

NOTES ON THE ECOLOGY AND NATURAL HISTORY OF TWO SPECIES OF *EGERNIA* (SCINCIDAE) IN WESTERN AUSTRALIA

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ABSTRACT

Ecological data on the skinks *Egernia depressa* and *Egernia formosa* are presented. *E. depressa* is both arboreal and saxicolous, whereas *E. formosa* was strictly saxicolous at the study site. *E. depressa* shelter above ground in mulga tree hollows and rock crevices, using their spiny tails to block off openings. During summer, times of activity are bimodal during the course of the day for both species. Average active body temperature of *E. depressa* is 34°C and that of *E. formosa* is 32.6°C. Both species are live-bearing, omnivorous dietary specialists, eating primarily termites and vegetation. *E. depressa* are semi-social.

INTRODUCTION

Egernia depressa is widespread in southern Western Australia (Cogger 2000, Doughty et al. 2011, Storr 1978, Wilson and Swan 2003). During 1967–1968, we encountered these spiny tailed skinks at three sites, in mulga tree hollows on the Atley area (Lat. 28° 27' x Long. 119° 05') and in a pile of fence posts along the rabbit proof fence at Lat. 28° 47' x Long. 118° 27'. Both *E. depressa* and *E. formosa* were found in sympatry in early January 1968 on granite rock outcrops at a tor area 71 km South of Wiluna on the west side of the road to Sandstone (Lat. 27° 05' x Long.

119° 37'). Other lizard species found at this site included *Ctenophorus caudicinctus*, *Ctenophorus nuchalis*, *Ctenotus leonhardii*, *Ctenotus schomburgkii*, *Gehyra variegata*, *Diplodactylus pulcher*, *Menetia greyi*, *Strophurus wellingtona*, *Rhynchoedura ornata* and *Varanus giganteus*.



METHODS

We recorded air and body temperatures, activity time, microhabitat, fresh snout-vent length (SVL), tail length, and weight for as many lizards as possible [some of these data were summarized in appendices in

Pianka (1986)]. Stomach contents were identified and prey volumes estimated for all lizards collected. Dietary niche breadths were calculated using the inverse of Simpson's (1949) index of diversity [$D = 1 / \sum p_i^2$] where p_i is the proportion by volume of prey category i .

RESULTS

Size. A frequency distribution of snout-vent lengths separates juvenile *E. depressa* from adults (Figure 1).

The seven smallest skins averaged 61.3 mm SVL (mean weight = 5.54 g). SVLs of 20 adults (inset) average 98.9 mm and range from 93 to 106 mm (mean adult weight = 30.5 g).

Six adult *E. formosa* averaged 102.67 mm in SVL (mean weight = 20.4 g). SVLs of two juvenile *E. formosa* measured 48 and 50 mm (weights 1.7 and 2 g), respectively.

Habitat and Microhabitats. *E. depressa* are usually found above ground in mulga tree hollows or in rock crevices (mean height 104 cm, N = 11). One was active in the open sun on the ground when first sighted. Several others were basking on rocks when sighted but retreated into crevices.

E. formosa were also first seen basking on rocks and retreated into crevices. In other parts of their geographic range, *E. formosa* are arboreal (Wilson and Swan 2003).

Time of Activity. During summer, *E. depressa* exhibit a

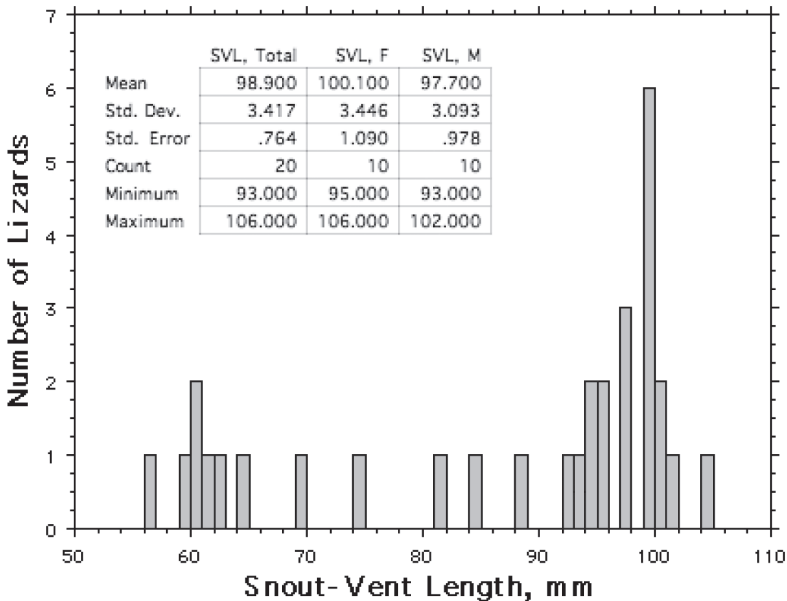


Figure 1. Frequency distribution of snout-vent lengths of 32 *E. depressa*.

bimodal pattern of activity throughout the day (Figure 2). Two *E. formosa* were active in the AM at 9.25 and 9.42, 7 others were active during the PM (mean = 17.426).

Thermal Relations. Active body temperatures of *Egernia depressa* are positively correlated with ambient air temperatures (Figure

3). Average active body temperature is 34°C (N=28). Females maintain slightly higher body temperatures than males. Body temperatures of 8 active *E. formosa* averaged 32.64.

Diet. *Egernia depressa* is a termite specialist with a narrow dietary niche breadth of only 1.473 (Table 1). Six individuals had

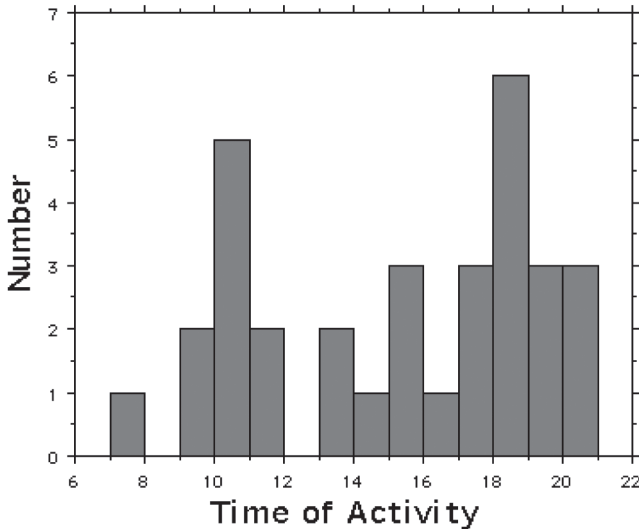


Figure 2. Numbers of *E. depressa* at various time of day.

Table 1. Summary of stomach contents of 32 *Egernia depressa*.

Prey Category	Number	Number %	Volume	Volume %	Frequency
Centipedes	3	0.18	0.5	2.64	1
Ants	9	0.54	0.16	0.85	2
Coleoptera	2	0.12	0.02	0.11	2
Isoptera	1592	96.25	15.46	81.67	18
Hemiptera	1	0.06	0.01	0.05	1
Larvae	38	2.30	1.83	9.67	4
Other Insects	3	0.18	0.11	0.58	3
Vegetative	6	0.36	0.79	4.17	6
UnID	1	0.06	0.05	0.26	1
Totals	1655	1.00	18.93	1	38

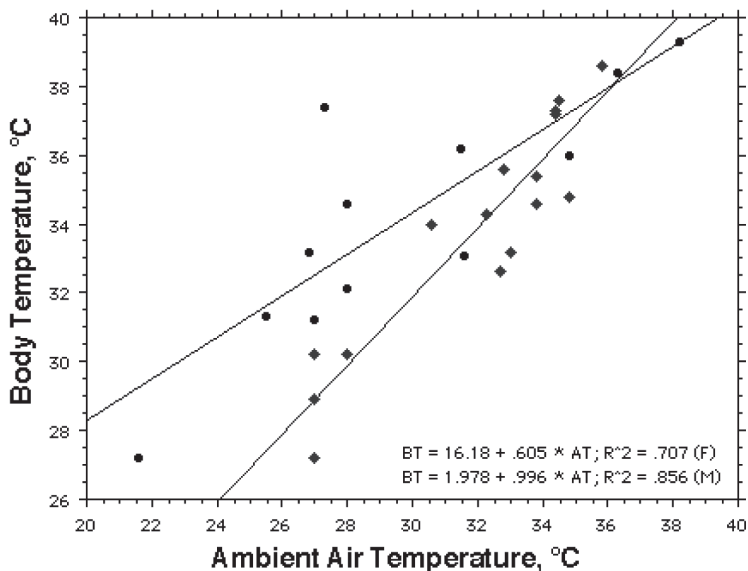


Figure 3. Body temperatures plotted against ambient air temperature for 28 *Egernia depressa*. Circles represent females, males shown as diamonds. Least squares regression lines are shown for each sex and equations are given at the bottom right.

eaten small amounts of vegetative material.

Diets of nine *E. formosa* are summarized in Table 2. Like *E. depressa*, it has a narrow dietary niche breadth (2.43) dominated by termites and plant material.

Sociality. Many species of *Egernia* exhibit varying degrees of sociality (Chapple 2003). Two juvenile male *E. depressa* were found in the same mulga tree hollow along with an adult male. No evidence of social behavior was observed in *E. formosa*.

Table 2. Summary of stomach contents of 9 *Egernia formosa*.

Prey Category	Number	Number %	Volume	Volume %	Frequency
Aranae	1	0.2427	0.04	1.3559	1
Ants	1	0.2427	0.01	0.339	1
Coleoptera	3	0.7282	0.16	5.4237	3
Isoptera	400	97.0874	1.4	47.4576	5
Other Insects	3	0.7282	0.08	2.7119	3
Vegetative	4	0.9709	1.26	42.7119	4
Totals	412	100.0001	2.95	100	

Reproduction. None of ten female *E. depressa* collected in January or February was gravid, nor was any of three female *E. formosa* collected in early January. Like other members of the *Egernia* complex, both species give birth to living young. Litter size in *E. depressa* is usually two and newborns are 54–59 mm SVL (Day 1980, Greer 1989). Average snout vent length (SVL) of adult female *E. depressa* is 100.1 mm. Average SVL of 10 adult male *E. depressa* is 97.7 mm.


Rarity. *E. depressa* was classified as rare (Pianka 2014) because it was found at only one of my ten study areas and was present at a low population density.

ACKNOWLEDGEMENTS

H. L. Dunlap provided companionship and assistance in the field. A. R. Main of the Department of Zoology at the University of Western Australia sponsored me and offered invaluable advice and tips for how to cope with living in the outback. G. M. Storr of the Western Australian Museum helped greatly as well. Stomach contents were identified by M. E. Egan. V. Johnson Dennison assisted with dissections, data, and laboratory analyses. This research was supported by grants from the US National Institute of Health and the US National Science Foundation. Specimens are housed in the Los Angeles County Museum of Natural History.

REFERENCES

- CHAPPLE, D. G. 2003. Ecology, life-history, and behavior in the Australian scincid genus *Egernia*, with comments on the evolution of complex sociality in lizards. *Herpetological Monographs* 17: 145–180.
- COGGER, H.G. 1992. *Reptiles and Amphibians of Australia*, 5th ed. Reed Books. 775 pp.
- DAY, K. 1980. Notes on the birth of the pygmy spinetailed skink *Egernia depressa* (Guenther) in captivity. *Herpetofauna* 11: 29.
- DOUGHTY, P., L. KEALLY AND S. C. DONNELLAN. 2011. Revision of the Pygmy Spiny-tailed Skinks (*Egernia depressa* species-group) from Western Australia, with descriptions of three new species. *Records of the Western Australian Museum* 26: 115–137.
- GARDNER, M. G., A. F. HUGALL, S. C. DONNELLAN, M. N. HUTCHINSON and R. FOSTER. 2008. Molecular systematics of social skinks: phylogeny and taxonomy of the *Egernia* group (Reptilia: Scincidae). *Zoological Journal of the Linnean Society* 154: 781–794.
- GREER, A. E. 1989. *The Biology and Evolution of Australian Lizards*. Surrey Beatty.
- PIANKA, E. R. 1986. *Ecology and Natural History of Desert Lizards. Analyses of the Ecological Niche and Community Structure*. Princeton University Press, Princeton, New Jersey.
- PIANKA, E. R. 1996. Long-term changes in Lizard Assemblages in



the Great Victoria Desert: Dynamic Habitat Mosaics in Response to Wildfires. Chapter 8 (pp. 191–215) in M. L. Cody and J. A. Smallwood (eds.) *Long-term studies of vertebrate communities*. Academic Press.

PIANKA, E. R. 2014. Rarity in Australian Desert Lizards. *Austral Ecology* 39: in press.

SIMPSON, E. H. 1949. Measurement of diversity. *Nature* 163: 688.

STORR, G. M. 1978. The genus *Egernia* (Lacertilia: Scincidae) in Western Australia. *Records of the Western Australian Museum* 6: 147–187.

STORR, G. M., L. A. SMITH, and R. E. JOHNSTONE. 1999. *Lizards of Western Australia. I. Skinks*. Revised Edition. Western Australian Museum.

WILSON, S. and G. SWAN. 2003. *Reptiles of Australia*. Princeton University Press.