, and then the freshly clothed creature becomes extremely active and hungry.

GRASS SNAKE, *Natrix natrix*, a native of England, occasionally attaining a length of 4-ft., has usually a mottled, greenish-brownish body, with yellow or whitish collar markings, bordered black. It is somewhat aquatic and does well in captivity.

DICE SNAKE, *Natrix tessellatus*, olive-grey with darker spots, underparts red or yellow, marbled black, is a more aquatic species and will spend a large part of the day in the cemented pool.

GARTER SNAKE, *Thamnophis sirtalis*, growing up to 3-ft., is an American species occasionally available; olive or green with or without black spots. A striking variety is blackish with three stripes of yellow, red, or pale green.

ÆSCULAPIAN SNAKE, *Elaphe longissima*, yellowish or olive, with few whitish spots. It should not be associated with lizards.

## Frogs

The range of practicable species of hardy frogs will be surprising to many people, and these form one of the most interesting groups for the attention of the vivarium enthusiast. Only those generally on the market are detailed here.

EDIBLE FROG, *Rana esculenta*. This is a fascinating creature which will live and breed in garden ponds of quite small size. In the outdoor vivarium it should not be associated with smaller species. The male may attain a body length of 3-in., and in its most pleasing form is bright green with a few blackish spots. As with many of the frogs and toads the females are the larger, and are usually olive green or bronzy with more numerous confluent spots.



Photograph] [L. G. Payne  
Edible Frog (*Rana esculenta*)

This frog is a powerful swimmer, and normally does not venture more than a few feet from the water's edge. The spawn is deposited in June in flat masses amongst water plants, the tadpoles when first free of the capsule being of a whitish colour. They develop rapidly, and soon need food of an organic nature. This can conveniently be supplied by suspending in the water a raw or cooked meat-bone to

which the young tadpoles will adhere. Another method is to crumble biscuit into a shallow net and suspend this in similar manner. In both cases the residue of food should be removed after two days to prevent contamination of the water.



Photograph] [M. Steiger  
Painted Frog (*Discoglossus pictus*)  
(Reproduced by courtesy of "Lacerta").

**PAINTED FROG**, *Discoglossus pictus*. A pretty species, yellowish or red with darker spots. This frog attains the size of the common frog; the male is distinguished by stronger fore limbs and more extensive webbing of the toes. This is one of the few kinds which can seize its food under water.

length, and normally of a bright green hue, this little frog possesses the chameleon-like power of "changing colour." This is perhaps better described as a slow approximation to the colouring of the material on which the frog is resting or climbing. The tree frog is an excellent climber, and perpendicular glass presents no difficulties, owing to the adhesive discs of the toes and to the adressed stomach; therefore the vivarium for these must be of the covered-in type.

The tree frog is principally active in the hours immediately before, and after, dusk; also in broad daylight when the weather is showery. A thunderstorm provokes tremendous activity. The foregoing does not mean, however, that the frog avoids or dislikes the sun; on the contrary, he likes to bask full in its rays, and it is then that the pigment of the skin glistens like the finest enamel.



Photograph] [W. S. Pitt  
Tree Frog (*Hyla arborea*).

The call-note is an insistent monotone most amazing in volume for so small a creature. The amateur will be interested to note the balloon-like swelling of the vocal sac which produces the



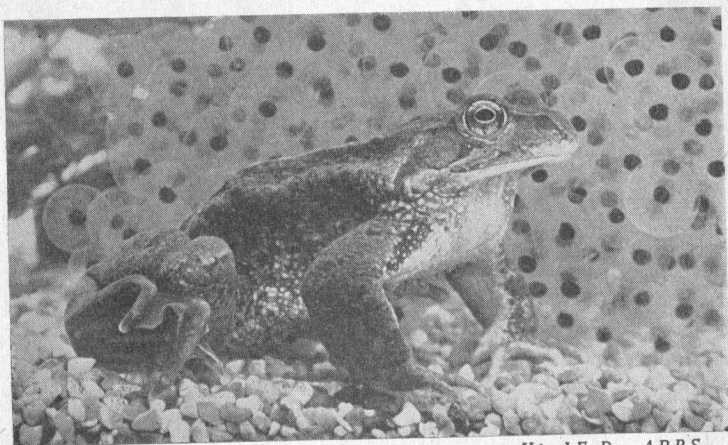
sound. When purchasing tree frogs it is advisable to limit the number of males. One or two of these will be found sufficient for any ordinary collection, the reason for this warning being that it is the male which produces the call-note. Should this latter become a source of trouble it is a good plan to catch the offender and place him in a jam-jar or other small receptacle. He will immediately cease to call and after a few hours may be replaced in the vivarium.

An interesting natural process which it is sometimes possible to witness is that of skin changing. This transformation occurs occasionally during the summer months and appears to be influenced by weather conditions. On some warm, showery day look carefully at your tree frogs and you may notice one humping its back and yawning prodigiously. These are infallible signs, and you will see the outer skin flake off and fall away, the process being accelerated by the grotesque contortions and leg movements of the frog.

**BULL FROG, *Rana catesbiana*.** This is frequently obtainable, either as a small frog, or in the tadpole state. It does best in a large outdoor pond, and may be associated with adult edible frogs, but not with smaller species.

**COMMON FROG, *Rana temporaria*.** Distinguishable from the Edible Frog by the dark colour patches on the temples. Found freely in Britain, its range covers Northern and Central Europe and Northern Asia.

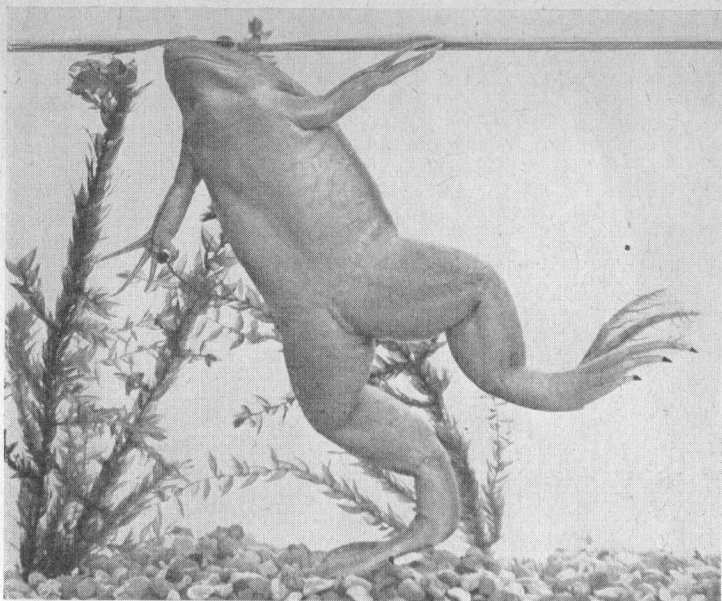
**SOUTH AFRICAN CLAWED FROG, *Xenopus laevis*.** Though this has not previously been classed as a hardy amphibian the author has no misgivings in placing it under this category. For some years they have been allowed the freedom of two small garden



Photograph]

Male Common Frog (*Rana temporaria*) with frog spawn forming a background.

[Lionel E. Day, A.R.P.S.]



*Photograph* [Lionel E. Day, A.R.P.S.]  
**South African Clawed Frog (*Xenopus laevis*) in a characteristic pose. These frogs have been bred frequently in this country in recent years.**

pools on which ice forms in winter in the normal way, and although it is a species reputed to be entirely aquatic they may often be seen crawling across the garden paths from pool to pool.

The clawed frog has a perfectly smooth skin, velvety brown or blackish, with underparts white. The fore legs are feeble in appearance and in action, while the hind legs are large and powerful and beautifully webbed. These webs are reddish veined, and the three inner toes terminate in blackish extensions aptly called claws.

Clawed frogs will thrive in an aquarium indoors. A few large stones should be provided for privacy, but water plants are usually unsatisfactory owing to the rooting propensities of the inmates. The frogs feed eagerly on live worms or scraps of meat, but the nature of this food and the absence of plants necessitates a weekly changing of the aquarium water. The quaint actions and comic postures of the clawed frogs will, however, amply compensate the owner for the trouble involved.

### Toads

Broadly speaking, toads may be distinguished from frogs by their more squat appearance, shorter hind legs, and by the possession of more or less conspicuous warts.



Photograph] / [W. S. Pitt  
Waterside position showing two Natterjack Toads (*Bufo calamita*) which are native to these islands.

FIRE-BELLIED TOAD, *Bombina bombina*; YELLOW-BELLIED TOAD, *Bombina salsa*. These are easy to keep, and the latter, at least, will breed readily in confinement. Both are small species, averaging about  $1\frac{1}{2}$ -in. body length. The former is usually grey or blackish on the back, with indistinct greenish spots, the underparts reddish, mottled black. The yellow-bellied toad is olive brown on back, with yellow, mottled black, underparts.

These toads are apparently active throughout the day and night, and will thrive indoors or out. Both species are decidedly aquatic, but in captivity, at least, the Fire-Bellied Toad may sometimes be seen far from the water's edge.

The call-note is a quiet and not unpleasing Hoo-Hoo, uttered when the toad is in the water. Spawn may be looked for from June to August. This is deposited amongst water plants either as separate eggs or in small clumps, rarely exceeding a dozen eggs. Metamorphosis is completed by October.

NATTERJACK TOAD, *Bufo calamita*. This is native to Britain, but strictly local, preferring well-drained sandy localities. Sometimes called the Running Toad, this name aptly describes its method of progression; indeed, in the dusk it may well be mistaken for a mouse. It is a colourful species, of olive green and yellow, flecked reddish, with a prominent yellow vertebral stripe; underparts white, spotted black. The throat of the male

is bluish, and this distends to a size equalling the head when the call-note is uttered. The Natterjack is particularly alert in appearance and may be depended on to show itself in the outdoor vivarium or reptiliary during the mild spells of winter.

COMMON TOAD, *Bufo bufo*, is worthy of inclusion in any collection; copper-coloured toads from old beechwoods being perhaps the most attractive. Adult females are twice the size of the males, and when once the pairs have become accustomed to the pool of the garden, or open-air reptiliary, they will breed regularly each year. It is interesting to watch the long string of spawn being wound around water plants.

DALMATIAN TOAD. This toad is not given specific rank, being regarded as an Eastern European form of the Common Toad, but is sufficiently distinct and desirable to be worthy of a place in the affections of the enthusiast. It is the giant of the hardy kinds, females frequently exceeding 5-in. in body length. Of a uniform dull copper colour, this toad seems to be slower and more deliberate in its movements than most of the others. It will accept snails in its menu in addition to the usual foods.

MIDWIFE OR BELL TOAD, *Alytes obstetricans*. This species is unique amongst hardy amphibians by reason of the male's assumption of responsibility for the eggs after these have been produced by the female. For a period of three or four weeks he carries the eggs wound externally round his thighs. Hiding



Photograph]

[W. S. Pitt

Male Midwife Toad (*Alytes obstetricans*) with the eggs laid by the female and which he carries wound round his thighs for a period of up to three or four weeks.

under stones by day, and seeking his food by night, he contrives to maintain the egg string at an even temperature until instinct urges him to make for the water, where the young tadpoles leave the eggs and become free-swimming.

Males with egg clusters are frequently on the market, and it is well worth while obtaining a specimen in this condition. The tadpoles can afterwards be reared in the ordinary way.

The Midwife Toad rarely exceeds 1½-in. body length and is of a uniform olive or greyish hue above, whitish below. The call-note is the delightfully clear tinkling sound suggested by the alternative name.

GREEN TOAD, *Bufo viridis*, is a handsome inmate for the vivarium. This toad is greenish or yellowish above, with large, distinct, or confluent, olive or brown spots. Not quite attaining the size of the Common Toad, it is an extremely active species with a large appetite.

SPADE-FOOTED TOAD, *Pelobates fuscus*. A small, sturdy-looking, olive-coloured toad, unique amongst the hardy European toads in possessing a horny, sharp-edged spur below the foot. With this "shovel" it rapidly scoops out sand or soft earth, and so digs for itself a burrow from which it emerges at dusk and in rainy daylight periods to search for food. Formerly classified as the Mud Frog.

### Salamanders

A genus of tailed amphibians. Salamanders are usually slow of movement, but should a fly or spider cross their line of vision, the salamander will jerk its body forward in an effort to intercept the morsel. Worms are seized with deliberation and shaken several times, from side to side, as a terrier shakes a rat.

As with most amphibians, the action of certain cutaneous glands keeps the skin moist, but these cannot function in a very dry atmosphere, therefore these amphibians should never be exposed to the direct rays of the sun. If kept indoors their vivarium should be in a cool room or north window.

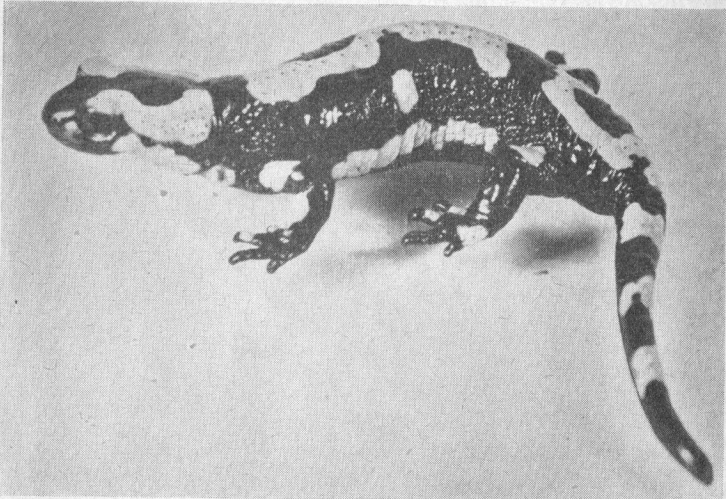
Newly purchased salamanders not infrequently give birth to young in captivity. This may be explained by the fact that the female carries her young for several months before birth. The young salamanders are entirely aquatic and should be given *Daphnia* and other small water creatures, while it is probable that they also obtain nourishment from aquatic vegetation. Typical colouring does not appear for several weeks, when the young ones will begin to leave the water.

Salamanders hibernate and, in the community vivarium, will have every opportunity of so doing; in captivity, however, this hibernation does not appear to be so complete as is the case with the majority of reptiles and amphibians, for they will probably

emerge from their hiding places during the spells of mild wet weather which occur even in the severest winter.

SPOTTED SALAMANDER, *Salamandra salamandra*. This salamander, despite its fierce colouring, is a gentle and desirable inmate for the outdoor vivarium. Attaining a length of 8-in. or more, it is of a glossy black, strongly marked with large bright yellow, or deep orange spots. In some specimens these spots appear almost as parallel lines, and when these continue towards the mouth, the evenness in the markings is notable.

ALPINE SALAMANDER, *Salamandra atra*. Average length, 4-in., of a uniform dull black. This species produces two young at a time, and these are born in the perfect state, breathing atmospheric air.



Photograph]

[WATER LIFE

Spotted or European Salamander (*Salamandra salamandra*), one of a number recently imported by a well-known London store.

## Newts

There are several charming varieties of newts frequently on the market which will give more satisfaction to the keeper of amphibians than the English species, as the latter spend a very large portion of the year under tree trunks and rocks in a shrivelled, dormant condition. Newts are graceful creatures when viewed through the glass sides of a water vivarium. They appear to have a peculiar buoyancy as they walk over the floor of the tank.

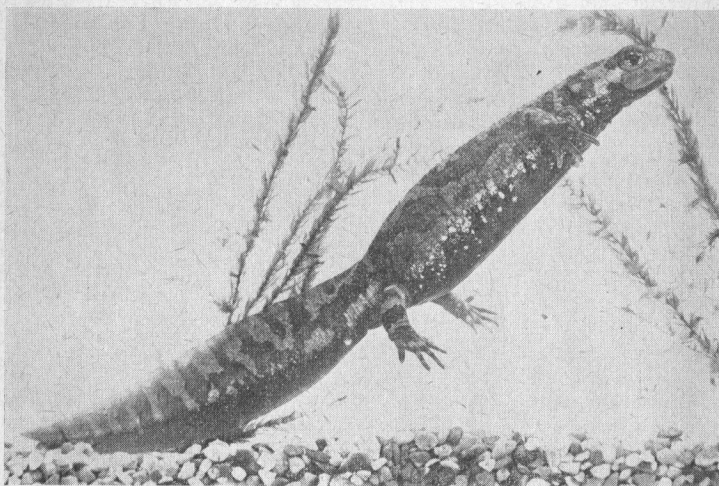
JAPANESE NEWT, *Triturus pyrrhogaster*, maximum size about 4-in. Dorsal surface dark brown, underparts brilliant carmine,

with or without confluent dark spots; sexes difficult to distinguish, though Boulenger states "body is quadrangular in male, but perfectly round in female." There is a prominent dorsal ridge in both sexes.

ALPINE NEWT, *Triturus alpestris*. Attaining about the same length as the previous species, this newt is brown, blackish, or dark green above, yellow or orange below. The male possesses a low crest.

MARBLED NEWT, *Triturus marmoratus*, adults average 6-in. A handsome species, dark green mottled with brown or black. Underparts greyish, speckled white. Crest conspicuous in male.

CALIFORNIAN NEWT, *Triturus torosus*, maximum size 7-in. Brown above, yellow below. Crest above and below tail.



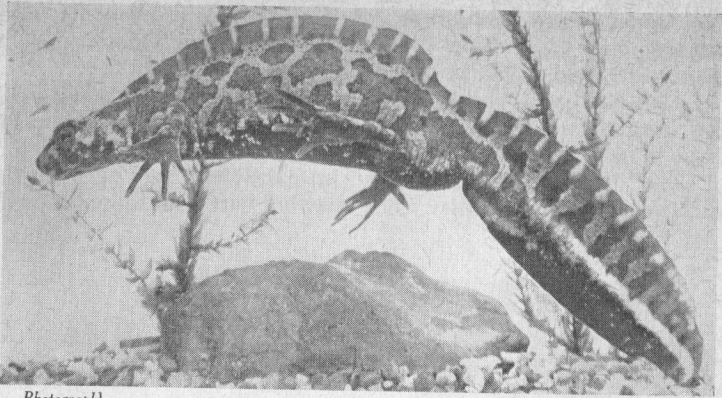
[Photograph]

[Lionel E. Day, A.R.P.S.]

Female Marbled Newt (*Triturus marmoratus*).

CRESTED NEWT, *Triturus cristatus*, var.: *karelinii*. Growing up to 7-in., this newt is brown or olive above, sides speckled white. Male with black and white head markings, and conspicuously toothed dorsal crest. Underparts yellow or orange, spotted black. Female with yellow vertebral line.

Most of the species breed in captivity, the eggs adhering separately to the leaf surfaces of water plants. In some cases the female envelops the egg in a curled leaflet. The larvæ should be removed to a separate tank, and growth encouraged by providing plenty of small food such as *Cyclops* and *Daphnia*. In a few weeks the young will take blood worms and small or chopped earth worms.



Photograph]

Male *T. marmoratus* showing the crest which is not seen in the female of the species.

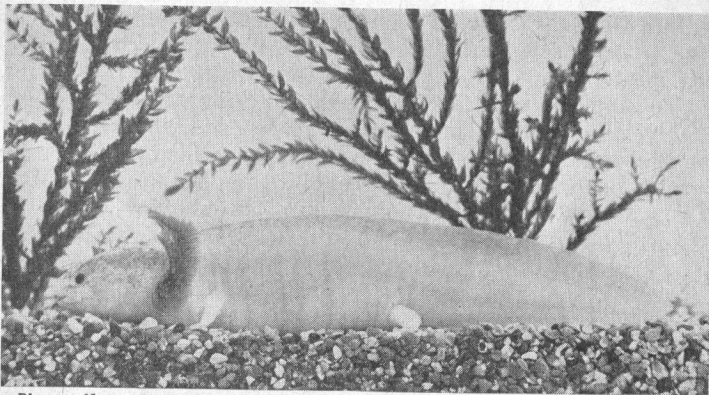
[Lionel E. Day, A.R.P.S.]

## Axolotl

*Amblystoma tigrinum*. This amphibian, a native of Mexico, is in reality the larva of a terrestrial salamander-like creature AMBLYSTOME, a fact only accidentally discovered in the middle of the last century; but as its life cycle in captivity appears normally to end at the Axolotl stage, the Axolotl breeding as such, it is this which will be considered here.

The Axolotl grows to about 10-in., and is brownish or blackish, with underparts grey. The head is large and furnished with prominent feathery gills. There is a well-known albino form which is usually more expensive.

Axolotls should be provided with aquarium conditions, or the tank may be set up as described for the Water Vivarium, but as



Photograph]

A specimen of an albino Axolotl (*A. tigrinum*), larvae of the Amblystome.

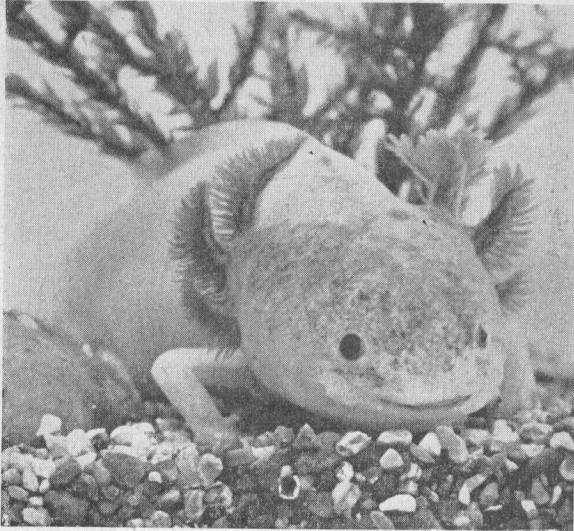
[Lionel E. Day, A.R.P.S.]



the inmates are somewhat heavy in their movements, and consequently destructive to vegetation, planting should be in small pots, which will permit of easy renewal.

They are carnivorous and should be given worms, small fish, tadpoles or raw meat. Care must be taken to see that uneaten food is not left to decompose.

The Axolotl breeds readily in captivity, the eggs being attached to water plants. The newly hatched tadpoles will



Photograph]

[Lionel E. Day, A.R.P.S.  
Head-on view of an albino Axolotl.

require *Daphnia* (Water Fleas) and other small forms of aquatic life. After a few weeks they will take tiny worms or shreds of raw meat.

To induce the metamorphosis of the Axolotl to the Amblystome various methods have been tried. The principal factor seems to be the provision of conditions which will encourage development of lung breathing and the disappearance of the gills. Confinement in a small area of shallow water has frequently proved successful, and the keeper of Axolotls will find a field of experiment within reach which is by no means yet exhausted.

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