

# Bosk's fringe-toed lizard *Acanthodactylus boskianus*: Follow-up study of a population in the Hajar Mountain foothills of the UAE

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Fig. 1. The male lizard shown here stationed itself under this sparse annual (*Farsetia stylosa*) for more than an hour. At least twice it leapt up to and into the plant to seize small insects. (Picture by GRF)

## Abstract

Follow-up observation of a UAE study population of *Acanthodactylus boskianus* in the foothills of the Hajar Mountains has confirmed that this species does not hibernate in the UAE and that it breeds over an extended period, but possibly not during the UAE summer. We have also observed prey capture by lizards leaping into low shrubs and from rocks, predation on a large grasshopper and a medium-sized wasp, intra-specific aggression among males and females (including a dramatic and vicious encounter between two females), and burrowing by a gravid female. Video footage greatly enhanced our ability to observe and understand many of these behaviours. We also recorded, unexpectedly, a number of additional reptile species within the study area, including Spiny-Tailed Agamas (*Uromastix aegyptia lepteni*) and the rarely observed Diadem Snake (*Spalerosophis diadema cliffordii*), a likely predator on *A. boskianus*.

## Introduction

In **Tribulus** Vol. 21, authors BR and GRF described a population of *Acanthodactylus boskianus* (Daudin, 1802) at a site in the foothills of the Hajar Mountains of the UAE (Roobas & Feulner 2013). Subsequent follow-up observations have resolved certain points left open in the original paper and have added additional interesting information. Those observations included a particularly fruitful visit by BR and YT, a naturalist and wildlife filmmaker, on 12 March 2014, when experience, skill and luck combined to produce video footage of several of the phenomena reported here.

Because *A. boskianus* remains a very rarely encountered species in the UAE and Northern Oman, a summary of our additional observations is presented.

## Hibernation

We can now confirm that *A. boskianus* in the UAE does not hibernate in winter, as it does in Egypt (El-Masry & Hussein 2001). We had surmised this from the presence of young juvenile lizards in early December 2012, just prior to the hibernation period. Subsequently, young juveniles were observed (along with adults) on 1 February 2014, in the heart of the south Arabian 'winter'.

## Prey Capture

In the course of our original study, we observed lizards lunging to snap up ground prey, principally ants. We also learned inadvertently that *A. boskianus* can track the trajectory of incoming aerial objects, including grasshopper-sized ones, and pounce on them when they land.

In additional field visits in winter and spring 2013-14, we discovered another unexpected talent. *A. boskianus* sometimes waits in ambush under a plant (Fig. 1), and can leap up to the lower branches to snatch an insect meal, or even leap into the lower branches with all four feet, jumping a vertical distance roughly equivalent to its own body length. In the most ambitious such attempt, an actively foraging female leapt that distance into a dense *Pulicaria glutinosa* shrub to seize a big green grasshopper. The problem then was to swallow the prey, which it did only very slowly, bit by bit, and apparently with great difficulty. [In North Africa, *A. boskianus* is known to climb into shrubs (Sahara-Nature). Some other desert lizards also do this, including at least one UAE species, but this behaviour is generally considered to be for cooling purposes, not for hunting. We have not observed plant climbing by *A. boskianus*, independent of the immediate goal of prey capture.]

We have also observed lizards jumping horizontally from low stones (Fig. 2) for a distance of up to two body lengths, to catch low-flying small insects in mid-air. One juvenile, in particular, climbed purposefully onto a dark stone and waited for some time, keeping watch. Suddenly it leapt into the air towards a small flying insect passing rapidly nearby. Speed, energy and accuracy won it a good meal. The heights involved in each case were no more than ca. 8 cm, but given the physics of jumping, it is possible that this behaviour is more characteristic of juvenile lizards than adults.

Although we had recognised that *A. boskianus* was prepared to tackle large prey, it was still a surprise to see one pounce on a medium-sized, long-waisted wasp (believed to be a digger or potter wasp). The wasp was already on the ground only ca. 5 cm in front of a female lizard we were watching, when we saw the lizard lunge. The lizard seized the wasp by the head and neck (Fig. 3), shook it, and tapped it against the ground, then dropped it on its back, obviously injured. During this initial grappling, the wasp had curved its long abdomen back towards the lizard's snout, as if to sting it. After only a second or so, the lizard picked the wasp up again, shook it, and tossed it ca. 10 cm to one



Fig. 2. A lizard perched on a stone, from which moments later it launched itself to catch a passing insect in flight. (Picture by GRF)

side. The lizard then retrieved the wasp, positioned it head first for swallowing and, after a pause, downed the entire wasp in a few gulps. (Experienced naturalists will recognise that it would have been extremely difficult to observe this level of detail in the absence of video footage that could be examined at leisure, and in slow motion or by individual frames.)

## Intra-specific interactions and aggression

We observed only about half a dozen interactions between individual lizards, and these were diverse and unpredictable. Most involved aggression and none involved mating. On one occasion we witnessed no more than a simple nose kiss between a foraging male and a foraging female whose paths brought them in close proximity; then each went on their way. On another occasion, a male, who proved to be patrolling a small area over the course of an hour or more, darted some two metres to chase an interloping female, who turned and fled without contact. We tentatively interpreted this as territorial defence of a feeding area, although possibly only a temporary one. The female returned to the general area after about ten minutes, but took the precaution of staying outside the male's line of sight, behind a clump of shrubs. We also observed a foraging juvenile retreat from a foraging male who was approaching, obliquely, at a distance of ca. 1 metre; the male showed no reaction.

The tables were turned on yet another occasion, when a foraging female and a foraging male from some distance away found themselves face-to-face. They performed a brief nose kiss but the female seemed aggressive and made a hissing noise with her mouth open, at which the male retreated.

In the only male/male encounter we observed, a male that we had followed while foraging for ca. 35 metres found itself in a silty hollow ringed by small shrubs, when a second male of similar size appeared and approached. The two circled, facing one another side-to-side, but with torsos curved away from each other. Then the second lizard lunged at the first, making hostile contact and driving it away.

By far the most dramatic encounter we witnessed was a vicious battle between two females. The combat began suddenly and lasted only five seconds. In the field, the spectacle appeared to be a blur of tumbling lizards, but we are able to describe it thanks to analysis of a video taken by YT, a tribute to his sense for his animal subjects.

The sequence of events of that encounter was as follows:

- A female lizard foraging near a small, dry shrub suddenly became agitated — and the photographer focused his attention.
- The lizard stepped into the open and directed herself, head up and mouth open, towards what proved to be an oncoming attacker.
- The attacker, a noticeably larger female, charged at high speed, at an angle from the left.
- The attacker rounded in front of the defender without a pause (*Fig. 4*) and attacked from the right flank, seizing the defender's right thigh in its jaws.
- Using its hold as leverage, the attacker rolled and flipped the defender through the air, in an arc (*Fig. 5*).
- These flips continued, and may have generated their own momentum. We counted at least six flips, each one sending one of the lizards more or less perpendicular to the ground, followed by three or four lower rolls.
- The video discloses that the defender was not simply a passive victim during the struggle. She twisted her torso backwards and was able to bite the attacker three times on the head and snout — first on the snout, second on the skull behind the eyes, and the third time over the left eye (*Fig. 6*).
- It may have been this last maneuver that finally discouraged the attacker. In any case, she released her hold on the defender and fled the scene as quickly as she had arrived.
- The victorious defender had obviously paid a price. She attempted to continue foraging but walked slowly and unsteadily at first, dragging her right hind leg. Raw flesh showed that she had also been bitten behind the left shoulder. Her heart beat strongly and rapidly and her tail shivered.
- Over the course of a few minutes, however, the defender seemed to recover much of her normal mobility.

In lizard studies, aggression among females has generally been associated with competition for preferred home ranges, including easy access to food

and shelter. A possible motivation that suggests itself in our circumstances is competition for access to preferred sites for excavation of a nesting burrow — behaviour which was observed later the same day (see below). It is also worth remarking that the defender was successful — (as in the majority of territorial disputes in the animal world) — notwithstanding that she was obviously the smaller of the two combatants.



Fig. 3 This *A. boskianus* has caught a large wasp on the ground and has grasped it by the head and neck, with wings and abdomen visible. (Picture by YT)



Fig. 4. The battle commences: The attacking lizard darts past the defender's open jaws, aiming to strike on the right flank and seize the defender's right thigh. (Picture by YT)



Fig. 5. Pyrotechnics: As the combatants flip and roll, one lizard is spun perpendicular to the ground. (Picture by YT)



Fig. 6. Counterattack: The defender has turned to bite the attacker on the head, covering and perhaps contacting the attacker's left eye. This image also shows the size discrepancy between the two combatants. (Picture by YT)

### Burrow excavation for egg-laying

An unattributed account from North Africa states that *A. boskianus* females dig a burrow ca. 30-40 cm deep in which to deposit their eggs (Sahara-Nature). During our visits to the study site in 2012 and 2013, we saw only a small number of relatively conspicuous burrows that might have been nesting burrows. On 12 March 2014, however, we observed an obviously gravid female lizard excavating what can only have been a nesting burrow.

The excavation site was in relatively soft soil (a former agricultural field) under a harder surface crust. The process was stereotyped. The female would emerge cautiously from the underground portion, body hunched low, perhaps recognising that the fresh burrow and digging activity made her relatively conspicuous. Then she would turn in the entrance apron (in this case, always in a clockwise direction) and commence digging (Fig. 7). We watched her do this more than twenty times. The front limbs were used to excavate new material; the hind limbs were used primarily to sweep loose material backwards and out

of the hole, assisted by sinuous movements of the hips and torso. Even while digging, the lizard remained wary, raising her head periodically to survey her surroundings.

Occasionally, after exiting the hole and before turning to dig again, the lizard would lie in the loose soil of the entrance apron and raise one or both forelimbs (Fig. 8). We had seen similar behaviour previously in an *A. boskianus* digging in loose soil while foraging for small insect prey. We continue to interpret this as thermoregulatory behaviour intended to cool the forepaws after the frictional heat of digging, and/or to cool the animal generally after physical activity (Roobas & Feulner 2013). One observational test of the "cooling" hypothesis might be to determine whether these behaviours are more common in hotter weather. Our two observations of lizards lying in dug soil with both forelimbs raised were in mid-March and mid-August.



Fig 7a



Fig 7b

A gravid female excavates her nesting burrow, using her forelimbs to dig (left) and her hind limbs to clear (right). (Pictures by BR)



Fig. 8 Returning to the surface after a bout of excavation, the female lizard lays out in the loose dirt and raises both forelimbs. (Picture by YT)

### Breeding period

The reproductive period for *A. boskianus* in North Africa is said to be in late spring and summer, with hatching occurring in August after a 75-day incubation period (Sahara-Nature). Mating and egg-laying would therefore occur from roughly mid-May to mid-June. The burrow excavation we observed on 12<sup>th</sup> March 2014 is inconsistent with the North African timetable, but our earlier observations of the population structure at the UAE study site led us to infer an extended breeding season in the UAE, with mating and egg-laying estimated to occur from late summer through mid-winter. Nest excavation in early March falls just after the end of that estimated cycle.

### Other reptile species present

During field work for the initial paper we did not observe any other reptiles within the area of the study site, a circumstance which we considered to be unusual. However, during several follow-up visits in 2014, including one evening visit, we recorded six additional reptile species within or adjacent to the study area.



Fig. 10. The Diadem Snake *Spalerosophis diadema cliffordi*, a likely diurnal predator on *A. boskianus*. (Pictures by BR)



Fig. 9. Gallagher's Leaf-Toed Gecko, a nocturnal rock-climbing species. (Pictures by GRF)

These include:

- Leptien's Spiny-Tailed Agama (*Arabic dhub*) *Uromastix aegyptia leptieni* (Agamidae): A juvenile was found in an inconspicuous burrow adjacent to the core zone of the study area and several larger burrows were observed on the stony lower slopes of the wadi. The dried tail of a small dhub was found up a tributary wadi. A few kilometres to the north, a small community of ca. 20+ dhubs has been recognised for a number of years. It seems likely that dhubs may be somewhat more common in this area of mountain front than has previously been recognised.
- Sinai Agama (a/k/a Blue Rock Agama) *Pseudotrapelus sinaitus* (Agamidae): A single individual was observed on a stony slope immediately adjacent to the core zone of the study area.
- Dwarf Semaphore Gecko *Pristurus rupestris* (Gekkonidae): Only two specimens of this normally common diurnal gecko were observed, one on a small *Acacia* tree and one on soil, but the latter uncharacteristically at dusk. These are sites and times at which *A. boskianus* would not normally be present. For this reason we are inclined to repeat our suspicion that *P. rupestris* may be preyed on by *A. boskianus*. If so, then within the study site it may have modified its normal habits to minimise the risk of predation.
- Banded Ground Gecko *Bunopus spatularis* (Gekkonidae): A number of specimens of this normally phlegmatic species were found on stony ground after dark.
- Gallagher's Leaf-Toed Gecko *Asaccus gallagheri* (Gekkonidae) (*Fig. 9*): Several specimens of this nocturnal, rock-climbing species were observed in a gorge in a small tributary wadi that debouches into the study area.

- Diadem Snake *Spalerosophis diadema cliffordii* (Colubridae) (Fig. 10): The observation of this diurnal hunter was exceptional; Gardner (2013) plots only two prior UAE records. The snake was moving along open ground when it was first sighted in mid-morning on 11 April 2014, but it withdrew to the shelter of a rock when observers gathered. Exposed, it made several threatening lunges with the forepart of its body raised. This behaviour is consistent with Gardner's (2013) advice that the Diadem Snake will strike readily if cornered, but Gardner also states that most prey is killed by constriction and that no serious effects of bites on man have been recorded. The Diadem Snake is a potential predator on *A. boskianus*, which appears to be the most abundant diurnal prey species at the site. It would not be unreasonable, based on the authors' experience, to expect at least a small number of additional reptile species to be present within the site or in the surrounding area, for example the Baluch Ground Gecko *Bunopus tuberculatus*, the Hadramaut Sand Lizard *Mesalina adramitana* and any of several snakes, including the Wadi Racer *Platyceps rhodorachis*, the Sand Snake *Psammophis schokari* and either of the UAE's two *Echis* species vipers.

In addition to the above-listed reptiles, on a nocturnal visit to the site we observed a single small mammal, believed to be Cheesman's Gerbil *Gerbillus cheesmani*, in a thicket of brush at the base of a medium-sized shrub (*Acacia ehrenbergiana*).

### Conservation considerations

Even apart from the exceptional population of *A. boskianus*, the reptile fauna of the study site reflects considerable diversity within a relatively small area. Moreover, as noted in the original paper, that fauna exists in conjunction with light but regular use by local residents. It does not seem either feasible or necessary to restrict current use, but in order to try to preserve the area as a microcosm of the UAE's native mountain front fauna, the authors propose to bring the site to the attention of local authorities as one deserving of protection in the form of non-destruction (no quarrying, power lines, road expansion, 'farm' construction, etc.) as well as culturally sensitive monitoring to prevent potentially abusive practices e.g., by weekend picnickers.

### References

El-Masry, A.A. and Hussein, H.K. 2001. Thermal Relations, Metabolism and Winter Dormancy of the Sand Lizard, *Acanthodactylus boskianus*. **Pakistan Jour. Biol. Sci.** 4(4):492-497.

Gardner, A.S. 2013. *The Amphibians and Reptiles of Oman and the UAE*. Chimaira Publishing. 480 pp.

Sahara-Nature. [http://www.sahara-nature.com/animaux.php?species=acanthodactylus\\_boskianus](http://www.sahara-nature.com/animaux.php?species=acanthodactylus_boskianus). [Accessed 19 December 2012, 9 October 2014] [Author's note: Although many portions of this French language site are written in the first person, we have been unable to ascertain the identity of the author; and although a list of references is included (under "Resources"), none of the information presented is specifically attributed.]

Roobas, B. and Feulner, G.R. 2013. A population of Bosk's fringe-toed lizard *Acanthodactylus boskianus* (Daudin, 1802) in the Hajar Mountain foothills of the UAE. **Tribulus** 21: 24-37.

[NB: *Tribulus* is available online at: <http://www.enhg.org/trib/> ]

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