

# THE SOUTHERN ALLIGATOR LIZARD, *GERRHONOTUS MULTICARINATUS* BLAINVILLE 1935: ITS CARE AND BREEDING IN CAPTIVITY

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## INTRODUCTION

The Alligator Lizard belongs to the family *Anguidae*, which is distributed over the Americas, Eurasia and Africa. There are three subfamilies:

1. *Diploglossinae*, to which belong the genera *Diploglossus Sauresia*, *Wetmorena*, *Ophiodes*, and *Celestes*; these are all confined to the Americas.
2. *Gerrhonotinae*, to which belong the genera *Gerrhonotus*, *Abronia*, *Cololychon* and *Ophisaurus*.
3. *Anguinae*, to which belongs *Anguis*.

## Subspecies, their distribution and biotypes

1. *Gerrhonotus multicarinatus multicarinatus* occurs in central and west-central California.
2. *Gerrhonotus m. scincicauda* occurs in the north-west of California, through west-central Oregon into southern Washington about the latitude of Kennewick.
3. *Gerrhonotus m. webbi* is found to the south of *multicarinatus* in southern California, east-central California, and the north western part of Baja California.
4. *Gerrhonotus m. nanus* is restricted to the Los Coronados Islands, Mexico.

In nature they live in dry rocky areas, open grassland, chaparral, and woodland. In particular, they prefer oak woodland on the lower slopes of the coastal mountains. They climb very well, are frequently seen in trees, and will even rob birds' nests.

## THE ALLIGATOR LIZARD IN CAPTIVITY

I have kept this lizard in captivity since 1975, in various kinds of terraria. My animals came directly from California. As the males were very intolerant of one another, I had to keep them isolated in different terraria. The males could be distinguished by their fighting and their relatively large, broad heads. Further, their hemipenes could be exposed rather easily by gently pressing the base of the tail.

One vivarium in which I keep the lizards is the one of 16m<sup>2</sup> which I described on page 34 of the BHS Bulletin No. 3, June 1981. In winter (October-March) this enclosure is totally covered with glass. In summer, 90% is glass-covered. By this means, the animals are provided with a microclimate similar to that of California. The Alligator Lizards live in this enclosure for the whole year. On the southern slope of the enclosure, between the Mediterranean shrubs planted in it, is a layer of dead leaves (easily collected in Autumn). In the middle of the enclosure is a trench or depression running from east to west, thereby creating a cooler north facing slope, also covered with leaves and hay. Throughout the enclosure, there are large pieces of logs. There is 1m<sup>2</sup> only of exposed sand, kept slightly moist, in the north-west corner. Here there are no leaves, but some flat stones. This is the area used for egg laying.

In these conditions, the lizards are most active in April-May, and copulation takes place during this period. Later in the summer the males climb less often in the bushes and stay hidden in the hay and leaves; they are active, but are mostly not directly visible. The females also are not seen at this time as they are protecting their eggs (see later). In September, they can be frequently seen again basking in the sun.

I have kept the Alligator lizard with other species of lizards without problems: *Podarcis lilfordi*, *Lacerta strigata*, *Lacerta lepida pater*, *Lacerta t. trilineata*, *Agama stellio*, *Agama caucasia*, *Agama lehmanni* and *Ophisaurus apodus*. To keep Alligator lizards with smaller species could be dangerous.

I have also kept this lizard successfully in other terraria, both larger and smaller. I released one male in my large open-air enclosure where it survived two Dutch winters and summers! In a large glass house of 50m<sup>2</sup> and 4m high I often observed the animals in the bushes at a height of 2-4m.

In the 16m<sup>2</sup> terrarium the Alligator lizards disappear into hibernation in October, beneath the piles of hay, and emerge again at the end of February. This year I saw the first one on February 23rd, and in 1977 on February 14th.

## REPRODUCTION

I have bred this species from the beginning, but from 1976-1980 it was never very successful (see table 1).

As I have described in my earlier articles, I always give calcium and vitamin D<sub>3</sub> to my lizards in the drinking water. This had a clear effect on the reproduction of all species except the Alligator lizards. Each year there were 20-40 eggs, but the number of births declined to zero in 1980. This

Table 1. Details of captive breedings of *Gerrhonotus multicarinatus* over the past 6 years.

| Year | date of copulation | date of egg-laying | number of eggs | date of hatching    | number hatched | incubation temperature | length of incubation (days) |
|------|--------------------|--------------------|----------------|---------------------|----------------|------------------------|-----------------------------|
| 1976 | Apr 8              | Jun 6              | 23             | Aug 10,11,12        | 6              | 28°C                   | 50-52                       |
|      | Apr 8              | Jul 2              | 20             | —                   | —              | 28°C                   | 50-52                       |
| 1977 | Apr 4              | Jul 11             | 24             | Aug 20,21,22        | 13             | 30°C                   | 40-42                       |
| 1978 | ?                  | ?                  | ?              | Sep 9               | 7              | 29°C                   | ?                           |
| 1979 | Apr 13             | } before<br>Jul 1  | ?              | Aug 8               | 3              | 29°C                   | about 40?                   |
|      | May 5              |                    |                |                     |                |                        |                             |
| 1980 | Apr 17             | } before<br>Jul 7  | 22             | —                   | —              | 29°C                   | —                           |
|      | Apr 30             |                    |                |                     |                |                        |                             |
|      | May 5              |                    |                |                     |                |                        |                             |
| 1981 | Apr 24             | Jun 20             | 20             | Aug 1,2,3           | 20             | 27°C                   | 42-44                       |
|      |                    | Jul 9              | 55             | Aug 18,19,<br>20,21 | 50             | 27°C                   | 40-43                       |

caused me to rethink my methods. I thought that the lizards, active climbers that they are, might drink condensation droplets from the glass, and so receive no intake of calcium and D<sub>3</sub>. This year I added the calcium and vitamin D<sub>3</sub> directly to the food itself: on about 1kg of crickets (*Gryllus bimaculatus*) I dusted one spoonful of Calcium Lactate and about 10 drops of highly concentrated vitamin D<sub>3</sub> (1 million units per ml.). As a result, success was high = only 5 of 75 eggs died. This is the breakthrough necessary to be able to breed them in hundreds annually in the near future.

Copulation takes place mainly in the second half of April; the eggs are laid at the end of June or the beginning of July. Hatching takes place in August. Full information is given in Table 2. Alas, as I have over 1000 lizards of about 40 species, I cannot notice everything that happens in the 50 terraria.

From the table it is clear that incubation is rather short, between 40-45 days. One may think, when reading the table, that the higher incubation temperature of 20-30°C may be the cause of poorer results in earlier years, but this is very unlikely: there were traces of calcium deficiency in the hatchlings of the years prior to 1981, such as a short lower jaw, parietal up-vaulting, weak feet and curved tail.

From the table it can be seen that in the worst years the incubation period was significantly longer than in 1981, even though the temperature was higher. I have also noticed the same tendency in *Lacerta* and *Agama* species, where eggs deficient in calcium take noticeably longer to hatch than good eggs.

A female usually lays about 20 eggs; the highest number I observed was 24 in 1977. There is only one clutch per female per year.

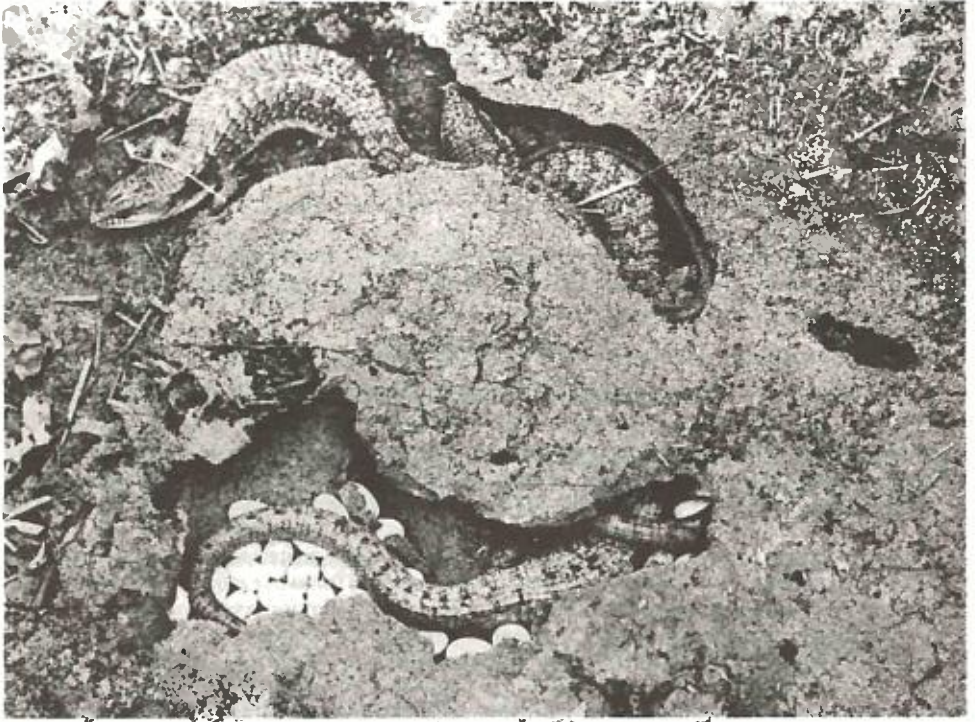
In 1976, two hatchlings were measured. Both had a snout-vent length of 37mm and total lengths of 97mm and 102mm respectively. In 1977 one hatchling was measured, total length 96mm. In 1981 a single hatchling was measured, snout-vent 34mm, total 90mm. It is remarkable that the hatchlings of the best years were the smallest, as usually, in other lizards, I have observed the opposite: eggs from females in poorer conditions produce smaller hatchlings.

I measured a single egg just after laying in 1976; this measured 17 x 10mm.

I have observed very remarkable behaviour in the females in almost every year: they remain with their eggs after laying to protect them. This year (1981) I have been able to make the best observations of this behaviour. In one terrarium there was a large flat stone beneath which three females *together* made a chamber and passage to it (see plate 2). In the chamber and entrance to it I found 55 eggs on 9th July. When I tried to remove the eggs the females became very aggressive and constantly tried to bite me. This is contrary to the behaviour of the related *Ophisaurus apodus*, which never bites when I take away the eggs, though it also protects them in a chamber like *Gerrhonotus*. I removed 50 of the eggs and left 5 in the chamber for two reasons: to see if and for how long the females remain to protect them and, because of the poor results of previous years, I thought that this protection might be necessary for the successful incubation of the eggs. I examined the chamber again on July 30th; the three females were still defending the 5 eggs. These eggs were probably all from one female, as they were all close together. I made a second examination on August 14th (after the first 20 eggs, of those which had been removed earlier, had hatched), and found only one female still with the eggs. One of these had died already, and so I considered it best to transfer the other 4 into the incubator; none of them hatched. All 50 of those which I had removed on July 9th, however, hatched successfully. The eggs left in the chamber until August 14th could have died for the following reasons: the defending females may disturb the eggs too much, though this seems unlikely to me; the eggs may be more sensitive to mechanical and/or thermal changes/disturbance at a later stage of development.



Plate 1. Copulation of *Gerrhonotus multicarinatus*



**Plate 2.** Three female *Gerrhonotus multicarinatus* protecting their eggs in a chamber beneath a flat stone.



**Plate 3.** *Gerrhonotus multicarinatus*: hatching time.

## RAISING THE YOUNG

On the first six hatchlings — hatched on August 10th, 11th and 12th 1976 — I made notes on growth and behaviour as this was the first time that I bred this species.

At hatching, they had a total length of about 10cm (see above). They lived secretively, spending most of their time hidden in dead leaves and hay. They would bask in the hay, hardly visible. I noticed the same behaviour in *Ophisaurus apodus* hatchlings. They would feed on all kinds of small insects: fly larvae, small cockroaches, small crickets and so on. Water was given by spraying the hay daily, from which the lizards would drink. The water contained vitamin D<sub>3</sub> and calcium lactate (see my other articles for details). These lizards were not hibernated in their first year. By the following August (1977 — at one year of age), they measured 35.5cm, of which 23cm was tail. By this time the males were clearly distinguishable, as they had well developed hemipenes: there were 3 males and 3 females. In 1978, after their first hibernation during the winter of 1977-78, they copulated, but the resulting eggs were then bad.

From these observations, I expect to breed many *Gerrhonotus multicarinatus* from 1983 onwards, if I keep a good number of the 70 young of this year.

## SOME GENERAL POINTS AND CONCLUSIONS

So far, I have lost none of these animals from disease; some only were lost because of accidents or fighting. It is an ideal lizard to keep in glass-covered garden terraria, where reproduction is possible if they are given enough food, minerals and vitamins.

Because of the ease of breeding this lizard, this is another species for which we will not depend on importation if we have a good population spread over terraria in Western Europe; it looks as though we may have achieved this already.

The Alligator Lizard does not tolerate great heat; at high temperatures it will die more quickly than, for example, *Lacerta* or *Agama* species. The critical upper temperature must be close to 40°C.

A favourable factor for many terrarium keepers may be the rather short incubation period of the eggs.

If the lizards are kept in an indoor terrarium, they may reproduce if they are kept a little cooler and darker (less daylight hours) in wintertime. But of this manner of keeping them, I have no experience.

## REFERENCES

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