

# Preliminary data on the reproduction of *Acanthodactylus schreiberi schreiberi* in a sand dune ecosystem in Cyprus

S. Zotos<sup>1</sup>, C. Adamopoulou<sup>1</sup>, B. Chondropoulos<sup>2</sup> & A. Legakis<sup>1</sup>

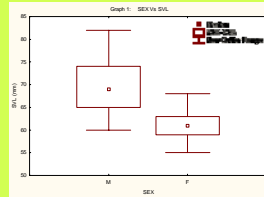
<sup>1</sup> Zoological Museum, Dept. of Biology, University of Athens, Panepistimioupoli, GR-15784, Athens, Greece

<sup>2</sup> Section of Animal Biology, Dept of Biology, University of Patras, GR 265 00, Patras, Greece

**Abstract:** The reproductive strategy of a population of the lacertid lizard *Acanthodactylus schreiberi schreiberi* was studied during two consecutive years (2008-2009) in the southern parts of Lady's mile beach in Cyprus. The aim of this study is to add information to the very limited scientific knowledge that exists on the reproductive strategy of this species. The reproductive season starts in May and ends late in August. Males gain sexual maturity at a minimum SVL of 60mm while females mature at a minimum SVL of 55mm. Sexual dimorphism is evident with males having larger body size and head dimensions than females. The population is characterized by a small clutch size (1-3) and a short incubation time (52-68 days) with a mean of 59.3 days. In comparison with *A. erythrurus* in Spain, *A. schreiberi* has smaller clutches and shorter incubation times, while its clutch size is more similar to that of *A. scutellatus* in Israel. In addition males gain sexual maturity at a larger SVL than males of *A. s. syriacus* in Lebanon. Further study is needed to describe in depth the reproduction strategy of *A. s. schreiberi*.

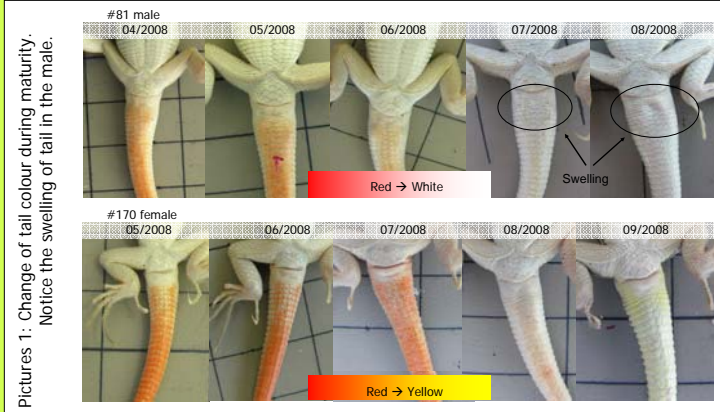
**Methods:** Age of maturity and reproductive period were estimated by monitoring the secondary sexual characteristics of sexes during monthly observations for the whole period of the survey. Pregnant females were transferred to terrariums in a laboratory simulating daily sunlight and temperature. The eggs were placed in an incubator (small plastic vials with Vermiculite substrate). Eggs were measured once every 7 days and the substrate was refreshed. Newborn juveniles were kept in the laboratory for a period of 15–30 days to study their growth rate.

**Sexual Dimorphism:** Sexual dimorphism was studied in 47 males and 42 females during the summer period of 2008. Males had significantly larger body size (SVL) and head dimensions than females (Graph 1). Tail colour was also different between sexes with males having white tails in contrast with the yellow tails of females alternates to reddish during the beginning of the reproductive period (Picture 1). All immature individuals have reddish tails.



**Reproductive period:** The reproductive season starts in May and ends late in August. Some data indicate that younger females that mature after July have a delayed reproductive period from August to late September-October (This is not fully clarified and needs further study).

**Age at maturity (SVL):** Males gain sexual maturity at a minimum size of 60mm while females mature at a minimum SVL of 55mm (based on secondary sexual characteristics, Picture 1)



**Egg size at oviposition:** During 2008, 30 eggs were laid from 17 different individuals. In 2009 61 eggs were laid from 29 individuals (Table 1). There was no significant statistical difference between the two consecutive periods. Egg Volume was positively correlated with Juvenile SVL (df=1.24, p=0.021, b=0.45). The larger the egg, the larger the juvenile that will hatch from it (Graph 2). Mother SVL was not correlated with Mean Egg Volume.

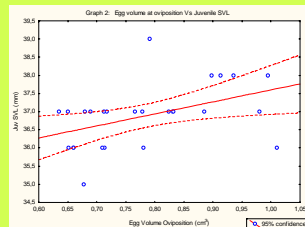
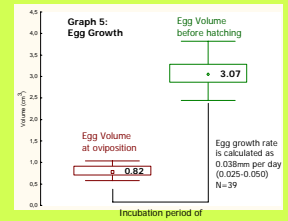


Table 1: Egg size characteristics at oviposition

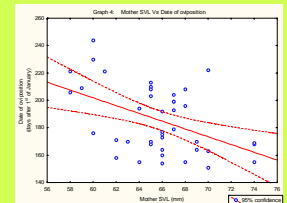
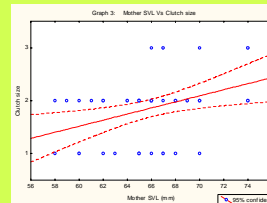
	N=91	Mean	Range	SD	SE
Length (mm)		17.4	13.8 – 21.4	0.16	0.02
Width (mm)		9.3	7.0 – 11.1	0.08	0.01
Volume (cm <sup>3</sup> )		0.8	0.43 – 1.33	0.18	0.02

**Egg size 2-3 days before hatching:** 13 individuals hatched in 2008 and 26 until the end of August 2009 (11 eggs are expected to hatch between mid September and mid October) (Table 2).

	N=39	Mean	Range	SD	SE
Length (mm)		23.8	21 – 28	0.16	0.03
Width (mm)		15.4	12.9 – 16.7	0.09	0.01
Volume (cm <sup>3</sup> )		2.96	2.04 – 4.04	0.44	0.07
Mass (gr)		3.19	2.48 – 4.18	0.40	0.06



**Clutch size:** The population is characterized by a small clutch size (max. 3 eggs) and large sized eggs. Mean clutch size is 1.86 (N=49, (1-3), SD=0.61, SE=0.09). Mother SVL was positively correlated with Clutch size (df=1.47, p=0.009, b=0.37). Females with larger SVL lay bigger clutches (Graph 3). There was no statistical significant difference among the two consecutive periods. Females, depending on their age, lay one or two clutches per year. There is also evidence of clutches occurring in August but it is still unclear whether it is a third clutch period or a second delayed one. Mother SVL was correlated with Birth date (N=41, df=1.39, p=0.002, b=-0.46). Larger females lay their clutches earlier than smaller ones, and thus are able to lay a second (or third) clutch (Graph 4).



**Incubation period:** Eggs of the same clutch had the same incubation period. Mean incubation period was 59.3 days (52–68), SD=3.66, SE=0.86. There was no statistical significant difference between the two consecutive periods.

**Juvenile characteristics:** Individual characteristics were studied among the new born of August-October 2008 and August-September 2009 (Table 3). Mother SVL was not correlated with Juvenile SVL. An ongoing study, is focusing on possible morphometric differences among the individuals originating from different months.

Table 3: Juvenile characteristics

	N=38	Mean	Range	SD	SE
SVL		36.34	32 – 39	1.42	0.23
Tail length		71.53	61 – 84	5.21	0.846
Head Length		8.8	7.8 – 9.7	0.042	0.007
Head width		4.7	4.2 – 5.3	0.026	0.004
Head height		3.7	3.0 – 4.6	0.032	0.005
Mouth opening		5.0	4.4 – 5.9	0.031	0.005
Mass		1.16	0.77 – 1.58	0.165	0.029

## References

- Busack S.D. & Jaksic F.M., 1982, Autecological Observations of *Acanthodactylus erythrurus* (Sauria: Lacertidae) in Southern Spain, *Amphibia-Reptilia*, 3(2-3):237-255(19)
- Busack S.D. & Klostermann L.L., 1987, "Reproduction in a Spanish population of *Acanthodactylus erythrurus*", *Ann. Carnegie Mus.*, 56: 97-102
- Carretero M.A. & Llorente G.A., 1995, Reproduction of *Acanthodactylus erythrurus* in its northern boundary, *Russian Journal of Herpetology*, 2:10-17
- Castilla M.A., Barbadiño J.L., Bauwens D., 1992, Annual variation in reproductive traits in the lizard *Acanthodactylus erythrurus*, *Can. J. Zool.*, 70: 395-402
- Hraoui-Bloquet S., Sadek R., Lahoud-Hokayem M. & Hakim-Saade J., 2007, "Cycle de reproduction chez les mâles d'*Acanthodactylus schreiberi syriacus* Boettger, 1879 (Reptilia, Lacertidae) du Liban", *Bull. Soc. Herp. Fr.*, 122: 5-18
- Perez-Quintero & Juan Carlos, 1996, Reproductive characteristics of three Mediterranean lizards: *Psammadromus algirus* (L.), *Psammadromus hispanicus* Fitzinger and *Acanthodactylus erythrurus* (Schinz), *Amphibia-Reptilia*, 17(3):197-208
- Perry G & Dmi'el R., 1994, Reproductive and population biology of the fringe-toed lizard, *Acanthodactylus scutellatus*, in Israel, *Journal of Arid environment*, 27: 257-263
- Pollo C.J. and Perez-Mellado V., 1990, "Biología reproductora de tres especies mediterráneas de Lacertidae", *Mediterranea Ser. Biol.*, 12, 149-160