

Ecology, distribution and status of the Rock Hyrax, *Procavia capensis syriaca*, in Jordan

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Abstract: The ecology, including habitats, population structure, and behavioural aspects of the Rock Hyrax, *Procavia capensis syriaca*, in Jordan are discussed. The current distribution in the Middle East is mapped. Direct threats affecting the current populations of the Hyrax were identified, with emphasis on conservation measures that should be implemented.

Kurzfassung: Die Ökologie, einschließlich Habitat, Populationsstruktur und Verhaltensaspekte des Klippschliefers, *Procavia capensis syriaca*, wurden in Jordanien untersucht und werden hier diskutiert. Die derzeitige Verbreitung im Vorderen Orient wird in einer Karte dargestellt. Faktoren, die die Population des Klippschliefers direkt bedrohen, wurden identifiziert, einschließlich von Schutzmaßnahmen, die durchgeführt werden sollten.

Key words: *Procavia capensis*, mammals, conservation, Jordan, Middle East.

Introduction

The Rock Hyrax, *Procavia capensis* (Schreber, 1784), is the only representative of the order Hyracoidea in the Middle East. This African species extends its range into the Arabian Peninsula, Palestine, Lebanon, and Jordan (HARRISON & BATES 1991). In the Middle East, two subspecies are recognized: *Procavia capensis syriaca* (Schreber, 1784), distributed in Jordan, Palestine and the Lebanon, and *Procavia capensis jayakari* Thomas, 1892, which occurs in the Arabian Peninsula; the former differs from the latter by its larger size (HARRISON & BATES 1991).

In Palestine the Hyrax has been reported on the mountains of the western side of the Dead Sea and the Jordan Valley. Populations also occur close to Eilat. They are also known from the mountains in the northeastern part of the country and the northwestern part, on the Mediterranean coast. In Lebanon it occurs on Mount Lebanon, from which the form *syriacus* was first described (as *Hyrax syriacus*) and which also represents the northernmost limit of the distribution of this species. Another report for Lebanon was from near Tyre (HARRISON & BATES 1991). LEWIS et al. (1968) describe the occurrence in the Lebanon as "occurs from the southern border, north to at least Kartaba, and possibly to the northern terminus of the Lebanon mountains". KUMERLOEVE (1975) in his list of mammals of Syria could not list any locality from this country. M. KASPAREK (pers. comm.) observed the Rock Hyrax on the southwestern Golan above Lake Tiberias in 1990.

Despite recent studies on the mammals of Jordan (AMR & DISI 1988, QUMSIYEH et al.

1993, QUMSIYEH 1996), little is known about the status and distribution of the Rock Hyrax. In this account we report on the current distribution of *P. c. syriaca*, with emphasis on its conservation and ecology.

Material and methods

Field observations were made during numerous field trips in 1998–1999 undertaken by L. RIFAI and Z. AMR. The population of Al 'Adasiyah was monitored and visited 5 times during different seasons. The distribution of the current populations is based on actual sightings.

Abbreviations: n: number of specimens examined, GTL: Greatest length of skull, CBL: Condylbasal length, ZB: Zygomatic breadth, BB: Brain case breadth, IC: Interorbital constriction, MDC: Mandibular cheek teeth, MXC: Maxillary cheek teeth, M: Mandible length. All lengths in mm.

Results

Distribution and habitat

Procavia capensis is distributed along the eastern slopes of the Jordan Valley, extending from the At Tafilah mountains southwards as far as the northern borders of Jordan overlooking the Yarmuk River (Fig. 1). Additionally, an isolated population is situated in Wadi Ramm, northeast of Aqabah. The distribution of the Rock Hyrax is limited by the presence of rocky terrain and steep mountains. These habitats occur along the Jordan Valley and are interrupted by forested mountains that extend from Ajlun, Salt and Jarash into the Valley. Populations are confined to more arid, steep and sandstone mountains, with the exception of the Al 'Adasiyah population where volcanic outcrops are dominant.

Wadi al Mawjib (31°23'N 35°34'E): This area consists of soft Palaeozoic sandstones and Holocene marls that underwent extensive erosion from water and wind action. Its eastern borders are in contact with the Dead Sea. Mineral and fresh water springs are scattered along its tributaries. The vegetation consist mostly of Saharo-Arabian species, dominated by *Retama raetam* and *Rhus tripartita* (RSCN 1996). At lower altitude, Afrotropical vegetation is dominant (*Balanites aegyptiaca* and *Abutilon* sp.) Some aspects of Wadi al Mawjib have sharp edges with longitudinal cliffs, and such habitats are preferred by the Hyrax.

Al 'Adasiyah (32°40'N 35°37' E): It is located at the most northern borders of Jordan on the edge of the Yarmuk River. The population is situated in a narrow strip (in an area of approx. 500 m by 1000 m) on gently sloping volcanic boulders that extend from the east to the river and westwards. The boulders are of large size, and are accumulated on top of each other, forming cave-like crevices. Along the slope, thick vegetation of *Retama raetam*, *Calycotome villosa*, *Ziziphus spina-christi*, *Aster subulatus*, and *Capparis* sp. are dominant almost all year round. This population is some 100 m from the Yarmuk River. The site is about 10 km from the Al Hammah (Birket el Ara'is) population.

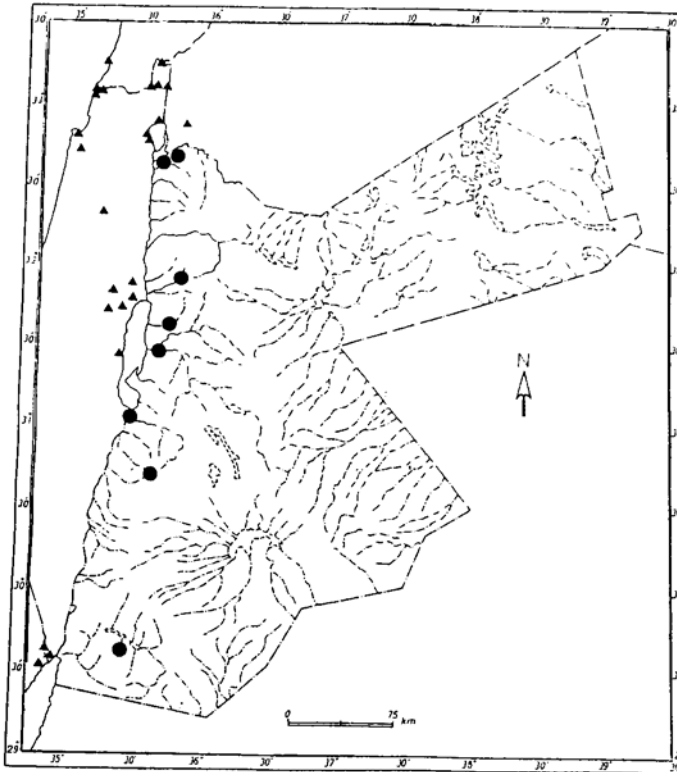


Fig. 1. Localities of the Rock Hyrax in Jordan (dots) and neighbouring countries (triangles) (based on HARRISON & BATES 1991 and QUMSIYEH 1996).

Wadi Ramm (29°35'N 35°26'E): The Wadi Ramm area consists of precipitous, sandstone and granite mountains, which are isolated from one another by flat corridors covered in mobile sand-dunes. It extends over 800–1750 m in altitude. The vegetation is typical of sandy Saharo-Arabian desert, dominated by a sparse scattering of *Haloxyton persicum* bushes up to 2 m high. Rainfall is low, scarce and irregular (less than 200 mm annually). The high mountains look rather barren but harbour a relict Irano-Turanian/Mediterranean flora, with large but very scattered juniper *Juniperus phoenicea* trees. There are numerous points of ground water seepage around the bases of some of the mountains, which support small patches of trees and bushes such as *Acacia*, *Ziziphus*, *Retama*, *Phoenix*, etc. (BARSOTTI and CAVALLI 1989). Few Hyrax were seen along the sharp-edged cliffs of several mountains. Some were taking refuge in narrow crevices. One skull was collected from nearby colonies.

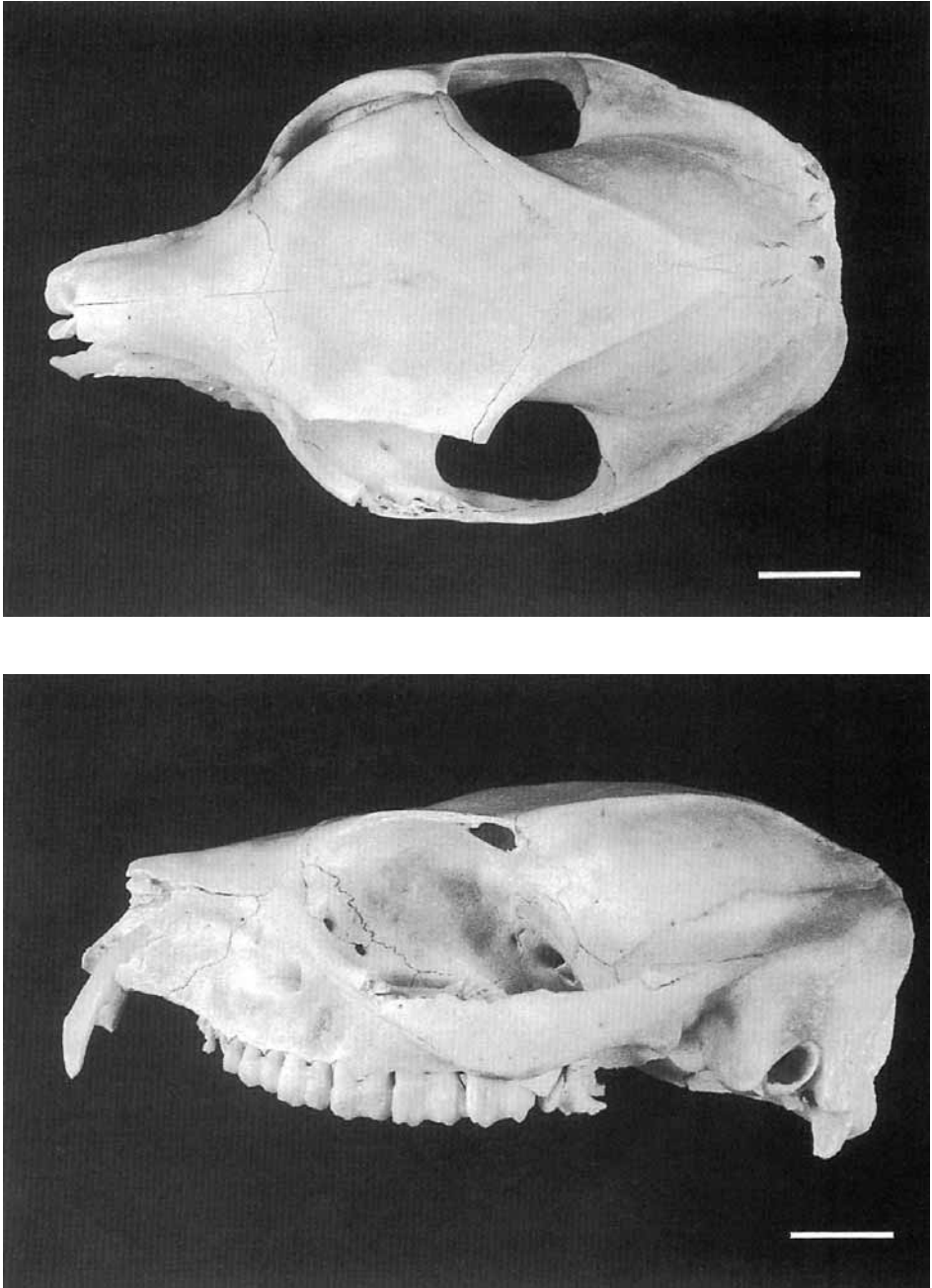


Fig. 2. Skull of *Procvia capensis syriaca*. Dorsal (above) and lateral (below) view (Scale bar 10 mm).

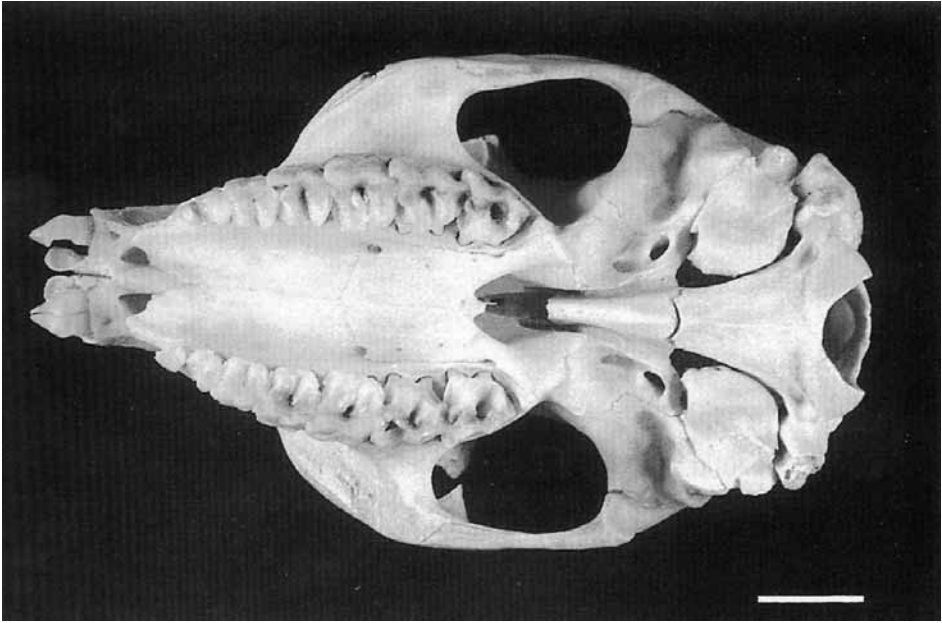


Fig. 3. Skull of *Procavia capensis syriaca*. Ventral view (Scale bar 10 mm).

Cranial measurements

Material: NHMJ 307 (Al 'Adasiyah, Jan. 1996, D. AL-SHAFFEE): GTL: 97.3, CBL: 91, ZB: 54.5, IC: 21.9, BB: 33.2, MXC: 40.5, MDC: 40.6, M: 80.7. – JUSTM 481 (Wadi Ramm, 1998): GTL: 82.46, CBL: 76.0, ZB: 50.2, BB: 27.8, IC: 26.5, MXC: 34.4, MDC: 35.1, M: 68.1. – RSCNM 011A (Wadi Ramm, 1998): GTL: 92.7, CBL: 87.1, ZB: 55, BB: 31.3, IC: 24.7, MXC: 36.8, MDC: 37.3, M: 81.

Skull robust, with a flattened and wide interorbital region. Very weakly developed sagittal crest. Tympanic bullae small (Fig. 2). A very distinctive feature are the tusk-like upper incisors and a unique wide mandible, greatly enlarged with plate-like angular regions. Upper incisors are pointed and triangular in cross section and far apart from the premolars. The upper premolars and molars are aligned in a very tight row, increasing slightly in size behind.

Field observations

Colony structure: A large colony with over 50 individuals was monitored in Al 'Adasiyah. Usually one or two adult females were found to guard 5–6 young individuals. They are active during daytime, bask in the sun for several hours in the mornings, and get very close to

the river to drink and feed on grasses. It seems that breeding occurs through August to September, and new born appear during late March to early May.

Three main resting patterns include: heaping, which usually takes place inside the hole; huddling, which is similar to heaping, but the animals do not lie on top of one another, and it may take place outside or inside the hole; and solitary resting, in which there is no physical contact (OLDS & SHOSHANI 1982). As the ambient temperature increases, the behavioural cycle progresses from heaping to huddling to solitary resting. Juveniles were also seen climbing up on their mother's back, a behaviour also reported by OLDS & SHOSHANI (1982).

Calls: Young Hyrax twitter like birds when they are undisturbed or playing. At one time, when approaching the Hyrax group, a warning call (a short, deep but loud whistle) was heard, after which all animals vanished into crevices and were out of sight. On one trip, in April, a couple of loud calls (deep croaks) could be heard, made probably by the males. Otherwise no voices were heard from adult animals.

Feeding: The Rock Hyrax is a generalist herbivore and feeds on a wide variety of plants, leaves, stems, fruits and buds. In the study areas, it feeds on *Retama raetam*, *Calycotome villosa*, *Ziziphus spina-christi*, *Aster subulatus*, *Caparis* sp. and grasses.

Habitats: The Hyrax is an agile rock climber. It is associated with rocky areas with steep edges. Current populations are found in Wadi Ramm, Ghawr as Safi, and most commonly in Al 'Adasiyah, overlooking the Yarmuk River.

Predators: Staff members at the Royal Society for Conservation of Nature indicated that Verreaux's Eagle, *Aquila verreauxii*, predated on the Hyrax. These observations are based on field notes at the Dana Nature Reserve, where one pair of Verreaux's Eagle is resident. This species, also known as Black Eagle, has also been reported from Wadi Ramm (ANDREWS 1995). BARRY & BARRY (1996) found that two species of Hyrax, *P. capensis* and *Heterohyrax brucei*, were the almost exclusive diet of the Black Eagle in the Matobo National Park in Zimbabwe.

PALMER & FAIRALL (1988) reported that the Caracal, *Caracal caracal*, preys on Hyrax in South Africa. This felid is known to occur in Dana and it is possible that it feeds there on Hyrax as well. Another potential predator of the Rock Hyrax is the Jungle Cat, *Felis chaus*, which was recently reported only a few kilometres away from Al 'Adasiyah, in Al Baqurah.

Threats affecting *Procavia capensis*

Populations of the Rock Hyrax are undergoing continuous decline. Road construction and habitat alterations are the major factors destroying the rocky habitats of the Hyrax. This is evident in Wadi Ramm and along the Eastern Dead Sea mountains.

Several authorities have incriminated *P. capensis* as a natural reservoir host for human leishmaniasis in Palestine (KLAUS et al. 1994), Saudi Arabia (MORSY et al. 1997), and Africa (JOHNSON et al. 1993, SANG et al. 1992). This fact alerted health officials as well as researchers in Jordan to control and collect specimens, to reveal the incidence of infection among Hyrax, since Jordan is considered as endemic to *Leishmania tropica* and *Leishmania major* (KAMHAWI et al. 1995, KHOURY et al. 1996).

The locals hunt the Hyrax for its meat. It is considered a delicacy. We were told that Hyrax were hunted near Wadi Zarqa' Ma'in about 30 years ago, when groups of 30–40 individuals could be spotted. The hunters usually blow a whistle, probably similar to that of the Hyrax call and then Hyrax come out from their hiding places, making them an easy target. At present, the population of Wadi Zarqa' Ma'in has almost vanished.

The Al 'Adasiyah population was conserved for over 45 years, since this was a military zone and human activities were prohibited, but now this population is being persecuted by local villagers and holiday-makers.

There are habitats along the eastern mountain ranges of the Jordan Valley and Wadi Arabah, which may harbour a few still undiscovered populations of Hyrax. Further field surveys should be undertaken.

With the accelerating rate of habitat degradation in Jordan, through intensive farming, road construction and urban expansion, the Hyrax remains highly threatened. It is fortunate that some populations of the Rock Hyrax are within the natural boundaries of existing nature reserves (Dana Nature Reserve and Al Mawjib Reserve); however, the largest population (Al 'Adasiyah) is still under threat. This population represents the northern limit of the Rock Hyrax distribution in Jordan, and is considered globally as one of the northern limits (reaching southern Lebanon and Mount Hermon). Further efforts should be implemented to acquire this limited breeding site for the Hyrax as a protected area, which should be managed and monitored. This means that there is an urgent need to protect this animal through public awareness and the implementation of protective measures by the Royal Society for Conservation of Nature.

Further studies should address population dynamics and other relevant ecological parameters of the Rock Hyrax habitats.

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