

MAINTAINING SUPPLIES OF FRUIT FLIES

by H. G. B. Gilpin

A DIFFICULTY much in the minds of herpetologists during the breeding season is the provision, in sufficient quantities, of insects small enough to meet the needs of newly-born lizards and tiny frogs and toads, recently emerged from the tadpole stage. Minute insects can be collected by shaking bushes over a sheet spread out beneath them but this is a wearisome business which must be performed regularly and frequently if enough food is to be obtained to satisfy the requirements of even a limited number of hungry babies. This source, too, is unreliable as its success depends upon factors such as varying weather conditions beyond one's power to control.

Fortunately an insect, capable of maintenance with very little trouble in confinement and which will reproduce freely under controlled conditions, is available to reptile breeders. This is the Fruit Fly, *Drosophila melanogaster*, a tiny winged fly commonly to be seen during the summer crawling over and flying around rotting fruit.

Fruit Flies are readily obtainable from most biological supplies firms who market them in response to the demands of schools, colleges, etc., for these insects where they are used as experimental animals in the study of the Mendelian principles of heredity.

The natural insect known as the Wild Type, has a dark banded, yellow abdomen, deeper coloured at the apex in the male than in the female, long veined wings and red eyes. Further distinguishing features between the sexes are the shape at the end of the abdomen and the presence of a comb of black hairs on the fronts of each of the first pair of legs in the male which is absent in the female.

Mutations from the normal are available and these include the Vestigial Wing, which has a dark body, red eyes and wings so shrivelled it is unable to fly, the Black-bodied Ebony, the Sex-linked White Eye, the red eyed Scarlet Eye, the White Eye Minia-

ture Wing, with wings shorter and darker than normal, the Brown Eye, which has light brown eyes, the Bar Eye, identified by a narrow vertical striped eye and the White Eye Miniature Wing Bar Eye.

From the point of view of the herpetologist the Vestigial Wing is by far the most satisfactory fruit fly. Initially I made the mistake of introducing the Wild Type into a vivarium. Many of these, by reason of their small size, were able to escape through tiny gaps between the lid and top of the vivarium and create something of a nuisance about the house. Other vivaria containing Vestigial Wings present no such problem. Where the Wild Type has been originally introduced it is necessary to make sure they have all disappeared before replacing them with Vestigial Wings as the Wild Type is dominant to all varieties except the Bar Eye and if only a few of the Wild Type remain future generations will be likely to contain many free-flying insects.

Fruit flies are easily maintained on an artificial nutrient material, made by pouring 100 ccs of molasses on to 200 ccs of maize meal. A trace of Nipagin, obtainable from most biological suppliers, is then added and the whole moistened and thoroughly mixed together. This is then stirred into a hot solution of five grams of agar agar in 200 ccs of water. The mixture is gently heated, stirring to avoid burning, for eight minutes and poured, while still hot, to a depth of one inch into aseries of sterilised bottles. One third pint milk bottles are a convenient size and shape for this purpose. These appear to have been discontinued by the trade and some dairies are willing to provide them for this purpose.

After the medium has cooled and solidified a small piece is cut from its circumference, forming a gap between it and the side of the glass to allow the escape of any gasses formed by fermentation. Previous to the installation of the flies a roughly shaped cone

of absorbent paper, such as a paper towel, is placed in the bottle so that it reaches from the food at the bottom almost to the top to remove any undue moisture and to provide a climbing space for the insects. The neck of the bottle is closed with a wad of cotton wool.

Fruit flies follow the typical reproduction cycle common amongst most insects. Eggs are laid and in due course hatch into tiny *larvae*. These, after a period of intensive feeding, pupate and finally the fully adult flies emerge from the *pupae*. The female flies produce their eggs twelve hours after they leave the pupal cases and the males are capable of fertilising them after a few hours.

Fruit flies are usually purchased in small tubes and on arrival they should at once be transferred to a bottle containing food medium to which has been added immediately preceding their introduction, two or three drops of yeast suspension in water. The tiny eggs, each bearing two filaments, are deposited on the surface of the food. They soon hatch and the *larvae* burrow into the food, feeding continually

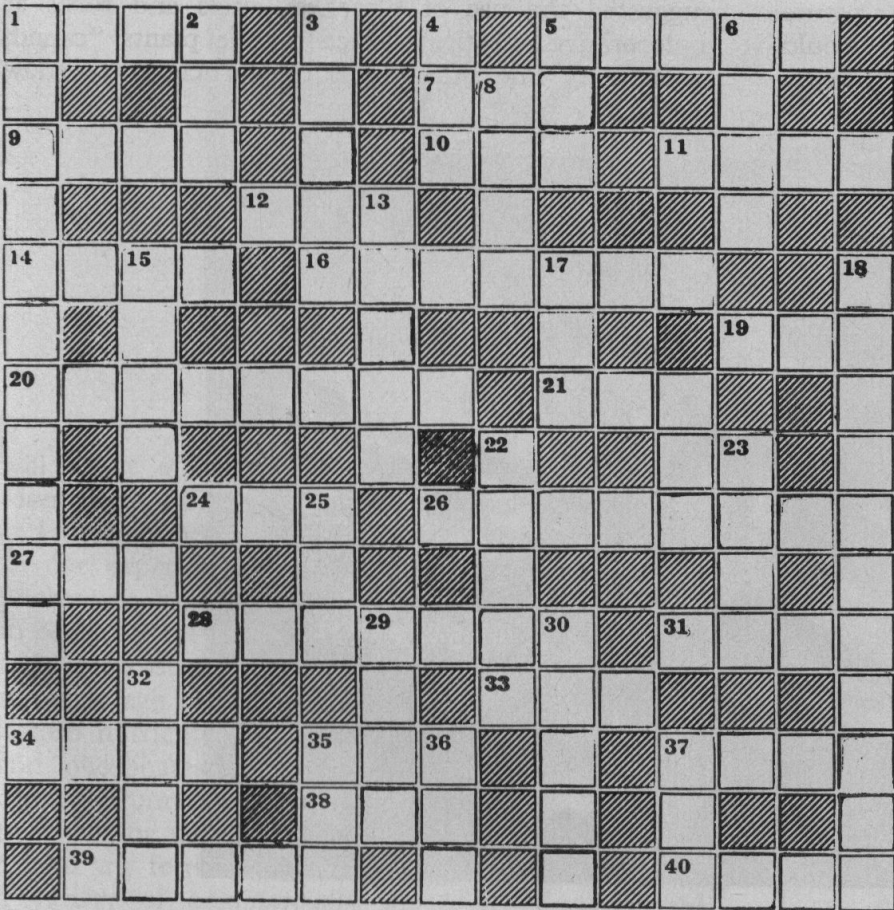
and moulting twice before leaving the medium and darkening in colour prior to pupation. Approximately 14 days after the eggs are laid the imago appear.

As soon as a reasonable number of flies are observed crawling over the absorbent paper, I transfer some of them to a second bottle previously prepared for their reception, to serve as a breeding unit for the next generation. The movement of insects can be brought about by removing the cotton wool plugs and holding the bottles neck to neck, the second bottle being above the first one. As soon as enough insects have entered the second bottle, the plug is replaced. The original bottle is then put into a vivarium where it will provide the inhabitants with a supply of insects for the next couple of weeks.

Fruit flies will reproduce satisfactorily in any warm room or cupboard but do best at a constant temperature of 23°C. Personally I achieve this by standing the rearing bottles in an old aquarium heated by a 25 watt bulb suspended from the lid.

The AQUARIST Crossword

Compiled by M. J. Ellick



CLUES ACROSS

1. Precious stone (4).
5. See 29 down.
7. Long time (3).
9. Colour lightly (4).
10. Ned terminates (3).
11. True ones required for breeding (4).
12. Young lion (3).
14. Needed for *Ichthyophonus* (4).
16. Type of beetle (7).
19. Heavenly body (3).
- 20 & 1 down. Millions fish (8, 11).
21. Metal obtained from *Barbodes schwanenfeldi* (3).
24. Long-eared quadruped (3).
26. Usually a pugnacious family (8).
27. Water container (3).
- 28 & 37 across. *Barbus lateristriga* (7, 4).
31. Scandinavian god (4).
33. Used for catching fish (3).
34. A good one will win the breeders' class (4).
- 35 & 23 down. Dairy producers of the sea? (3, 4).
37. See 28.
38. Single (3).
39. *Xiphophorus maculatus* (5).
40. Narrative (4).

CLUES DOWN

1. See 20 across.
2. As late as now (3).
3. Garden bush (5).
4. Enclosed for a reply (3).
5. Boy's name (3).
6. Thoroughfare (4).
8. Small insect (4).
13. Flesh support (5).
15. Steals from (4).
17. Floor covering (3).
18. What white spot in the tank is (11).
22. This cat is also a barb (5).
23. See 35 across.
25. Health resort (3).
- 29 & 5 across. *Hyphessobrycon innesi* (4, 5).
30. *Rutilus rutilus* (5).
32. Caudal fin (4).
35. Shy (3).
36. What all fish must be (3).
37. Club got from *Platax orbicularis* (3).

Solution on page 29

THE HARDY EUROPEAN REPTILES AND AMPHIBIANS IN CAPTIVITY (Part II)

by Andrew Allen

22. The Moor Frog (*Rana. a. arvalis*)

Description.—This is rather a slender frog growing to a maximum length of 8 cms., with long hind legs. The back is usually smooth, but there may be a row of tiny warts down each side. The male has internal vocal sacs, and dark, horny nuptial pads on the first finger of each hand during the breeding season. Dorsal coloration is almost always brown, sometimes plain, sometimes with darker spots. There is always a large, dark patch in the region of the tympanum, and sometimes a pale line bordered in black down the back. In the breeding season the male may assume quite a vivid blue colour, thanks to the lymph stored beneath the skin. The ventral surface may be an unspotted white, yellow or cream.

Distribution.—The Moor frog is essentially an inhabitant of North and Central Europe. This includes North-East France, Belgium, Holland, Denmark, Sweden, Germany, Austria, Hungary, Yugoslavia and across Russia to Siberia. In the North it reaches to the Arctic Circle, in the South to Burgenland. Throughout this wide range it is a lowland animal, favouring marshes, heaths, meadows and forests.

Breeding Habits.—These are very similar to those of the Common frog. Mating commences in late March, the call of the male being dull, low in pitch, and repetitive. The spawn is usually laid in a single mass containing about two thousand eggs, or more rarely in two separate clumps.

Care in Captivity.—During the past few paragraphs

the similarities between this frog and *Rana temporaria* will have become obvious. It would be naive to say that it required identical treatment, but generally speaking it will do well in much the same conditions. Thus it does not make a good inmate of the indoor vivarium, sharing this characteristic with all the other members of the Ranidae. If it is kept indoors it will require a large pool and a fairly, but not excessively, humid atmosphere. Shelters should be provided, but plant life should be restricted, giving a reasonable amount of open jumping room.

As the notes on its distribution have illustrated, this is a thoroughly hardy species that is well at home in Northern climes. Hence it will settle down perfectly in the outdoor reptiliary, and survive our winters with ease. All it needs is a varied habitat suitable for the other fully hardy frogs and toads, namely a large pond with marshy surround, open grassland, mixed, shady vegetation and numerous rocky shelters. It may hibernate on land or in the water, so the pool should be provided with a good depth of muddy substratum. This won't help visibility, but it will be welcomed by the frogs themselves. An equivalent arrangement in either greenhouse or cold-frame will suffice very nicely, though neither of these forms of accommodation provides any improvement upon a well designed reptiliary. This is not a species that appreciates the heat, so it derives no advantage from the unique qualities of the greenhouse. If it is housed under these conditions it is imperative to provide large areas of deep shade.

The Moor frog will take exactly the same range of foodstuffs as the Common frog, and will fit nicely into the same communities. From the latter point of view it can be regarded as interchangeable with *Rana temporaria*.

Though similar in many respects to the Common frog, this is an interesting and distinct species. It is well worth a place in the vivarium, particularly in the balanced outdoor community.

R. a. issaltschikova comes from Northern Russia.

R. a. wolterstorffi is found in Hungary, Romania, South Poland and Yugoslavia. It is slightly larger than the type, slender, with longer legs, and superficially it resembles the Agile frog in many respects. Its general treatment should be the same as for *R. a. arvalis*, but it should be allowed even more space in the indoor vivarium, to accommodate the greater length of its leaps.

23. The Agile Frog (*Rana dalmatina*).

Description.—Male specimens may grow to about 6 cms. in length, while females may sometimes attain 9 cms. The body is distinctly slender, the legs are enormously long, ensuring that there are no problems concerning identification. The tympanum is very noticeable. The male has no vocal sacs, but does have a grey (not black) nuptial pad on the first finger of each hand in season. Dorsal coloration is a uniform light brown, rarely with darker brown or black markings. There is always a dark patch around the tympanum. Ventrally it is yellow, white or cream in colour, only seldom with other markings.

Distribution.—Essentially this species has a wide, rather non-uniform distribution in Central and Southern Europe, extending as far as Sweden in the North. This includes North-West Spain, France, Germany, the Balkans, the Caucasus and Asia Minor. It favours areas of low or medium altitude, particularly mixed woodlands, and has often been recorded from Beech forests. It may be found quite a large distance from open water, but always in damp locations.

Breeding Habits.—The season starts in late March, the male uttering a loud croak despite his lack of vocal sacs. Spawn is laid in clumps in small ponds, ditches and watery hollows, often in shady, wooded areas.

Care in Captivity.—Many of the comments made about Common and Moor frogs apply equally to *Rana dalmatina*. However, the implications of its name should be taken carefully into account. It is a terrific leaper capable of covering six feet in a single jump and coupling this with heights of about two feet.

Clearly this just about disbars it as an inhabitant

of the indoor vivarium. It is extremely nervous of temperament and takes flight readily. In confined conditions it is almost certain to damage itself against the walls of its vivarium, and such injuries usually lead to disease and ultimate death. For this frog a vivarium of six feet by six feet would be distinctly cramped, and a smaller size would be well nigh useless.

Better by far to give it the run of a spacious outdoor reptiliary, where its leaps are unlikely to end in disaster. But please ensure in this case that the walls are sufficiently high to contain it, for under the stimulus of panic it is capable of great feats. Such a reptiliary should be provided with a generous amount of shady plant life, preferably in the form of a corner entirely devoted to small shrubs. In essence this is a frog of the forest floor, and if we cannot provide a fully fledged forest within the vivarium, we can at least do our best to substitute a reasonable imitation version. Perhaps this can be carried out more easily in greenhouse or cold-frame than in a reptiliary, where there must of necessity be strict control of the height of all plants. Ideally a greenhouse or cold-frame designed for this species should be placed away from the sun, and filled with tall bushes or small trees. There should be a pool, perhaps half-choked with decaying leaves, and a good variety of shelters. This arrangement would suit most newts, salamanders and toads, as well as the agile frog itself. Though these are perfect conditions for this one animal, it will adapt itself quite readily to a less specific habitat in a community vivarium designed for a wider range of inhabitants.

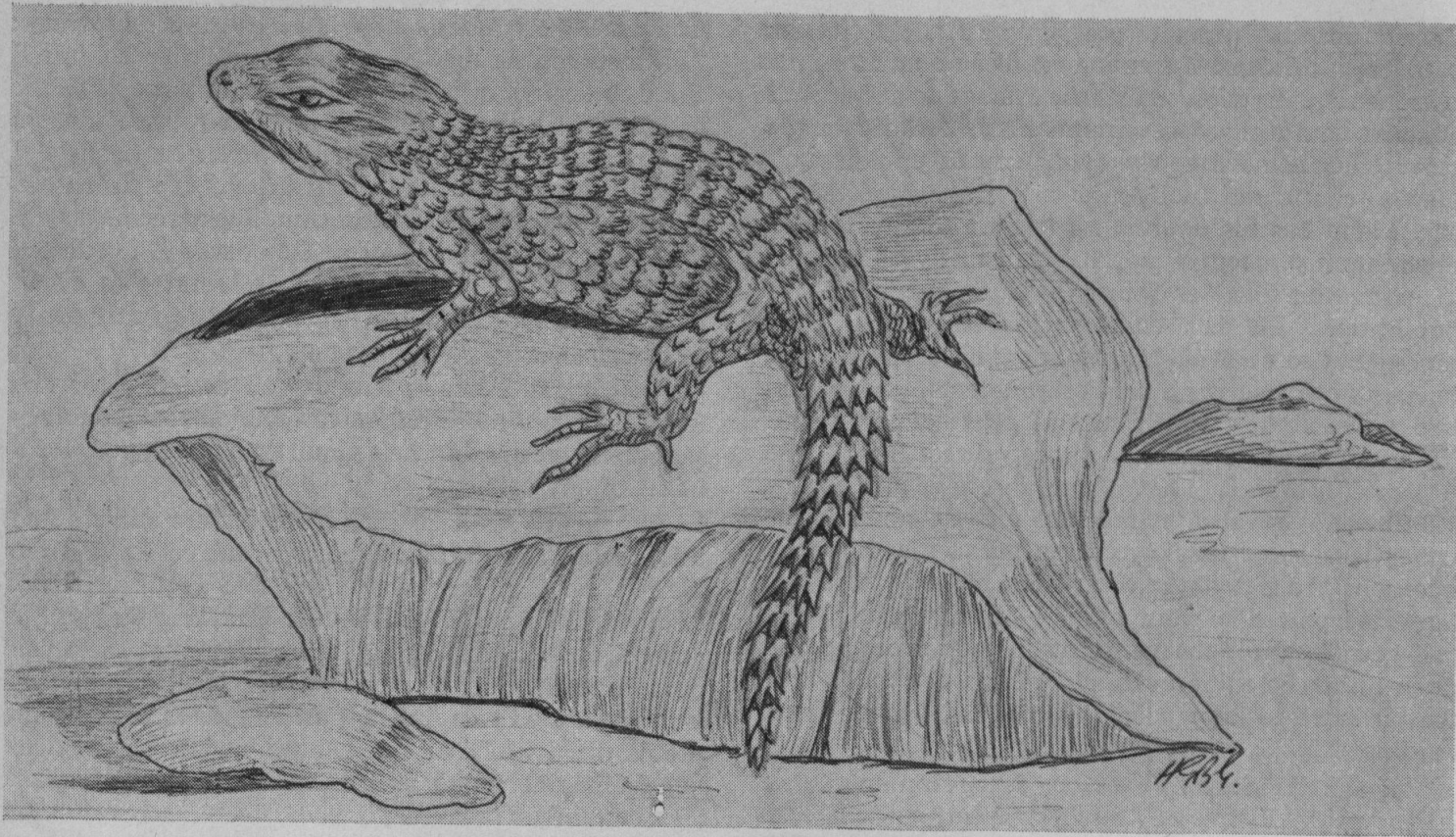
Its diet need cause no problems, for it will take the same range of terrestrial invertebrates as the other medium-sized frogs and toads. It will also fit easily into most communities of the smaller reptiles and amphibians, provided that enough shade and space are available.

This is a beautiful, fickle and unusual frog, highly demanding but also highly rewarding. It is not an easy species to keep successfully, especially for those rash enough to house it indoors, but its interesting habits and unfamiliar nature constitute a tempting challenge.

There are no sub-species.

For the sake of completeness it is necessary to mention *Rana macrocnemis*, a small, plump, brown frog from Asia Minor and the Caucasus. I have never seen a specimen nor noticed one offered for sale, and can offer no comments on its care. It is quite closely related to the Moor frog, and would probably require fairly similar attention.

This concludes our survey of the Order Anura, the tail-less Amphibians of Europe. In the following article we will consider the Grass, Dice and Viperine snakes.



REARING THE JONES'S ZONURE

by *H. G. B. Gilpin*

WHILE BROWSING around a pet shop last August, I was attracted to a vivarium containing some Spiny-Tailed Lizards and several species of Zonures. The latter were in exceptionally good condition, healthy looking and reasonably active. A Transval Zonure and a Jones's Zonure, both females, seemed considerably plumper than one would have expected and, stimulated by the possibility that they might be carrying young, I bought them.

On reaching home they were installed in a 30 inch long aquarium, already inhabited by a small Iguana and three Viviparous Lizards. A careful watch was kept for several days in case of possible aggression. No trouble, however, and the Zonures quickly settled down in their future quarters, completely ignoring

the original inhabitants who, in turn, took no notice of the new arrivals. The temperature of the vivarium was maintained at just over 70°F. by means of two electric light bulbs, one of 25 watts and one of 40 watts.

At this time I was particularly interested in the Jones's Zonure. Although drab in colour it is a fascinating creature, encased in an "armour" of rough edged, plated scales on the back and stout rectangular scales along the underside. In addition it possesses a heavily spiked tail which looks as though it could prove extremely discouraging to a small predator intent on converting the Zonure into a meal. Ridges over the piercing, dark eyes and spines protruding from behind the head further

suggest that this creature is not to be trifled with, except under strong provocation. Dorsally it is a greyish-brown colour, relieved by dark patches, and ventrally a pale cream. Its stout body is both wide and deep and measures five inches from the tip of the nose to the root of the tail. The tail itself is two inches long, thick at the base and tapering to a fine point.

Initially the lizard was provided with mealworms, Tenebrio beetles, stick-insects and woodlice. It showed a marked preference for the *larvae* and little interest in the stick insects. Subsequently it fed freely on locusts ranging in size from newly hatched hoppers up to the third instar. It has been seen to drink on a number of occasions, lapping water from a shallow vessel sunk in the gravel covering the floor of the vivarium, with its short, thick tongue.

While not an active lizard, the Jones's spends much of the day in full view, sprawled across a rock which rises gently from the floor level to within a few inches of an electric light bulb, or clinging to a bark-covered branch originally installed for the benefit of the iguana.

It does, however, occasionally disappear into the cavities below a pile of rocks, sometimes for hours at a time. Early in October the Jones's failed to put in an appearance for a longer period than usual, in fact for so long that fears were felt that it might have crept into some hidden corner and died there. All was well, though, and before a search was begun it reappeared, still looking in the best of health, but to my mind slightly thinner than when I last saw it. An explanation was soon forthcoming. On the 19th of the month a baby Jones's Zonure was seen basking on a rock. The little animal was surprisingly large considering the modest dimensions of its mother. It measured 2½ inches in overall length and its tail was shorter in proportion and considerably more spiky than that of a Transval Zonure of comparable age. A chequer-board pattern of light fawn patches spread over its dark brown dorsal surface, contrasting with the ochre-yellow under surface and the yellowish edge of the upper jaw.

In general shape and make-up it closely resembled the adult but its basic colours and markings were brighter and more distinct. It was extremely nervous and the slightest movement outside the vivarium sent it scuttling for shelter.

During the following week three more baby Jones's Zonures appeared in the vivarium, two of them equal in size to the first-born and the third slightly smaller.

At this stage their mother, though thinner than she had been before their arrival, was not markedly so and it seemed incredible that she could have produced four such relatively enormous babies.

I had previously bred Transval Zonures and it was interesting to compare the two broods. While similar in shape, the markings on the Jones's were

more distinct and the animals were far more nervous and retiring than their rather larger relatives.

Although previously the Iguana had made no attempt to attack the other inhabitants, it seemed unwise to leave so much larger a lizard with the young Zonures and it was transferred to another vivarium. The adult Zonures showed no interest in the babies and, after considerable hesitation, it was decided to leave them all together. Subsequent events justified this.

Fortunately, at the time the baby Zonures arrived, several pods of locust eggs had hatched and I had a good supply of newly born hoppers and small meal worms. The wide mouths of the Zonures enabled them to cope with these insects and *larvae*. Fruit flies were also plentiful and were eaten freely.

The Zonures, now three months old, are all strong and healthy and if anything rather over-plump. They are far less nervous than they were and spend most of their time in the open parts of the vivarium. Adults and babies continue to live amicably together and constantly demonstrate the tendency of these lizards to pile themselves one on top of the other. It is by no means unusual to see a "four storied" sandwich of Zonures on the flat top of one of the rocks, often with one of the smaller individuals on the bottom.

The babies are far less timid than they were originally, though still be no means tame. They will ignore an observer outside the vivarium but raising the lid, preparatory to introducing a hand into their domain, is sufficient to send them rushing for cover amongst the nearest pile of stones.

Crossword Solution

R	U	B	Y	S	S	T	E	T	R	A	
E		E	H	A	G	E		O			
T	I	N	T	R	E	N	D	P	A	I	R
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THE HARDY EUROPEAN REPTILES AND AMPHIBIANS IN CAPTIVITY (Part 12)

by *Andrew Allen*

24. The Grass Snake (*Natrix n.natrix*)

Description.—Male specimens may grow to about a metre in length, while females are usually larger and stouter with lengths of up to about 1.5 metres. The body is slender, the head is high and ovoid. The species exhibits enormous colour variation, with a grey dorsal surface the rule, but melanism a common phenomenon. There may be longitudinal rows of black dots, or two pale dorsal stripes. On either side of the back of the head is a crescent-shaped patch in yellow or orange, often bordered in black. Ventrally it has dark squares scattered over a light, cream or grey background.

Distribution.—*Natrix n.natrix* is the Central European form of the Grass snake, with a range that includes Germany, Poland, Czechoslovakia, West Russia, the North-East Alps and Scandinavia. It frequents many different habitats, all of them sunny, and prefers to be near water.

Breeding Habits.—Mating takes place without excessive preliminary display or courtship. Between eight and thirty (sometimes many more) calcareous white eggs are laid in piles of rotting vegetation that act as natural incubators.

Care in Captivity.—The Grass snake is one of the easiest of ophidians to keep in captivity, and rapidly settles down and becomes tame. At first specimens may hiss and bite, or void a nauseous fluid from the cloaca when handled, but with the exception of certain old females they usually cease these antisocial habits within a week.

Though better housed in an outdoor vivarium, this species should also do well indoors. The vivarium should be large and well ventilated, and placed in a sunny position (but partially in the shade to avoid overheating). Supplementary heat and light can be provided by means of a small barrage of electric bulbs

of low wattage. Opinion differs as to whether a small pool should be kept permanently in the vivarium. Undoubtedly it is the more natural and attractive arrangement, very much to the taste of the inhabitants who greatly enjoy a drink and a swim. But on the other hand it can lead to an excessively humid atmosphere that adversely affects sloughing and can cause a variety of ailments. So if possible a large water bowl should be available, but otherwise the snakes should be removed each day to a suitably arranged aquarium where they can have a long drink and a good swim. The vivarium substratum can be gravel, soil or peat, though the latter does tend to mar the beautiful living colours of this snake. A large and carefully stabilised pile of stones will furnish an abundance of hiding places, and several flakes of bark scattered haphazardly will also make fine shelters. Some good rugged branches will provide climbing room, and also help with sloughing. Tastefully designed and disguised pots of greenery can add the finishing touches to an attractive arrangement.

However, an outdoor reptiliary is indisputably the premier home for these animals. It should be complete with a very large pool, a hibernating chamber, rocky shelters and a selection of small shrubs. Under these conditions the inhabitants will thrive royally. A greenhouse is not to be recommended with such emphasis. If a pool of the necessary dimensions is supplied, the humidity of the air will soon build up to totally unacceptable levels. This can be countered by replacing several panes of glass with perforated metal sheeting to establish a regular flow of air. This is not a course of action to be undertaken lightly, for there will always be some danger of the snakes rubbing their snouts against the mesh and causing damage that can lead to infection and death. Best then to avoid the greenhouse, for the extra warmth and



Grass Snake

protection that it supplies are surely superfluous to a species as hardy as the Grass snake.

In general snakes are the most difficult of all the Reptilia to feed with ease and success. But among the snake clan *Natrix natrix* poses fewer problems than the majority (a) because it tames readily and rarely indulges in hunger strikes, and (b) because it will accept such a wide variety of offerings. At first it will take only live-food, but it can usually be weaned on to more convenient dead foodstuffs. Small fish such as minnows, sticklebacks and guppies are possibly the easiest live-foods to obtain, and they need simply be liberated in the vivarium pond where they will be stalked and captured with great perseverance and sagacity. Frogs, newts and tadpoles will be accepted with equal enjoyment, while raw meat and sea-fish may be taken by some specimens. Mice are usually rejected, as are all kinds of insect fare. Prey is hunted both on land and in the water.

The Grass snake will fit comfortably into most communities of large snakes of similar hardiness. In this context we may mention Dark Green, Aesculapian, Viperine and Dice snakes. Adult Eyed lizards, Glass snakes (*Ophisaurus* spp.) and all the land tortoises can also be accommodated with it, but small lizards, frogs, toads and newts should all be strictly avoided.

This species is perhaps the best of all for the amateur who is just commencing his experience with snakes. It is easy to house and feed, tames readily, and rapidly becomes established in the vivarium. It can

be recommended with every confidence.

Most important sub-species is the Barred Grass snake (*N.n.helvetica*), powerful of build and growing to a full two metres in length, and usually possessing yellow neck patches. It is the Western European form of the species, coming from Britain, France, West Germany, the Low Countries and much of the Alps. It is the sub-species that the amateur is most likely to encounter, and requires identical treatment to the type.

Other sub-species are the Spanish Grass snake (*N.n.astreptophora*), *N.n.cetti* from Corsica and Sardinia, *N.n.persa* from Asia Minor and the Balkans, *N.n.schweizeri* from Milos, *N.n.scutata* from the extreme East of Europe, and *N.n.sicula*, an inhabitant of Sicily and Southern Italy.

25. The Dice Snake (*Natrix tessellata*)

Description.—This is a slender snake, growing to a metre or so in length, with a long narrow head. Dorsal coloration is grey or brown with a pattern of square markings, sometimes arranged in rows. There is a forward-pointing V-shaped marking on the neck. The undersurface may be yellow, brown or red, usually chequered with black.

Distribution.—The range of this species is extremely wide, for it may be found in Italy, Austria, Switzerland, West Germany, Czechoslovakia, Hungary, the Balkans, the Caucasus, South Russia, Asia Minor and across mainland Asia to North India and West China. It is

nearly always reported close to open water, and is a very accomplished swimmer.

Breeding Habits.—These are similar in most respects to those of the Grass snake. Up to twenty-five eggs are laid in soft soil or rotting vegetable matter.

Care in Captivity.—This Colubrid is very closely related to *Natrix natrix* and in outline its care should be the same.

However, it is an even more aquatic species, and spends nearly all of its life in or near the water. The vivarium must be supplied with a large and deep pool, preferably fully equipped with plants, gravel and rock. To ensure that the atmosphere remains suitably dry, ventilation must be continuous and efficient. Though it is a fully hardy species, additional heat and light must nevertheless be provided, as must ample branches for climbing. Like the Grass snake it prefers the more spacious and airy conditions of the outdoor reptiliary, where it will prosper comfortably as long as it has access to a full-sized pond.

The Dice snake takes much the same range of food as its close relative, favouring fish, frogs and newts. Initially it may only take live prey beneath the water, but can sometimes be encouraged to transfer its attentions to dead animals on the land. To bring about this desirable state of affairs a great deal of patience is the order of the day, combined with a thoroughly equable temperament. *N.tessellata* will slot nicely into the same communities as the Grass snake, and can be relied upon to cause a minimum of trouble.

This is equally a species that can be commended to the amateur, attractive in appearance and lively and engaging in its habits. If it is a shade more demanding than our own Grass snake, it is also slightly more exotic, surely a compensating virtue to those with the time to spend upon it.

There are no sub-species.

26. The Viperine Snake (*Natrix maura*)

Description.—As its name suggests, *Natrix maura* bears a superficial resemblance to a Viper, though

close examination rapidly dispels this initial impression. As in many of its relatives, the female is considerably larger than the male, growing up to a metre in length. The body is slender, coloured grey-brown or red with darker markings that may form a zig-zag arrangement. Laterally there are rows of eye-spots with light centres. Ventral coloration may be green or grey, with dark patches that form no definable pattern.

Distribution.—This species comes from South and West Europe, notably the Balearics, France, Corsica, Sardinia, Southern Switzerland and North-West Italy. Like *N.natrix* and *N.tessellata*, it lives in or near the water, and is very aquatic in its habits.

Breeding Habits.—Up to twenty eggs are laid; sometimes these show a faint greenish tinge.

Care in Captivity.—There are no problems here. Those with experience of Grass or Dice snakes will find its needs to be very similar and quite simple. Like them it prospers best in the outdoor reptiliary, feeding on the same range of fare, settling down with the same companions in a community vivarium. Indoors it can be housed in a perfectly dry container as long as it has daily access to water. In winter it is best allowed to hibernate. The vivarium can be filled with paper, leaves and dry moss and transferred to a cool, frost-proof outhouse. Alternatively the snakes can be moved to a separate hibernating box which should be treated in the same way. Conditions should be maintained as dry as possible if the inhabitants are to emerge full of robust good health in the spring—when one of their first requirements will be a long drink and a swim.

The Viperine snake completes a trio of animals that will bring joy to inexperienced and expert alike, the most satisfactory of all ophidians as inmates of the vivarium.

There are no sub-species.

The next article will consider the remaining hardy European snakes, notably the Aesculapian and Dark Green or Angry snakes.

THE CONVICT CICHLID

by G. Pope

IT is popular opinion amongst the cichlid specialists that the Convict Cichlid is a fish with an unpleasant temper and aggressive tendencies.

For this reason, the Convict Cichlid is not widely kept, and possibly not appreciated as an interesting fish. It is also claimed to be of dull coloration—

THE HARDY EUROPEAN REPTILES AND AMPHIBIANS IN CAPTIVITY (Part 13)

by Andrew Allen

27. The Aesculapian Snake (*Elaphe l. longissima*).

Description.—This is a large but slender snake, growing to lengths of about two metres. It has a small, long head. Dorsal coloration is brown, a light shade anteriorly merging nearly into black posteriorly. Close examination of dorsal scales may reveal that they are bordered in white. Ventral coloration is a uniform, unspotted yellowish-white.

Distribution.—It has a very local and scattered range throughout much of Central and Southern Europe, possibly due to the activities of the Romans who connected this species with the god Aesculapius, and liberated specimens in their wake. Whatever the cause, it is now to be found in Germany (around Passau), France, Austria, Switzerland, North-East Spain, the Balkans, Iran, Asia Minor, Poland, Czechoslovakia and Hungary. It frequents open country and scattered woodland, particularly favouring rocks and ruins. It is an accomplished climber.

Breeding Habits.—The female lays up to ten eggs in holes in the ground or beneath debris and leaf litter.

Care in Captivity.—When originally captured this species bites readily, but not viciously. However, it soon settles down and becomes very placid and tame. Naturally this easy temperament inclines it to be a good inmate of the vivarium, and its general care is fairly straightforward.

However, it is essentially a South European species, and as such it is not particularly hardy. It does quite well in the indoor vivarium, which should be very spacious, perhaps with dimensions of about six foot by six foot by four foot, or larger. In the construction of such accommodation the minimum of cracks and joints should be left, as these can easily harbour ticks and other undesirable parasites. The vivarium should be placed in a sunny position (but

not so sunny as to cause overheating), and supplementary light and warmth should be provided by means of the appropriate number of electric light bulbs of low wattage. Some of these can be blacked out to supply heat, but not light, during the night. The environment should be kept dry and well ventilated, but the snakes must be allowed access from time to time to a large water bowl where they can drink and swim. The flooring, which is best made of heavy or medium grade gravel, should be strewn with rocks and stones, and there should be a large pile of stones to provide shelter and opportunities for exploration. A few pots of plants will improve the aesthetic appeal of this arrangement. An abundance of stout old branches should also grace the vivarium, for the Aesculapian snake requires a good amount of climbing room.

Because its hardiness is suspect this snake should not be risked in the outdoor reptiliary, except perhaps in certain sheltered Southern localities of particularly mild climate. Even in these a certain element of gamble would be very much involved. Instead it should be housed in a greenhouse situated in an open sunny place. There should be a small pool, but otherwise the greenhouse must be kept dry and well ventilated, for a humid atmosphere will soon adversely affect the health of these animals. On the arid flooring should be placed large stones and boulders, or perhaps a section of dry stone walling, copiously endowed with cracks and crevices. A few tough shrubs and bushes grown between the rocks will improve the design and prove much to the taste of the inhabitants. To ensure successful hibernation a hibernating chamber should be sunk deep beneath the soil, and an abundance of tunnels and caves should be available for those snakes unwilling to utilize it. When the first cold spells arrive, and

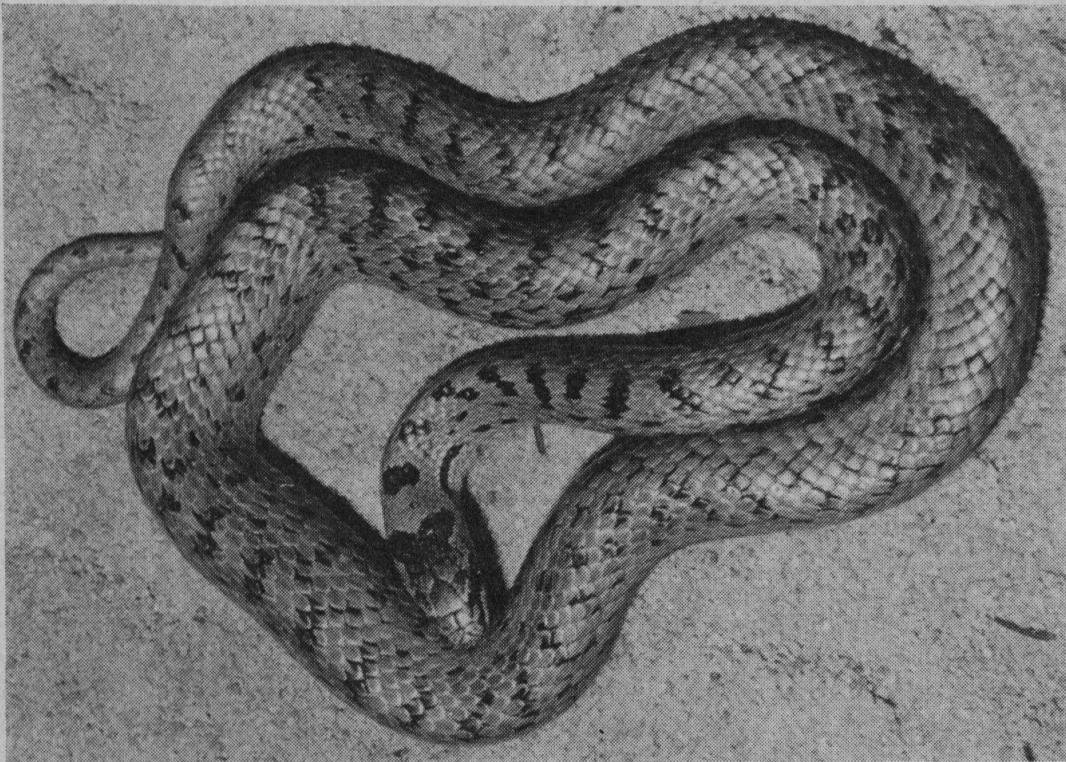
the inhabitants duly retire, the inside of the greenhouse should be painstakingly lagged with newspaper or another effective insulating agent. No water should be added during this period so that sleeping conditions are as dry as possible.

Young Aesculapians require rather a different diet from old specimens. They start off by consuming small lizards, and when adult progress to mice. These are controlled by the coils of the body in a manner reminiscent of the Pythons. Newly obtained specimens will usually only take live mice, but with monumental patience can sometimes be persuaded to graduate to the dead variety. This partiality for small rodents means that the herpetologist must become adept at livestock breeding—and also manage not to view his doomed stock with

the Leopard snake, *E. situla*, the Ladder snake, *E. scarlaris*, and the Four Lined snake, *E. quatuorlineata*. All are to be found only in Southern Europe, and none can be classed as truly hardy. Indoors they require similar treatment to *E. l. longissima*, but they cannot be recommended as inmates of the outdoor vivarium.

28. The Dark Green or Angry Snake (*Coluber v. viridiflavus*).

Description.—This snake grows to between one and two metres, and has a head clearly separated from the slender body. Dorsally it is dark green, brown or black, lightly speckled with yellowish-green spots which form bands across the forequarters and longitudinal lines posteriorly. Ventral coloration is a dirty



Smooth Snake

affection. The Aesculapian snake makes a fair community animal, not too aggressive, and so is reasonable company for tortoises and the other large snakes. However, it should be kept well away from even the largest of lizards.

The amateur is perhaps best advised not to keep this species until he has had experience with Grass, Dice or Viperine snakes. But, once such experience has been gained, the Aesculapian snake will be found an excellent and rewarding inmate of the vivarium, one that is fundamentally well suited to captivity.

E. l. romana is a sub-species that comes from South and Central Italy.

There are several other European members of the genus *Elaphe*, including the Climbing snake *E. dione*,

yellow-grey, the belly shields being edged with black.

Distribution.—The Dark Green snake occurs in Northern Spain, Southern France, Switzerland, Italy (including Elba), Corsica and Sardinia. It favours dry areas of rubble and stone, especially old walls and vineyards.

Breeding Habits.—After mating, in which the male seizes the female behind the head, up to twenty elongated white-marbled eggs are laid in holes or under lead litter.

Care in Captivity.—This is not a species to be recommended to those inexperienced in the treatment of snakes. It is bad tempered and rarely becomes tame, often feeds poorly, and will bite viciously though not dangerously.

Indoors it requires a very large vivarium, set up as for the Aesculapian snake, with an abundance of hiding places. Outdoors its hardiness is again doubtful, so it should be placed in a sizeable greenhouse furnished in the manner already described a few paragraphs back. Its diet is wide, but this is sparse help, for it tends to refuse food in captivity. Lizards of all sizes are perhaps the favourite fare, but snakes, frogs and small mammals will all be taken. Initially it may only take live food, and many individuals persist in this difficult habit. When young, large insects also feature on the menu. The fact that it preys upon lizards and snakes is not a quality that engages this species to the herpetologist. It means that it is practically impossible to accommodate as a community animal. It will take any lizards, smaller snakes of other species, and is a confirmed cannibal upon young specimens of its own species. It can be housed with tortoises, and fully adult Grass and Eesculapian snakes.

The Dark Green snake cannot be recommended to the amateur, on account of its uncertain temper, fickle character and difficult nature. However, it is a very active and attractive species, a challenge to those with the patience, space and money to be able to cope with its vagaries.

C. v. carbonarius is an important sub-species, which tends towards complete melanism. It is found in the Alps, Italy, Sicily, Malta and Istria.

There are several other members of the genus *Coluber* in Europe, of which we may note *Coluber jugularis caspius* (this is probably the largest snake in Europe, growing to lengths of well above three metres), *Coluber gemonensis*, *Coluber najadum* or Dahl's snake, and the Horseshoe snake *Coluber hippocrepis*. None of these snakes can be classed as hardy, and all are extremely difficult in captivity. Most settle down slowly, tame but rarely, and are strongly inclined towards cannibalism.

Several other European snakes are definitely hardy, but cannot be fully recommended for a number of reasons.

The Smooth snake (*Coronella a. austriaca*) is very

rare indeed in this country, though it is more common on the Continent, in Central and Southern Europe from the Balkans to Scandinavia. It grows to about 80 cms. and is brown or grey in colour. It inhabits woods, moorlands, and heaths, up to about two thousand metres in mountainous country. Most specimens become fairly tame, but it is not a very conspicuous vivarium animal, spending much of its time in hiding buried beneath the soil. At present there is some risk that specimens on sale may have been captured in this country, so the diligent herpetologist should refrain from buying this species unless he can obtain an absolute guarantee of foreign origin.

C. a. fitzingeri is a smaller sub-species occurring in Italy (including Elba and Sicily), Switzerland and the Pyrennees.

Coronella girondica is named the Southern Smooth snake, coming from Portugal, Spain, Southern France, and Italian and Austrian Alps. It is slightly smaller than its close relative, and does well in a dry vivarium with a good depth of soil, if fed regularly upon lizards and slow-worms.

The Northern Viper or Adder (*Vipera b. berus*), the Asp Viper (*V. a. aspis*), and the Sand Viper (*V. a. ammodytes*) are all sufficiently hardy to prosper in outdoor vivaria in this country. However, I give no details about their care (a) because I have little personal experience in this field, and (b) because of their extremely dangerous nature. Those who attempt to keep them should have wide experience of dealing with snakes in general, and venomous snakes in particular. It is essential also to possess detailed knowledge about snake bite, and its prevention and treatment. I sincerely hope that no readers of this journal will try to deal with even these familiar venomous snakes unless they have the necessary experience and expertise. Far better, as a first step, to carefully and judiciously observe these animals in the wild and learn about their lives and habits at first hand.

The following article will deal with the various European land tortoises available in this country.

THE WATER SPIDER

by David C. Wareham

There are well over 500 species of spider in Britain, living in a wide variety of habitats. In this large family there are many which live in damp situations or on the edges of ponds and rivers, and a few which live on the surface of ponds. There is, however, only one species

which is completely aquatic, spending the whole of its life beneath the surface. This interesting Arachnid, sometimes called the "water silver swimmer", is the water-spider, *Argyroneta aquatica*, and is common in ponds and slow-moving streams throughout most of

THE HARDY EUROPEAN REPTILES AND AMPHIBIANS IN CAPTIVITY (Part 14)

by Andrew Allen

THIS ARTICLE considers the various European land tortoise available in this country. Dozens of books, some excellent and some mediocre, have been devoted to the subject of their care, and in a few short paragraphs I cannot hope to compete with these. So instead of trying to paint a comprehensive picture I have concentrated on areas where I feel that the available books are sometimes inadequate, and upon certain quite widespread fallacies.

29. The Marginated Tortoise (*Testudo marginata*)

Description.—This tortoise may grow up to 30cms in length. It can be distinguished by the absence of a spur on the tail or tubercles on the thigh, and above all by the flattened marginal plates at the rear end of the carapace. The carapace is yellow and black, the plastron is yellow with black triangular blotches.

Distribution.—Marginated tortoise may be found in Southern Greece, and also in parts of mainland Italy and Sardinia, where they probably occur as introductions.

This species is only rarely imported into England.

30. The Spur-thighed Tortoise (*Testudo g. graeca*)

Description.—*T. graeca* may grow up to 25cms in length. There is no spur on the tail, but there is a very large cone-shaped tubercle on the rear portion of the thigh, and it is from this that the species derives its common name. The carapace is often olive or yellow, the shields being edged in black. The plastron is yellow, often with a black area down the middle. Some specimens may be uniformly yellow or brown.

Distribution.—The type form is widespread in North-West Africa and Southern Spain (hence the alternative name Iberian tortoise).

A sub-species *T. g. iberica* is found on the North side of the Mediterranean in Southern Europe and Western Asia, including Iran, Syria, Mesopotamia, Asia

Minor, the Caucasus, lower Danube and Eastern Balkans. The shields of its carapace are slightly broader and flatter, and it may be darker in colour.

Unfortunately the old literature on tortoise may be confusing because the scientific name *T. graeca* is often given to

31. Hermanns Tortoise (*Testudo h. hermanni*)

Description.—This species may be distinguished from *T. g. graeca* by:

- (a) its slightly smaller size, growing to lengths about 20cms;
- (b) the presence of a large horny spur on the tail, particularly in the male;
- (c) the absence of a large tubercle or spur on the thigh of the forelimb; and
- (d) the possession of a divided marginal above the tail.

Carapace colour may be yellow or brown, often with a central brown patch on each shield. In this species, as in the preceding species, males may be distinguished from females by:

- (a) the plastron—this is concave in males but flat in females;
- (b) the tail—this is longer in the male;
- (c) the marginal plate—this is curved in males but flat in females;
- (d) behaviour—observation of a group of tortoises on a warm sunny day will soon clear up any lingering doubts.

Though the number of growth rings on the shields of the carapace is related to age, this relationship is not simple. Counting the rings will give an indication of age, but no direct measure.

Distribution.—The type is found in the Balkans, Italy and Sicily. A sub-species, *T. h. robertmertensi*, comes from Sardinia, the Balearics, Spain and the extreme South of France.

Breeding Habits.—In all three species the male courts the female by butting her from behind, biting her limbs, and mounting clumsily from the rear. The female subsequently digs a hole with her hind feet in soft soil, and there deposits between three and twelve large white spherical eggs. In warm conditions these should hatch in a little over three months.

Care in Captivity.—The following remarks apply to each of the three species already described.

The familiar tortoise is one of the most misunderstood and ill-treated of all household pets. Enormous numbers are imported each Spring, the vast majority of them destined to die within the year. The mass trade in tortoise is utterly and unequivocally to be condemned, both because of the cruelty that it causes to the animals themselves, and for its drastic effects on wild populations.

The new arrivals are doomed both because of the ignorance of their prospective, often well intentioned, owners and on account of the environment to which they are coming.

The tortoise is not a truly hardy animal. These species are imported exclusively from Southern Europe, Asia or Africa, lands where the climate is far different from our own. They favour dry scrub or desert habitats where the summer is long and hot, and the winter, though often extremely cold, is very rarely long. Contrast this with our own damp, cool summers and long, long winters and you will understand the effects that these can have on the health of a physiologically sensitive creature like the tortoise. If it were not for the fact that so many *are* imported I would hesitate to mention tortoise at all in a series dealing with hardy reptiles.

Naturally they cannot be housed indoors in the vivarium when adult, on account of their large size and notably active habits (tortoise are far from being the slouches that many people believe). Instead, the best home for them is a very sizeable greenhouse or conservatory. This should be sunny and well ventilated, with a small, shallow pool and dry soil and atmosphere. Under such conditions the tortoise should prosper mightily, in a climate and habitat that are ideal for their welfare. A centrally placed, brick-built hibernating chamber will give ample protection in the winter months.

It is unfortunate that few of us can afford to provide a perfect set-up such as this. We are forced instead to keep these animals outdoors in conditions that are far from desirable. The situation is not too bad in the Southern counties, where tortoise can do quite well if given proper care, and may live to a ripe old age. But in Northern climes it is downright cruel to keep these creatures outdoors unless the local climate is particularly favourable. This having been said, what are their prime requirements under the average conditions that they are likely to encounter in the

English suburban garden?

To start with they must be confined. Tortoise are born wanderers and great escape artists, and it is not sufficient merely to release them in the garden and hope for the best. If you do so they will probably escape, and either get run over or perish at the onset of winter. A completely walled garden makes an admirable home—provided that you remember to block up the gap beneath the garden gate. In ordinary gardens a special enclosure must be built. This can have low walls of brick or of very heavy grade wire mesh (with all jagged points and edges carefully removed). The height of the walls should be not less than a foot, and they should extend an equal distance below ground as a defence against tortoise burrowing out, and rodents burrowing in. The enclosure should be the maximum possible size, for if the inhabitants feel too confined they will spend all their time trying to escape, and, knowing tortoise, they will probably succeed in the end. The landscape included within the enclosure must be both rugged and varied. It is totally unsatisfactory merely to wall off a section of the lawn. Tortoise enjoy exploration and will soon become bored in a featureless environment. There should be hills and rocks, hollows and shrubberies, with a wealth of vegetation. But there must be no abrupt cliffs and no deep ponds, for both could be the cause of nasty accidents. Tortoise are often confined by drilling a small hole through the rear of the carapace, threading a string through this, and tying the string to a pole, wall or brick. This method is to be avoided, for it is both unnecessary and dangerous.

Adequate summer shelter from the elements is also essential. This is best provided in the form of a stout waterproofed wooden box with sloping roof, packed with dry leaves or straw. It should be raised from the ground to protect against draughts, an opening must be cut in one face, access to this being via a gently sloping wooden board. The door should face towards the rising sun and be sheltered from prevailing winds.

In most of the articles of this series I have stressed that hardy reptiles and amphibians should be allowed to hibernate “naturally”, i.e. choose their own hibernacula at their own chosen time. This is emphatically not the case with any of these tortoise. If left to their own devices they are unlikely to dig hibernating chambers that are sufficiently deep and warm to protect them against the worst ravages of our winters. This especially applies to clay soils. If they do survive they are likely to wake up during some warm spell in early January, walk about a little—and then get caught by a sudden frost. It is preferable to pack them away in a stout wooden box (their summer shelter is ideal) filled with dry leaves, straw and newspaper. This should then be placed in a

permanently cool, but frost-proof outhouse. The time at which hibernation commences will naturally vary with latitude, but will probably be in late October or early November. Though the tortoise should be well fed during late summer and autumn, they must not be allowed to hibernate on a full stomach, nor if their health is less than perfect. In the latter instance they must be brought indoors and coddled through the winter. When they awake in the spring they may need a drink, their eyes may need bathing, and until early June they should be replaced in the cool outhouse each night to protect against late frosts.

The keynote in feeding these animals must always be variety. Tortoise soon get bored with the same fare, and have very definite views upon what should be included in their diet sheet. Some of my specimens will not touch fresh fruit, others adore it; I have heard of individuals that enjoyed canned dog food or even

sphagetti. Among the items that can be offered to these omnivorous creatures are lettuce, bean cabbage, pea, onion, buttercup and dandelion leaves, brown bread, a range of flowers (yellow seems to be a particularly favoured colour), earthworms, tender young peas, banana, orange, apple, grape (remove the pips!) and plum. Many other green leaves will also be enjoyed, but please avoid ivy or privet leaves and others that could be distasteful or even poisonous.

Those who take the trouble to provide these animals with a good, safe home will find the rewards enormous. Tortoise rapidly become very, very tame and are fascinating creatures with a wealth of interesting and diverting habits. Their popular reputation as slothful and dull animals could not be further from the truth.

The following article will consider the various European water tortoise and their treatment.

the University of Maine claim that migratory eels sense a very weak electrical force and may use this to orientate themselves, for the Gulf Stream has an electric force, like an electrical conductor moving through a magnetic field.

This smacks of the long disproved theory of pigeons homing by reading earth's magnetism. But the Scripps Institute worker suggests that when fish emit electrical pulses as well as sense them, this could be a means of communication. He has shown that a South American electrical fish has sex differences in its electrical discharge rates, and suggests communication as the reason. An adult male changed its steady drone of discharge to a different note when approaching a female. Maybe it is also used for specific recognition where related species live together. Lightning would interfere with this, hence the effect of thunderstorms, when some fish adjust their discharges.

In contrast to the Pacific giant salamander whose prey includes small mammals as well as lizards and other salamanders, even British reptiles eat small fry.

The contents of the alimentary canals of 50 common lizards captured in different habitats in Finland were found to comprise well over a quarter spiders, just over a fifth flies, and 16 per cent bugs, as well as many moths. But their diet varied with season and habitat. Bugs and spiders were the chief food around houses; spiders and flies on stony seashores; spiders and bugs on swamp fields (in both the latter habitats spiders

comprised over a third). In damp heath-forest, flies comprised over half, and spiders a little less than a third the diet; but in dry heath-forest, spiders were over a third and ants, etc., increased in volume. Thus spiders and flies were their commonest summer food while bugs were taken mostly in mid-late summer then harvest-spiders increased towards the end of summer.

The world's most important nesting beach for the leathery turtle is between the Marowinje River and Organabo Creek, in French West Guiana. Here large numbers breed with 3 or 4 other species. The leathery turtle has recently been found nesting on the Caribbean coast of Colombia, an extension of its range. Some of the 10 or so breeding females were tagged there and found nesting there again 20 days later. Though leathery turtles stray to Britain, we do not recognise the fictitious claim for one, without proof at Hilbre, Cheshire, about 1950.

Success is claimed for the pilot hatchery established for loggerhead turtles at Tongaland, with no significant difference in success between untouched wild nests and transplanted nests. Loggerheads take 10-12 years to reach maturity. Since tagging began there in 1963, no cyclic phenomena has been found with the return of nesting females, but it does indicate some territory to which females return after nesting. Sometimes leatherbacks shift the intervals between nesting from 3 years to 2 years.

AN ALTERNATIVE FOOD FOR LIZARDS

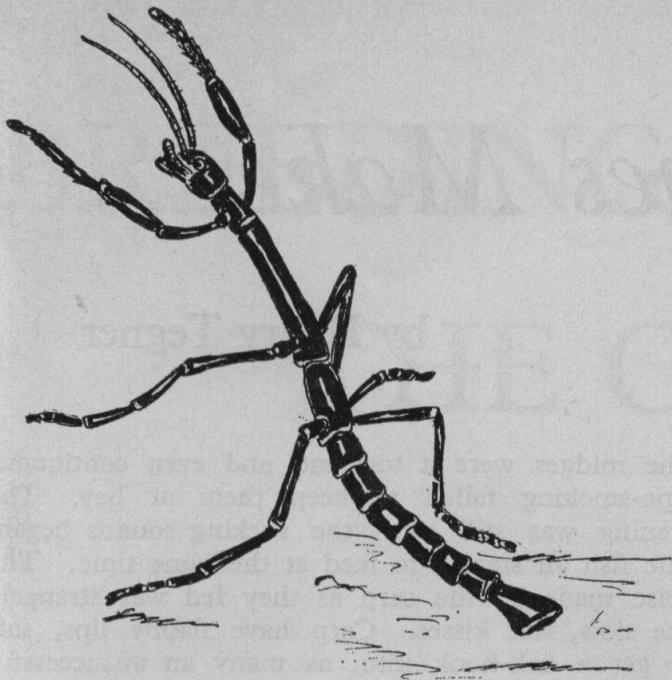
By H. G. B. Gilpin

Lizards, in general, provide few maintenance problems but giving them sufficient food in adequate variety does demand some forethought and long-term preparation. Most species will only take living food and it is desirable that this should be presented in as many different forms as possible.

Stick-insects offer a very welcome and readily obtainable addition to the menu. They are clean to handle, occur in a wide enough range of sizes to suit both small and large lizards, and a breeding colony

can be maintained year after year with an absolute minimum of attention. Not the least of their virtues is that they will flourish at room temperatures and require no extra heat to stimulate reproduction.

Stick-insects are often ignored when first introduced to a vivarium. They are effectively camouflaged. Their stem-like structure and brown or green coloration, only relieved by small red flashes on the upper parts of the front legs near their point of attachment to the thorax, merge into the background. Also they



tend to remain perfectly still for considerable periods and the lizards fail to see them. They do, however, occasionally scuttle from one place to another and when disturbed, as by the sudden movement of a lizard, although remaining fixed to one spot, weave frantically to and fro so drawing attention to themselves. Once the lizards appreciate that stick insects represent food, and it is not long before they do so, the insects will be eaten freely, their long, succulent bodies providing a rich source of nourishment.

My present colony of stick-insects, now in its seventh year of existence, has provided me with a constant continuity of the creatures and maintained itself without the introduction of any new individuals. Reproduction is parthenogenetic. Males occur only at very rare intervals and the females produce eggs, generation after generation, without being fertilised.

The eggs are "fired" with considerable force from the end of the abdomen. They closely resemble small, dark brown radish seeds, each with a yellow spot, and often take several months to hatch. The yellow spot indicates the presence of a "cork" like device which in due course is pushed out, allowing the emergence of a baby stick-insect. No larval stage occurs and the newly-hatched insect is an exact replica of the adult, only differing from its parent in size. When first born its total length equals the diameter of a new penny. After a series of moults it reaches a maximum of approximately four inches. Both young and adults are wingless.

Although the eggs are slow to hatch, reproduction is continuous and once a colony has become established it will at all times contain eggs, young, of a wide range of sizes, and adults. Judicious culling will provide insects for the lizards, keep the numbers in the colony manageable and ensure continuity of supplies.

Stick-insects show no tendency towards cannibalism and considerable numbers can be kept together without harm resulting. The main disadvantage of overcrowding arises when the cage lid is raised in order to replace the leafless twigs with fresh food. At such times there is a possibility that some of the insects will escape. Should they do so, although vegetarians, they will do no harm in the garden, as they will not survive the first spell of cold weather.

Not infrequently the empty exoskeletons of stick-insects, posed in a life-like attitude, will be found. These are not insects which have been brought to a premature end but merely the moulted skins shed at various stages as the insects grow.

Feeding stick-insects involves a minimum of trouble. A colony will survive indefinitely on an unrelieved diet of privet or euonymus leaves. The insects will also eat fuchsia leaves and, with less enthusiasm, ivy. All these plants are readily available in the garden and with the exception of out-door fuchsias, may be obtained throughout every month of the year. I find a bunch of leafy cuttings tightly packed into a small jar of water and stood in the cage will provide my insects with sufficient food for a week. Stick-insects do not appear to drink directly and it is unnecessary to install a vessel of water.

The cage itself is basically a glass fronted wooden box, 14 inches by ten inches by 18 inches high. It stands in a well lighted corner of the room but out of direct sunshine. The sheet of glass forming the front can be slid up and down in grooves cut in the woodwork on either side. It can be removed completely at such times as a thorough cleaning becomes necessary. The closely fitting lid which seals the cage at the top can also be lifted away to give easy access when removing insects or changing the food.

Three one inch diameter holes have been bored in the lid and covered with perforated zinc sheet. These together with six similar holes cut near the bottom of the back of the cage, ensure adequate ventilation.

To further facilitate cleaning operations and the periodic removal of eggs, which for convenience are collected from time to time and stored in a small vessel suspended from the top of the cage, a wooden draw-tray is provided. A false floor, consisting of half inch square wire mesh, is fitted two inches above the surface of the draw-tray. This greatly reduces the possibility of insects escaping during the removal of waste and eggs, as only a few of the smaller ones fall through on to the draw-tray and those that do can easily be picked up and returned to the upper part of the cage.

The provision of a flat piece of wood some two inches by six inches with holes bored in it in which slender well branched twigs can be inserted should be considered. When stood on the mesh floor, it serves as a support from which the growing insects can hang when shedding their skins during a moult.

THE HARDY EUROPEAN REPTILES AND AMPHIBIANS IN CAPTIVITY (Part 15)

by Andrew Allen

32. The European Pond Tortoise (*Emys orbicularis*)

Description.—This aquatic tortoise may grow up to 36 cms. in the South of its range. The carapace and plastron are joined only by a cartilaginous septum, and the plastron itself consists of two mobile plates. The toes are webbed, and the tail long. The carapace is dark brown or black with yellow spots or fine radiating stripes, while the plastron is greyish-yellow splashed with brown.

Distribution.—The Pond Tortoise is to be found almost throughout Southern Europe, and in much of North Africa and Western Asia. Northwards it extends at low density into Central France, North Germany, Poland and Lithuania. It used even to inhabit Southern England, but attempts to reintroduce it have largely failed. As its name implies it favours ponds, preferably muddy, and also lakes, ditches and slow-running streams, sunning on their banks and hibernating in their depths.

Breeding Habits.—Courtship takes place in the water, the male swimming around the female, biting and nudging her. Mating also occurs in the water. Up to fifteen eggs are laid in a small hole dug in soft, damp soil on the land.

Care in Captivity.—Treatment of the adult animals is fairly straightforward, but this is emphatically not the case with the baby Pond Tortoises that are so frequently to be seen in pet stores. They are far from hardy, and require similar care to the tiny North American Painted and Elegant Terrapins. Their purchase should be avoided unless much time can be devoted to their welfare. An admirable article upon the treatment of these delicate creatures appeared recently in this journal ("The Care of Baby Terrapins" by Stephanie J. Peaker, *The Aquarist*, February, 1973).

The adults may be kept indoors, assuming that a

sufficiently large aquarium can be provided. Six foot would be an unsatisfactory minimum length for an aquarium intended to house a pair of specimens. It should be divided equally between land and water areas. Ideally the water should be both deep and muddy, however the amateur may find it more convenient, hygienic, and aesthetically pleasing to have a gravel substratum and maintain the water in crystal clear condition by means of sturdy filters. Aquatic plants tend to be rather superfluous, having a rough time at the claws of these boisterous and robust creatures. The terrestrial half should contain a few large shelters and possibly some decorative pots of resilient plants. The vivarium should be located so that part of it is in the sun, and supplementary heat and light are also desirable.

The Pond Tortoise is hardy enough to make a perfect inmate of an outdoor reptiliary. This need only have low walls (about a foot would do), but should contain a very large and deep pond. One of the easiest ways to create such a basic arrangement is merely to surround a pre-existing garden pool with a simple stone wall or low, stout fence. If the pond is sufficiently deep and has a good layer of mud or rotting leaves, the Pond Tortoises will hibernate very satisfactorily of their own accord. Otherwise they should be placed at the onset of Winter into a sturdy, escape-proof wooden box packed with dry leaves and straw. This should be transferred to a cool, frost-proof outhouse, and inspected at regular intervals. In the Spring the tortoises must only be returned to the reptiliary when temperatures in the outhouse and the garden are identical.

This species would probably prosper in a well planned greenhouse, though I have never personally attempted to so house them. The atmosphere would have to be kept dry by means of ample ventilation.

They are voracious feeders whose tastes are readily

satisfied. Food is generally dealt with in the water often being ripped to pieces by the sharp claws. Earthworms provide a useful basis for the menu, and can be supplemented by woodlice, snails, pond snails, mealworms, gentles, gnat larvae, slugs, beetles and whole range of aquatic invertebrates. Raw red meat and liver are a good reserve for times of shortage, but should not be used regularly. Small fish, newts and frogs will be attacked and eaten with equal eagerness. Though Pond Tortoises are savage and ferocious aquatic predators they will also take a variety of vegetable fare, and a certain amount of greenstuff is essential to their total good health. They will nibble at a range of coldwater plants, gulp down Duckweed (*Lemna sps.*) with gusto, and may sometimes enjoy a leaf of watercress or lettuce. These animals are very messy eaters, and the remains of their meals will soon contaminate a small pond, providing ideal conditions for disease to take hold. Ideally some form of filtration should be used to combat this, or the environment could be kept fresh by means of frequent changes of water.

From these comments it should be obvious that Pond Tortoises will not fit harmoniously into the majority of communities. They must be kept well away from all frogs, toads, newts and small lizards. Possible companions are Caspian and Spanish terrapins, Green and Eyed lizards, and Grass, Dice or Viperine snakes. Land tortoises are thoroughly compatible, but are probably not accomplished enough swimmers to be trusted in the vicinity of a deep pond.

Emys orbicularis is a particularly interesting and entertaining species. If treated well it is capable of living to a ripe old age and becoming extremely tame. It can be difficult if it is not given sufficient space or an adequately varied diet, but then this applies to all reptiles. It is also imperative to purchase healthy specimens to start with, for terrapins of all kinds are susceptible to a number of diseases that can rapidly infect an entire stock. The introduction of one ailing individual to a previously thriving group can have disastrous effects. Once some form of ailment takes a hold it can be almost impossible to eradicate, especially in a large outdoor pool. So check all new acquisitions with considerable diligence, and preferably place them in quarantine for a few days for close observation. These precautions are thoroughly worth while. Having sounded this warning, let me stress that these animals will be an unfailing source of enjoyment to their owners, and a fascinating object of scientific study thanks to their intelligence and great vivacity.

There are no sub-species.

33. The Spanish Terrapin (*Clemmys caspica leprosa*)

Description.—The Spanish terrapin grows up to 26 cms. in length. It has a low domed carapace that is rigidly fixed to the plastron by bony plates. There are five claws on the fore-limbs and four claws on the hind-limbs, with thick webbing between the toes. The carapace is a light yellow-brown that darkens to olive-brown with the passage of time. Red or orange patches occur centrally on the shields. The plastron is yellow, while the skin is olive spotted with red or orange. There is a ring about each ear and a dot behind each eye.

Distribution.—This sub-species of the Caspian terrapin is widely distributed in Spain, Portugal and North-West Africa. It may be found in all types of water, hibernating or aestivating according to the local climate, and is also highly mobile on land.

Breeding Habits.—Only four or five eggs are laid, usually in July.

Care in Captivity. Newly hatched terrapins are no more hardy than the equivalent Pond Tortoises, and will demand similar treatment.

The adults are hardier than their restricted Southerly distribution would suggest, and will do extremely well in an outdoor reptiliary, simple enclosure or greenhouse. Small specimens should not be allowed to spend the Winter outdoors, but larger animals will hibernate happily in their pond if this has about a foot of water underlain by another foot of mud. Spanish terrapins can also be housed indoors, and should live for many years if given supplementary heat, access to natural sunlight, and really spacious quarters. In general their accommodation and diet should be the same as for *Emys orbicularis*, and they can be integrated into similar balanced communities.

It should be noted when selecting specimens that a cracked, alga-encrusted carapace is not necessarily an omen of ill-health. In fact it is a direct consequence of the particular climate in which they normally live, characterized by wide fluctuations in temperature, and the seasonal nature of ponds and streams.

The Spanish terrapin is an attractive animal, and one that well deserves a place in any community of the larger Reptiles.

34. The Caspian Terrapin (*Clemmys caspica rivulata*)

Description.—This species is slightly smaller than the preceding one, growing to about 20 cms. in length. It closely resembles the Spanish terrapin, but can be distinguished by some delicate notches on the upper jaw. The carapace is olive-green, and covered by a mesh of dark-bordered grey lines that become less obvious with increasing age.

Distribution.—The European range of this species includes Southern Yugoslavia, much of mainland Greece, the Ionian islands, the Cyclades and Cyprus. It also occurs in Syria and Asia Minor. Like the

Spanish terrapin it is a sub-species of the Asian *Clemmys caspica caspica*. It inhabits the same type of country as its close relations, and is very lively both on land and in the water.

Breeding Habits.—These can safely be treated as the same as those of *Clemmys caspica leprosa*.

Care in Captivity.—The Caspian terrapin is not often imported into this country. However, it will cause few problems, is very hardy, and will thrive under the same conditions as the Spanish terrapin.

The next article will concern itself with our most familiar native lacertid, the Common lizard.

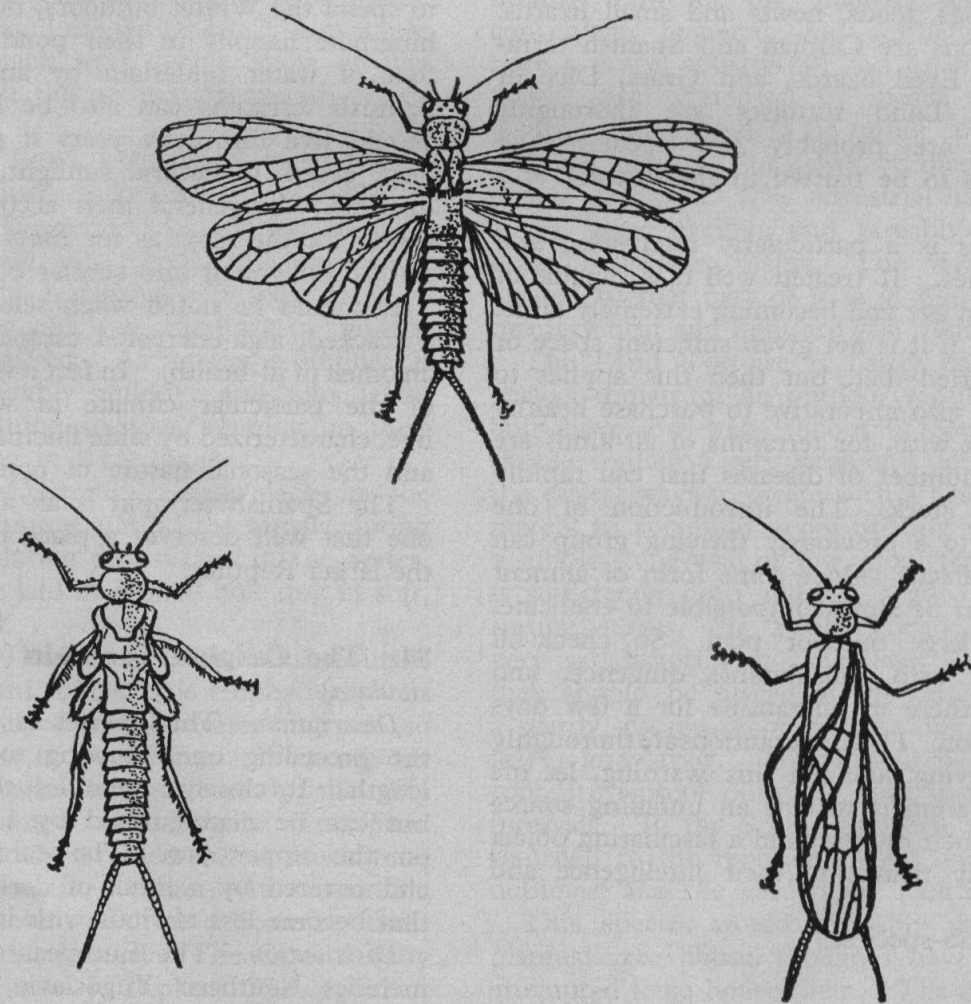
STONEFLIES

by David C. Wareham

THE STONEFLY is a rather primitive insect which has remained almost unchanged since it first appeared on this Earth some 250 million years ago. Altogether something like 1,400 different species have been

recorded throughout the world, and these have been divided into seven families, three of which occur in Britain. They form the Order Plecoptera.

The adult insect has a thick, soft body, with a



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THE HARDY EUROPEAN REPTILES AND AMPHIBIANS IN CAPTIVITY (Part 16)

by Andrew Allen

35. The Common Lizard (*Lacerta vivipara*).

Description.—This species grows to a maximum length of 18cms. The tail never reaches double the length of head and body, and is fairly short by lacertid standards. The head is short, blunt and flattened, whilst the body is rather slender. Coloration varies enormously. The back may be brown, grey, brick-red or even green. There is usually a vertebral stripe, and dark lateral bands. The sides are often darker than the back. The belly is red or orange spotted with black in males, and a more subdued and uniform yellow or grey in females. Melanism is a very frequent occurrence.

Distribution.—The Common lizard is a very hardy and adaptable creature, with a wide distribution throughout Northern and Central Europe, including Britain and Ireland. It also extends through much of temperate Asia right across to Sakhalin island, which lies off the coast of Russia near to Japan. Northwards it reaches the Arctic circle, and in all these regions it is to be found in a vast range of lowland and montane habitats. Southwards its distribution is more limited, and in warmer climes it is largely restricted to montane localities, notably the Pyrennees, the Alps (to the very snow-line), the Northern Balkan uplands (Bulgaria and Macedonia), Altai mountains and Caucasus. In all these areas it may be found at altitudes exceeding three thousand metres. Elsewhere it frequents woods, meadows, banks, verges, walls and sand dunes, tolerating both arid and damp conditions. All in all it is one of the most successful of living Reptiles.

Breeding Habits.—As its name implies this species brings forth live young, though it is perhaps more truly ovo-viviparous than viviparous. Mating takes place between February and May. The young are born fully formed in late Summer, though there are isolated reports of egg-laying, notably from the Pyrennees. Usually the baby lizards, up to ten in number, are deposited in a moist, concealed cavity,

still enclosed in their egg membranes. In the course of a few minutes or of several days they free themselves from these by movements of the head, emerging fully equipped to face the dangers of a hostile world.

Care in Captivity.—If suitably treated the Common lizard makes an excellent inmate of the vivarium, undemanding in its requirements and fascinating in its habits.

Except for purposes of close scientific study I believe that it is totally unnecessary to house this species indoors. Firstly enough space to accommodate its lively way of life is rarely available. Secondly it has absolutely no need for any supplementary heat or light being fundamentally a very hardy North European species. Thirdly its good health demands a period of hibernation, and allowing for this always causes problems in indoor vivaria. In view of these factors I think that this species is best housed outdoors, where climatic and environmental conditions will be more to its liking. Space indoors is better allocated to semi-hardy or tropical species that will appreciate hot conditions throughout the year.

Outdoors the Common lizard will thrive in almost all forms of accommodation. The extra warmth and protection afforded by a greenhouse are rather superfluous. I have several specimens in a small greenhouse and they live there quite happily, breeding regularly each Summer. However, they do not enjoy the great heat that can sometimes be generated there in high Summer, and tend only to emerge in dull weather, or at dawn and dusk. Perhaps then the ideal way to "house" these animals is just to release a few specimens onto an overgrown, South-facing rockery. If the location is right they will probably stay and mate, and establish a small colony. Alternatively they will do well in a reptiliary, provided that this stands in a sunny position well protected from the wind that lizards so detest. There should be some damp corners, and also a few shady areas where the inhabitants can escape from the hottest rays of the sun. It

will soon become obvious to the vivarium keeper that the Common lizard is the hardiest, most resilient animal in the entire reptiliary. It will probably retire to hibernate the last and emerge the first, whilst more sensitive relations are still buried deep beneath the earth. As long as the micro-habitat in the reptiliary is a reasonable copy of some typical environment in Northern Europe this lizard will not complain, for its tolerance of different conditions is enormously wide.

Feeding this adaptable animal is every bit as easy as accommodating it. A small lizard, it is only capable of dealing with small fare, but will take almost any tasty invertebrate of reasonable size. Mealworms and spiders are firm favourites, but slugs, woodlice, beetles, gentles, earthworms, houseflies, bluebottles and many others will be taken and enjoyed. Common lizards have the heartiest of appetites, and I have never known a specimen go on hunger strike, though unwanted offerings will be completely ignored. It is important to ring the changes, for these intelligent creatures will speedily become bored with a monotonous diet, and their health will deteriorate in consequence. They rapidly become thoroughly tame, and will readily take food from the fingers or allow themselves to be gently handled.

They are completely inoffensive animals that will never molest even their smallest companions, and hence make admirable members of a wide variety of community vivariums. Not only will they happily accompany a good range of fellow Reptiles and Amphibians, but they will tolerate many different habitats as well. However they are rather small, and have few defences apart from their intelligence and agility. As a result they are liable to fall prey to many larger creatures, among which we may number all the snakes, any Pond Tortoises or terrapins, Eyed, Green, Dalmation and Schreiber's lizards, Grass snakes and very large Slow-worms, adult Common toads (especially Southern sub-species like *Bufo b.spinosus*), and Marsh and Edible frogs. Common lizards should not be introduced to any community that contains one or more of these species. Baby *L.vivipara* are only about 40mms in length when first born, and unfortunately are fair game for almost any frog, toad or lizard—including sometimes their own parents. Unless the vivarium is particularly spacious it is kindest to remove the tiny lizards at an early date, and only return them when they are large enough to fend for themselves. This need not be an unduly long period, for the young lizards feed voraciously, grow rapidly, and soon attain maturity. Adult lizards may be housed in company with land tortoises, most Slow-worms, Sand, Wall and Ruin lizards, all European newts and salamanders, Painted frogs, Fire-bellied, Yellow-bellied and Midwife toads, Common, Agile and Moor frogs, and Green, Spade-

foot, Natterjack and most Common toads.

L.vivipara is not the most colourful or spectacular of the Reptilia, with its small size and subdued colours. In these respects it cannot hope to compete with the glories of such animals as the Ruin lizard, or the magnificently beautiful Green lizard. This is not where its attraction lies, and those who seek solely a living masterpiece in brilliant tantalizing hues would do well to look elsewhere. Seen in the company of lordlier, more aristocratic lizards it appears rather drab and insignificant. But exteriors aren't everything, and it fascinates instead by its liveliness and relative intelligence. Most individuals soon become confident and tame in the presence of humans, indeed some lose their fear even in the wild. Several times I have induced a completely free lizard to take a worm from my fingers, and on one occasion in France the animal in question even sunned itself on my hand for some minutes. This was certainly exceptional, but nonetheless it illustrates the perkiness of these delightful little creatures.

I hope that I have painted the portrait of these lizards in sufficiently appreciative colours. I have derived many hours of pleasure from watching their antics and studying their lives, and expect to find many more surprises in the future. They are an ideal species for the amateur, causing the barest minimum of trouble, and being almost too easy both to accommodate and feed. It is worth stressing once again that they are emphatically not suited to any indoor vivaria, where their condition will deteriorate and their life span be shortened. But for all the outdoor vivaria they can be recommended without reservation. They are almost certainly the simplest of all the European lizards to cope with, but at the same time will give just as much pleasure as their grander, more demanding cousins.

There are no sub-species.

WHAT AM I?

By Hilary Maynard

My first is in PARTNER but not in MATE,
My second is in PUNCTUALITY but not in LATE
My third is in HAYRICK but not in STRAW,
My fourth is in HAMMER but not in CLAW,
My fifth is in PRINCIPLE but not in THOUGHT,
My sixth is in NOTHING but not in NOUGHT,
My seventh is in EXCITEMENT but not in GLEE,
My eighth is in HE and also in SHE,
My ninth is in BLINDNESS but not in SIGHT,
My tenth is in AIR-TICKET and also in FLIGHT,
My eleventh is in BODY and also in HEAD,
My whole's coloured grey, flecked with orange and red.

Answer on page 233

see a trace of a *Daphnia*, but soon found the reason. Smooth newts must have got into the tanks and bred for there were newt tadpoles instead of *Daphnia*. However, I shall try again with more care before using any tank with well established water.

I thought I would have another spawning of fantails before I went away, but it was a false alarm. One very young fantail was being chased all day long for a couple of days but no eggs appeared. The following morning this fish, a two year old, with a very fat abdomen was floating on the top of the water. I took it from the pond fearing it was dead, but it struggled well and so I popped it into one of my hatching tanks in the frame. I left it there with no base compost nor plants of any kind and went on holiday. On my return I found the fish in tip-top

condition. I have not yet returned it to the tank as I shall use it as an experiment. This will be in the form of feeding on Duck weed, *Lemma minor*, exclusively. I have plenty of spawners in the pond without this one and in any case, although fat, it was not ready to shed its eggs.

In all the many years I have been with fantail breeding I have never before found any fish in such distress. There is a theory that the reason male fish chase a female is because they are excited by the sight of the fat belly, but I cannot go along with this idea entirely, as if this is the case why is it that for months in the year the males do not chase such fish although they are always with them. Besides the fat belly there must be some other factor which encourages the chasing.

HERPETOLOGICAL NOTES

by Stephanie Peaker

ANTI-INFLATION

THE Pancake or Soft-shelled Tortoise (*Malacochersus tornieri*) which occurs in East Africa must be the oddest of all the land tortoises. The shell, which has the consistency of thick parchment, is thin and flat and entirely lacks a domed carapace. The bony plates which underlie the shell have large apertures so that the whole arrangement gives virtually no protection against predators. Early collectors found that these tortoises are extremely difficult to extricate from the rock crevices into which they run when disturbed, and suggested that not only do they wedge themselves in but also actually inflate the body in order to press the shell against the wall of the crevice.

In fact the ability to inflate was never checked although the story has been repeated from book to book since the 1920s with greater emphasis on the inflation than on the wedging action of the legs, even though Dr. Robert Mertens had failed to find any evidence for inflation during the early 1940s. Drs. L. C. Ireland and C. Gans of the State University of New York realised that the respiratory mechanism of tortoises probably could not allow the lungs to be inflated in order to distend the soft shell. Therefore they tested the response of Pancake Tortoises to being forcibly pulled from an artificial crevice they had been allowed to enter. Direct measurements of pressure on the

lungs (reported in *Animal Behaviour*, volume 20, pages 778-781, 1972) during this procedure clearly showed that there is no sustained inflation and that the tortoises depend on the wedging action of the fore- and hind-limbs to hold tightly in the crevice. Although the results seem clear I imagine it will be many years before this new information on this very interesting species reaches the text books.

In captivity Pancake Tortoises require a large heated enclosure, and it is best if some rocks can be provided so that they can hide in the crevices. As well as the usual varied diet of fruit and green vegetables tinned dog food (preferably rich in calcium) as well as vitamins and minerals should also be supplied; they have bred successfully in some collections.

UROMASTIX

The lizards of the genus *Uromastix* (sometimes seen as *Uromastyx*) are known by so many different common names—mastigures, dab or dabb-lizards, spiny-tailed lizards—that the beginner can be bewildered by the situation. In fact the relatively few species in the genus are easily-recognised members of the agamid family which live in the hot and arid regions of North Africa, the Middle East and South-West Asia. They are heavily built lizards with a bulky armoured tail

which is used for defence. It is said that some, instead of disappearing into depths of their burrow (which may be several feet deep), when chased by a predator will stop in the entrance and leave the tail above ground level. This is then waved, spines and all, in the face of their pursuer. The attacker can then neither pursue further down the hole nor attack the body of the lizard on the surface, and the tail is so unpleasant that retreat is the only course of action possible.

Mastigures grow to something over a foot in length and some are attractively marked. The two species most commonly imported are Bell's whichever-name-you-choose-to-use (*Uromastix acanthinurus*) from North Africa and General Hardwicke's (*Uromastix hardwickii*) from Pakistan. Others however, for example the Egyptian (*U. aegyptius*), the Small-scaled (*U. microllpis*) and the Ornate (*U. ornatus*) have certainly been imported.

When adult these lizards are largely vegetarian but this does not mean to say that meat and large insects should not be given. By contrast the young are largely insectivorous and they lack the broad cutting teeth of the adult; instead they have small pointed teeth typical of insectivorous lizards. However the young will eat some plant food so for both adults and young a mixed diet should at least be offered. A good basic mixture of green vegetables (lettuce, dandelions, cabbage, clover etc.) with chopped fruit (apples, pears, banana, peaches, apricots etc.), flowers and chopped meat is ideal. A mixed vitamin and mineral preparation should be added. Mealworms or, better still, locusts should be offered to adults and all manner of insects supplied to young mastigures. It is wise not to give too much food at any one time because at the high temperatures these lizards need it will soon wilt and dry out.

Adults need a large vivarium if they are to be seen at their best and if a group is kept a really large enclosure, say five feet by four feet, may be necessary. The young or several adults can of course be kept in a much smaller cage. The detailed arrangements can be left to the imagination and ingenuity of the builder but with these lizards that prefer a home burrow a false floor can be fitted. If holes are cut in this and camouflaged with rocks and logs on the surface, burrows can be constructed underneath into which the lizards can retire. Both "floors" should be covered with builders' sand, ballast and peat. Large flat rocks or logs can be positioned for basking. The whole set-up should normally be kept as dry as possible and although a bowl of water should be provided seepage into the sand should be prevented. Although the humidity should be low the occupants and sand may be sprinkled occasionally and it may be found that the lizards drink this "dew" rather than from a bowl.

When the lizards start to slough the sand in the burrow should be dampened and then allowed to dry out again. This procedure will keep the skin moist at night during the slough.

Mastigures require high temperatures during the day-time. In a large cage an infra-red lamp hung from the ceiling can be used to provide a hot spot and the lizards choose their own temperature. In a small vivarium a thermostatically-controlled heater with a lamp to keep the temperature at 90°F. is probably the best arrangement, with the lamp directly over a basking spot so that there the temperature is somewhat higher than in the rest of the cage. At night the temperature should be allowed to fall to about 70°F. and the lights should also be turned off. The lizards will then enter their burrows until the light is switched on again in the morning and the temperature begins to rise.

Some authors have noted that mastigures sometimes suffer from worms in the intestine. It has been found advisable at Jersey Zoo to worm them every six months (G. Watson, *International Zoo Yearbook*, volume 9, pages 29-30, 1969). For this "Thiabendazole", which can be obtained on a veterinary prescription is ideal at a dose of 400 mg per adult. It can either be mixed with the food, pushed into the side of the mouth (or solution dropped in from a hypodermic syringe) or given by stomach tube. The last method is the most certain means of delivering the full dose but it requires practice and the first two may be preferred. If the infestation is severe it is worth asking a vet. to make sure a large dose is given by passing a soft rubber or plastic tube into the stomach.

Apart from being extremely interesting members of their family, mastigures are easily tamed, active when the temperature is high and can be highly recommended if some thought is given to their housing and feeding.

NAMES CHANGED

Taxonomists have been at work in the past few years on chelonians. We might soon start to see *Chrysemys* being used instead of *Pseudemys* because it has been decided that the two genera are indistinguishable. So the Red-eared or Elegant Terrapin now becomes *Chrysemys scripta elegans*, which is I think what it started out as not so many years ago. However I cannot avoid the suspicion that the painted terrapins as a group just look different from the sliders and cooters (*Pseudemys*) and I wonder whether future work will show the change to be justified.

It is also not so long ago that it was decided the Spanish Terrapin is a race of the Caspian (*Clemmys caspica*). But now I have seen this species placed in a new genus—*Mauremys*. So we have *Mauremys caspica leprosa*—still the Spanish Terrapin.

THE HARDY EUROPEAN REPTILES AND AMPHIBIANS IN CAPTIVITY (Part 17)

by Andrew Allen

36. The Green Lizard (*Lacerta v. viridis*)

Description.—This noble lizard can grow to 40 cms. or more in length, though more than two-thirds of this total will be due to the long, graceful tail. Dorsally it is a glorious grass or yellow green, ventrally cream or pale yellow. In the breeding season in both sexes the throat and sides of the head may be a vivid blue. Males can be distinguished from females by the small black spots on the back (the females have larger spots and several yellow or white stripes), by their more massive heads, and by the bulkier root to the tail. Juvenile lizards are light brown in colour, often with pale yellow stripes.

Distribution.—*L. viridis* is a common lacertid of Central and Southern Europe, including Spain, Italy, the Balkans, South-West Russia, Czechoslovakia, Austria, Switzerland, parts of Germany, Belgium, France and the Channel Islands. It frequents most dry and sunny localities within this great range.

Breeding Habits.—Courtship and display are colourful and vigorous. The female lays up to twenty eggs in an excavation in the ground.

Care in Captivity.—If suitably treated these beautiful and intelligent lizards should live for many years, and be a perpetual joy to their owners. But if sufficient attention is not devoted to them their condition will deteriorate drastically, and they will become drab and sorry creatures.

They can be accommodated indoors, but I do not recommend the practice. An indoor vivarium should be very spacious indeed, and totally escape-proof. It should be placed in the sun, and given supplementary heat and light. Abundant hiding places should be provided, plus a small water bowl, branches for climbing, flat stones for sunning, and appropriate arrangements of carefully chosen plants. In these conditions the inhabitants could do tolerably well, but they are unlikely to live as long, or as healthily, as in

freer outdoor vivaria. Among other disadvantages hibernation poses considerable problems. Overwintering is the simple solution, convenient for the vivarium-owner, but it reduces the life-span of the lizards and may disrupt their reproductive cycles. The alternative is to pack the lizards safely away into a box crammed with dry straw and leaves. The box should be placed in a cool outhouse for the winter, and checked regularly as spring approaches. When the lizards awake they can be transferred back to their summer home, and given an immediate drink and early feed.

It is much fairer to give these large and athletic creatures the running space that only an outdoor vivarium can provide. A spacious reptiliary is ideal in Southern England, but might not give sufficient protection from the weather in Northern climes. It should have high walls and a wide, smooth overhang. Green lizards are escape-artists supreme, so the defences must be maintained in good order, and grasses or bushes should not be allowed to grow too close to the outer walls. A hibernating chamber, or some deep caves or piles of soft soil, should be provided for winter shelter, and the vivarium should have maximum exposure to the sun and protection from the wind.

A greenhouse provides an admirable alternative, and is much preferable where harsh climates prevail. Ventilation must be good, aspect must be to the South, and shelter from excessive heat is imperative. Luxuriant foliage can be established (as long as the atmosphere is kept dry), and the entire arrangement can be aesthetically most pleasing. In either greenhouse or reptiliary these lizards should prosper royally, enjoying conditions very similar to their home habitats.

Variety is the key to successfully feeding *L. viridis*. On a restricted diet these lizards will soon become bored, and their health suffer in consequence. The

range of possible offerings is very wide, and they are voracious feeders, so that a monotonous bill of fare is inexcusable. Almost any palatable small invertebrate will be taken, with spiders and mealworms the firm favourites. Many small land vertebrates are potential prey, whilst minced meat may be accepted—though it should only be offered if live foods are totally unavailable. Most Green lizards have a sweet tooth, and will relish some demerara sugar or a little honey. Fruit is consumed with enthusiasm, and grapes, oranges (both with the pips removed!), apples, bananas and plums are all much appreciated.

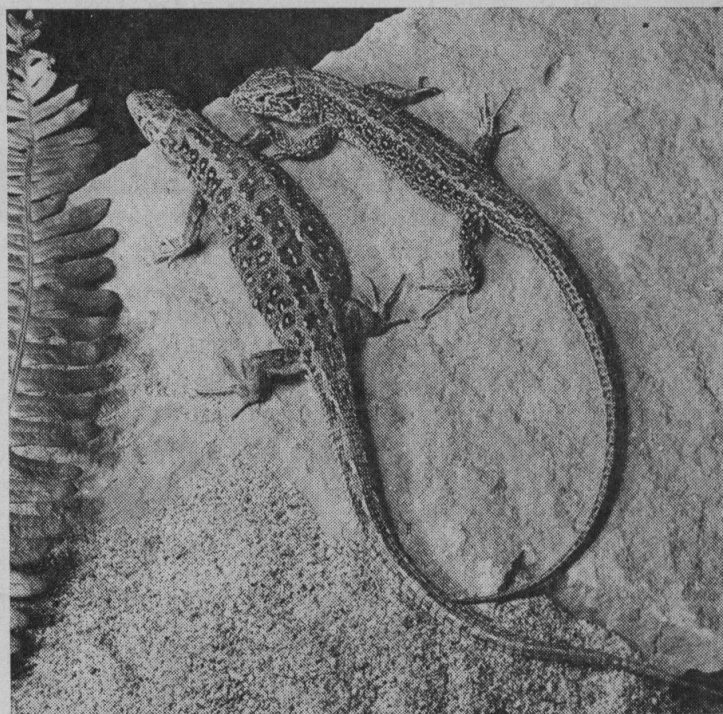
Because of its hearty appetite the Green lizard should not be housed with smaller animals. Baby newts, frogs and toads, medium-sized lizards, small Slow-worms and juvenile snakes would all be in peril. For the opposite reason, adult snakes and Eyed lizards should be avoided, as they are very capable of making a meal of *L. viridis*. At the current price of Green lizards this is not at all desirable! But these restrictions still leave us with quite a lengthy list of potential companions, among which we may note land tortoises, water tortoises and terrapins, adult Slow-worms, Schreiber's lizard, Crested and Marbled newts, Fire salamanders, and most adult frogs and toads.

This brief guide can scarcely do justice to such an engaging animal. Perhaps the most beautiful and colourful of the European Reptilia, it is lively and diurnal, longer-lived than its smaller cousins, and readily and rapidly tamed. For those who can give it ample space and a place in the sun, it is an unbeatable species. Those who cannot, should go to Southern Europe and watch and study it on its home ground. This is far more rewarding than confining a few colourless and depressed individuals in some cramped, uninspiring indoor vivarium.

There are a number of sub-species of which it is worth mentioning *L.v.chloronata* from Calabria and Sicily, *L.v.citrovittata* from the Cyclades, *L.v.fejevaryi* from Apulia and Campagna, and *L.v.meridionalis* from South-East Europe. A closely related species is the large Dalmation lizard, *Lacerta trilineata*. It demands similar conditions, but is somewhat less trustworthy in the community vivarium, and should be housed with larger companions.

37. The Sand Lizard (*Lacerta agilis agilis*)

Description.—Lengths of 25 cms may be attained, the tail being comparatively short. The body is stout, the tail thick, and the head blunt. Colour is very variable, with brown or grey predominating dorsally, there being a vertebral band featuring black-brown spots with white centres. The flanks of the female are grey-brown, but may be a muted or vivid green in the male. Ventrally the male is yellow or green, females cream or yellow, sometimes liberally sprinkled



Photo

Sand Lizards

Robert Bustard

with black. The most colourful males may fleetingly be confused with the larger, brighter Green lizard.

Distribution.—*L. agilis* has a fairly wide range in Central Europe, from the Alps Northwards. It may be found in Central Russia, Northern Yugoslavia, Hungary, Germany, Switzerland, France, Belgium, Holland, South Scandinavia and England. It favours dry, sunny areas where vegetation is sparse, and is the characteristic lizard of the steppes. Dunes, heaths, field borders, hedgerows and gardens are all frequented, and it occurs to altitudes exceeding a thousand metres in the mountains.

Breeding Habits.—In June or July the female lays up to fifteen eggs in soft soil, sand, or beneath superficial rocks and roots.

Care in Captivity.—Essentially the Sand Lizard requires similar treatment and conditions to *L. viridis*. Being much less active it fares better indoors, for it is far less likely to chafe in a small vivarium of perhaps ten square feet floor area. In such a vivarium there should be only one male, but it could be housed with two or three females.

Though I have kept this species indoors with fair success, it nonetheless does far better in an outdoor vivarium. A reptiliary is again ideal, and will not need to be so carefully guarded, for the Sand lizard, belying its scientific name, is far from agile and only a poor climber. It is probably the least mobile of the European lacertids. A very well ventilated greenhouse will do equally nicely. It will take a similar range of food to the Green lizard, though both its appetite and its cubic capacity are considerably smaller. In the

community vivarium it is a much more inoffensive beast, not to be trusted with Slow-worms or young lizards, but otherwise an exemplary inmate. It can be slotted into a great variety of communities of medium sized Reptiles and Amphibians, and will cause very little trouble indeed. The Sand lizard is comparatively intelligent, whilst its sedate movements will contrast pleasurably with the quicksilver activity of the other lacertids.

Unfortunately *L. agilis* is now on the very verge of extinction in this country, and faring poorly in some other parts of Europe. Stringent and intelligent conservation measures will be necessary to save it here; major steps in this direction are being taken by the British Herpetological Society via its Conservation Committee. Their efforts are obstructed by irresponsible amateur herpetologists and unscrupulous collec-

tors who take this species from endangered sites. So please don't collect any specimens yourself, for there is no locality in England where the species is sufficiently abundant to survive any depletion. In the present situation it is certainly best to refrain from keeping the Sand lizard altogether. Collecting is only one of the threats that imperils its status, probably not the major one. But it is up to us to ensure that this particular threat is eliminated entirely, thus helping to protect this beautiful member of our native herpetofauna.

Among its sub-species are *L. a. boemica* from the Caucasus, *L. a. chersonensis* from parts of Russia and Rumania, and *L. a. exigua* from Central Russia.

The next article will deal with Schrieber's lizard and the magnificent Eyed lizard, largest of the hardy lacertids.

THE JEWEL DAMSEL FISH

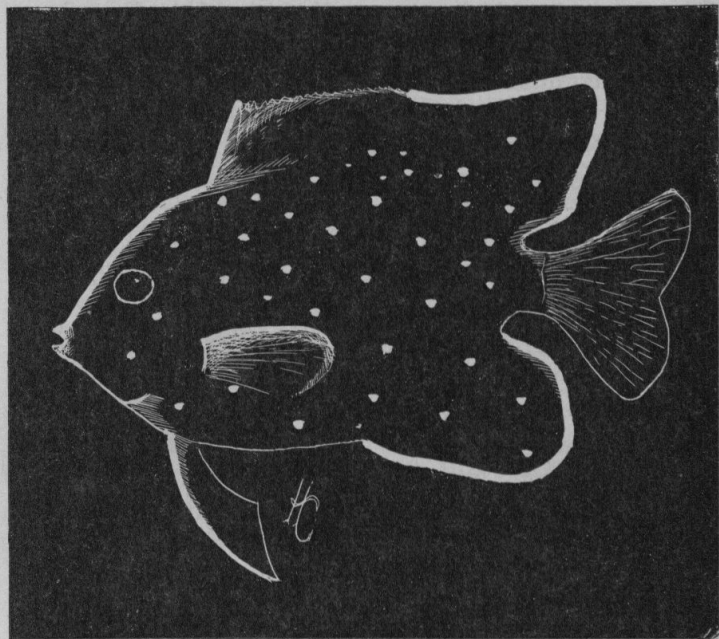
by Huw Collingbourne

As with many other marine creatures, the name, Jewel Damsel is applied to more than one variety of fish. Certainly, I have seen at least two different colour varieties with this name, and possibly two different species. While the basic body colour may vary between deep blue and brown, (and the deep blue in colour are reckoned to change to a brown hue with age) they have in common a very remarkable design of many small highly luminous green or blue spots flecking the body surface.

In any case, according to the reference books, the Jewel Fish is listed as *Microspathodon chrysurus*.

I have kept a Jewel Fish in a large tropical marine aquarium and I found it to be very aggressive and it was very demanding over its territorial rights. Unlike a damsel fish of another species which is content to take a small piece of coral or rock for its territory, the Jewel Fish commandeered several large pieces of coral and more than half of the entire base area of the aquarium, and this it defended with great fervour.

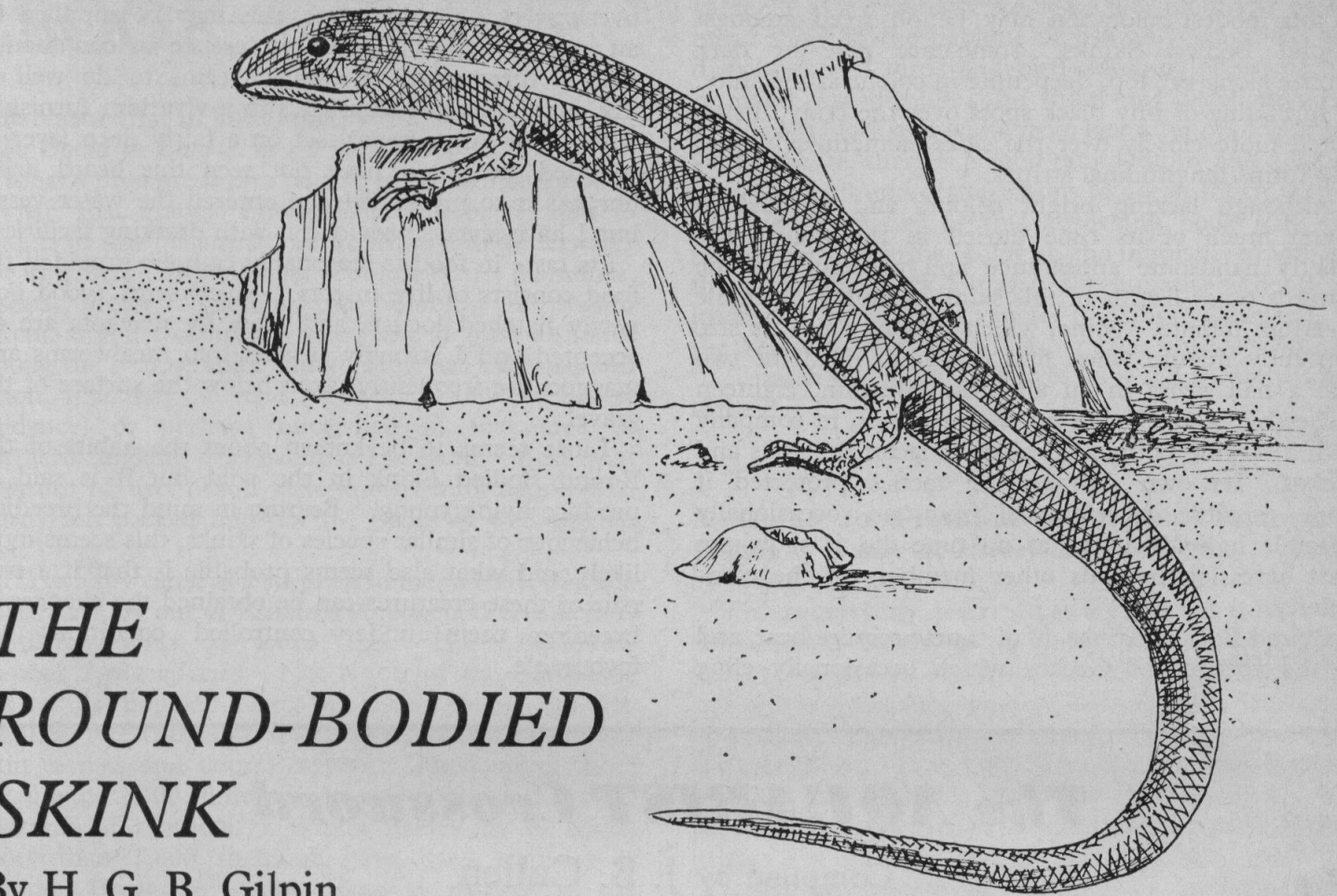
Very soon the other fish in the aquarium, (including two Humbug Damsels and a Picasso Triggerfish) learned to respect the Jewel Fish's self-proclaimed territorial rights, and, indeed, had any of them neglected to show the proper respect for these unseen boundaries, the Jewel Fish would have shown no sympathy and it is certainly not of passive enough nature to allow any infringement by anything, no matter how much larger than itself.



The Jewel can be somewhat ill mannered outside its territory, however, and shows little regard for the territories of lesser creatures.

In small aquaria, I would imagine that this fish would be an impossible neighbour for less capable species, and even in a very expansive setting, it is a merciless bully to small fish and will persistently attack fish with long flowing fins. And when food is introduced into the water, it is almost invariably the first to snap it up and on the rare occasions when it is not first, it wastes no time in snapping up any morsels protruding from the mouths of others.

So, in conclusion, I think it goes without saying that a Jewel Damsel, though very beautiful, cannot be kept successfully with any but the most robust of fishes. However, in the right circumstances, it is an amazing fish to keep and observe and grows remarkably quickly when fed on fresh or dried foods.



THE ROUND-BODIED SKINK

By H. G. B. Gilpin

Chalcides bedriagai, commonly known as the Round Bodied Skink, is a rather charming, quietly hued lizard inhabiting the Iberian Peninsula, particularly the more mountainous regions. I imagine it is infrequently seen owing to its habit of spending most of its time hidden under rocks, from which it rarely emerges except to search for food or indulge in an occasional spell of sun bathing.

My own specimen was caught in Benidorm on the east coast of Spain, during early spring. It was found lurking under a stone in the shade of some Locust Bean trees and, surprised by the sudden removal of its cover, allowed itself to be captured.

Like most healthy and well-fed lizards, it stood the journey to England well. It spent the first few days after collection and then travelled, in company with several Geckos, in a small wooden box, packed with soft, dry grass and on arrival was transferred, first to a little all glass tank for examination and then to its permanent quarters. In the glass observation tank it showed no signs of the lethargy it exhibited when first discovered under the stone but flashed around with surprising speed and agility.

The lizard's total body length barely exceeded four inches. The tail, thick at the root and gently tapering to a fine point, accounted for one and a half inches. Its body was rounded and covered with small scales,

all roughly the same size and so smooth as to give the animal a shiny, metallic appearance. The tiny forefeet carried five delicate toes, the fourth being rather longer than the third. The hind feet supported an equal number of toes and again the fourth was the longest.

The fore limbs fitted into grooves on the sides of the body to facilitate movement underground. This movement incidentally can be extremely rapid, as was demonstrated whenever one wished to remove the lizard from the vivarium. On such occasions it inevitably buried itself in the gravel, two inches deep on the floor of its quarters, and once under this cover moved with such speed that its capture became difficult. The merest touch of the fingers, as they gently groped through the gravel, against the lizard sent it swirling away to the far end of the vivarium.

As a further protection this animal, in common with other skinks, had a transparent central part to its lower eyelid, enabling it to see even when its eyes were closed to prevent damage from particles of sand or soil. The eyes themselves were small and bright and vision was keen, especially when the object viewed was in motion.

In colour my specimen was a uniform, faintly greenish, bronze on its dorsal surface and silvery grey on its under surface. A certain amount of variation

in this modest coloration may be observed amongst Round Bodied Skinks. Some are pale or dark bronze along the top, deepening in colour at the sides. A sprinkling of tiny black spots over the body, distributed more closely over the sides, sometimes occurs and forms longitudinal stripes.

Although lacking bright colours and inclined to spend much of its time buried in the gravel, the quietly handsome appearance and peaceful attitude towards other lizards of this skink make it a desirable vivarium inmate. Mine, which judging from its size was fully mature when first captured, lived for two and a half years in an all glass vivarium, eighteen inches by twelve inches by twelve inches, in company with a varying population of small lacertid lizards and geckos. Its own disappearing tactics protected it from possible interference from an occasionally irascible individual and at no time did it show the least aggression towards other members of the community.

Round Bodied Skinks do of course require heat, and in the absence of Geckos which occasionally cling

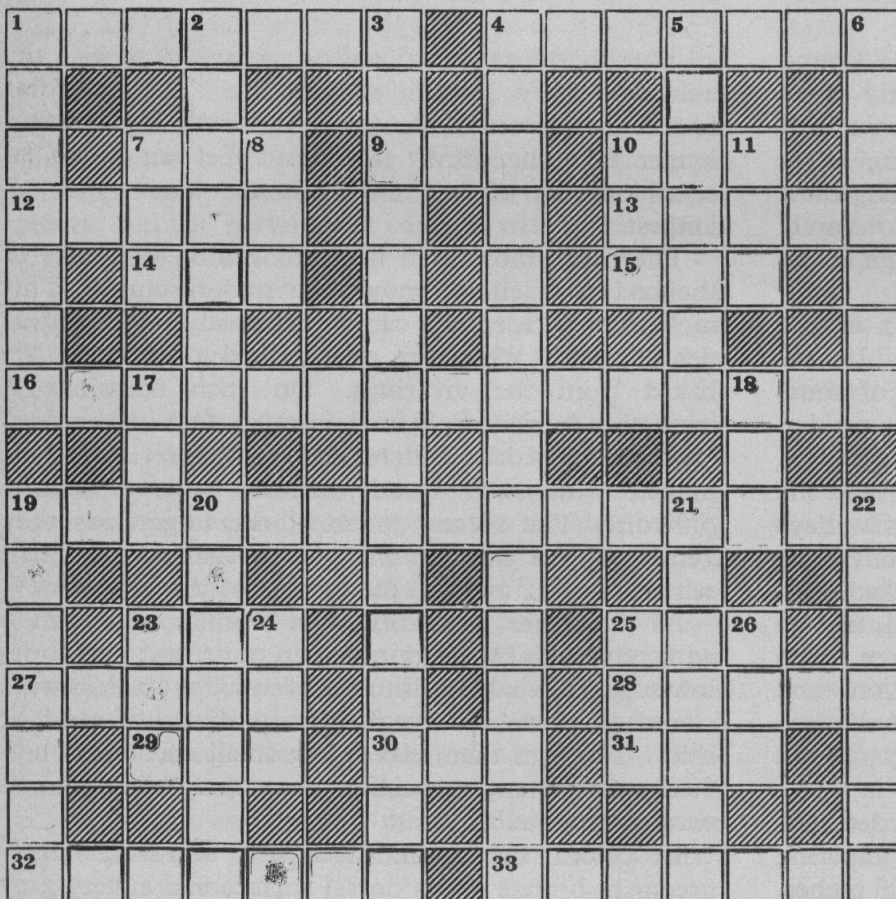
overlong to its hot surface, this may be supplied by an electric light bulb, for preference in conjunction with a thermostat. Bedriagai seems to do well in dry conditions and flourishes in a vivarium furnished with a few large stones, set on a fairly deep layer of rounded gravel. I have not seen this lizard drink nor has it to my knowledge entered the water vessel but I have always provided it with drinking facilities.

Its taste in food is reasonably catholic provided the food consists of live insects. Mealworms, wood lice, newly hatched locusts and blow fly maggots are all accepted and I strongly suspect that mealworms and maggots are frequently taken below the surface of the gravel.

Little seems to be known about the habits of the Round Bodied Skink in the wild but it is said to produce living young. Bearing in mind the breeding behaviour of similar species of skinks, this seems most likely and what also seems probable is that if a true pair of these creatures can be obtained the chances of breeding them under controlled conditions are favourable.

The AQUARIST Crossword

Compiled by J. B. Cullen



Solution on page 277

CLUES ACROSS

1. Provides aeration (7)
4. Nourishing worms (7)
7. This grass is *Vallisneria* (3)
9. Famous chairman (3)
10. Salmon do this (3)
12. Pearl or Mosaic Gourami (5)
13. Most fish can make one! (5)
14. Don't keep baby fish in this (3)
15. White garment (3)
16. Home of *Tilapia galilaea* (3, 3, 2, 7)
19. The Bronze Catfish (9, 6)
23. Tonic water for fish? (3)
25. Under (3)
27. Start with a pair of guppies and you'll soon have this! (5)
28. Fish can weather this (5)
29. Useful tube (3)
30. Her Majesty's Inspector (3)
31. Unit of energy (3)
32. They're also lions and turkeys! (7)
33. It's a tetra and a pencil-fish (3, 4)

CLUES DOWN

1. Useful device for aquarists (7)
2. Scorpion fishes (not to mention 32 across!) (7)
3. *Symphysodon discus* (9, 6)
4. South American mouth-brooder (9, 6)
5. Young brine shrimp (7)
6. *Nannacara taenia* bears this pattern (7)
7. Common Market (3)
8. An aquarium must be adequately . . . (3)
10. Royal Society of Arts (3)
11. Gist (3)
17. The lateral line acts as one (3)
18. Fishy story (3)
19. An Angel, for example (7)
20. You won't catch a dog-fish doing this—nor a Talking Catfish! (7)
21. pH 7 (approx) (7)
22. *Betta splendens* is (7)
23. Does the Clown Loach feel like this? (3)
24. Serpent (3)
25. Compass points (3)
26. You'll find marginal plants here (3)

Memoirs of a Junior

Having read the experts' suggestions and tips on keeping tropical and coldwater fish in *The Aquarist and Pondkeeper* I feel that I am but a novice (being 17 yrs. old) having started in fishkeeping only three years ago.

I first kept goldfish and golden orfe in an inadequate fish tank—they died—so I felt that since I had obviously brought about their deaths I should amend and improve my ways by building an outside pond of no less than 8 ft. in diameter and 2 ft. deep. Since that day, fish have thrived well, bred and have grown to amazing sizes.

Regarding size of pond and number of fish, of which I have 19. All of the fish have grown larger than I would have imagined.

I have one large goldfish (which incidentally came 5th in a local show and having only been entered for the first time) of 12 in. length, a comet-tail goldfish that had grown in one year from 4 in to 9 in, a golden orfe that was 2½ in. only six months ago and rapidly reached a size of 7 in. and is still growing, as well as many other fast-growing fish.

I should like to add that during the time I have kept the fish, only three had any signs of disease, but none actually died although I did, over the past two years lose 22 fish from leaving no net over the pond and letting the local alley cats have a great feast—leaving my neighbours to laugh themselves silly, sympathise or join in the 'game' of catching the cat. Before people begin to wonder or ask questions—yes I do grow plants in the pond—reeds, iris, water lilies and floating plants. The fish themselves couldn't be healthier, their size, as I have mentioned, must give credit to the condition of the pond, as it is only cleaned every four to six months; in between it remains

algae coloured. The pond itself has no fountain and certainly no waterfall.

The fish rise daily to the surface at exactly 7.00 a.m. when my father feeds them with pellets and flake and then they swim around below the water until they appear at 8.00 p.m. to rise again expecting, but not always getting, food.

The biggest goldfish can take two to three pellets in one go, and often performs a backward movement then rises and jumps out of the water. The fish have their last feed at 3.30 p.m. or 4.00 p.m. according to where I am at the time.

The goldfish, as well as the golden orfe and Koi have often fed out of our hands and are excellent in predicting the forthcoming weather—although I very much doubt whether I shall be appearing in the weather report yet! Early in July I managed to save a small number of goldfish eggs, as well as those of a moor and fantail goldfish which had been living in the pond for a year and a half. To date they are already swimming about very well and growing—having no sign of diseases or deformity.

As I have said, I am certainly no expert, I have certainly never read many books on the subject of keeping goldfish and I doubt very much whether this is actually due to luck.

I could go much longer about my efforts at keeping tropical fish which likewise have never had any diseases. Only a few fish have died of natural causes; the tank has kept perfectly clear and *algae*-free for the past six months. The water has remained at a level pH of 6.5 and has only once strayed past the 7 mark.

W. G. WOOD,
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Addiscombe,
Croydon, Surrey, CR0 6LQ.

HERPETOLOGICAL NOTES

by Stephanie Peaker

Marginated Tortoises

LARGE Marginated Tortoises (*Testudo marginata*) have been available to collectors in this country in recent years. This attractive and desirable tortoise, which grows to a length of about twelve inches, is found in Greece. It is in fact the only tortoise found in that country although two other species from around the Mediterranean—*Testudo graeca* and *T. hermanni*—are often known as Greek Tortoises. This species is easily recognised when adult by the splayed marginal plates of the carapace and in older animals this rear

'margin' has a serrated edge. However, the marginal plates are not turned outwards in the young so it is necessary to turn to other characters in order to distinguish this species from the other tortoises from the Mediterranean and Middle East. These are the Mediterranean Spur-thighed Tortoise (*Testudo graeca*, once also called *T. iberica*), or as is sometimes seen the Algerian Tortoise; Hermann's Tortoise (*Testudo hermanni*, once called confusingly *T. graeca*) and Horsfield's Tortoise (*Testudo horsfieldii*).

Identification of all four species can be made

simply on only two characters. The first is the presence or absence of spurs or raised tubercles on the underside or the thighs, and the second is the presence or absence of a horny 'spur' on the end of the tail.

Species	Tail spur	Thigh tubercles
<i>T. graeca</i>	No	Yes
<i>T. hermanni</i>	Yes	No
<i>T. marginata</i>	No	No
<i>T. horsfieldii</i>	Yes	Yes

Margined Tortoises require the same treatment as other European and North African species but it must be remembered that the larger specimens, and some I have seen have been large, have an appetite to match.

Chasing their own tail

Many lizards store fat in their tails and this applies particularly to skinks. But just like so many other lizards skinks can shed their tail when attacked by predators. This means that not only does the animal lose its tail but its stores of fat, built up over the months, as well. This apparent anomaly led Dr. D. R. Clark, of Texas A & M University to the discovery published in *Journal of Experimental Zoology*, volume 176, p. 295, 1971, that the tail of the skink itself escapes from the predator by means of writhing movements and that it is then searched out by its original owner and eaten! Thus all the materials lost in the emergency are recovered.

This behaviour was seen both in the wild and in captivity in the Little Brown Skink (*Lygosoma laterale*), as well as in other species. In contrast iguanids like the Green or Carolina Anole (*Anolis carolinensis*) which have no stores of fat in the tail very rarely or never re-captured their own tails. It should be pointed out that the skinks did not return immediately to seek out their lost appendage; some waited for several days before returning. Have any readers observed this behaviour in the wild or in vivaria?

As far as keeping these lizards in vivaria is concerned we must perhaps remember to leave the tail with the lizard if any are lost during necessary transfers between cages.

Continuous Light

In these articles I have sometimes warned of the dangers of exposing reptiles and amphibians to continuous light. If heat is supplied by incandescent lamps which are turned on all the time or which may come on at any time as a thermostat operates, daily activity cycles are often upset and the chances of breeding seriously affected. In fact it has recently been discovered that rats exposed to continuous light suffer damage to the retina—the light-sensitive part

of the eye, and there is no reason to suppose that reptiles and amphibians are not similarly affected. I therefore reiterate that lighting (and heating too in most vivaria) should be arranged to ensure that night is as night should be—dark.

Food

Many collectors and zoos find that newly-hatched chicks, which can often be easily obtained from hatcheries, are a convenient food for their larger carnivorous reptiles. While they are an excellent food for some snakes, the digestive system of others is upset if chicks are given too often. It is difficult to give guidance on which snakes are likely to be affected but R. L. Blakely of the Chicago Zoological Park, writing in *International Zoo Yearbook* (vol. 6, 1966), found that boas and cobras were unaffected. However, some colubrids, the Indigo Snake (*Drymarchon corais*) had digestive trouble and the faeces were extremely loose. We and others have noticed the same effect in monitor lizards.

One can of course stop giving young chicks to specimens that are affected but Blakely found that if meals of chicks and mice or other rodents were alternated trouble of this kind could be avoided.

More about Food

Amateur herpetologists often experience difficulties in obtaining food for their animals and I am pleased to see that the Herpetological Centre, Porthgwyn, Goytre, Nr. Pontypool, Monmouthshire can now supply locusts, *Drosophila* cultures, earthworms, mealworms as well as some vertebrates—mice, rats, fish and frogs. These items together with tubifex, white worms and tinned dog food, not forgetting blowflies, should see most specimens well fed during most of the year but it must be remembered that insects caught in the summer months form a very valuable addition to a basic diet.

We are incidentally convinced that to keep many lizards successfully only locusts will suffice as a basic diet—but more about breeding locusts for another article.

Books

For those interested in lizards Dr. Robert Bustard's book, *Australian Lizards* (Collins: Sydney and London, 1970) at £3.50, is an essential item of reading even though few of the species described are ever available to collectors outside Australia. Dr. Bustard, incidentally used to write these Herpetological Notes in *The Aquarist* in the late 1950s and early 60s.

Another book of interest to herpetologists has recently been published. *Crocodiles* by C. A. W. Guggisberg (David & Charles, Newton Abbot, 1972) at £2.75 is a most useful account of these animals.

THE HARDY EUROPEAN REPTILES AND AMPHIBIANS IN CAPTIVITY (Part 18)

by Andrew Allen

38. Schreiber's Lizard (*Lacerta schreiberi*)

Description.—This elegant lizard grows to 30 cms., having a strong body and thin, lengthy tail. It is green in colour, with many large black patches that are often concentrated into bands. The patches continue onto the belly, thus allowing the species to be readily distinguished from *L. viridis*. The young are uniformly brown, with up to four irregular rows of black-rimmed eyespots.

Distribution.—*L. schreiberi* is confined to the Iberian Peninsula, especially to the South and West of that landmass. It inhabits sunny localities among rocks and stones, on walls, rough slopes, and in woods.

Breeding Habits.—Its breeding habits are similar in most respects to those of *L. viridis*.

Care in Captivity.—On most counts this beautiful animal could be treated similarly to the Green lizard. It is about the same size, comes from similar habitats, has the same enemies and will take similar food.

However, it is probably not equally hardy. Green lizards fare well in Central Europe, whilst Schreiber's lizard is restricted to a very small corner of the extreme South-West of the continent, where the climate is very warm and favourable. Accordingly I would not recommend housing them in outdoor reptiliaries, where they would be at the mercy of every vagary of the British weather. But they should succeed in a greenhouse, provided that this is fully exposed to the sun and has an abundance of well insulated hibernacula.

Indoors it would require a vivarium of similar size and design to that described earlier in the series for *L. viridis*. Abundant space, sun-drenched aspect and artificial heat and light are all imperative. In general not a great deal is known about the requirements of this species, but it is exceptionally attractive and would make a worthy inhabitant of an artistically arranged vivarium.

There are no sub-species.

39. The Eyed Lizard (*Lacerta l. lepida*)

Description.—With lengths of 60 cms. or more, this is easily the largest European lacertid (though not the largest European lizard). It is strongly and heavily built with a powerful head and long tail. Dorsally it is greenish-brown in colour, with a network of green or yellow lines. The flanks are of brighter green, with several large blue patches bounded by black. Ventrally it may be yellow, cream or white, with no markings. The young are initially grey, with brown patches soon developing.

Distribution.—This massive lizard inhabits most of the Iberian Peninsula, North Africa, the Iles d'Hyeres, Liguria and Mediterranean France. It favours rough, rocky country and scrub, and may be found up to moderate altitudes.

Breeding Habits.—After mating comparatively late in the spring, the female lays up to ten eggs in holes in the ground or beneath stones.

Care in Captivity.—Because of its great size and semi-hardiness *L. lepida* is not the easiest of lizards to deal with. Its care is a full time job, and not to be lightly undertaken. But given that it is a demanding species, it is also a rewarding one, certainly the most spectacular of the moderately hardy Reptiles.

Indoors it requires space above all else. It is large, it is active, it climbs, it burrows. All this demands a very sizeable vivarium. One of six feet by six feet by four feet would be distinctly cramped for a true pair of these animals. If you can't provide a vivarium of these dimensions or greater—don't attempt to house this species indoors. An interesting alternative to such a bulky vivarium would be to give the lizards the run of an entire escape-proof, carefully heated room. In either event, natural sunlight is an absolute "must", supported by additional heat and illumination. There should be a thick layer of soft soil on the floor, a large water bowl (but a dry atmosphere and good ventilation),

large caves as hiding places, and sturdy branches for climbing.

The lizards can be hibernated by packing them away in a solid, escape-proof wooden box filled with newspaper (a great boon to the herpetologist), dry leaves, straw and moss. The box should be airy, and must be placed in a cool dry location. It should be inspected regularly when spring arrives, so that the inhabitants can be given an immediate drink upon awakening.

The Eyed lizard is of rather suspect hardiness. It is very much a creature of the deep South of Europe, prospering only in really warm climes. On account of this it is not to be recommended for the average outdoor reptiliary. It might live happily in a large reptiliary in the extreme South or West of England, if this was protected from the wind and received an absolute maximum of sunlight. But elsewhere the winters would be too long for such a sensitive animal, and the summers insufficiently hot. If accommodated in a reptiliary it would require some very deep and thoroughly protected hibernating chambers.

On all criteria the ideal home for this species is in a greenhouse. This could easily be of the required dimensions, provides all the sun (and more!) that these lizards relish, and gives a maximum of protection from even our longest and most inclement winters. In an intelligently arranged greenhouse the Eyed lizard could enjoy itself enormously, tame fairly readily, and live for a goodly number of years. But even under exemplary conditions it will still only appear when the sun shines brightly, will retire to hibernate very early and only emerge again when spring is thoroughly established.

In keeping with its size and activity the Eyed lizard has a massive appetite, though under imperfect conditions it is perhaps more liable to go on "hunger strike" than other European lacertids. It will take the usual range of insect fare, though only at the larger end of the scale. This includes mealworms, earthworms, cockroaches, beetles and smooth caterpillars. Any vertebrates smaller than itself will be attacked

and eaten. This includes some frogs, toads and newts, many lizards and snakes, fledgelings, and mammals such as mice. Raw meat may sometimes be accepted, though it should only be held as a stand-by. Eggs are very popular, and soft fruit of all kinds makes a welcome change from animal fare. If feeding by hand, keep an eye on your fingers. *L. lepida* has a distinctly powerful and painful bite, though not a dangerous one.

Its pugnacity and appetite scarcely recommend it as the perfect community reptile. A safe working rule is to assume that anything smaller, meeker or softer than itself will be eaten or savaged. This doesn't leave it with many possible companions. Large adult Marsh and Edible frogs and Clawed toads should be reasonably safe, as should adults of some Southern sub-species of the common toad. With their virulent poisons and bright warning colours the Fire salamanders are also proof against molestation. Land tortoise, water tortoise and terrapins are ideal companions. I defy any Eyed lizard to make a meal of a tortoise! The only acceptable lizard is the Glass snake (*Ophisaurus apodus*), itself a confirmed cannibal. Several snakes are in the same size range, and are at least potential companions. However, I would hesitate to recommend any in this capacity, for the balance between this predatory lizard and the predatory snakes would be at best a delicate one. A measure of caution is probably indicated.

It is scarcely a major disadvantage that the Eyed lizard can be incorporated into so few communities. It is such a gloriously aristocratic, beautiful, temperamental animal that it is well worth a large vivarium of its own; one where it can occupy permanently the centre of the stage, without the distractions of superficially drabber companions. For those with long experience of the ways of lizards, and a lot of space, money and time it is a magnificent beast that makes the ideal centre-piece in any collection of European Reptilia.

The following article will consider the Wall and Ruin lizards, and some of their numerous relatives.

PRAWNS

by Huw Collingbourne

ALMOST INVISIBLE bodies streaked with wild gashes of brilliant glowing colour glide gently and silently in the brine. Hunched backs stroked by long flowing tendrils characterise one of the strangest, and luckily, most common of the myriad strange inhabitants of the shallow sea.

Often strikingly beautiful in colour. these creatures are easy to keep in a small aerated marine aquarium, and what is more they are easy to breed in large numbers!

I am talking about the common prawn, of course, a misleading name covering numerous different species

HOOKED ON IGUANAS

by Peggy Aldis

MY FIRST encounter with an Iguana came quite unexpectedly on a warm sunny afternoon. I was shopping in our busy high street, when suddenly I spotted this magnificent creature, perched on the shoulder of its owner, completely oblivious to the noise and people around him.

I think I was hooked from that moment, although quite a few months passed before doing anything about acquiring one. Every time I gave any thought to the matter, a picture of our very large cat came into my mind. He is a devious character being part Siamese. I felt a small timid Iguana would be no match for him. However, common sense in this case did not prevail, and one evening after work I found myself hurrying home from my local pet shop with my first Iguana in a white linen bag stuffed down my jumper. He was a pathetic specimen, about 8 in. long with only part of a tail, and a rather thin body. Probably, someone with experience in keeping reptiles would have left him where he was, but I was thrilled to bits, determined to do my best for him.

Three weeks later temptation got the better of me and I bought another, much smaller, but healthier, this time with a lovely long tail.

It seemed to me that a name should be the first thing, but as I have never had much imagination where names are concerned, "Simon" was the best I could come up with. The second Iguana fared even worse, he is still referred to as "the little one." What I lack in imagination, I certainly make up for in enthusiasm, for I grow daily more and more interested, my only sorrow being the lack of information available.

What to feed them on, and the necessary temperature is all I could find out. My knowledge to date has been acquired through trial and error, which does not seem to have done them any harm. "Simon," in four months, has doubled his size, and his tail is four inches longer, he is now eating almost everything offered,

even tinned cat food. "The little one" is more particular, and sometimes has to be coaxed.

Housing the Iguanas

My husband is a keen aquarist and has a fish room of his own, so he does not have time to share my hobby. He is nevertheless always willing to help, and has proved invaluable in doing the many odd jobs which have been necessary. For instance, a kitchen cabinet with shelves removed and doors replaced with glass has made a fine home for the Iguanas. A 40-watt bulb installed in the top of the box is enough to maintain a daytime temperature of approximately 25°C. No heat was necessary during the summer months, but as the nights have now become colder, a small 15-watt bulb, shaded with a tin, keeps the temperature around 15°C.

The Iguanas were put into an empty room at the top of the house, the idea being that they could come out of their box and run around. Things went well for a while until Simon became plagued with that age-old emotion, jealousy. Whenever I attempted to make a fuss of the little one, Simon seemed to perform a kind of war dance, lifting his head high, and shaking it vigorously and at the same time, hissing. Once or twice he even tried to bite the little one, this came as a great surprise to me, as never once has he attempted to bite me—there must have been many times when I have provoked him to do so.

Feeding Iguanas

My method for feeding Simon when I first had him is probably an example of the provocation I mentioned earlier. Anxious for him to grow stronger, I was continually offering him food. Fish, meat, fruit, anything in fact that I thought he would eat. Sometimes he would eat it, but mostly his eyes would close tightly and adopt a "get lost" expression. Having got the message, I now leave food for him to eat when he wishes, daily consisting of lettuce, nasturtium leaves or cabbage, the nasturtium leaves being the

favourite. Added to this, about $\frac{1}{4}$ -tin of cat food with a little vitamin powder mixed in. Twice a week, meal worms, and once a week, a few small garden worms folded into a nasturtium leaf for extra protein. The reason for adopting this method is obviously to fool him as he doesn't like them, and it works.

As previously mentioned, the little one does not eat so well, raw egg yolk is acceptable, also a little grated carrot. Fortunately he drinks well, and the vitamin powder is added to his water daily. Funnily enough, no matter what else is offered he only tastes it; it is as if there is something special that he is waiting for, but to date I have yet to discover it.

One thing that has proved very popular with my Iguanas is a very large tree branch in their room. The moment I let them out, they make a dash for it, climbing from branch to branch, returning to their

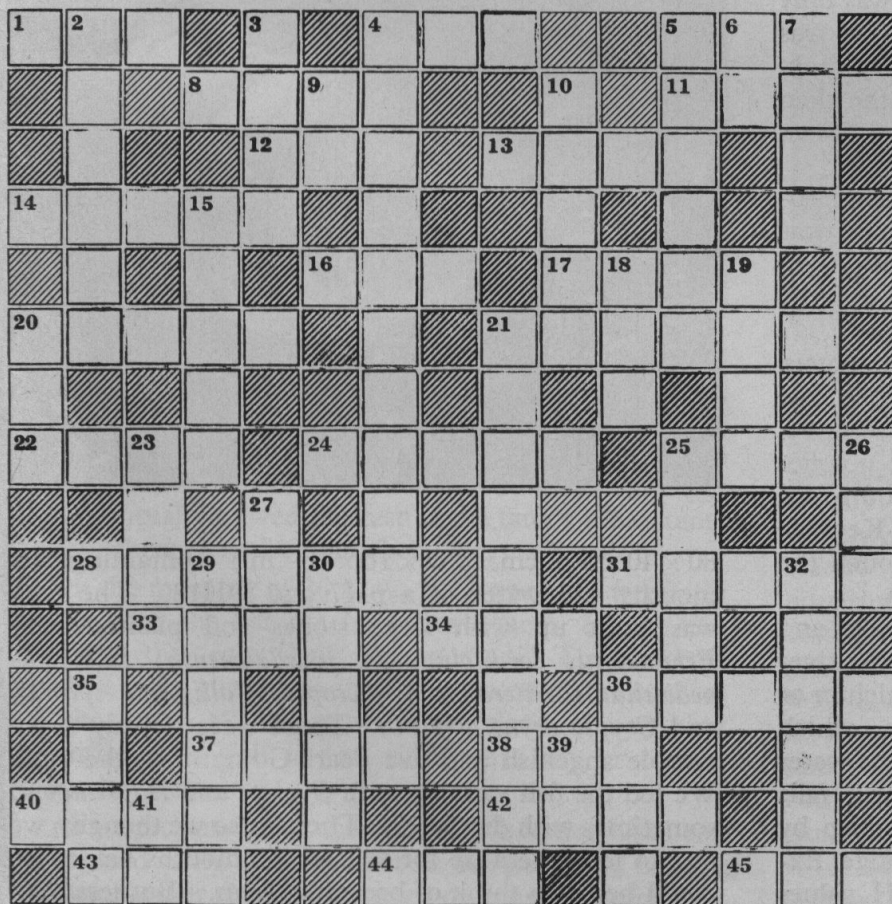
box only to sleep. Since giving them plenty of freedom they have become very tame, and will now climb right up on to my shoulder.

It would be impossible to count all the mistakes I have made, but a great deal has been learnt too. I have also made a few interesting observations, and now feel confident enough to add other species of reptile to my collection.

In conclusion, to those who are contemplating keeping an Iguana, may I say that in my humble experience, patience is all that is needed; remember that, like all wild creatures, they will at first be nervous and hide away. After a while, realising you are not such a bad sort after all, they will venture on to your hand, and eventually on to your shoulder. You will then know that their instinctive fear of humans, of you at least, no longer exists.

The AQUARIST Crossword

Compiled by M. J. ELLICK



Solution on page 337

ACROSS

- 1 and 22. *Branchiomma vesiculosum* (3, 4).
4. and 3 Down. *Bodianus axillaris* (3, 4).
5. Single (3).
8. Regrettableness (4).
11. Outer garment (4).
12. Unhappy (3).
13. Close at hand (4).
14. Place for cricket (5).
16. Of the Gadiformes family (3).
17. Preach noisily (4).
20. Decoration for marine tanks (5)
21. See 36 Down.
22. See 1 Across.
24. Water vapour (5)
25. Restrain (4)
28. Poisonous metal that can cure (6).
31. Circus fish? (5).
33. Jumping Insect (4).
34. Terminate (3).
36. Basic food (5).
37. Betting office (4).
38. Under the weather (3).
40. Greek letter (4).
42. Does *Centropyge flavissimus* taste this? (4).
43. Crafty one (3).
44. Type of tree (3).
45. Home of *Flammeo scythrops* (3).

DOWN

2. One with no colour (6).
3. See 4 Across.
4. Instrument for measuring s.g. (10).
5. A scone turns about for the seas (6).
6. Negative (2).
7. Obtain pay (4).
9. Small thanks (2).
10. See 29 Down.
15. A rabbit's foot is said to be one (5).
18. Measure of current (3).
19. Exam (4).
20. *Acanthostracion quadricornis* (- - - fish) (3).
21. Also called a turkey fish (6, 4).
23. Covering on home (4).
25. Of the heavens (5).
26. Cooking utensil (3).
27. Copy (3).
- 29 and 10. Does this fish rest upside down? (6, 5).
30. Fox's home (5).
32. *Hemigymmus fasciatus* (6).
35. Cook (4).
36. and 21. Across *Pomacentrus coelestis* (4, 6).
39. *Lo vulpinus* (2).
41. In the direction of (2).

THE HARDY EUROPEAN REPTILES AND AMPHIBIANS IN CAPTIVITY (Part 19)

by Andrew Allen

An immense variety of closely related small lacertids inhabit the South of Europe. Most of them require fairly similar care.

40. The Ruin Lizard (*Lacerta sicula sicula*)

Description.—This is the largest and most colourful of the Wall lizard group. It grows to 25 cms. in length, and has a long tail. Dorsally it is bluish-green with black patches (often with a blue centre) forming regular or irregular bands. The belly is a subdued cream, yellow or green.

Distribution.—The type is very abundant in Southern Italy, the Lipari islands, and parts of Sicily. It favours dry, rocky country and is common upon old walls.

Breeding Habits.—Up to ten eggs at a time may be laid in shallow holes in the ground, usually during May or June.

There are a host of sub-species, about twenty in all. The only one commonly to be seen in this country is *Lacerta sicula campestris*. It is a glorious grass-green, with a brown band down the back, usually spotted with dark patches. Females may have a deep blue patch on the shoulder. It comes from Northern Italy, Northern Yugoslavia, Monte Cristo, Elba and Corsica.

Related lacertids are:

Lacerta wagneriana—from Sicily, with uniform green back and brown flanks.

L. lilfordi—from the Balearics; sometimes imported into this country.

L. bedriagae—from Corsica and Sardinia, an exclusively montane form.

L. dugesii—from Madeira and the Canary Islands.

L. oxycephala—from Dalmatia, known as the Sharp-headed lizard. It is dark blue-grey dorsally, and a rather lighter shade below.

L. heiroglyphica, *L. praticola*, *L. horvathi*, *L. mosorensis*, *L. graeca*—from Sporades and Rhodes.

L. peloponnesiaca—an attractive and statuesque lizard from montane parts of the Peloponnesus.

L. taurica—a very similar lizard from Russia, Rumania, Hungary, Bulgaria, Albania, Yugoslavia and Greece.

L. erhardii—from Greece, Albania and the Aegean Islands; exists as numerous sub-species.

L. melisellensis fiumana—from Albania, Yugoslavia and its islands. The Rock lizard and its related sub-species are sometimes imported into this country. It comes from rocky, montane areas, and is characterised by a short head and a brown or copper-red dorsal coloration.

L. saxicola—from South-East Europe, is another lizard infrequently to be seen on dealers' lists.

L. bocagei—from the Iberian Peninsula, is a Spanish equivalent of the Wall lizard. It is green, olive or brown dorsally, with two white lines down each side of the body. The stripes are bounded by rows of black patches, which sometimes merge into bands. There are numerous sub-species.

L. hispanica—from the Southern coast of Spain, is a very small lizard with a pointed head, and grey or green coloration. It is not very abundant.

L. monticola—from mountainous parts of Spain and Portugal, is very similar to the "true" Wall lizard, but has a flatter body and more pointed head. The belly of the male is bright green, that of the female yellow. There are several sub-species.

41. The Wall Lizard (*Lacerta muralis muralis*)

Description.—Maximum length is about 20 cms., males usually being longer than females. The body is slender, and the tail very long. Dorsal coloration may be several shades of brown or grey, marked by small black spots in the male and rows of patches in the female. The belly is cream or yellow, sometimes with black and blue spots at its outer margin. In general coloration is rather more drab than in other Wall and Ruin lizards.

Distribution.—This is the ubiquitous and familiar Wall lizard of much of Central Europe, the type being

found in Pyrenees, France, Apennines, Belgium, Holland, Southern Germany, the Alpine countries, parts of the Balkans and Asia Minor. The major sub-species is *L.m. bruggemanni*, which is indigenous to North-West Italy, and now occurs also in the Danube valley near Passau. It is greener in coloration than the type. Numerous other sub-species come from Calabria, Corsica and Sardinia, many small Adriatic islands, Yugoslavia, Albania and Greece. Dry sunny habitats are favoured, including rocky slopes, vineyards, meadows and old walls.

Breeding Habits.—As for *L. sicula*.

Care in Captivity.—The following remarks apply in varying measure to all the Wall and Ruin lizards described above. Some of the most Southern species or sub-species may be less hardy than *L. muralis*, but otherwise their requirements are similar.

These animals do fairly well indoors, provided that they are given a very spacious vivarium with much opportunity for climbing. There should be a small water bowl, some sun-drenched stones or tiles, extra heat and light, and a goodly number of hiding places. It is important that the vivarium be thoroughly escape-proof. Wall lizards are small, and fast, and can climb practically anything. They will soon wriggle through a crack, or race up the arm that feeds them. One of my first pair of Wall lizards escaped three times from an apparently impregnable vivarium. The third time it got clear out of the house as well, and spent the next couple of years laughing at me from the safety of a rockery in the garden. Don't take any chances; all these lizards are like living quicksilver.

Most Wall and Ruin lizards are hardy enough to be housed in an outdoor reptiliary. But again this must be perfectly designed and constructed. The boundary walls must be high (about three feet) and smooth. The overhang must be wide and flawless, with a minimum of joints. No tall vegetation should be permitted to grow near the walls. Take all these precautions, and I would still be prepared to place a small bet on the lizards getting out at some time. One danger period is the feeding session, when lizards are climbing all over you, exploring your pockets, sunning on your shoulders or the top of your head. It is easy to forget just one, perhaps the one that has gone to sleep inside your shirt, and walk out with it. So be warned. However, if all due precautions are taken, the inhabitants should stay put and do very well indeed. A sunny, lightly planted reptiliary with deep hibernacula is ideal for these species.

Excellent also is a greenhouse, which must be well ventilated and dry. All cracks and potential egress routes must be rigorously sought out and blocked. A greenhouse provides an admirable climate for the semi-hardy Southern species, and gives much more vertical climbing space than either indoor vivarium or reptiliary. One good idea is to train variegated ivies up

the back wall of the greenhouse, thus providing a wealth of opportunities for acrobatics. Alternatively, it would be possible to construct a stone wall along the rear of the greenhouse. With cracks and creepers this could be designed to mimic a crumbling Italian farmhouse wall or similar. Especially suitable for such a purpose would be a lean-to greenhouse, where the appropriate wall would be ready and waiting. The opportunities for one of artistic bent are almost endless, and the end result could be of great aesthetic quality.

All are very easily fed, accepting a whole range of small invertebrates. As with most lizards, spiders are number one in popularity, closely followed by mealworms. House flies and bluebottles are taken eagerly and athletically. They are best raised from maggots rather than caught as adults, to avoid contamination from insecticides used by well-meaning neighbours. Raw meat may be offered if all other fare is totally unavailable. In company with the majority of lacertids these lizards have a "sweet-tooth," and will relish a taste of demerara sugar or honey. This should be reserved solely for an occasional treat, and not be placed on the menu too often. Ripe soft fruit of many kinds will also help to add variety, and can be most beneficial to the health of these lizards.

These are good community animals, and can be associated with a pleasantly wide range of companions. Smaller Reptiles and Amphibians will never be molested, except when very young indeed. In consequence Wall lizards can be housed with practically any of the moderate-sized frogs, toads, newts and lizards, assuming, of course, that the appropriate different habitats are provided.

Despite their marvellous agility, they are potential prey for a number of larger predators. Green, Eyed and Schreibers lizards are not to be trusted in their company, and this applies to all the snakes as well. In addition, I have my suspicions of Marsh and Edible frogs, Clawed toads, and of big mama Common toads. It could be argued that in nature Wall lizards and some of these creatures co-exist perfectly happily. This is quite true, and I have often seen Green and Ruin lizards sunning together or Wall lizards and Edible frogs beside the same pool. Unfortunately, this constitutes no guide to composing a harmonious balanced community. The essence of a vivarium is that it is extremely cramped. There just is not the space for these lizards to escape from their foes, especially over a period of time. One other point should be remembered; there will always be intense territorial competition between males of the same species. In the wild the losers can retire to lick their wounds, in the vivarium they are confined in the company of their successful rivals. Thus there should only be one or two males per large outdoor vivarium, though seven or eight females can be housed in the same area with only minor bickering.

Any of the lizards described will fascinate through their varied, sometimes spectacular, colours and their extreme agility and pleasing activity. Most are easy to keep and tame fairly rapidly; some are quite reasonable in price. The more familiar species can be recommended safely to the moderately experienced

amateur. The expert will find great interest in some of the more obscure, less hardy examples of the great group of "Wall lizards."

The final article in this series will deal with our own Slow-worm, and the Glass snake or Scheltopusik, largest lizard in Europe.

A REEF IN OUR HOME

by

Douglas Rose (B.M.A.A. member)

ABOUT SIX months ago my father and I decided that a go at marines would be fun. We had seen a number of marine tanks around and they were, in our opinion, startling. It would be unfair to compare them with their freshwater counterparts as it would be like comparing an aeroplane with a car.

We finally decided to go in for marines after we had read the following books: "Tropical Marine Aquaria," by R. A. Risely; "The Salt Water Aquarium in the Home," by Straughn; and "Tropical Marine Aquaria," by Graham F. Cox. We also consulted three other paperbacks: (1) "The Marine Aquarium for the Home Aquarist," by Robert F. O'Connell; (2) "Enjoy a Saltwater Aquarium" (the Pet Library); and finally, "Saltwater Fishes in Colour," by Dr. Herbert R. Axelrod. We had visited certain well-known marine dealers in Middlesex, Edgware and Guildford. They had some wonderful exhibits which boosted our desire to try this side of the hobby further.

After a great deal of thought we decided that it would be far more interesting and rewarding to set up the tank ourselves—unlike our discus tank. ("Prolific Pompadours," September, 1973).

The main problem was to decide what system to use. People have had great success with the natural, semi-natural and clinical systems. They all work; but of course some people prefer one system to another. At



Mandarin Fish

Photo. D. Rose

first we decided to use the natural system; but after using this for a couple of weeks our tank became rather dirty and we at once fitted up an Eheim power filter. We were told to do this by a very reputable dealer in Guildford. We have never regretted doing this and we are indebted to him for this advice.

Even though I said that we at first used the natural system, I must admit that our only extra device was an ozoniser. Our system thus consists of aeration, power filtration through charcoal/carbon and wool, and ozone (weak). So much for the type of system we use. We decided that a 48 in. x 15 in. x 24 in. (high) all-glass tank would be ideal. Next we obtained two 150w. combined heater and thermostats which could be adjusted under water. We bought an excellent make of salt called "New Tropic Marin" and also obtained a packet of Hilena Integral (an excellent plant fertiliser). We then bought a few bags of crushed coral sand—enough to cover the base of the tank to a depth of about half an inch. We bought two 3-foot 30w. Kolor-rite fluorescent tubes. The colour of the tubes was chosen after very careful consideration of the light spectrum of the various types available and it was considered that Kolor-rite was the nearest the light spectrum of the various types available and approach to pure daylight. We also put light blue photographic background paper on the tank to provide

THE HARDY EUROPEAN REPTILES AND AMPHIBIANS IN CAPTIVITY (Part 20)

by *Andrew Allen*

42. The Slow-worm (*Anguis fragilis fragilis*)

Description.—The Slow-worm may grow to beyond 50cms. in length. It is snake-like in form with a very long tapering tail. The scales are very small, imparting a smooth, polished texture to the body. It is readily distinguished from any snake by its movable eyelids, broad tongue and external ear openings. Dorsal coloration ranges from yellow through brown and red to grey. It is uniform in the male, but there may be a black vertebral stripe and other dark stripes in the female. Ventral colouration is grey or steel-blue. Males may occur as 'Blue-Spotted Slow-worms,' once classified as a distinct species.

Distribution.—This is a familiar lizard almost throughout Central and Western Europe, including much of the British Isles, the Alps and Carpathians. It occurs in brush, woodland, meadow, heath, moor and hedgerow, frequenting damp or dry habitats up to two thousand metres or more in altitude.

Breeding Habits.—Up to thirty young are produced in the late Summer. The species is ovo-viviparous the baby lizards speedily freeing themselves from their egg membranes.

Care in Captivity.—*A. fragilis* requires very different conditions from the other lizards previously considered in this series. It is far less mobile, takes different prey, favours slightly different habitats, and has little love of the sun. In consequence it needs specialized, but not demanding treatment.

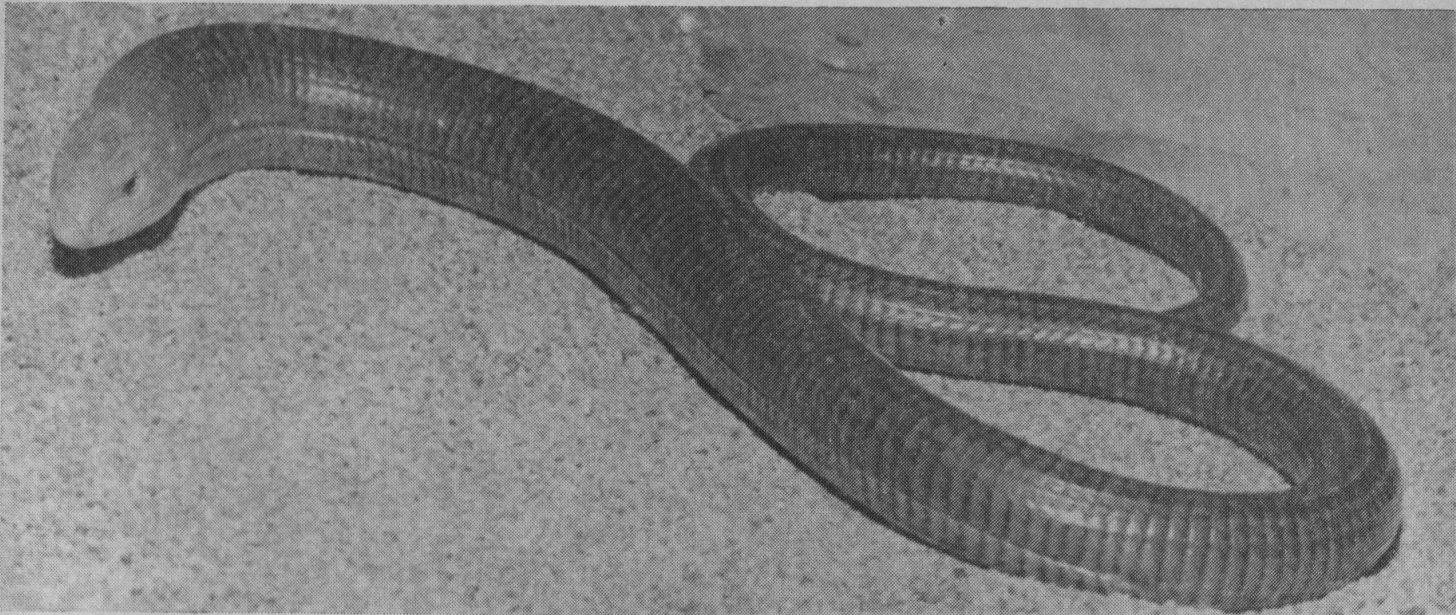
Indoors it is an acquiescent animal. It will survive in restricted, ill-designed vivaria that no other lizard would tolerate. It will live on an unvaried diet that would speedily finish off a Green or Ruin lizard. But this provides absolutely no excuse for actually treating it thus. It should have a medium-sized vivarium that has a limited exposure to the sun. There should be a small water bowl, a deep layer of soft, faintly moist soil, some dense vegetation and a

good number of hiding places in the form of washed cork-bark, stones and fragments of clay flowerpot. The inhabitants will over-winter happily, but are better hibernated. Supplementary heat and light are usually unnecessary; indeed this lizard will not enjoy great warmth. It is very hardy, and so not perfectly suited to a centrally heated living room. Moderate temperatures are to be preferred, and sharp fluctuations should be avoided.

Though it does well indoors, these are not ideal conditions. It is hardy enough to house in the garden under a regime that will be much more to its tastes. In a 'wild' garden or one with spacious rockeries it would be best just to release half-a-dozen specimens and let nature take her course. They will work wonders with your slug population! Alternatively they can be released in an outdoor reptiliary. Their mobility is so restricted that there need be few fears of their escaping. Given an unspecialized environment and good companions they should live for many years.

Their adaptability is such that they will also prosper in a greenhouse, even if it is designed with sun-loving lacertids in mind. But they will not enjoy the great heat, and the protection afforded against inclement weather is clearly superfluous to this thoroughly hardy species.

Slow-worms are extremely conservative in their diet. Firm favourites are white slugs (*Agrolimax agrestis*), followed at a great distance by black (*Milax sps*) and other slugs. Earthworms are tolerated, as are blowfly maggots and a number of other insect larvae. Small snails may also be taken. All prey is stalked slowly and ponderously, before being seized with the utmost deliberation. On the whole Slow-worms are very simple to feed, and rarely go on hunger strikes. The one cardinal rule to remember is that a steady supply of white slugs is the surest route to a Slow-worm's heart!



Glass Snake

This is an admirable inmate of a community vivarium, molesting few of its companions, but equally being safe from molestation itself. Report has it that small frogs, toads and newts may be attacked; I have never personally found this, but mention the point in passing. In general it may be housed with all the smaller Reptiles and Amphibians. It should not be left at the mercy of any snakes, of Eyed lizards or Glass snakes, of large terrapins, or of Marsh and Edible frogs. But otherwise there are very few restrictions, and it can be confidently integrated into almost any community.

The above remarks most certainly do not apply to baby Slow-worms. These bear a considerable resemblance to a juicy and tempting earthworm. Accordingly they may fall foul of just about every Reptile and Amphibian on the face of the earth. It is kindest to remove them from all company (including that of their parents) until they have grown enough to fend for themselves.

The Slow-worm is not the most exciting of Reptiles. It is cumbersome and clumsy compared with most lizards, and its colours are muted. In addition it passes a very quiet life, spending much of its time in hiding. But it is easy to keep, and has a distinct interest of its own that makes its observation rewarding.

Like most members of our native herpetofauna *A. fragilis* is a threatened species. Though far from rare as yet, its status has deteriorated in several parts of the country. The responsible herpetologist should do nothing liable to further imperil its position. This means that specimens should not be collected in the field, and that any young bred in the vivarium should be liberated on some chosen heath or bank. If the vivarium owner is well intentioned he should be able to formulate his own code of conduct towards

native and European species, and aid actively in their conservation for the future.

Anguis f. peloponnesiacus comes from the Peloponnesus, whilst *A. f. colchicus* is an important subspecies from South-East Europe.

43. The Glass Snake or Scheltopusik (*Ophisaurus apodus*)

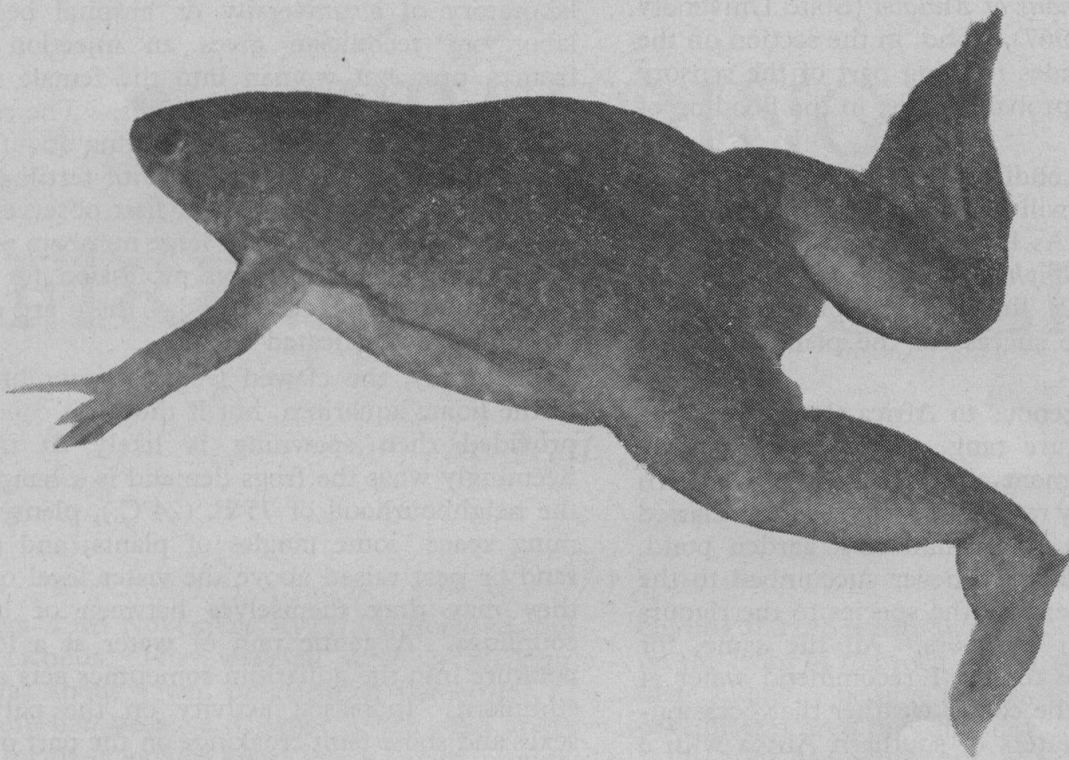
Description.—With lengths exceeding 100cms. this is the giant of European lizards. Its rounded body is snake-like, though rudiments of the hind limbs are visible upon close scrutiny. The large head is distinct from the body, while the tail is long. There is a characteristic furrow down each flank, extending as far as the cloaca. Adults are yellow, brown or even red, with few distinct markings. Juveniles are grey above, white below, with a variety of brown patches and stripes.

Distribution.—The Glass snake is a South-East European species, occurring in the Balkans, Caucasus, Crimea and Asia Minor. It favours similar, though often drier and rockier, country to the Slow-worm. This includes hillsides, fields, hedgerows and sparse woodlands.

Breeding Habits.—Unlike the Slow-worm this member of the Anguinae is oviparous.

Care in Captivity.—Glass snakes bear many resemblances to the Slow-worm, and this extends to their care in captivity.

They will fare quite comfortably in the indoor vivarium, which is best maintained at a temperature of 75-80°F, showing a tolerance similar to that of their close relative. However, they are very large and bulky, and so an exceptionally spacious vivarium is imperative (one of thirty square feet floor area would suit the needs of a true pair). Vertical dimensions are not so crucial, for Glass snakes are only



THE CLAWED FROG

by Jack Hems

I WANT to tell you something about the tongueless clawed frog or platanna (*Xenopus laevis*) from southern Africa. In general it is not difficult to identify. It has upturned lidless eyes on top of the head and a silky smooth skin overlaid with a slimy secretion which makes capture in the hands extremely difficult. The inner three toes of the beautifully webbed hind feet are provided with dark claws. I will not use the word "armed" because these needle-pointed appendages are used neither for offence nor defence. It is, however, noticeable that when this fascinating frog is disturbed or attacked the clawed feet are used to rake up a cloud of mud or sand. This is accomplished by a lightning downward thrust of both legs which not only results in an obliterating screen but propels it away at great speed.

Although the hind legs are thickly fleshy and strong the front legs are short and give the impression of being weak. They terminate in four slender tentacles or fingers that are used with great skill in guiding living

or dead food into the wide mouth. The upper jaw overlaps the bottom jaw with a rounded lip.

The two sexes show some external differences. For one thing, the female attains a larger size than the male. For another thing, the vent of the female has more pronounced lips sprinkled with minute pimples or *papillae*. Still another sexual distinction is that in the breeding season a mature male always, or almost always, develops dark callosities on the undersides of the arms and fingers.

What are the requirements of *X. laevis* in captivity? Also, what is its maximum size, coloration and shape? Firstly, it asks for nothing more elaborate than a water-filled fish tank for a home. A tank of about 18 in. by 12 in. by 12 in., with a glass cover, will suit two adults well. In the matter of size, a full-grown female may attain 5 in. or thereabouts from nose to vent. In coloration the body and limbs are broken brown on a pale ground above and clayey yellow to

creamy ivory below. Numerous skin glands which bear a resemblance to dressmakers' tack marks are visible on the body. When I turn to Dr. Margaret M. Stewart's *Amphibians of Malawi* (State University of New York Press, 1967), I find, in the section on the clawed frog that, besides forming part of the sensory system, these glands probably assist in the flooding of the skin with slime.

Under different conditions or according to its mood the coloration will change (always in shades of brown) quite a lot. As Dr. Walter Rose observes in his *Reptiles and Amphibians of Southern Africa* (Maskew Miller, 1962), this power of pigment change "helps to explain the success of the platanna in the race of life."

For a species indigenous to Africa the clawed frog has a wide temperature range. Herpetologists who have tried the experiment over here (in the southern half of England, at any rate) have stated that the clawed frog will survive the year round in a garden pond. Nevertheless, I myself have never succumbed to the strong temptation to expose the species to the rigours of an English winter outdoors. All the same, for those who would like to try, I recommend water at least 2 ft. deep. In the colder weather that occasionally glazes the still waters of southern Africa with a thin coating of ice, the clawed frog stays on the bottom until warmer days return. Then again, when the strong African sun dries up some ponds and water courses, *X. laevis* burrows into the mud and there remains until the return of the torrential rains. In general outline, the frog resembles a somewhat depressed (vertically flattened) sausage.

It has been stated that the clawed frog is by nature a bottom feeder (L. G. Payne, *Water Life*, 27th July, 1937), but my own observations of this amphibian over more than a few years have led me to believe that it is sensitive to any movements in reasonably shallow water and, if hungry, will swim quickly to the scene of the disturbance, wherever it is taking place. Thus an earthworm or maggot thrashing about near the surface will be seized almost as quickly as one snaking its way over the bottom. Strips of lean meat or white fish are accepted as eagerly as more conventional items of diet. And the frog soon becomes tame. Indeed, within a few days after its introduction into a tank it will shoot to the surface and snatch at food held between the fingers.

As a rule, a well-fed *X. laevis* will live for many years in its aquarium, but because it is a glutton for food its water must be changed frequently. The amphibian may be removed from its tank while this is cleaned out or the hazy water may be siphoned away and fresh water poured in. Here it is necessary to see that fresh water is about the same temperature as the old. An abrupt change of temperature will almost certainly do harm. For obvious reasons, too,

such a glutton must not be placed in the company of small fish.

It is not difficult to breed the clawed frog in the laboratory of a university or hospital because if a laboratory technician gives an injection of urine from a pregnant woman into the female frog there will be a rapid production of eggs. The same treatment meted out to a male will bring about matching sexual activity and the discharge of fertilizing sperm. This interesting phenomenon, first observed between the two World Wars, led to large numbers of *X. laevis* being used by the medical profession for the early diagnosis of pregnancy. Today there are alternative and more sophisticated tests.

Ordinarily, the clawed frog does not breed freely in the home aquarium, but if the right conditions are provided then spawning is likely to take place. Seemingly what the frogs demand is a temperature in the neighbourhood of 75°F. (24°C.), plenty of swimming space, some tangles of plants, and a bank of sand or peat raised above the water level onto which they may drag themselves between or before the couplings. A gentle rain of water at a lower temperature into the aquarium sometimes acts as a sexual stimulant. Increased activity on the part of both sexes and some faint croakings on the part of the male usually herald the onset of spawning.

According to Zdenek Vogel (*Reptiles and Amphibians*, Studio Vista, 1964) up to 2,000 sticky eggs may be laid. The eggs incubate in about a week, and the *larvae* hang head-up from the plants and other objects at or near the surface for another nine days or so before they become free-swimming.

The tadpoles are provided at the start with external gills but before long these wither away. Two long tentacles or feelers, one on each side of the snout, help them find their food. The long and finny tail vibrates ceaselessly. Hind limbs develop gradually. Most of the time the tadpoles swim in a head-downwards position, and the mouth is continually sucking in miniscule vegetable and other organisms. Free-floating *algae* (green water) is an important part of their diet. As the tadpoles increase in size so, also, do the tentacles on the snout diminish. Front legs appear and the tail, once so extensive, is soon no more. Nevertheless, complete metamorphosis may be delayed by several months. For the tadpoles' development is retarded or advanced by the availability of food and the temperature of the water. Be this as it may, as soon as the tadpoles become froglets they require the same sort of food as their parents but small enough, of course, to gulp down.

If a couple of clawed frogs spawn in your aquarium it is advisable to separate them from their eggs without too much delay. And one more word, although some herpetologists classify *X. laevis* as a frog others equally expert call it a toad.

as if too much is given it will not be cleared up and the present day types of bread appear to turn very foul in a short space of time and become a nasty stinking mess. The worms can be fed every two or three days and if one can regulate the amount of food given it will be found that the previous bread will have been cleared up. It is the same as feeding small fishes. It is better to err on the too little side rather than on too much. Other food can be given such as boiled potato, stiff oatmeal and portions of cheese.

To collect some worms for feeding purposes it is only necessary to pick out a quantity from around the feeding medium or scrape a few from the under side of the cover glass. Small tweezers can be used. I find that once a culture is progressing well I can put in a small cube of cheese and after about three days, it will be possible to pick up thousands of worms which have congregated around the cheese. I have had them almost an inch thick all round the cheese. One should always run at least two boxes at a time so that worms can be taken from each one alternatively. Also, should one fail then the stock is not lost. After a time it may be found that the medium has consolidated and become too solid for the worms to penetrate. The top inch of the medium can then be lightly turned over with a small hand fork.

Occasionally, perhaps after two years, I have found that the worms have apparently swarmed. There are many thousands packed round the sides of the box, on the top of the glass and even outside the box altogether. This may be because the medium has become stale or the worms have multiplied so that there are too many for the size of the box. In such cases I have prepared a fresh box or have removed one

half of the medium, put in fresh peat in its place and after a few days, removed the other stale material and added more fresh.

Sometimes the culture may be attacked by pests. A small mite is sometimes found, but this does no harm. One of the most numerous is the *Sciara* fly. This is a tiny black fly which can run about with great speed. The flies lay their eggs in the damp medium and the resultant *larvae* are almost transparent and can be of no harm to the worms. I did find a pest a year ago which was causing me some concern. The creature was shaped like a miniature devil's coach-horse and its *larvae* were a pale yellow with a brown head. I suspect that the beetle like creature and its off-spring could eat the white worms. The adult was very active and I soon found that all the boxes were infested. I had to restock all the containers and put something to prevent a fresh infestation. I did this by filling a concrete box with water and standing two inverted flower pots in. My boxes now stand on a type of island and if the pests want to get to the worms they will have to swim for it. Up to the present time none has done so.

I feel quite certain that any aquarist who breeds fishes will find that white worms are the safest live food to use and the easiest to keep and breed. Remember to keep the boxes well covered from the light and to feed with caution, trying to give just enough at a time which can be cleared up in two or three days. The boxes of worms can be left for a few weeks without losses and after that although no worms may be in sight, a little fresh food for them will soon bring them up and they soon start multiplying once again.

THE TRANSVAAL ZONURE

by H. G. B. Gilpin

I OBTAINED my female Transvaal Zonure during the first week of August, 1972, at the same time as I bought the Jones' Zonure, described in a previous article, largely for the same reasons. Apart from the fact that it was, and is, an attractive and interesting little animal, when I first noticed it, it was in particularly good condition and plump enough to indicate that it might be carrying young.

Its overall length of six and a half inches suggested

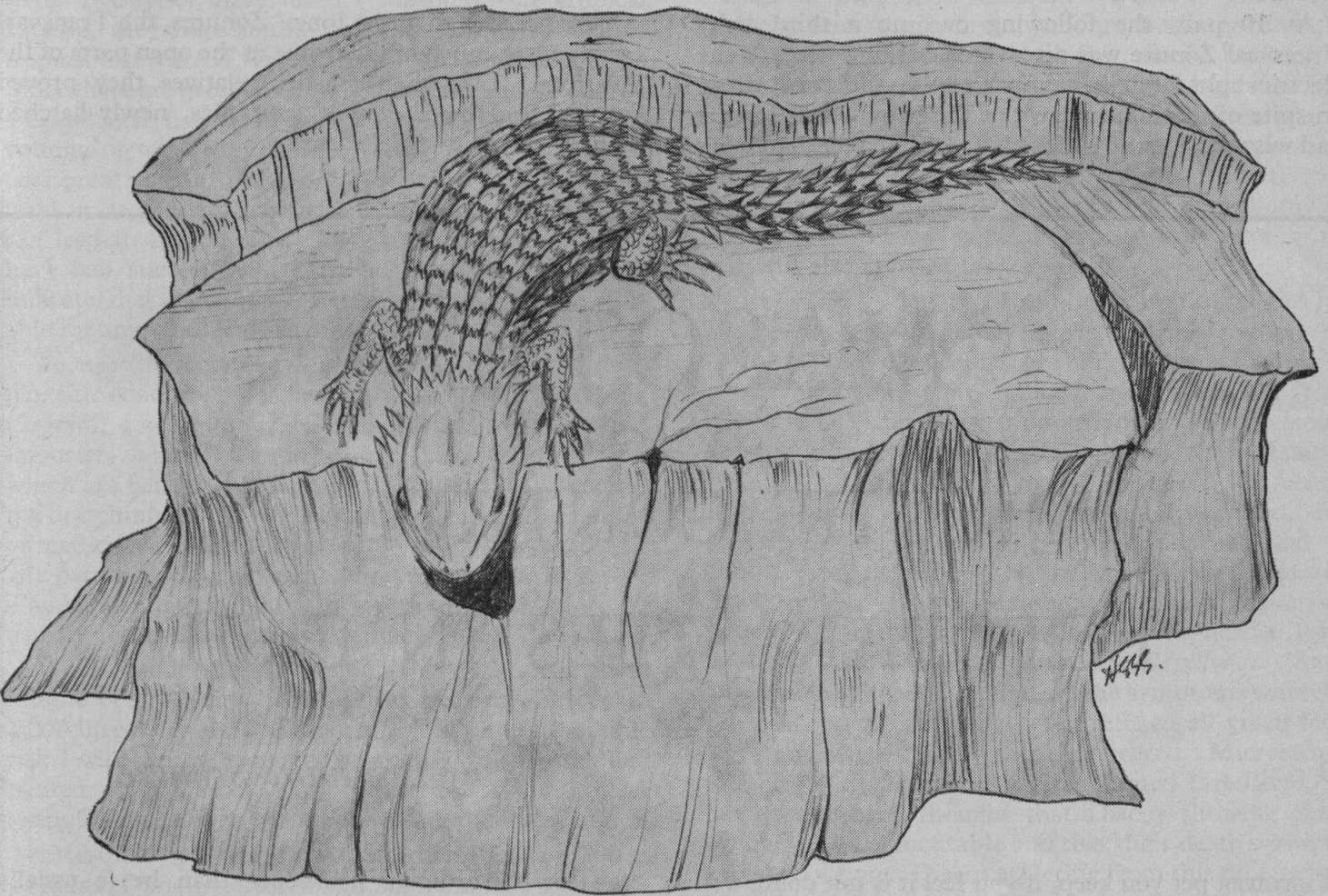
that it was fully adult, a suggestion that has since been substantiated as today, some fifteen months later, it is still the same size it was when first purchased. Its almost orange coloured tail, heavily-spiked with sharp pointed scales, broad at the root and tapering fairly sharply to a blunt extremity, accounts for three and a quarter inches of its total length. The ochre-hued upper surface of the animal is armoured with rectangular, plate-like scales and the cream under surface

with square scales. The head is broad and somewhat aggressive in appearance, an impression in no way minimised by the presence of a row of spines on the back of the neck. The eyes are small, penetrating and overset by a low ridge.

When I first saw it in the shop it was confined with some extremely lethargic Mastigures and a number of Zonures, of various species but approximately the same size and seemed, like the Jones' Zonure, to be completely non-aggressive. This view of its character was subsequently justified. Although at different times it has shared accommodation with Viviparous Lizards, other Zonures and on one occasion an Iguana

continues to spend, far more time in the open parts of the vivarium than does the Jones'. It is particularly addicted to sprawling on the sloping stone luxuriating in the heat pouring down from above. It decamps smartly if a hand is introduced into its quarters but otherwise remains indifferent to the presence of observers in the neighbourhood.

From the beginning the Transvaal Zonure showed an enthusiasm for food almost amounting to greediness. It fed readily on spiders, small locusts and mealworms, but showed less interest in stick insects, woodlice and Tenebrio beetles. On one occasion, although not short of mealworms and small locusts, it seized with



much larger than itself, it has never resented, nor suffered from, the presence of fellow inhabitants of the vivarium. Its attitude towards other species has been one of indifference.

On arrival it was transferred to a thirty-inches-long vivarium, maintained at a temperature of 70°F., floored with fine gravel and furnished with several large flat stones arranged in such a way that at one spot they provided a sloping ramp, reaching from ground level to within a few inches of an electric light bulb and at other darkened "caves" into which the animal could retreat when so inclined. Less nervous than the Jones' Zonure, the Transvaal Zonure spent, and con-

savage determination, a fully-grown female locust (*Locusta migratoides*) and attempted to devour it. It quickly killed its prey but the large bulk of the insect proved too much for the lizard to swallow and it was compelled to relinquish its projected meal and transfer its attentions to a smaller specimen. Since this episode the occasional adult locust, surviving in the vivarium, has remained safe from attack.

Approaching the vivarium on the 15th October, I was gratified to see a baby Zonure sunning itself on the sloping stone, as near as it could get to the electric light bulb. Whilst I was watching, the female appeared from underneath a pile of rocks and clambered

on to the sloping stone, displacing the young one in the process. After a few minutes, during which she remained completely stationary, she suddenly raised her hind quarters, curled her tail upwards in the form of a question mark and a second baby slid, head first, out of her cloaca and without a moment's pause instantly disappeared amongst the rocks. A slimy envelope and a trace of blood marked the spot where the baby was dropped. This birth took place at 8 o'clock in the evening and apparently placed very little strain on the mother. She showed no signs of fatigue or distress and in her turn vacated the sloping stone and, with none of the haste which marked her young one's departure retired, from sight.

At 10 p.m. the following evening a third baby Transvaal Zonure was discovered basking beneath the electric light bulb in company with the two others. In spite of the rapid retreat of the baby whose birth I had witnessed, at no time was the adult seen harassing

the young ones. In fact, she was frequently observed sprawled over the sloping stone with all three babies piled up in tiers on top of her.

When first observed the baby Transvaals were three inches in total length. In general appearance they closely resembled their parent but were without the ochre coloration of that animal. Their tails, which measured one and a half inches, lacked the orange hue of the adult and were relatively longer and rather less spiky than those of young Jones' Zonures at the same age. Their light brown upper surfaces were marked with regular, fairly large, dark brown spots and their ventral areas a creamy yellow. This latter colour was also repeated on the borders of the upper jaw.

Less nervous than the Jones' Zonures, the Transvaal babies spent much of their time in the open parts of the vivarium. Like their smaller relatives they proved easy to feed on a diet of fruit flies, newly-hatched locusts and tiny mealworms.

MASOTEN

FOR THE CONTROL OF ECTOPARASITES IN FISH

by Eberhard Schulze

WHATEVER pet you keep, if you feel it is not doing well it can easily be taken to a vet where it will receive attention and the necessary treatment from an expert. But if your hobby is "tropical fish" the diagnosis is left entirely to the aquarist. An experienced aquarist will usually know the state of health of his fish; feeding well, movement, erect fins and good coloration are a clear indication that the fish are doing well. The more common ailments like fungus, white spot, etc., are recognisable at an early stage and the average hobbyist should be able to deal with them. How many times has an aquarist "known" that all was not well with his fish, but failed to diagnose a specific disease? Although there are a great number of tropical fish disease books available they still make a correct diagnosis a greater

task for the average fishkeeper than he is usually capable of, especially when dealing with parasitic conditions. External parasites can be seen by the hobbyist on his fish; the presence of internal parasites can only be discovered by microscopic examination of the various organs. This would mean, of course, that the fish would have to be sacrificed. With the more common species little would be lost as the diseased fish can be cheaply replaced. With the more rare and expensive varieties most hobbyists would be reluctant to sacrifice a specimen. It is perhaps because of this that relatively little is known about a great number of tropical fish diseases.

As a result of the willingness of some serious aquarists to experiment with new preparations the average