

## NOTES ON THE NATURAL HISTORY OF THE TINY SKINK *MENETIA GREYI*

By ERIC R. PIANKA

Section of Integrative Biology C0930  
University of Texas at Austin  
Austin, Texas 78712 USA

### ABSTRACT

Ecological data on the skincid lizard *Menetia greyi* are presented. Ambient air temperature averages 29.7°C and active body temperature averages 32.8°C in this diminutive diurnal species. Average time of activity is 11.6 hours. Most lizards are found near spinifex grass hummocks or in the litter under shrubs and trees. Microhabitat niche breadth is 3.6. These lizards are specialised predators that consume small invertebrates especially thysanura (silverfish), small spiders, and true bugs. Mating occurs during the Spring, eggs are laid in October–November, clutch sizes consist of 1–2 eggs (mean = 1.54, N=41) and relative clutch mass averages 0.159. Hatchlings emerge in November and grow rapidly, doubling in size in 3 months. *Menetia* reach adult sizes in a few months, and they appear to be annuals that may live only one year.

### INTRODUCTION

*Menetia greyi* is a wide-ranging tiny skink, found over most of Australia except for the east coast and the Cape York Peninsula (Cogger 1992). This species occurs at 7 of my 10 study sites in the Great Victoria Desert (GVD) of Western Australia. With more adequate sampling, it would likely be found on all my study areas.

### METHODS

Most lizards were collected during Springs in the Great Victoria

Desert (GVD) of Western Australia. Field work took place over 11 separate expeditions over 42 years, commencing in November 1966 and ending in November 2008. A total of 1256 days and 41 months were spent in the field, studying lizards, mostly during Springs in the Great Victoria Desert (GVD) of Western Australia. Up until 1979, all lizards were collected by hand, and data were obtained on date and time of activity, ambient air temperature, active body temperature, habitat and microhabitat (Pianka 1986). While it is difficult to measure active

body temperatures of such small lizards, I was able to measure body temperatures of 13 individuals immediately after capture with Shultheiss thin bulb cloacal thermometers. Air temperatures were taken at the same time in the shade at chest height. All times of activity were decimalized to facilitate computation of statistics. Beginning in 1989, most lizards were collected using pit traps (62,226 pit trap days), which provided more limited, qualitatively different information.

Items within stomachs were sorted among 19 categories, mostly arthropod orders. Prey items were counted and volumes estimated to the nearest cubic millimetre for each category. Volumes were estimated by placing a one millimetre thick layer of material over square millimetre grid paper and approximating total volume.

Each lizard's counted stomach contents were kept individually and stored in ethanol. Dietary niche breadths were estimated 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 food items in stomachs based on the 15 prey categories.

All lizards were collected under permits issued by appropriate authorities and animal ethics committees, and all were deposited either in the Los Angeles County Museum of Natural History, the Western Australian Museum, or The Texas Natural History Museum.

## RESULTS

### Temperature Relationships and Time of Activity

Ambient air temperatures of active lizards ranged from 18.2°C to 37°C and averaged 29.78°C (SD=5.28,

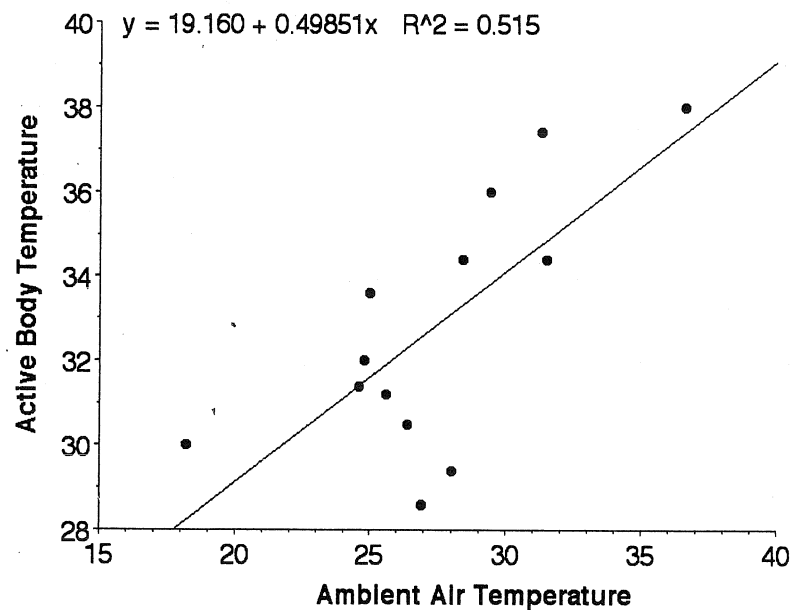


Figure 1. Active body temperatures of 13 individuals plotted against ambient air temperature.

N=26). Active body temperatures ranged from 28.6°C to 38°C and averaged 32.84°C (SD=3.05, N=13). The slope of a regression of active body temperature on ambient air temperature is 0.499 (Figure 1), suggesting a moderate degree of thermoregulation (Huey and Slatkin 1976). Time of activity ranged from 6.75 to 18.17 and averaged 11.63 (N=31).

Greer (1989) commented on thermoregulation in this tiny species, saying "the lizards' small size would make them very susceptible to almost instant overheating. In addition to all the normal vagaries of a lizard's life, *Menetia* must also cope with the added hazard of rarely being more than a false step away from being fried." Active body temperatures of the two warmest individuals were near 38°C, well below their critical thermal maximum of 44.4–45.2°C (Greer 1980). In addition to maintaining relatively low active body temperatures, these lizards appear to stay very close to shade most of the time, ensuring that they can reach cooler microhabitats rapidly to avoid overheating.

#### Habitat and Microhabitats

At a sandridge study site, about half (66 of 130 lizards) were trapped on crests of sandridges, 21.5% were on flat sandplains, 22.3% at the base of sandridges, and 5.4% on sandridge slopes (these 4 habitat types were not sampled equally). Table 1 shows the numbers and proportions of 25 active lizards in different microhabitats. Most

**Table 1.** Numbers and proportion of 25 active lizards found in various microhabitats. Lizards found at interfaces between habitats are split among them.

Microhabitat	Number of Lizards	Proportion of Lizards
Open Sun	5.5	0.218
Grass Sun	12	0.475
Tree Sun	0.75	0.030
Other Sun	0.5	0.020
Open Shade	0.75	0.030
Grass Shade	2.75	0.109
Bush Shade	1.5	0.060
Tree Shade	0.75	0.030
Other Shade	0.5	0.020

lizards were found near spinifex hummocks (47.5% in sun, 10.9% in shade), although some were in litter under shrubs and trees. Microhabitat niche breadth, based on 9 microhabitat categories, is 3.61, calculated as the inverse of Simpson's (1949) index of diversity,  $1/\sum p_i^2$ , where  $p_i$  represents the proportion of animals in microhabitat  $i$ .

#### Size, Tail Length, and Weight

Snout-vent length (SVL) in mm ranges from 10 to 37, averaging 25.84 (N=448). Length of intact (non-regenerated) tails ranges from 12 to 63.5, average = 38, N=324). Body weight in grams ranges from 0.1 to 1.0 (average = 0.27, N=446). Although males have, on average, slightly larger SVLs than females and females are slightly heavier than males, no statistically significant sexual dimorphism is discernable. Hatchlings are very small (10–12 mm SVL), emerging

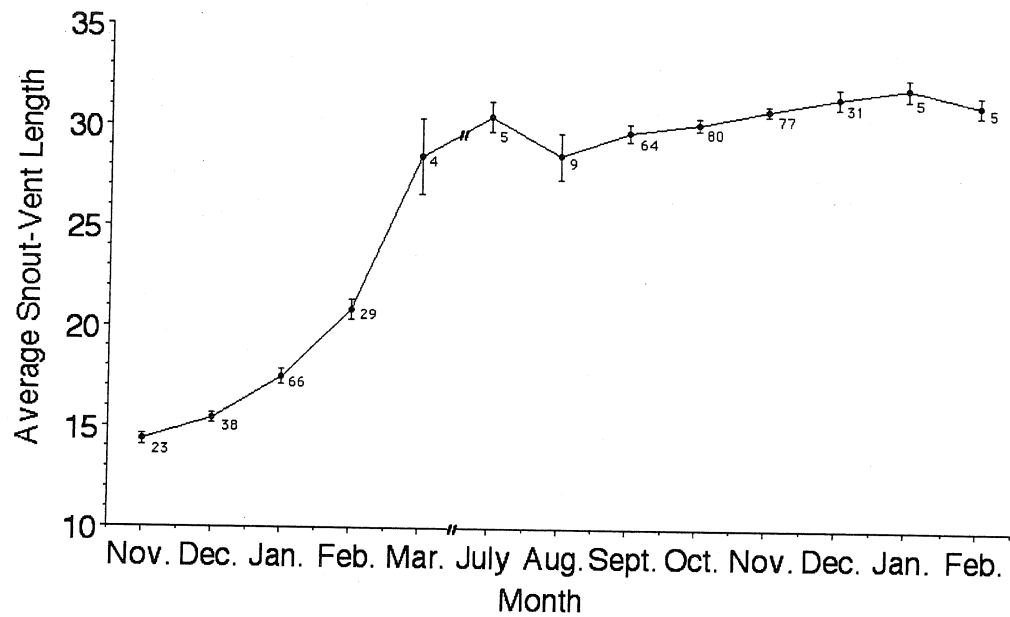


Figure 2. Average snout-vent length plotted against month of collection with hatchlings separated from adults. Standard errors of means shown with vertical bars, sample sizes given with numbers.

Table 2. Summary of stomach contents of 146 individual lizards based on 19 different prey categories.

Prey type	Total Number	Total Volume	Proportion by Number	Proportion by Volume
Centipede	1	.02	.002	.006
Aranae	155	.81	.331	.289
Pseudoscorpions	4	.01	.004	.005
Acarinae	10	.013	.030	.005
Ants	12	.05	.026	.016
Wasps	4	.001	.009	.001
Orthoptera	11	.13	.024	.042
Thysanura	104	1.10	.222	.353
Blattaria	3	.03	.006	.010
Coleoptera	16	.03	.034	.011
Isoptera	16	.06	.034	.054
Hemiptera	83	.36	.177	.131
Diptera	7	.02	.015	.006
Lepidoptera	1	.02	.002	.006
Eggs	22	.04	.047	.013
Larvae	6	.03	.013	.010
Vegetation	1	.01	.002	.003
Other Insects	10	.08	.021	.026
Other unidentified		.06	.001	.019
Total	468	3.12	1.00	1.01

in November, and grow rapidly, doubling SVL in a few months (Figure 2). These lizards reach adult sizes by March and may be annuals that live only one year.

### Diets

*Menetia greyi* are food specialists with a narrow dietary niche breadth. They consume a variety of small arthropods, but their primary foods are thysanura (silverfish), small spiders, and true bugs (Table 2).

### Reproduction

Smyth and Smyth (1974) reported clutch sizes of from 1–3 eggs (N=9) and average SVL of reproductive females of 34.6 mm. In this study, most gravid females were found in September (N=5), October (N=11) and November (N= 20), but 2 were found in December, 1 in January and 2 in March. Reproductive females ranged from 29–35 mm in SVL (mean=31.5, N=41). 19 females had a single shelled egg in their oviduct, and 22 others contained two oviductal eggs. Mean clutch size was 1.54 (SD=0.505, N=41). Relative clutch mass (egg volume over female fresh body weight) ranged from 0.05 to 0.4 (mean=0.159, SD=0.089, N=40). Bush (1983) reported an incubation time in captivity of 46–49 (mean=47) days at  $28 \pm 0.4^\circ\text{C}$  (Greer 1989). Nest temperatures in the desert may be higher than  $28^\circ\text{C}$  and incubation times shorter. Testes were enlarged in October, suggesting that mating takes place during the Spring.

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