Notes on the Diet, Survival Rate, and Burrow Specifics of *Uromastyx aegyptius microlepis* from the United Arab Emirates

PETER L. CUNNINGHAM

P.O. Box 17258, Al Ain, United Arab Emirates. email: plc@emirates.net.ae

Abstract.- Uromastyx aegyptius microlepis are almost exclusively herbivorous and feed on a variety of plant species with Pennisetum divisum being extensively utilized in the United Arab Emirates. The survival rate, as determined over a one year period without any rainfall is <50%. Burrow openings are mainly aligned in a southerly and easterly direction with the average burrow entrance size being 60x155 cm. Temperatures measured at 30 cm down the burrow entrance are on average 6°C lower than the ambient temperature.

Key words.- Reptilia, Squamata, Agamidae, *Uromastyx aegyptius microlepis*, United Arab Emirates, ecology

Figure 1. The Spiny-tailed lizard, *Uromastyx aegyptius microlepis*.

Introduction

Uromastyx aegyptius microlepis (Spiny-tail Lizards; Fig. 1) belong to the Family Agamidae and occur throughout the Arabian Peninsula, Iran, Iraq and Jordan (Arnold 1986, Leviton et al. 1992). They are diurnal ground dwelling lizards that may reach sizes of up to 60 cm and are generally yellowish-grey in colour with an impressive spiny club-like tail. Adult *U. a. microlepis* are documented as being mainly herbivorous, although insects form part of their diet, while juvenile lizards are thought to be mainly insectivorous (Arnold 1984, Baha El Din 1996, Brown 1982, Highveld and Slimani 1998, Jongbloed 1997, Manthey and Shuster 1996).

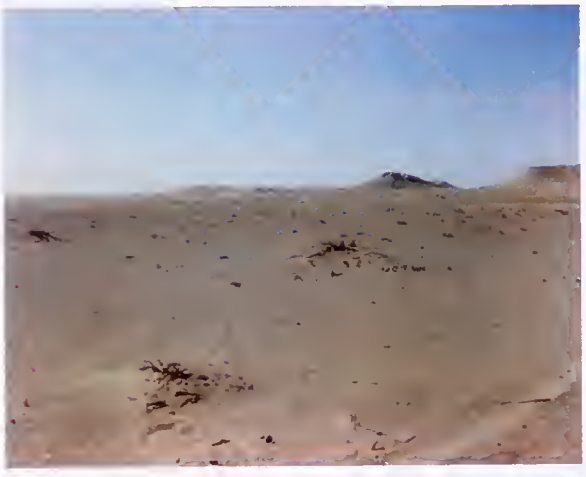

Figure 2. The study site and habitat of *U. a. microlepis* in Abu Dhabi.

Material and Methods

Twenty mature *Uromastyx aegyptius microlepis* individuals in a scattered population, ±35 km northwest of Al Ain (24°25'07"N and 55°35'01"E; Fig. 2) in the Abu Dhabi Emirate of the United Arab Emirates (UAE), were observed for one full day each (sunrise to sunset). These observations took place during summer (May and June 1999) and winter (December 1999 and January 2000), respectively. I spent 480 observation hours studying these lizards. Direct observations of plant species utilized during their feeding bouts was conducted using an 8x40 binocular over a distance of 100m so as not to influence the feeding behavior. Tracks were also followed once the lizards had retreated underground to confirm sightings. Fecal pellets were collected for later analysis. Burrow

information (orientation, burrow entrance height and width, temperature above ground and 30 cm down burrow) was collected from 25 active burrows once the lizards had retreated.

Survival rate was determined for the 20 study individuals by investigating their burrows for any signs of activity in June 2000, one year after the first observations were made.

Results

Diet. *Uromastyx aegyptius microlepis* utilized the following 10 plant species:

Class Monocotyledonae

Gramineae (Grass family): *Pennisetum divisum, Stipagrostis plumosa*

Class Dicotyledonae

Amaranthaceae (Cockscomb family): *Aerva javanica*

Asclepiadaceae (Milkweed family): *Leptadenia pyrotechnica*

Boraginaceae (Borage family): *Moltkiopsis ciliata, Heliotropium kotschyi*

Chenopodiaceae (Goosefoot family): *Haloxylon salicornicum*

Cucurbitaceae (Gourd family): *Citrullus colocynthis*

Leguminosae (Pea family): *Taverniera cuneifolia*

Polygalaceae (Milkwort family): *Polygala erioptera*

Survival Rate. Of the 20 study individuals first observed in May 1999, only 9 were still present in June 2000.

Table 1. Vegetation selected by *Uromastyx aegyptius microlepis* as documented by different authors from the Arabian Peninsula. **Pulicaria glutinosa* observed being utilized in other areas although not in the present study area.

This Study UAE – Abu Dhabi	**Jongbloed (1997) UAE - Sharjah**	**Mandevile (1965) Saudi Arabia**
Aerva javanica		
		Aristida plumosa
		Astragalus gyzensis
Citrullus colocynthis		*Citrullus colocynthis*
	Fagonia sp.	
Haloxylon salicornicum		
Heliotropium kotschyi		
		Horwoodia dicksoneae
		Launaea capitata
Leptadenia pyrotechnica		
Moltkiopsis ciliata		*Moltkiopsis ciliata*
		Neurada procumbens
Pennisetum divisum capitata	*Pennisetum divisum*	
		Plantago boissieri
Polygala erioptera		
**Pulicaria glutinosa*		
Stipagrostis plumosa		
Taverniera cuneifolia		
	Zygophyllum sp.	

Burrow specifics (n=25). Burrow openings were orientated as follows:

North 2, West 3, South 12 (S/West: 4, South: 5, S/East: 3) and East 8.

Mean average burrow opening height and width was 61 cm and 155 cm (n=25), respectively.

Mean average temperature at a depth of 30 cm down the burrow was 38°C (n=25). The ambient temperature measured at 1.5 m above ground at 13h00 was 44°C.

Discussion

Diet. Ten perennial plant species are selected by *Uromastyx aegyptius microlepis* as observed during the study period, with the coarse desert grasses *Pennisetum divisum* and *Stipagrostis plumosa* being favored. Jongbloed (1997) identified 3 plant species selected by the lizards from the Sharjah area in the UAE while Mandaville (1965) identified 8 plant species from the stomach contents of six *Uromastyx aegyptius* specimens from Saudi Arabia (See Table 1). Foley et al. (1992) identified 23 plant species, mainly annuals, selected by the same species in Israel.

As no rain had fallen during the study period no annuals were observed and therefor the exclusion from the diet. It would therefor be expected that more plant species, especially flowering annuals, would be utilized after rains. Rainfall is highly variable (±100mm p.a.) and unpredictable in the UAE (Bottomley 1996) forcing the lizards to rely on the available perennials. According to Zari (1996 and 1998) *Uromastyx philbyi* feed on a variety of annual grasses and perennial shrubs in western Saudi Arabia. Highfield and Slimani (1998) indicate *Uromastyx acanthinurus's* preference for the family Chenopodia (fat hen/spinach) as well as the salt tolerant *Artiplex* genus and a wide variety of ephemeral plants after rains in Morocco.

An analysis of 170 fresh adult fecal pellets (85 summer and winter, respectively) confirmed the herbivorous nature of *U. a.microlepis* as only one pellet (<1%) contained insect remains, that of a Tennebrionid beetle. According to Highfield and Slimani (1998) adult fecal pellets of *U. acanthinurus* in Morocco contained 6% insect matter. Brown (1982) also mentions *U.a.microlepis* feeding on locusts from the UAE. It still has to be investigated if the lizards would show a preference for insects during autumn and spring although it is expected that the lack of insects in the diet could be contributed to the fact that most insects, Tenebrionidae at least, are crepuscular or nocturnal (Tiger 1996).

Other items consumed by *Uromastyx* as observed during the fecal analysis of the pellets include: sheep droppings (17 pellets), date kernels (4 pellets) and feathers (3 pellets). It is expected that above mentioned items are consumed erroneously by the lizards as insect material although Brown (1982) suggests that sheep droppings be consumed to extract undigested plant material. If the sheep droppings, date kernels and feathers were consumed as insect material, it would suggest that the lizards would prey on insects more often if they were more readily available.

Survival rate. Nine (45%) of the 20 study individuals survived a period of one year from May 1999 to June 2000. Three of the 11 missing individuals were found as severely malnourished carcasses. The other 8 individuals not accounted for are presumed to have succumbed below ground in their burrows, some of which were covered by sand. No signs of emigration were determined. No rainfall occurred during this period in the study area. The area is also frequented by large numbers of domestic camels and sheep, which compete directly with the lizards for the available food. It is suggested that the lack of rainfall and lack of annual plants as a result of this, together with the extra pressure of domesticated stock, resulted in the high mortality observed.

Burrow specfics. Burrow openings were mainly aligned to the south and east with 80% of the burrow entranced facing this way. During summer, temperatures consistently reach between 40°C and 47°C between 10h00 and 16h00. North and west facing burrow entrances would be hotter than burrows facing in other directions, especially during midday. During winter the lizards would also benefit from the southerly orientation warming the burrows quicker and more effectively. Wind direction during summer is predominantly from the northwest and can cause severe sandstorms locally known as "shamal" (El-Ghonemy 1985). This causes lizard whose burrows face that direction to spend more time on den clearing, a time consuming an energetically costly affair espe-

cially during summer when plant availability and palatability are low.

Burrow size is often related to the size of the resident lizard. The mean average size of 61 x 155 cm (n=25) is indicative of an adult *Uromastyx* colony. Bigger burrow openings have higher temperatures at a depth of 30 cm, especially when facing to the north or west.

The mean average temperature of 38°C, during the heat of the day, at a depth of 30 cm down the burrow is on average 6°C lower than the ambient temperature. This gradient is imperative to the survival of the lizards. During the fieldwork it was often found that the lizards were resting in the burrows at a depth of just over 30 cm, scurrying deeper once the thermometer was inserted down the burrow. According to Brown (1982), the burrows can be more than 6 feet long and 3 to 4 feet deep in the form of a spiral. Jongbloed (1997) confirms this depth even indicating reports of up to 12 feet deep burrows. The same author mentions that an excavated burrow of 5 feet in depth was 2 feet across and 1 foot high and still not at its end. Burrows do not only serve as thermoregulatory havens for *Uromastyx aegyptius microlepis*, but also for the Desert Monitor (*Varanus griseus*) (Pers.obs.) and certain Larks (Cunningham 2000, Williams et al. 1999). Williams et al. (1999), states that *Uromastyx* burrows can potentially reduce Hoopoe Lark (*Alaemon alaudipes*) water loss by as much as 81% during the hottest periods during summer. Temperatures at a depth of 30 cm are relatively stable therefor being exploited by many desert dwelling animals (Lovegrove and Knight-Eloff 1988). Burrows are thus an effective way of escaping predators, the harsh desert environment as well as controlling water loss.

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