Appendix

Diet in *Egernia whitii* living on Kangaroo Island and Wedge Island in South Australia

Abstract

The lizard species *Egernia whitii*, although primarily insectivorous, is an opportunistic forager throughout its range. The gut contents of 14 preserved specimens from Kangaroo Island were examined. Identifiable items included hemipterans, hymenopterans, coleopterans, arachnids, small eggs of undetermined invertebrates, leaves, buds, stalks, snails and fruity seeds or berries. Four herbaceous plants widely available and consumed by *E. whitii* and *E. multiscutata* on Wedge Island in the Spencer Gulf of South Australia, are *Enchylaena tomentosa var. tomentosa* (Ruby Saltbush), *Rhagodia candolleana* ssp. c*andolleana* (Seaberry Saltbush), *Myoporum insulare* (Boobialla), and *Lycium ferocissimum* (African boxthorn). Lizards appear to gain supplementary nutrients from these berries at a critical time during the annual seasonal cycle and their availability in ungrazed areas may make a significant contribution to morphology on Wedge Island. The flexibility and opportunism *E. whitii* demonstrate in devouring such a broad range of items may be linked to habitat choice.

Introduction

The gut contents of 14 Kangaroo Island (KI) preserved specimens of the lizard species *Egernia whitii* from the South Australian Museum, Adelaide (SAMA) were examined. Investigation of gut contents from lizards on KI and the active feeding behaviour of the species on Wedge Island (WI) provides new information on the species concerning the range of items consumed, the consumption of ants only at the alate stage, and the utilization of small berries found in profusion during summer on three native and one exotic species of vegetation on W I.

Materials and methods

Preserved specimens were selected randomly during the process of examination for reproductive information (Chapter 3). The entire gut from each specimen was removed between the diaphragm and vent, and all food items were identified under a

dissecting microscope using the *Key to Insect Orders*, a CD-ROM developed at the University of Queensland, and with reference to expert staff and postgraduates working in proximity to the laboratory at that time. Invertebrate taxa and vegetation were recorded, along with the number of items and volume of each category in 10% increments.

Herbaceous plants extant at the study site on Wedge Island, in the Spencer Gulf of South Australia were identified (Robinson *et al* 1996), and this information was used in combination with field notes recording incidences of lizard consumption to research four herbaceous plants for historical and current uses.

Results

Identifiable items included hemipterans, hymenopterans, coleopterans, arachnids, small eggs of undetermined invertebrates, leaves, buds, stalks, snails and fruity seeds or berries. Table 8 shows the percentage of animal and vegetative gut contents for the sampled group (N = 14) to the nearest 10%, indicating the relative proportion of skinks allocated to each combination.

Table 8: Diet of 14 SAMA specimens sampled from K. I., showing the percentage of animal and vegetative gut contents to the nearest 10%, and indicating the relative proportion of the group allocated to each combination.

Volume % animal contents	Volume % vegetation	%-age of skinks falling into diet-mix category
20	80	16.6
50	50	8.3
80	20	50:7
100	0	25

An average of 72.5% by volume of gut contents consisted of animal matter with the remaining 27.5% a range of identified and undifferentiated vegetative material.

Discussion

Kangaroo Island specimens

The stomach contents of the SAMA KI specimens indicate a generalist diet with a preference for animal rather than vegetative content. When ants were present in the stomach contents they were invariably accompanied by wings and were hence most

likely alates, suggesting that ant consumption took place only when the prey species were relatively well provisioned nutritionally. *E. whitii* demonstrate flexibility and opportunism in their dietary choices. Hickman (1960) reports similar diet contents in a Tasmanian sample of the same species. The high vegetative constituent found in some individuals appears to be seasonal.

Wedge Island feeding behaviour

A large component of the *E. whitii* diet during summer on Wedge Island consists of small fruits or berries found on three native and one exotic species of vegetation. *Enchylaena tomentosa var. tomentosa* (Ruby Saltbush) has been reported as a food source for both Aboriginal people (Australian National Botanic Gardens 2006) and other lizard species (Dubas & Bull 1991). *Rhagodia candolleana* ssp. c*andolleana* (Seaberry Saltbush) berries are listed by the Australian National Botanic Gardens (2006) as a bush food that can be eaten fresh if necessary for survival in the bush.

Saltbush species are an important diet supplement for sheep during droughts because they provide a protein source to supplement dry fodder and aid digestion (Landline 2001). It is likely that lizards also gain supplementary nutrients at a critical time during the annual seasonal cycle. Wedge Island, in contrast to Kangaroo Island, is no longer grazed, and saltbush is regenerating, especially along the perimeter of the inland salt marsh where there is a particularly dense population of skinks. The high density of *E. whitii* in this area may at least partially be explained by the proliferation of these two saltbush species at the location.

Whenever *Enchylaena tomentosa var. tomentosa* (Ruby Saltbush) or *Rhagodia candolleana* ssp. c*andolleana* (Seaberry Saltbush) are fruiting within *E. whitii* or *E. multiscutata* habitat, they constitute an important food source for the lizard occupants. Berries from both species were particularly prolific in March when growth and fat storage in the animals is paramount before the weather cools and they must hibernate.

E. multiscutata have been seen (Bellamy 2006) eating the purple fruits of *Myoporum insulare* (Boobialla) and these are described by a vegan group (Plants for a future 2006) as ‘juicy and sweet’. They mention that while no records of toxicity can be found some caution is advised as the fruits of others in the genus contain liver toxins and can be harmful in large quantities.

Lycium ferocissimum (African boxthorn) is considered a noxious weed in South Australia whose fruit is eaten and spread by birds and foxes (Parsons and Cuthbertson 1992). Because its seeds are still viable after excretion it is readily transferred to other areas and it easily invades mature native communities of remnant vegetation. It was initially planted to provide a protective barrier for sheep that might stray too close to the steep cliffs on Wedge Island, but remains now as a tenacious woody weed. Both Boobialla and African boxthorn may also act as an important supplementary food for lizards of the *Egernia* genus during their fruiting seasons.

The broad range of items consumed may be linked to habitat choice. Large seasonal components of edible fruits found in live lizard scats from Wedge Island, which is currently ungrazed, may provide a possible explanation for greater body length and a comparative lack of sexual dimorphism found in Wedge Island populations (Chapter 2, p. 29-31).

References

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Follicle size in *Egernia whitii* females between September and January, and February and June.

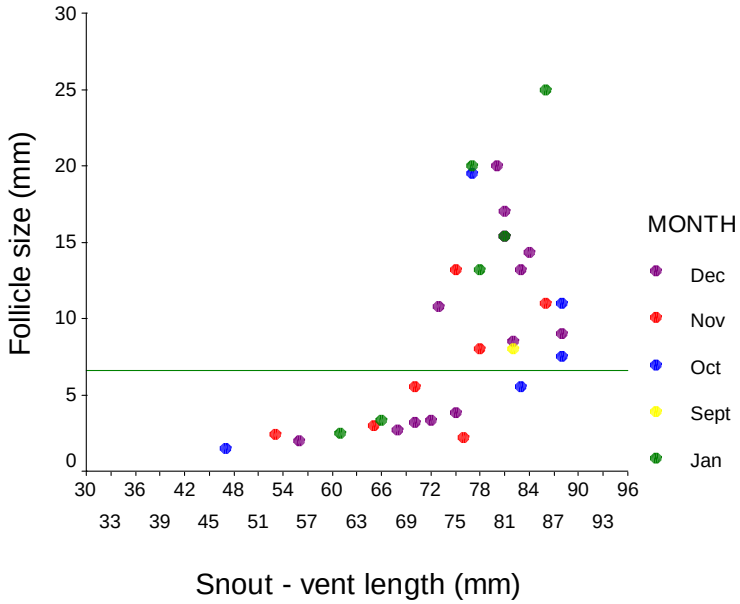

Figure 1: SAMA offshore island specimens showing female follicle size from September to January. Green reference line at 6.6 mm separates the largest gonad size in the sample during the non-reproductive period, from follicles undergoing vitellogenesis and fertilisation.

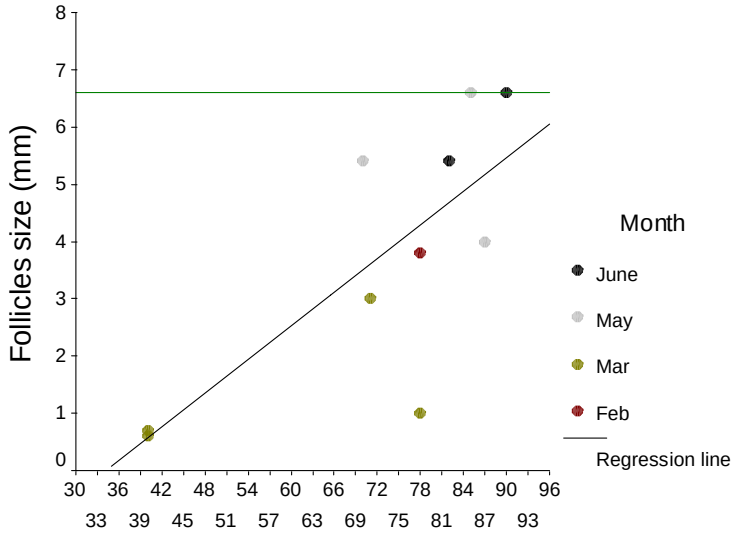

Figure 2: SAMA female follicle size from February to June, as a function of SVL. Green reference line at 6.6 mm follicle size indicates the maximum follicle size in the sample. A linear regression line has been fitted.

Testis size in *Egernia whitii* males between October and January, and February and June.

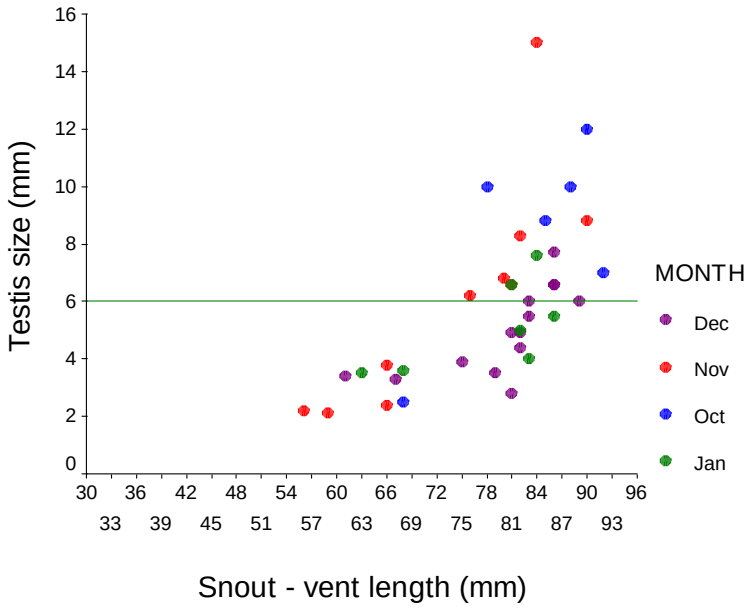

Figure 3: SAMA offshore island specimens showing male testis size from October to January. Green reference line at 6 mm separates the largest gonad size in the male sample during the non reproductive period, from the testis peak during the reproductive season.

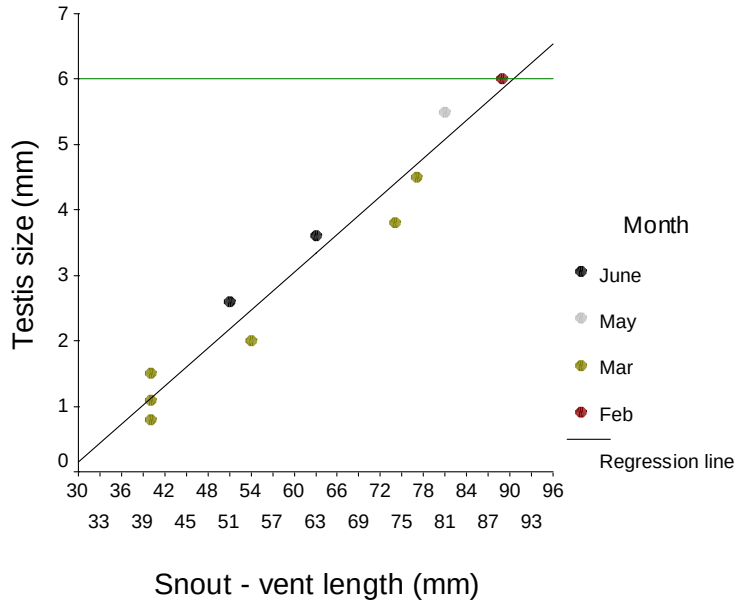

Figure 4: SAMA male testis size as a function of SVL based on specimens collected from February to June. Green reference line at 6 mm indicates maximum testis size in the sample. A linear regression line has been fitted.

Female follicle size as a function of SVL for specimens captured between September and January is shown in Figure 1, where capture months are indicated by different plot symbols. During this time female follicle size increased through vitellogenesis and fertilisation to full term pregnancy. Young are usually born in early February, after which there is a return to quiescent gonad size (Figures 1 & 2). Males experience a shorter period of reproductive activity, with steady growth in testis size with SVL (Figures 3 & 4).