

North Africa and the Middle East (Ethiopian)

7.1 Blanford's fox

Vulpes cana Blanford, 1877

Vulnerable – VU: C1 (2004)

E. Geffen, R. Hefner and P. Wright

Other names

Arabic: tha'leb sakhari; **English:** royal fox, hoary fox, king fox, Afghan fox; **French:** renard royale; **German:** Afghanfuchs; **Hebrew:** shual tzukim.

Taxonomy

Vulpes canus Blanford, 1877. J. Asiat. Soc. Bengal, 2: 315. Type locality: "Gwadar, Baluchistan" [Pakistan].

A cladistic analysis of mtDNA restriction-fragment and restriction-site data, and 402 base pairs of cytochrome b sequence in fox-like canids, revealed that Blanford's fox and the co-existing desert species, the fennec fox (*Vulpes zerda*), were consistently associated as sister taxa (Geffen *et al.* 1992e). Furthermore, these two taxa formed a monophyletic clade distinct from the other fox-like canids, and thereby defined a taxonomic grouping that previously has not been recognised. However, based on restriction-site data, the sequence divergence between the fennec fox and Blanford's fox is 8.7%, indicating an ancient divergence as much as 3–4 million years ago. This divergence is coincident with the appearance of desert regions in the Middle East and northern Africa (Wickens 1984).

Chromosome number not known.

Description

Blanford's fox is a small fox (*c.* 1kg) with a long and very bushy tail (Table 7.1.1.). Sexual dimorphism is minimal, males having significantly longer bodies and front legs, but these differences are on a scale of 3–6%. The head is orange buff in colour, especially in the winter coat. The face is slender with a distinctive dark band extending from the upper part of the sharply pointed muzzle to the internal angle of the eyes. The iris is almost as dark as the pupil (Geffen 1994). The ears are pale brown on both sides with long white hairs along the antero-medial border (Harrison and Bates 1991; Geffen *et al.* 1992d; Geffen 1994). The body is brownish-grey, fading to pale yellow on the belly. The winter coat is soft and woolly with a dense, black under wool. Its dorsal region is sprinkled with white-tipped hair. The summer coat is less dense, the fur is paler, and the white-tipped hairs are less apparent. Specimens from the eastern part of the distribution may be predominantly grey. A distinctive mid-dorsal black band extends from the

nape of the neck caudally, becoming a mid-dorsal crest throughout the length of the tail. The tail is similar in colour to the body. A distinctive dorsal black spot (violet gland) is present at the base of the tail, which usually has a black tip, although in some individuals the tip is white (4% in Israel and 26% in U.A.E.). The dark mid-dorsal band, which is a distinctive feature of the Israeli specimens, is less evident in specimens from Oman, although the black tail markings are equally developed (Harrison and Bates 1989). Also, specimens collected in Israel were lighter and had shorter bodies and ears than those collected in the United Arab Emirates (Smith *et al.* 2003). The fore feet and hind feet are dorsally pale yellowish-white, while posteriorly they are dark grey. Unlike the other fox species in the Arabian deserts, the blackish pads of the feet and digits are hairless and the claws are cat-like, curved, sharp, and semi-retractile (Geffen *et al.* 1992d; Geffen 1994). The baculum of Blanford's fox is similar in size to that of Rüppell's fox (*V. rueppellii*) (41mm), but it is broader and has an expanded bulbous tip (Harrison and Bates 1991).

The skull of Blanford's fox is intermediate in size (mean of greatest length is 94mm) between fennec fox and Rüppell's fox. The rostrum is slender, and the nasal bones are long and thin. The postorbital processes are well developed and are not deeply concave dorsally. The braincase is relatively narrow and weakly ridged. The

Table 7.1.1. Body measurements for Blanford's fox.

	Ein Gedi and Eilat, Israel (Geffen <i>et al.</i> 1992d).	United Arab Emirates (Smith <i>et al.</i> 2003).
HB male	427mm (385–470) n=19	744mm (700–800) n=8
HB female	411mm (385–450) n=17	711mm (657–762) n=11
T male	324mm (260–355) n=19	328mm (307–350) n=8
T female	317mm (290–340) n=17	322mm (300–350) n=11
HF male	92mm (80–100) n=19	98mm (91–105) n=8
HF female	93mm (82–110) n=17	93mm (85–100) n=11
E male	80mm (72–85) n=19	86mm (80–95) n=8
E female	78mm (74–87) n=17	86mm (82–91) n=11
WT male	1.0kg (0.8–1.3) n=19	1.2kg (0.9–1.4) n=9
WT female	1.0kg (0.8–1.5) n=17	1.3kg (1.0–1.5) n=6



Blanford's fox, Israel.

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palatines are narrow, and the mesopterygoid space also is long and thin. The tympanic bullae are relatively smaller than those of Rüppell's fox, and the coronoid process of the mandible is relatively more convex (Harrison and Bates 1991). The dental formula is 3/3-1/1-4/4-2/3=42.

Subspecies Monotypic (Mendelsohn *et al.* 1987).

Similar species Red fox (*Vulpes vulpes*), fennec fox (*V. zerda*) and Rüppell's fox (*V. rueppellii*). The tail of the Blanford's fox is bushy and longer (mean=323mm), relative to length of body (mean=426mm), than in the other Arabian desert foxes (6.8%, 9.8%, and 22.5% longer than that of Rüppell's fox, red fox, and fennec fox, respectively (Mendelsohn *et al.* 1987; Geffen *et al.* 1992d). The length

of the hind foot, relative to body length, is significantly shorter in Blanford's fox (1.8%, 0.8%, and 3.2% shorter than that of Rüppell's, red, and fennec fox, respectively). The relative ear length is intermediate (2.0% longer than in red fox and 2.6% and 5.4% shorter than in Rüppell's and fennec fox, respectively; Harrison and Bates 1991; Geffen *et al.* 1992d).

Current distribution

Present in arid mountainous regions of the Middle East eastwards to Afghanistan (Figure 7.1.1). The Blanford's fox was first described from south-western Asia in 1877, and specimens were collected from Afghanistan, Pakistan, Iran and Turkistan (=Kazakhstan) (Novikov 1962; Bobrinskii *et al.* 1965; Lay 1967; Hassinger 1973; Roberts

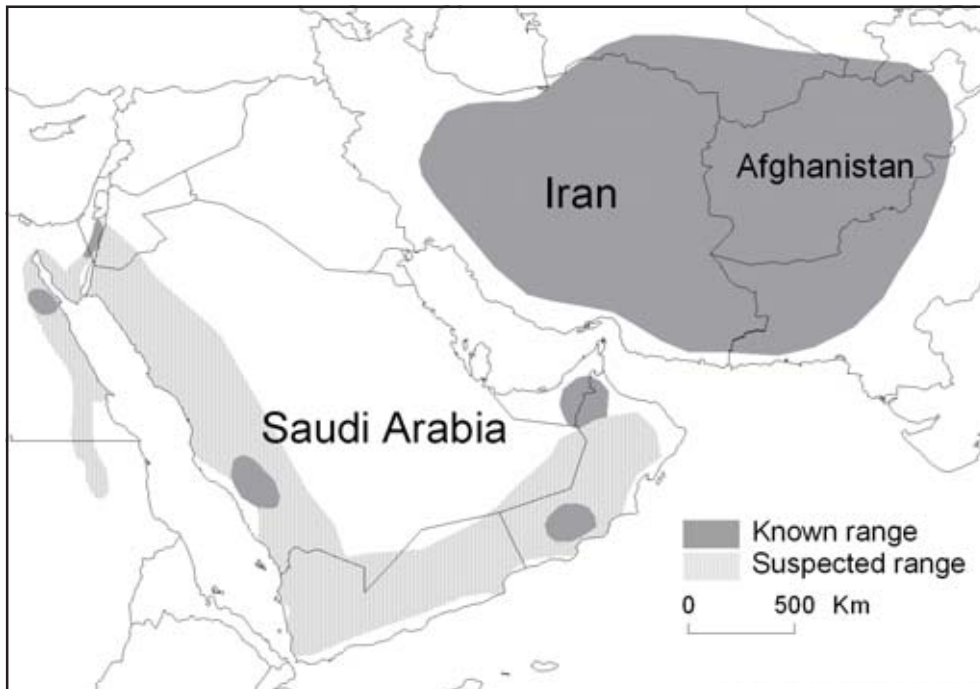


Figure 7.1.1. Current distribution of Blanford's fox.

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1977). In 1981, the species was discovered in Israel (Ilany 1983), and since then throughout the Middle East (Harrison and Bates 1989; Al Khalil 1993; Stuart and Stuart 1995; Amr *et al.* 1996; Amr 2000) and recently in Egypt (Peters and Rödel 1994).

Range countries Afghanistan, Egypt, Eritrea (?), Iran, Israel, Jordan, Kazakhstan, Oman, Pakistan, Saudi Arabia, Sudan (?), United Arab Emirates, Yemen (?) (Al Khalil 1993; Geffen *et al.* 1993; Peters and Rödel 1994).

Relative abundance

Fairly common in south-eastern Israel; in Israel, density estimates of 2.0/km² in Ein Gedi and 0.5/km² in Eilat have been recorded. Abundance in other countries is unknown.

Estimated populations/relative abundance and population trends

Table 7.1.1. Status of Blanford's foxes in Israel (C=common, S=stable).		
Region	Population/abundance	Trend
Israel, Ein Gedi	C	S
Israel, Eilat	C	S

Habitat

Blanford's fox is confined to mountainous regions (Lay 1967; Roberts 1977). Hassinger (1973) concluded that Blanford's foxes are generally found below an altitude of 2,000m in dry montane biotopes. All the records collected on the Persian Plateau are from foothills and mountains in the vicinity of lower plains and basins (Hassinger 1973; Roberts 1977). In that region, the habitat of Blanford's fox comprises the slopes of rocky mountains with stony plains and patches of cultivation (Lay 1967; Roberts 1977). This species appears to avoid higher mountain ranges as well as lower, warmer valleys (Roberts 1977).

In the Middle East, Blanford's foxes are confined to mountainous desert ranges and inhabit steep, rocky slopes, canyons, and cliffs (Mendelssohn *et al.* 1987; Harrison and Bates 1989). In Israel, Blanford's fox is distributed along the western side of the Rift Valley, and, in the central Negev, specimens were collected in creeks that drain into the Rift Valley (Geffen *et al.* 1993). Apparently, Blanford's fox can occur on various rock formations as long as its other requirements are met. The distribution of Blanford's fox in the Arabian Desert is not limited by access to water (Geffen *et al.* 1992a). In Israel, Blanford's foxes inhabit the driest and hottest regions. The densest population is found in the Judaeen Desert at elevations of 100–350m below sea level. This is in contrast to Roberts' (1977) remark that the species avoids low, warm valleys in Pakistan.

Geffen *et al.* (1992c) found that dry creek bed was the most frequently visited habitat in all home ranges in Israel. Home ranges at Ein Gedi (in km²), comprised an

average (\pm SD) of 63.4 \pm 3.2% gravel scree, 3.6 \pm 2.6% boulder scree, 28.4 \pm 4.0% dry creek bed, and 4.5 \pm 3.5% stream and spring. Average time (\pm SD) spent by foxes at Ein Gedi in gravel scree was 148.8 \pm 109.8 min/night, 46.0 \pm 63.8 min/night in boulder scree, 359.9 \pm 141.9 min/night in dry creek bed, and 13.0 \pm 27.9 min/night near a water source (Geffen *et al.* 1992c). Dry creek bed provided abundant prey for the foxes and only sparse cover for their terrestrial predators. Creek bed patches were used in proportion to their size. Both the available area of creek bed in each range and the area of creek bed patches that was used by the foxes were independent of home range size. However, variance in home range size was explained by the mean distance between the main denning area and the most frequently used patches of creek bed (Geffen *et al.* 1992c; and see Social and reproductive behaviour).

Food and foraging behaviour

Food In Israel, Blanford's foxes are primarily insectivorous and frugivorous (Ilany 1983; Geffen *et al.* 1992b). Invertebrates are the major food with beetles, grasshoppers, ants, and termites eaten most often (Geffen *et al.* 1992b). Plant foods consisted mainly of the fruits of two caperbush species, *Capparis cartilaginea* and *C. spinosa*. Fruits and plant material of *Phoenix dactylifera*, *Ochradenus baccatus*, *Fagonia mollis*, and various species of Gramineae were also eaten. Remains of vertebrates were present in c.10% of faecal samples analysed (Geffen *et al.* 1992b). The diet differed significantly between two sites examined in Israel, but seasonal and individual differences in diet were not detected (Geffen *et al.* 1992b). Blanford's foxes in Pakistan are largely frugivorous feeding on Russian olives (*Elaeagnus hortensis*), melons, and grapes (Roberts 1977).

Foraging Blanford's foxes are almost always solitary foragers (92% of 463 observations; Geffen *et al.* 1992b), only occasionally foraging in pairs. Mated pairs, which shared home ranges, differed significantly in the time of arrival at fruitful food patches and in the pattern of use of their home range (Geffen and Macdonald 1993). Three types of foraging behaviour were observed: 1) unhurried movements back and forth between rocky patches in a small area (0.01–0.03km²), accompanied by sniffing and looking under large stones and occasionally digging a shallow scrape; 2) standing near a bush for a few seconds, alert with ears erect, prior to circling the bush or pouncing upon prey within, and then walking to another bush to repeat the sequence (on four occasions members of a pair were observed using this type of foraging behaviour simultaneously around the same bushes); and 3) short, fast sprint after small terrestrial or low-flying prey (Geffen *et al.* 1992b). Food caching is rare or absent in the Blanford's fox, contrary to other fox species. Food offered to foxes was either consumed on the spot or carried away and eaten (Geffen *et al.* 1992b).

Blanford's foxes are strictly nocturnal, likely an anti-predator response to diurnal raptors (Geffen and Macdonald 1993). The onset of activity is governed largely by light conditions, and closely follows sunset. Foxes were active *c.* 8–9 h/night, independent of duration of darkness. Average distance (\pm SD) travelled per night was 9.3 ± 2.7 km, and size of nightly home range averaged 1.1 ± 0.7 km² (Geffen and Macdonald 1992). Significant seasonal or sexual differences in duration of activity, nightly distance travelled, or nightly home range, were not detected (Geffen *et al.* 1992c). Climatic conditions at night in the desert appeared to have little direct effect on the activity of Blanford's foxes, except when conditions were extreme (Geffen and Macdonald 1993).

Damage to livestock or game Not known. May prey on free-ranging chickens.

Adaptations

Most canids are cursorial terrestrial carnivores adapted for long-distance travel over horizontal ground. Blanford's fox and the Arctic fox (*Alopex lagopus*) are the only canids known regularly to climb cliffs, and the gray fox (*Urocyon cinereoargenteus*) is the only species that routinely climbs trees. Compared with other small canids, the Blanford's fox has a relatively long, bushy tail. Large tails are typical of tree-dwelling carnivores such as stone martens (*Martens foina*) and ringtails (*Bassariscus astutus*). Jumping is usually an integral part of the locomotor pattern in fast-moving arboreal mammals and the large tail is probably an important counter-balance during jumps and may function like a parachute. Mendelsohn *et al.* (1987) described the jumping ability of Blanford's fox as astonishing; captive individuals bounced from one wall to another or jumped to the highest ledges (2–3 m) in their cage with remarkable ease and as part of their normal movements. Their small feet and naked pads provide sure footing even on the narrow ledges of a vertical wall. In the field, these foxes were observed climbing vertical, crumbling cliffs by a series of jumps up the vertical sections. Their sharp, curved claws doubtless enhance traction on the more difficult vertical ascents.

Daily energy expenditure of free-ranging Blanford's foxes near the Dead Sea was 0.63–0.65 kJ/g/day, with no significant seasonal difference (Geffen *et al.* 1992a). Mean rate of water intake was significantly higher in summer (0.11 ml/g/day) than in winter (0.08 ml/g/day). They concluded that foxes maintained water and energy balances on a diet of invertebrates and fruits without drinking. Furthermore, this study suggested that Blanford's foxes foraged more for water than for energy, because metabolic needs are met before water requirements when feeding on invertebrates. Blanford's foxes in Israel consume more fruit during the hot summer, which compensates for deficiencies in body water (Geffen *et al.* 1992a, b).

Social behaviour

Data from 11 radio-tracked Blanford's foxes studied over two years in Israel indicated that they were organised as strictly monogamous pairs in territories of *c.* 1.6 km² that overlapped minimally (Geffen and Macdonald 1992; Geffen *et al.* 1992c). Locations and configurations of home ranges were stable during that study. A shift in location of home range was observed only once following the death of a pair member. Three of five territories contained one, non-breeding, yearling female during the mating season, but there was no evidence of polygyny (Geffen and Macdonald 1992).

Reproduction and denning behaviour

Blanford's foxes live in monogamous pairs (Geffen and Macdonald 1992). Females are monoestrus and come into heat during January and February (in Israel). Gestation period is *c.* 50–60 days, and litter size is 1–3 pups. Females have 2–6 active teats, and the lactation period is 30–45 days. Neonates are born with soft, black fur. Based on repeated measures of body mass of three young born in captivity, a neonate body mass of 29 g has been estimated (Mendelsohn *et al.* 1987; Geffen 1994). The body mass of a subadult is reached in *c.* 3–4 months (700–900 g). At about two months of age, the young start to forage, accompanied by one of the parents, and at three months of age they start to forage alone. Juveniles have similar markings as the adult, but their coat is darker and more greyish. Sexual maturity is reached at 10–12 months of age (Geffen 1994).

Young are entirely dependent upon their mother's milk for food and water until they begin to forage for themselves. Adult Blanford's foxes have never been observed to carry food to the young and only one den was found with remains of prey at the entrance (Geffen and Macdonald 1992). Observations of Blanford's foxes suggest that food is not regurgitated to the young, as in other small canids. Geffen and Macdonald (1992) have no indication that the male provides food either to the female or to the cubs, although they observed males grooming and accompanying 2–4-month-old juveniles. Therefore, it appears that the direct contribution to survival of the young by any individual other than the mother is probably minimal. Offspring often remain within their natal home range until autumn (October–November).

Dens used by Blanford's foxes in Israel were usually on a mountain slope and consisted of large rock and boulder piles or scree. Blanford's foxes appeared to use only available natural cavities and never dug burrows. Dens were used both for rearing young during spring and for daytime resting throughout the year. During winter and spring, both members of a pair frequently occupied the same den, or adjacent dens at the same site, while during summer and autumn they often denned in separate locations. Frequent changes in location of den from day to

day were more common in summer and autumn (Geffen and Macdonald 1992).

Competition

Blanford's foxes have been observed to flee from a red fox. However, occasionally, individuals will stand at a safe distance and bark at larger potential predators (e.g., leopards and humans).

Mortality and pathogens

Natural sources of mortality In Israel, old age or rabies were the primary causes of death (Geffen 1994). Only a single known case of predation was recorded, where the suspect was thought to be a red fox.

Persecution Not known. There is a single poisoning record of three Blanford's foxes and two red foxes from U.A.E. However, we anticipate that poisoning is a rare cause of mortality in this species.

Hunting and trapping for fur Records by CITES showed that no furs were exported during 1983 and 1985 to 1986. In 1980 and 1982, seven were exported, and in 1981 c. 30 skins were exported from Afghanistan. In 1984, 519 Blanford's fox skins were reportedly exported, mostly from Canada, which is well beyond the distribution of this species (Ginsberg and Macdonald 1990). There is no hunting of this species in Israel.

Road kills A single record from Saudi Arabia. None reported elsewhere.

Pathogens and parasites Blanford's foxes appear to be susceptible to rabies. During 1988 to 1989, 11 dead Blanford's foxes were found in two populations in Israel, and two fresh carcasses tested positive for rabies. Individuals that are in poor body condition often have many ticks.

Longevity The lifespan of Blanford's foxes in the wild was estimated at 4–5 years. In captivity, individuals reached six years of age. Old individuals showed severe tooth wear, absence of some incisors and canines, and poor body condition.

Historical perspective

None.

Conservation status

Threats The threat from habitat loss in Israel is limited as most of the area where this species occurs is designated as protected. Political developments may change the status of the northern Judaeen Desert. Human development along the Dead Sea coasts may also pose a considerable threat to existing habitat. Similar concerns exist for the populations in the U.A.E.

Commercial use At present, the trade in Blanford's fox fur is negligible and confined to Afghanistan. See Mortality and pathogens.

Occurrence in protected areas

- *Israel*: Ein Gedi Nature Reserve, Judaeen Desert Nature Reserve, Maktesh Ramon Nature Reserve, Eilat Mountain Nature Reserve;
- *Jordan*: Dana Nature Reserve;
- *Oman*: Jebel Samhan Sanctuary, Dhofar.

Protection status CITES – Appendix II (2000)

Current legal protection Fully protected in Israel, with no hunting, trapping or trading permitted. Holding in captivity requires a special permit from the Nature Reserves Authority of Israel. There is a ban on hunting in Jordan and Oman. However, there is no legal protection in Egypt, Saudi Arabia, U.A.E., Iran, Afghanistan or Pakistan.

Conservation measures taken None.

Occurrence in captivity

In Israel, the species is kept in captivity at the Hai Bar Breeding Centre (near Eilat). In previous years, there was a pair at the Tel Aviv University Zoo. Captive individuals are also kept at the Breeding Centre for Endangered Arabian Wildlife, Sharjah, U.A.E. Foxes have been successfully bred at all the above facilities.

Current or planned research projects

Research on the life history and diseases in Blanford's foxes is currently being conducted in U.A.E., and extensive surveys are being carried out in Saudi Arabia, Oman and U.A.E. (M. Smith, K.J. Budd and C. Gross, Breeding Centre for Endangered Arabian Wildlife, Sharjah, United Arab Emirates).

Gaps in knowledge

The information on the biology of Blanford's foxes is mostly from the southern part of Israel. Nothing is known on the behaviour and ecology of the species in the eastern part of its distribution. Interactions with other predators and the susceptibility to diseases are poorly understood.

Core literature

Geffen 1994; Geffen *et al.* 1992a,b,c,d,e, 1993; Geffen and Macdonald 1992, 1993; Harrison and Bates 1989, 1991; Mendelsohn *et al.* 1987.

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