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SHORT COMMUNICATION

DISTRIBUTION AND MORPHOMETRIC MEASUREMENTS OF BLANFORD'S FOX *VULPES CANA* (MAMMALIA: CARNIVORA: CANIDAE) OF THE KINGDOM OF SAUDI ARABIA

Abdulhadi Aloufi & Ehab Eid

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DISTRIBUTION AND MORPHOMETRIC MEASUREMENTS OF BLANFORD'S FOX *VULPES CANA* (MAMMALIA: CARNIVORA: CANIDAE) OF THE KINGDOM OF SAUDI ARABIA

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Abstract: A study on Blanford's Fox was conducted from Tabuk Province, a poorly studied area of the Kingdom of Saudi Arabia (KSA), from December 2015 until May 2016. This study adds to our knowledge, where two survey methods were used, which are the live trapping and camera trapping methods. Five specimens were captured alive, in addition to a dead specimen reported during the survey period. Measurements of live, captured specimens were obtained and the skull of the dead specimen was measured. The information provided will serve as a basis for future monitoring of Blanford's Fox in Saudi Arabia, and it will provide the foundation for future research in the species' range of occurrence in the Arabian Peninsula. In addition, more attention shall be paid to establish a joint collaboration between scholars from Saudi Arabia and Jordan to assess the status of Blanford's Fox along the sandstone escarpments Hisma plateau.

Keywords: Blanford's Fox, distribution, morphometric measurements, skull, Tabuk Province.

The Blanford's Fox is a small canid species, which is associated with mountainous habitats (Smith et al. 2003; Eid et al. 2015). This species was categorized as Least Concern by the IUCN, as evidence suggests that it has a relatively wide distribution despite being largely confined to mountainous regions (Hoffmann 2015). Studies on the Blanford's Fox's distribution, morphological characteristics, and behavior from the arid mountainous regions of the Arabian Peninsula has

expanded with records from Jordan, Oman, Palestine, Saudi Arabia, Yemen and the United Arab Emirates (Mendelssohn et al. 1987; Al Safadi 1990; Kingdon 1990; Nader 1990; Harrison & Bates 1991; Geffen et al. 1992; Al-Khalili 1993; Geffen et al. 1993; Stuart & Stuart 1995; Qumsiyeh 1996; Al Jumaily 1998; Al Jumaily et al. 1998; Disi & Hatough-Bouran 1999; Spalton & Willis 1999; Llewellyn-Smith 2000; Cunningham & Howarth 2002; Drew 2003; Abu Baker et al. 2004; Al Jumaily et al. 2012; Eid et al. 2013, 2015).

Information from Saudi Arabia, however, is still limited due to limited research attempts and monitoring programs. J. Gasperetti reported a road-killed specimen 40km south east of Biljurshi in Saudi Arabia, and another specimen was found in the vicinity of Asir photographed by Mrs. Collenette at Jabal Shada (Harrison & Bates 1989). Cunningham & Wronski (2009) from Saudi Arabia obtained further records and despite the available information, records are sparse and often limited. Williams et al. (2004) studied the basal metabolic rate and total evaporative water loss of the Blanford's Fox in the Arabian Peninsula. Cunningham & Wronski (2009) updated the distribution map of the Blanford's

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Fox in Saudi Arabia and provided new range expansion in northern and central Saudi Arabia. Despite these efforts, more details are needed on this species from Saudi Arabia.

This paper contributes to our understanding of the Blanford's Fox from Bajdah at Tabuk governorate in the northwestern region of Saudi Arabia. The information provided improves our knowledge about the distribution range of this species, and its activity period. Although single skull morphometric measurements were provided, it could be used for comparison purposes with other regions, and could lead to future investigations on evolutionary significance.

Study Area

Bajdah is located at the northwestern side of the Tabuk governorate in Saudi Arabia (28.399°N & 36.571°E) with an elevation exceeding 1,167m (Figure 1). It is part of the Hisma plateau (28.666°N & 35.7°E) in the Arabian Shield, which covers around 3,699.29km² and its geology is composed mainly of late Cambrian and Ordovician sandstone (Image 1). The surveyed area in Bajdah was approximately 42km², which overlie the metamorphosed Precambrian volcanic and volcanoclastic basement rocks of the Arabian Shield, mixed with green schist and sedimentary rock (Llewellyn et al. 2010). The flora composition is represented by several species including *Ferula assafoetida*, *Ficus populifolia*, *Retama raetam* and *Capparis cartilaginea* (Llewellyn 2013; Aloufi pers.

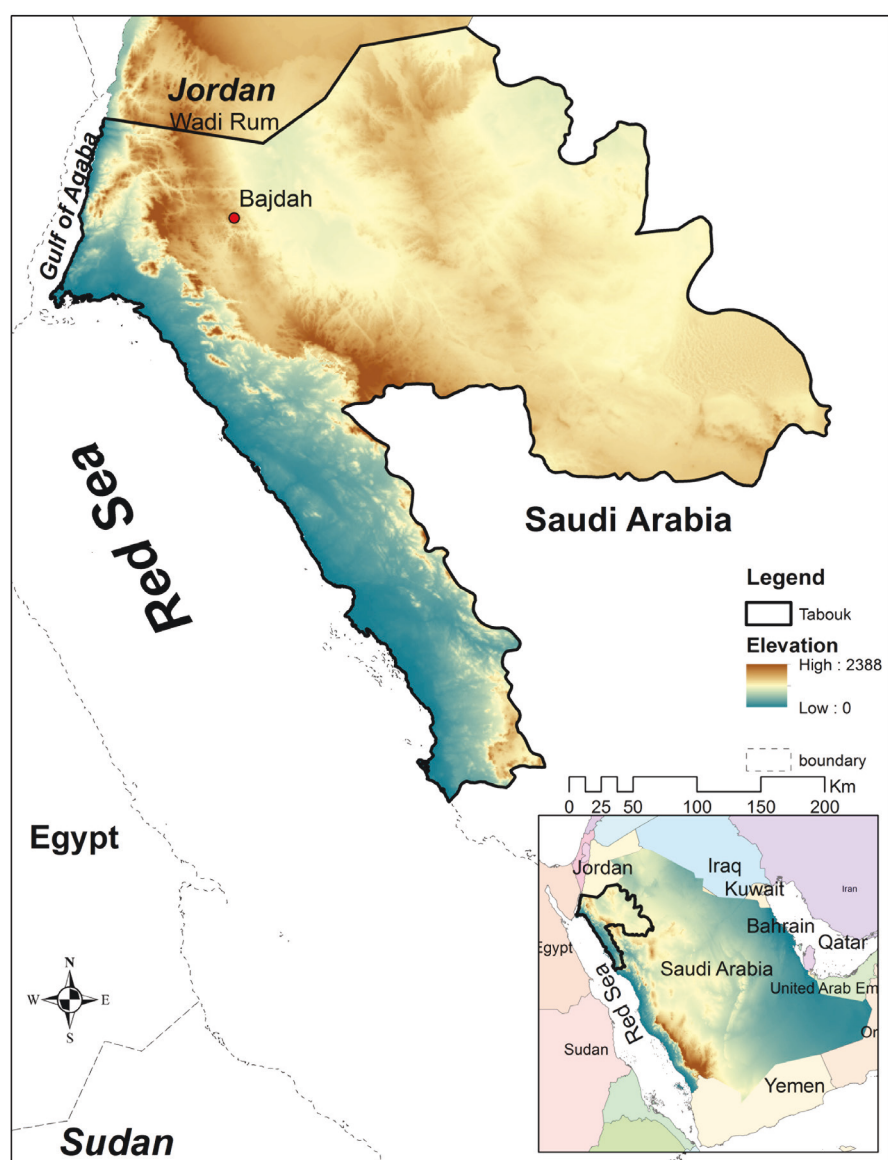


Figure 1. The location of Bajdah in Tabuk Province.

comm. 2016). In addition, the site is also important for mammals where several species were recorded including the Rock Hyrax *Procavia capensis*, Nubian Ibex *Capra nubiana*, Striped Hyaena *Hyaena hyaena*, and the Arabian Wolf *Canis lupus* (Llewellyn 2013)

METHODS

Live-trapping Method

Live-traps manufactured locally, with a dimension of 100 x 40 x 40cm mesh size were used from December 2015 to May 2016. During a total of 432 trapping nights, all traps were placed in the field for three successive nights, and distributed in different locations depending on accessibility. Traps were hidden as much as possible to provide shelter for the captured animals as well as to prevent the traps from being taken by local people. Traps were checked every morning and reset late in the afternoon using chicken and sheep viscera as bait. When a specimen was captured, it was marked by cutting some hair from different parts of the body, identified, sexed, measured morphometrically using a digital caliper and a measuring tape, after which the captured specimens were released at the same capture site (Eid et al. 2015).

Camera-trapping Method

HCO NightXplorer UWAY-NX50 cameras were used with a total of 192 camera-trapping nights. Cameras were programmed for still photos, and they were fixed to stones at different locations, which were selected randomly. The bait was placed in front of the cameras at a distance of approximately five meters to increase capturing probability. Cameras were fixed in the late afternoon and removed in the early morning of the following day to upload photos for analysis (Eid et al. 2015).

RESULTS

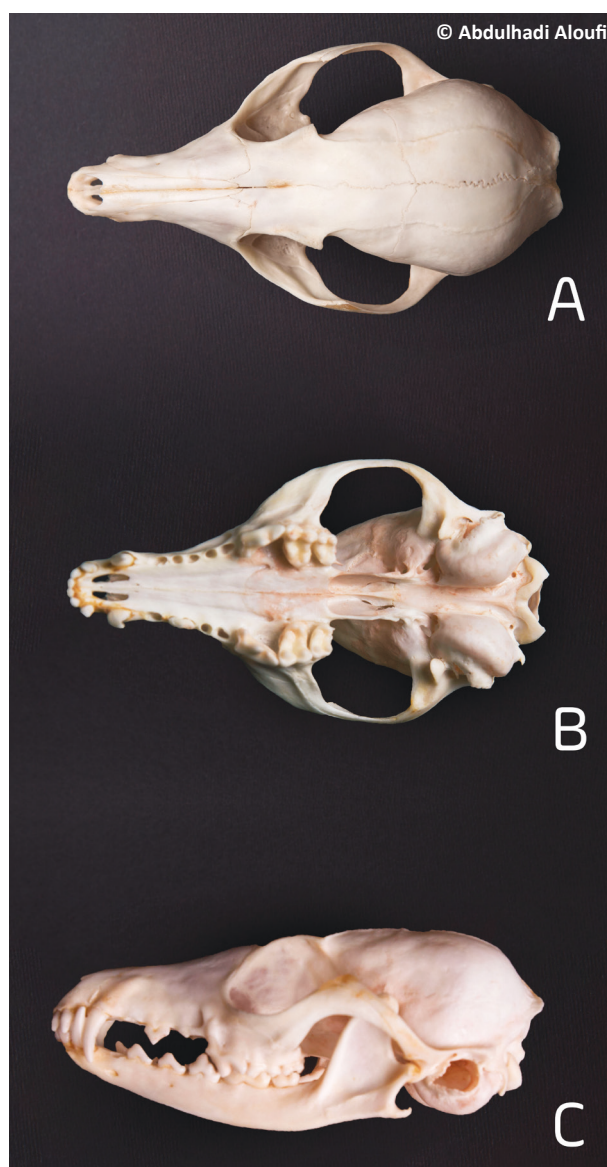
A total of five specimens of Blanford's Fox (2 females, 3 males) were captured live, with no recaptured attempts. In addition, a single killed male specimen was recorded at a Bedouin tent. Morphometric measurements were obtained for all specimens including the dead one (Table 1; Image 2).

In addition, authors obtained the skull measurements from the killed specimen following Onar et al. (2005) (Table 2). Camera traps have confirmed the presence of the Blanford's Fox with a maximum of two foxes per photo (Image 3). According to the camera trap results, the peak of activity was analyzed based on photos uploaded, and it started after 19:00h with the highest peak at around 05:00h followed by 24:00h. In addition,



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Image 1. Topography of Bajdah Village in Saudi Arabia.



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Image 2. A - dorsal view | B - ventral view | C - lateral view of the Blanford's Fox skull.

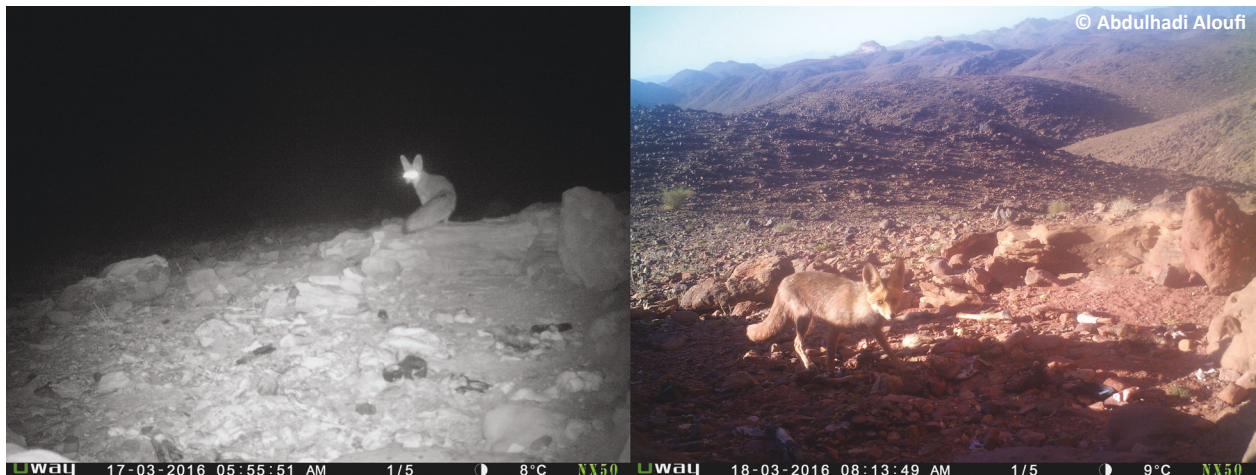


Image 3. Camera-trap images showing Blanford's Fox. *Vulpes cana* (Left) and Red Fox *Vulpes vulpes* (Right).

Table 1. Morphometric measurements of live captured Blanford's fox (W – weight | HB - Head and Body Length | T - Tail Length | E - Ear Length | FA - Forearm Length | HF - Hind arm Length).

	Sex	W (kg)	HB (mm)	T (mm)	E (mm)	FA (mm)	HF (mm)
1	Female	1.32	410	300	80	49.4	88
2	Male	1.80	430	335	82	53	89.7
3	Male	1.25	450	310	77	55	90.45
4	Female	1.04	440	330	80	40	100
5	Male	1.2	412	300	70	50.5	91.71
6	Male-killed	NA	415	330	75	51	90.2

the Red Fox was captured by photo, where it has an activity period commencing at 01:00h, with a peak after 05:00h.

DISCUSSION

This research is significant since it enhanced our knowledge on the Blanford's Fox from a poorly surveyed region in Saudi Arabia. This survey revealed a new distribution range and provided more evidence on the habitat preferences of this species (Amr 2000; Smith et al. 2003; Eid et al. 2015). Authors believe that the extent of occurrence of this species is large, and extend from the current locality at Bajdha in Saudi Arabia to Wadi Rum in Jordan. However, the area of occupancy is small, referring to the small population collected from Jordan and Saudi Arabia where five specimens were captured in 432 trapping nights in Saudi Arabia, compared to six individuals collected in 520 trapping nights from Wadi Rum (Abu Baker et al. 2004). The low trapping frequency highlights the necessity for more research on population size as well as reconsidering the most recent Red List

status of this species as Least Concern (Hoffmann et al. 2015). In addition, the most recent assessment for carnivores in the Arabian Peninsula stated that the Blanford's Fox is a vulnerable species (Mallon & Budd 2011), which indicates the necessity for a global review to the status of this species. Potential collaboration between scholars from Saudi Arabia and Jordan might reveal more interesting information, and cross-border protected areas may provide a possible solution.

The dead specimen of Blanford's Fox was found near a Bedouin tent killed by accident, since the shooter considered it as a threat, after it approached the herd late at night (A. Aloufi pers. comm. 03 July 2017). It is believed that the fox approached the vicinity of the herd for feeding on insects present at the site. Cunningham & Howarth (2002) stated that Blanford's Fox's diet consists mainly of invertebrates and fruits in the United Arab Emirates. Geffen et al. (1992) and Ilany (1983) found the Blanford's Fox to be primarily insectivorous and frugivorous, whereas Roberts (1977) found them to be largely frugivorous in Pakistan. Eid et al. (2015) stated that Coleopterans, goat hair, and unidentified bones were also present in the fox's diet, in addition to Juniper fruits. Human persecution is a major threat to Blanford's Foxes in Jordan (Abu Baker et al. 2004), as Eid et al. (2013) stated that Jordanians do not differentiate between fox species. Aloufi & Eid 2016 stated that foxes flesh is used in treating diabetes mellitus and jaundice in Saudi Arabia. However, the killed specimen was not used for folk medicine according to our survey.

The skull of the Blanford's Fox is intermediate in size between the Sand Fox, *Vulpes rueppelli*, and the Fennic Fox, *Vulpes zerda*. Our survey records obtained from the killed specimen's skull was in accordance to Harrison

Table 2. Skull measurements of the Blanford's Fox.

A - Dorsal view		
1.	Skull length	91.73mm
2.	Facial length	53.63mm
3.	Upper neurocranium length	43.41mm
4.	Cranial length	57.60mm
5.	Viscerocranial length	36.31mm
6.	Greatest length of the nasals	27.65mm
7.	Snout length	33.51mm
8.	Least breadth between the orbits	17.31mm
9.	Frontal breadth	22.58mm
10.	Least breadth of skull	17.33mm
11.	Maximum width of neurocranium	34.20mm
12.	Maximum zygomatic width	50.81mm
B - Ventral view		
1.	Condylbasal length	88.51mm
2.	Basal length	80.98mm
3.	Median palatal length	45.84mm
4.	Length of the horizontal part of the palatine	16.65mm
5.	Length of the horizontal part of the palatine-1	16.17mm
6.	Palatal length	45.07mm
7.	Greatest breadth of the palatine (P4 level)	26.29mm
8.	Least palatal breadth	9.56mm
9.	Breadth at the canine alveoli	12.49mm
10.	Length of the premolar row	24.90mm
11.	Length of the molar row	9.77mm
12.	Length of the cheektooth row	33.05mm
13.	Greatest diameter of the auditory bulla	16.71mm
14.	Breadth dorsal to the external auditory meatus	32.75mm
A - Left-Lateral view		
1.	Greatest inner height of orbit	17.19mm
2.	Neurocranium length	51.36mm
3.	Braincase length	38.69mm
4.	Skull height	26.04mm
B - Occipital view		
1.	Height of the occipital triangle	20.24mm
2.	Height of the foramen magnum	9.48mm
3.	Maximum width of the foramen magnum	10.86mm
4.	Maximum width of occipital condyles	16.97mm
5.	Greatest breadth of the bases of the jugular process	23.34mm
6.	Greatest mastoid breadth	29.63mm

Table 3. Comparison between skull measurements as stated by Harrison & Bates (1991) and Mendelssohn et al. (1987).

Measurement	Source	
	Current Survey	Harrison & Bates (1991) and Mendelssohn et al. (1987)
Greatest skull length	91.73	94.1 ± 3.1
Condylbasal length	88.51	87.0 ± 5.1
Zygomatic width	50.81	49.1 ± 3.0
Width of Braincase	38.69	35.8 ± 0.9
Interorbital constriction	17.31	16.9 ± 0.8

& Bates (1991) with a dental formula obtained from the killed Blanford's Fox skull was $i \ 3/3, c \ 1/1, p \ 4/4, m \ 2/3$, with a total of 42. In addition, all measurements are in the range described by Harrison & Bates (1991), though the greatest skull measurement is smaller when compared to the measurements obtained and indicated in Table 3 below. It is important to note that the skulls from the Oman population are the largest with lengths reaching 99.8mm. However, specimens described from Mendelssohn et al. (1987) showed a skull range of 90.7 to 94.4mm for the six specimens measured. These results enhanced our understanding, and provided a new reference for skull measurements for this species from the Arabian Peninsula.

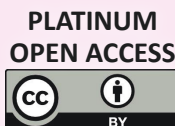
Data obtained from photo surveillance cameras indicated that the Red and Blanford's Fox do not appear within the same time duration. The peak for the nocturnal Blanford's Fox was around 05.00h followed by 24.00h compared with a peak at 05.00h for the Red Fox. Eid et al. (2015) indicated a peak activity at 04.00 in the early morning, and Geffen et al. (2004) stated that the onset of activity was triggered by dim light (sunset). The conversation with the Bedouin indicated that the specimen was killed after 04.00h. These results confirm that the Blanford's Fox is a strictly nocturnal species, and strengthens the hypothesis proposed by Geffen et al. (1992) that the nocturnal activity period is to avoid predation, including from the Red Fox. The knowledge obtained from this survey is important, and support earlier research attempts (Eid et al. 2015), though more specific research should be conducted to get more details about this secretive species.

REFERENCES

Abu Baker, M., K. Al-Omari, M. Qarqaz, Y. Khaled, M. Yousef & Z. Amr (2004). On the Current Status and Distribution of the Blanford's fox, *Vulpes cana* Blanford, 1877, in Jordan (Mammalia: Carnivora: Canidae). *Turkish Journal of Zoology* 28: 1–6.

- Al Jumaily, M.M. (1998). A review of the mammals of the Republic of Yemen. *Fauna of Arabia* 17: 477–502.
- Al Jumaily, M.M., W.A.M. Al Rayl & M.M.A. Naji (2012). First record of Blanford's Fox, *Vulpes cana* Blanford, 1877, for Yemen (Mammalia: Carnivora: Canidae). *Zoology in the Middle East* 57(1): 137–139. <https://doi.org/10.1080/09397140.2012.10648973>
- Al Safadi, M.M. (1990). The Carnivora of Yemen Arab Republic. *Proceedings of the Egyptian Academy of Sciences* 40: 129–138.
- Al-Khalili, A.D. (1993). Ecological review and the distribution of Blanford's Fox; *Vulpes cana* Blanford, 1877 (Mammalia: Carnivora: Canidae). *Fauna of Saudi Arabia*, 13: 390–396.
- Aloufi, A. & E. Eid (2016). Zootherapy: A study from the Northwestern region of the Kingdom of Saudi Arabia and the Hashemite Kingdom of Jordan. *Indian Journal of traditional knowledge* 15(4): 561–569.
- Amr, Z.S. (2000). *Jordan Country Study on Biological Diversity: Mammals of Jordan*. United Nations Environment Program, Amman.
- Cunningham, P.L. & B. Howarth (2002). Notes on the distribution and diet of Blanford's fox, *Vulpes cana* Blanford, 1877 from the United Arab Emirates. *Zoology in the Middle East* 27: 21–28. <https://doi.org/10.1080/09397140.2002.10637937>
- Cunningham, P.L. & T. Wronski (2009). Blanford's fox confirmed in the At-Tubaiq protected area (northern Saudi Arabia) and the Ibex reserve (Central Saudi Arabia). *Canid News* 75: 157–161
- Disi, A.M. & A. Hatough-Bouran (1999). Biodiversity of the terrestrial vertebrate fauna of Petra (Jordan). *Časopis Národního Muzea, Řada Přírodovědecká* 168: 83–98.
- Drew, C. (2003). A report on a preliminary ecological and environmental survey of Jebel Hafeet. Unpublished Internal Report, Environmental Agency - Abu Dhabi, Abu Dhabi. United Arab Emirates
- Eid, E., N. Boulad, T. Al Share, O. Abed & Y. Hageer (2013). Population density of the Blanford's Fox; *Vulpes cana* in Jordan. *Vertebrate Zoology* 63(2): 241–245.
- Eid, E., T. Al Share & O. Aabed (2015). Additional Knowledge on the Blanford's Fox *Vulpes cana* from Jordan. *Canids News* 1478–2677.
- Geffen, E., R. Hefner & P. Wright (2004). Blanford's Fox *Vulpes cana* Blanford, 1877, pp194–198. In Sillero-Zubiri, C., M. Hoffmann & D.W. Macdonald (eds.). *Canids: Foxes, Wolves, Jackals and Dogs*. Status Survey and Conservation: Action Plan. IUCN, Gland, Switzerland.
- Geffen, E., R. Hefner, D.W. Macdonald & M. Ucko (1992). Diet and foraging behavior of Blanford's Fox, *Vulpes cana*, in Israel. *Journal of Mammalogy*. 73: 395–402. <https://doi.org/10.2307/1382074>
- Geffen, E., R. Hefner, D.W. Macdonald & M. Ucko (1993). Biotope and distribution of Blanford's Fox. *Oryx* 27(2): 104–108. <https://doi.org/10.1017/S0030605300020639>
- Harrison, D. & P.J. Bates (1989). Observations on two mammals species new to the Sultanate of Oman, *Vulpes cana* Blanford, 1877 (Carnivora: Canidae) and *Nycteris thebaica* Geoffroy, 1818 (Chiroptera: Nycteridae). *Bonner Zoologische Beitrage*. 40: 73–77.
- Harrison, D. & P.J. Bates (1991). *The Mammals of Arabia*. Harrison Zoological Museum Publications. Kent, 354pp.
- Hoffmann, M. & C. Sillero-Zubiri (2015). *Vulpes cana*. The IUCN Red List of Threatened Species 2015: e.T23050A48075169. Downloaded on 28 June 2017. <https://doi.org/10.2305/IUCN.UK.2015-4.RLTS.T23050A48075169.en>
- Ilani, G. (1983). Blanford's fox, *Vulpes cana*, Blanford, 1877, a new species to Israel. *Israel Journal of Zoology* 32: 150.
- Kingdon, J. (1990). *Arabian Mammals: A Natural History*. Academic Press, London, 279pp.
- Llewellyn, O.A., M. Hall, A.G. Miller, T.M. Al-Abbasi, A.H. Al-Wetaid, R.J. Al-Harbi, K.F. Al-Shammari & A. Al-Farhan (2010). Important Plant Areas in the Arabian Peninsula: 1. Jabal Qaraqir. *Edinburgh Journal of Botany* 67: 37–56.
- Llewellyn-Smith, R.E. (2000). A short note on Blanford's Fox, *Vulpes cana*, in the Mountains of Ras al- Khaimah. *Tribulus* 10(1): 23–24.
- Mallon, D. & K. Budd (eds.) (2011). Regional Red List Status of Carnivores in the Arabian Peninsula. Cambridge, UK and Gland Switzerland: IUCN, and Sharjah, UAE: Environment and Protected Areas Authority vi+49pp.
- Mendelssohn, H., Y. Yom-Tov, G. Ilany & D. Meninger (1987). On the occurrence of Blanford's Fox, *Vulpes cana* Blanford, 1877, in Israel and Sinai. *Mammalia* 51: 459–462.
- Nader, I.A. (1990). Checklist of the Mammals of Arabia. *Fauna of Saudi Arabia* 11: 329–381.
- Onar, V., O. Belli & R.P. Owen (2005). Morphometric examination of red fox (*Vulpes vulpes*) from the Van-Yoncatepe necropolis in Eastern Anatolia. *International Journal of Morphology* 23(3): 253–260. <https://doi.org/10.4067/S0717-95022005000300011>
- Qumsiyeh, M.B. (1996). *Mammals of the Holy Land*. Texas Tech University Press. Lubbock, 389pp.
- Roberts, T.J. (1997). *The Mammals of Pakistan*. Oxford University Press, Karachi, 525pp.
- Smith, M., K. Budd & C. Gross (2003). The Distribution of Blanford's Fox (*Vulpes cana*: Blanford, 1877) in the United Arab Emirates. *Journal of Arid Environments* 54: 55–60. <https://doi.org/10.1006/jare.2001.0891>
- Spalton, A. & D. Willis (1999). The Status of the Arabian leopard in Oman: First results of the Arabian leopard Survey. In: Fisher, M., S.A. Ghazanfar & A. Spalton (eds.). *The Natural History Museum of Oman*. A Festschrift for Michael Gallagher. Leiden, Netherland, 206pp.
- Stuart, C. & T. Stuart (1995). First Record of Blanford's Fox; *Vulpes cana* from south-eastern Arabian Peninsula with notes on the Canids of the Mountains of the United Arab Emirates. Unpublished Internal Report, Arabian Leopard Trust, Dubai.
- Williams, J.B., A. Munoz-Garcia, S. Ostrowski & B. Tieleman (2004). A phylogenetic analysis of basal metabolism, total evaporative water loss, and life-history among foxes from desert and mesic regions. *Journal of Comparative Physiology B* 174(1): 29–39. <https://doi.org/10.1007/s00360-003-0386-0>





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