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Abstract: Sixteen species of the large Saudi Arabian mammals are either rare or endangered. These include nine carnivores and seven artiodactyls. Two carnivores have become extinct in Saudi Arabian within recent times. The Asiatic lion *Panthera leo* vanished from Arabia by the middle of the last century and the last Asiatic cheetah *Acinonyx jubatus* in Saudi Arabia was killed in the early fifties of this century. Among the artiodactyls, the last wild Arabian oryx *Oryx leucoryx* was killed in 1972, and the dorcas gazelle *Gazella dorcas* is feared to have vanished from the wild in Saudi Arabia. The main contributing factors to the extinction and the existence of these large mammals seem to be overhunting, overgrazing and habitat destruction. Recommendations to alleviate the situations are given. A Red Data Book for the wildlife of Saudi Arabia is proposed.

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RARE AND ENDANGERED MAMMALS OF SAUDI ARABIA

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ABSTRACT

Sixteen species of the large Saudi Arabian mammals are either rare or endangered. These include nine carnivores and seven artiodactyls. Two carnivores have become extinct in Saudi Arabia within recent times. The Asiatic lion *Panthera leo* vanished from Arabia by the middle of the last century and the last Asiatic cheetah *Acinonyx jubatus* in Saudi Arabia was killed in the early fifties of this century. Among the artiodactyls, the last wild Arabian oryx *Oryx leucoryx* was killed in 1972, and the dorcas gazelle *Gazella dorcas* is feared to have vanished from the wild in Saudi Arabia. The main contributing factors to the extinction and the existence of these large mammals seem to be overhunting, overgrazing and habitat destruction. Recommendations to alleviate the situations are given. A *Red Data Book* for the wildlife of Saudi Arabia is proposed.

الثدييات النادرة والمهددة بالانقراض في المملكة العربية السعودية

اياد عبد الوهاب نادر *

جامعة الملك سعود، فرع أبها
ص ب ٥٥٧، أبها
المملكة العربية السعودية

ان عدد الأنواع النادرة والمهددة بالانقراض من الثدييات الكبيرة في المملكة العربية السعودية يصل الى ست عشرة نوعا. ويشمل ذلك تسعة أنواع من آكلة اللحوم وسبعة أنواع من شفعية الأضلاف. وقد انقرض نوعان من آكلة اللحوم من المملكة العربية السعودية منذ وقت ليس بالبعيد. فقد انقرض الاسد الآسيوي في حوالي منتصف القرن الماضي، كما أن آخر حيوان من الفهد الآسيوي في المملكة قد قتل في بداية الخمسينيات من هذا القرن. ومن شفعية الأضلاف كان آخر حيوان من

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الوضيحي العربي قد قتل في بيئته الطبيعية عام ١٩٧٢، أما العفري فيخشى أن يكون قد انقرض الآن من مواطنه الطبيعية في المملكة. أن أهم العوامل التي أدت الى انقراض بعض الأنواع أو التي تهدد البعض الآخر بالانقراض هي الصيد الجائر والرعي الجائر واتلاف البيئة المناسبة لهذه الحيوانات. ويقدم البحث بعض التوصيات للمساعدة في التغلب على هذه المشكلة، منها توصية بوضع كتاب أحمر للحياة الفطرية للمملكة العربية السعودية.

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INTRODUCTION

The large mammals of Saudi Arabia, as is the case in many other countries, have suffered greatly with the advent of modernization and the destruction of the environment by man himself. The greed of overhunting and the use of firearms and motor vehicles has taken a heavy toll on several species of large mammals. Overgrazing caused by the presence of large herds of domestic animals (goats and sheep in particular), has exceeded the carrying capacity of the land, depriving it of the plant cover which is very important for wildlife. Habitat destruction by road construction, new agricultural projects or wood cutting has also had an adverse effect on wildlife.

Carnivores and artiodactyls are the animals most affected by these factors. Presently, 14 species of carnivores and eight species of artiodactyls have been recorded from Saudi Arabia (see checklist below). Of the carnivores, two have vanished within recent times. The Asiatic lion *Panthera leo* disappeared about the middle of the last century, and the presumably last Asiatic cheetah *Acinonyx jubatus venaticus* was killed in 1973. Of the 12 other carnivores, eight are either rare or endangered. As for the artiodactyls, the last wild Arabian oryx *Oryx leuconyx* was killed or captured in 1972. Of the other bovids, the status of the lesser kudu *Tragelaphus imberbis* in Arabia is uncertain and the all other species are either rare or endangered.

Great efforts are being made by the Saudi Arabian government, represented by the National Commission for Wildlife Conservation and Development (NCWCD), to breed and reintroduce certain endangered animals to their original habitat. Work has been started with the Arabian oryx and various gazelles, in addition to the houbara bustard *Chlamydotis undulata*.

SPECIES ACCOUNTS

Order Carnivora

Canis aureus aureus Asiatic jackal

Previous records: Gasperetti *et al.* (1986).

This report: near Riyadh, two live animals in Riyadh zoo, collected in November 1986.

CHECKLIST

Fourteen species of ten genera representing five families of carnivores, and eight species of five genera representing one family of even-toed ungulates have been recorded from Saudi Arabia to date.

Order Carnivora: Carnivores**Family Canidae: Dogs, Jackals, Wolves and Foxes**

- | | |
|--|--------------------|
| <i>Canis aureus aureus</i> Linnaeus 1758 | Asiatic jackal |
| <i>Canis lupus arabs</i> Pocock 1934 | Arabian wolf |
| <i>Vulpes vulpes arabica</i> Thomas 1902 | Arabian red fox |
| <i>Vulpes rueppelli sabaea</i> Pocock 1934 | Rüppell's sand fox |

Family Mustelidae: Weasels, Polecats, Badgers and Otters

- | | |
|---|---------------------|
| <i>Mellivora capensis</i> (Schreber 1776) | Ratel, honey badger |
| <i>M. c. wilsoni</i> Cheesman 1920 | |
| <i>M. c. pumilio</i> Pocock 1946 | |

Family Viverridae: Mongooses and Genets

- | | |
|---|-----------------------|
| <i>Genetta felina granti</i> Thomas 1902 | Common genet |
| <i>Herpestes edwardsi ferrugineus</i> Blanford 1874 | Indian grey mongoose |
| <i>Ichneumia albicauda albicauda</i> (G. Cuvier 1829) | White-tailed mongoose |

Family Hyaenidae: Hyaena

- | | |
|--|----------------|
| <i>Hyaena hyaena sultana</i> Pocock 1934 | Striped hyaena |
|--|----------------|

Family Felidae: Cats

- | | |
|--|------------------------|
| <i>Felis silvestris tristrami</i> Pocock 1944 | Wild cat |
| <i>Felis margarita harrisoni</i> Hemmer, Grubb & Groves 1976 | Sand cat |
| <i>Felis caracal schmitzi</i> Matschie 1912 | Caracal lynx |
| <i>Panthera pardus nimr</i> (Hemprich & Ehrenberg 1833) | Arabian leopard, Nimr |
| <i>Acinonyx jubatus venaticus</i> (Griffith 1821) | Asiatic cheetah, Fahad |

Order Artiodactyla: Even-toed ungulates**Family Bovidae: Goats, Sheep and Antelopes**

- | | |
|---|-----------------------------|
| <i>Tragelaphus imberbis</i> (Blyth 1869) | Lesser kudu |
| <i>Oryx leucoryx</i> (Pallas 1777) | Arabian oryx |
| <i>Gazella subgutturosa marica</i> Thomas 1897 | Arabian sand gazelle, Rim |
| <i>Gazella dorcas saudiya</i> Carruthers & Schwarz 1935 | Saudi dorcas gazelle, 'Ifri |
| <i>Gazella gazella cora</i> (H. Smith 1827) | Mountain gazelle, Idmi |
| <i>Gazella arabica</i> (Lichtenstein 1827) | Arabian gazelle |
| <i>Capra ibex nubiana</i> F. Cuvier 1825 | Nubian ibex, Bedan |
| <i>Ovis ammon</i> (Linnaeus 1758) | Wild sheep, Asiatic mouflon |

The jackal is a medium-sized canid measuring 825-1020 mm in total length and 210-270 mm in tail length. According to Harrison (1981) the colour of *C. a. aureus* is variable, generally brown with black speckling on its back, and white on the belly. The tail is strongly variegated in black, white and tan brown.

C. a. aureus is a rare animal in the Arabian Peninsula, though common in Iraq. In Saudi Arabia it is known from the Eastern region, with two recent records from the north central and the central parts of the kingdom. It is urgently in need of protection.

***Vulpes rueppelli sabaeya* Rüppell's sand fox**

Previous records: Gasperetti *et al.* (1986).

This report: 54 km west of Afif, the head skin and part of the skull of a female killed on the road, 4th January 1974 (IAN Coll.).

Rüppell's sand fox is smaller than the Arabian red fox, measuring 593-805 mm in total length and 260-355 mm in tail length. The ears lack the black tips usually present in the red fox. The general colour is pale sandy with the ventral aspects white. It is widespread although not common in Arabia except the Red Sea coastal plains and the western highlands.

***Mellivora capensis* ratel, honey badger**

Previous records: Gasperetti *et al.* (1986) - ~~Map 1~~; Anon. (1986) Jiddat al-Harasis.

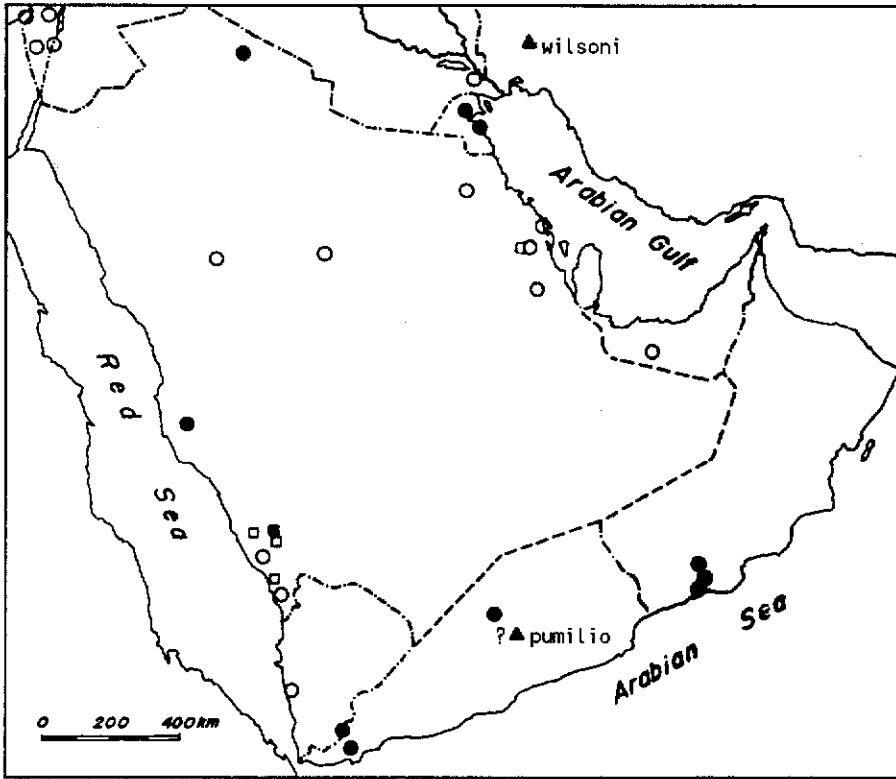
This report: (i) 5 km west of Ain Dar, Eastern Region, a pair sighted in March 1978 by J. Burchard; (ii) Sabya, road killed, 14th April, 1984, reported by Abdu Marzooq; (iii) Al Jurrah, young sighted on the mountain slope by M. Melgat; (iv) Wadi Al Tala, 10 km north of Abha, a male, road killed on 7th August 1985, obtained by A.M. Ayadh (IAN Coll.); (v) Muhyal, a live animal in the zoo at King Faisal Military City, collected May 1986.

The honey badger is a medium-sized robust animal measuring 788-927 mm in total length and 190-246 mm in tail length. It is quite distinct owing to its black and white coloration. The crown, neck, back and base of the tail are white contrasting with the rest of the body which is black. The limbs are short and the forefeet have long sharp claws adapted for digging. It is widespread in Saudi Arabia although not common. Two subspecies are recognised in Arabia: *M. c. wilsoni* is known from the north and *M. c. pumilio* from the south.

***Genetta felina granti* common genet**

Previous records: Gasperetti *et al.* (1986).

This report: (i) 12 km northeast of Ad Darb on the Abha road, road killed, 7th September 1978, obtained by J. Gasperetti and K. Nasher (IAN Coll.); (ii) 20 km south of An Nimas on the Abha road, at 2200 m, road killed, 29th October 1979, seen by J. Gasperetti; (iii) north of Shugaig, a live animal crossed the road, 10th October 1980 (author); (iv) 10 km north of Qunfida, a live animal crossed the road, 2nd May 1981, seen by K. Al-Khalili; (v) 20 km southeast of Al Mijardah, male, 23rd December 1984,



Map 1: Records of the occurrence of the ratel or honey badger *Mellivora capensis* in Arabia.

Circles = previous records; squares = new records; triangles = type localities; solid symbols = museum specimens; open symbols = observations.

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collected by M. Z. Al-Amry (IAN Coll.).

The genet is a long-bodied animal with short legs, measuring 837-920 mm in total length and 470-500 mm in tail length. The general color is olive-grey with fulvous red spots and streaks on the flanks, and a black dorsal stripe. The tail is bushy with 11 or 12 black rings. The genet is a nocturnal, secretive animal. It can climb trees and raid birds' nests, feeding on unwary birds or their eggs as these constitute one of its main food items. The genet is a rare animal in Arabia, found in the western and southwestern regions of the kingdom. In addition, it has been recorded from North and South Yemen and Dhofar (Oman) (Gasperetti *et al.* 1986).

G. f. granti was first recorded in Saudi Arabia in 1979 (Nader 1979). Although it has been sighted several times since then, the genet is a rare animal and measures should be taken to protect this fine, endemic Arabian subspecies.

Herpestes edwardsi ferrugineus Indian grey mongoose

Previous records: Gasperetti *et al.* (1986).

This report: None.

The Indian grey mongoose is a small animal measuring 710-739 mm in total length and 305-371 mm in tail length. The general colour is uniform and without pattern. Because of the bands on the individual hairs the colour appears to be tawny yellowish-grey speckled with greyish-white. The tip of the tail is creamy white. The dorsal side of the forearms and feet are dark reddish-brown, finely speckled with white. In Arabia, *H. e. ferrugineus* is known only from the Eastern Region of the kingdom, in addition to Kuwait and Bahrain. It is an Oriental species, and its limited range in Arabia represents the western limit of the species's distribution. This animal is rare but not endangered in Arabia.

Felis margarita harrisoni sand cat

Previous records: Gasperetti *et al.* (1986)

This report: None.

The sand cat is a small feline measuring 700-740 mm in total length and 230-300 mm in tail length. It has a broad face and large, broad ears with black tips. There is a dark brown nose pad, and a fulvous red streak on the cheeks. The general colour is pale sandy; the underparts and inner limbs are whitish, while the paws are white and covered with long tufts of hair. Black bars are present on the elbows. The adults have five to seven tail rings and tip of the tail is black. *F. m. harrisoni* is rare in Saudi Arabia, so far recorded from only three localities in the Kingdom and no voucher specimen is available. In Arabia, this cat is known also from southern Jordan, South Yemen, Kuwait, Qatar and Oman. Because of its secretive habits and nocturnal activities, it might be more widespread in Arabia than presently apparent.

Felis caracal schmitzi caracal lynx

Previous records: ~~Nader (1984), Gasperetti *et al.* (1986)~~ Stewart (1963): a dead caracal

in the vicinity of Ramlat Shuwait and Ramlat Mitani, Dhofar (Oman); Sale (1980): present in the Jabal Samhan area and around Hasik, Dhofar (Oman); Nader (1984); Jungius (1985) and Anon. (1986): along the Huguf, Jiddat al-Harasis (Oman); Gasperetti *et al.* (1986).

This report: (i) caught near Taif, a fine live animal at the Riyadh Zoo obtained early December 1986; (ii) seen by local people near Al-Serhan, about 22 km southeast of Abha; (iii) one seen in Harrat al-Harrah, 16th April 1988 (P. D. Goriup, pers. comm.).

The caracal is a medium-sized cat with a total length of 857-1140 mm and a tail length of 227-320 mm. Its colour is reddish-sandy without pattern and its underparts whitish. Adult animals have well-developed ear tufts, reaching 50 mm in length. The limbs are long, slender and without elbow markings. The caracal in Saudi Arabia is known from the highlands of the western and southwestern regions, extending from the vicinity of Taif south to the Yemen border. However, it also seems to be present in the northwestern and northeastern regions of the kingdom. In addition, it has been recorded in South Yemen, Dhofar (Oman), United Arab Emirates and Kuwait. Although it is not common where it occurs, the caracal seems to be maintaining itself in the Taif and Abha areas (Nader 1984, Gasperetti *et al.* 1986). However, the survival of this rare cat is not assured as it is easily trapped.

Panthera pardus nimr Arabian leopard, Nimr

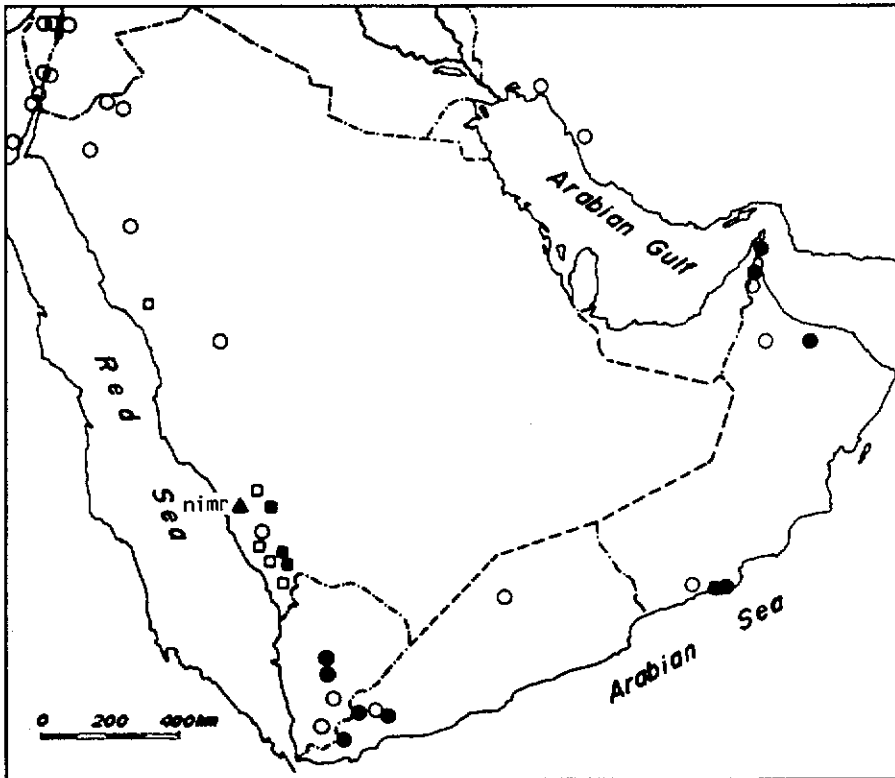
Previous records: Gasperetti *et al.* (1986).

This report: (i) Wadi Al Sader, near Al Jurrah, about 35 km southeast of Abha, skin and part of skull collected 20th December 1977, by M. Meferreh (Coll. Ed. Mus., Abha); (ii) Wadi Baysh, near Tamniyah, about 33 km southeast of Abha, skin and part of skull collected 21st March 1978, by Y.M. Al Kahtani (IAN Coll.); (iii) Tor Uthatha, near Al-Serhan, about 22 km southeast of Abha, female skin and part of skull collected 12th May 1980, by Y. Aseri (IAN Coll.); (iv) two stuffed skins with teeth were for sale at Abha suk obtained from Wadi Maraba on 25th October 1980 and 15th April 1981; (v) Belad Bel Gern, about 170 km north of Abha on Bisha road, skin and part of skull collected Spring 1980 (IAN Coll.); (vi) a locally collected mounted specimen in a pet shop at Khamis Mushayt, 1985; (vii) a female and cub were killed late in summer 1974 near Rijal Alma; (viii) one was shot near Abha airport in spring 1977; (ix) three were killed between An Nimas and Al-Alaya between January and March 1980; (x) a young leopard was seen twice crossing a wadi between As Shugari and Dhame in April 1984; (xi) one was reported by local people to be present in Al Mejjadah area, January 1987; (xii) one was killed about 100 km west of Medina in November 1987.

The *nimr* is the largest Arabian cat, measuring 1600-2007 mm in total length and 660-814 mm in tail length. It is readily distinguished from the cheetah by its black open rosettes on a usually pale golden-brown ground colour. The tail is long with a black tip. There are no stripes on the face. A distinct endemic subspecies of the leopard, *Panthera pardus nimr*, is recognized in the Arabian peninsula. Two other subspecies to the northwest are not known from the peninsula.

It is most likely that the *nimr* was once more abundant in the western and southern highlands of Arabia than it is at the present time. To-day, it exists only in small

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Map 2: Records of the occurrence of the leopard *Panthera pardus* in Arabia.
 Circles = previous records; squares = new records; triangles = type localities;
 solid symbols = museum specimens; open symbols = observations.

numbers, confined to the mountains of Asir, North and South Yemen, and the mountains of Dhofar and Ras Musandam, Oman. Shooting and poisoning are thought to be the main factors in the decline of this fine cat.

***Acinonyx jubatus venaticus* Asiatic cheetah, Fahad**

Previous records: Gasperetti *et al.* (1986); Dickson (1951) listed the cheetah to be present in Kuwait and northeast Arabia.

This report: Hail area, 2 dead animals killed in May 1973.

The *fahad* is a large cat measuring about 1950 mm in total length and 690 mm tail length. It is slightly smaller than the leopard, with a more slender body and long thin legs. Its body colour is pale buff with black spots except the belly which is white. There is a black stripe extending between the inner side of the eye and the corner of the mouth. The tip of the tail is bushy and white. The cheetah is an animal of open steppes, utilizing its extraordinary speed in the pursuit of its prey which is usually gazelles or hares. Its diurnal activity made it an easy target for hunters.

The recorded occurrence of the *fahad* in the Arabian peninsula is confined largely to the northern parts with only two records in the south-central region. However, it may have been more widespread than has been recorded. The published records of the cheetah indicate that the last animals in Saudi Arabia were killed in the early 1950's. Hatt (1959) noted that since 1950 four cheetahs had been killed by Aramco employees working on the Tapline project in northern Saudi Arabia; some of these were obtained a few kilometers south and some kilometers east of the intersection of the Saudi Arabian, Jordanian and Iraqi borders. Morrison-Scott (1951) exhibited a photograph of one of these animals which had been killed in March 1950 on the Tapline road in northern Saudi Arabia (31°32'N - 39°35'E). A reliable source informed the author that two cheetahs were killed about May 1973 near Hail and were exhibited for a few days near the Imara palace. This seems to be the last record of the cheetah in Saudi Arabia. If the cheetah still survives in the Kingdom, it is most likely to be in the northern desert areas north of Hail.

The two records from southern Arabia comprise a sighting of a cheetah in March 1963 in Wadi Mitani, 80 km west by north of Habarut, South Yemen (Harrison 1972), and an animal killed during November/December 1977 by tribesmen in the region of Jibjat (17°15'N - 54°27'E) in Dhofar (Oman) (Harrison 1983). These two records raise the hope that the cheetah might still be present in the wild in the remote areas of the south-central part of the peninsula.

Order Artiodactyla

***Oryx leucoryx* Arabian oryx**

The Arabian oryx is a large antelope measuring about 1000 mm at the shoulders in the males. Both sexes have very long, nearly straight horns which attain about 700 mm in length. The general colour of the body is white, with strongly contrasting dark brown

markings on the head, neck, limbs and tail tip.

The history of the decline of the Arabian oryx in the wild is well documented by Stewart (1963). This history has been summarized by Nader (1989). It is known that until the early part of the nineteenth century, the oryx was present in most of the Arabian peninsula. However, due to overhunting with the aid of firearms and motor vehicles, its numbers rapidly diminished and its range greatly reduced. By the beginning of this century, the oryx was restricted to two populations: one in the Great Nafud desert in the northern part of the kingdom and the other one in the Rub' al-Khali in the southeastern part of the peninsula. It is thought that the last oryx in the Great Nafud was killed around 1950, and the last animal was killed in Saudi Arabia in 1969 near the eastern borders of North Yemen (Nader 1989). The last wild Arabian oryx in the southern fringes of the Rub' al-Khali was killed or captured in the Jiddat al Harasis (Oman) in October 1972 (Henderson 1974).

Fortunately the Arabian oryx was saved from total extinction by international efforts. The Fauna and Flora Preservation Society of England in cooperation with IUCN organized in 1962 an "Operation Oryx" which was able to capture two males and one female from the southern fringes of the Rub' al-Khali. These, with six other animals donated from different zoos (notably two pairs from Saudi Arabia), formed the nucleus of the "World Herd" of oryx which were taken to Phoenix Zoo in Arizona (see Dolan, this volume). By 1979, the official "Arabian Oryx Studbook" maintained by the San Diego Zoological Society recorded 159 males and 163 females (Fitter 1982). Today, the total number of captive animals is estimated to be over 600, almost half of them in the Arabian peninsula.

It is gratifying to realize that the international efforts along with the keen interest of the rulers of the Arabian peninsula in conserving this endemic animal from the brink of extinction have succeeded so marvellously. The successful return of the oryx to its wild state in its natural habitat is the next challenging operation. Already small herds have been returned from the "World Herd" to Jordan and Oman and are kept in Reserves (Al Shaumari Reserve in Jordan and Jiddat al Harasis in Oman) as a first step before releasing them in the wild. Furthermore, Saudi Arabia (through the newly established NCWCD) have embarked on an ambitious programme to breed and later release this fine animal in the wild.

Gazella subgutturosa marica Arabian sand gazelle, Rīm

Previous records: Harrison (1968a); Nader (1989).

This report: None.

The *rīm* is a medium-sized gazelle with relatively long horns in the male measuring about 210 mm that are usually widely divergent at their tips and strongly curved inwards. Females also have horns, but they are about 20% smaller and somewhat straighter. The general colour is very pale, nearly white. The facial and flank markings are almost absent in adults. The *rīm* inhabits sandy areas throughout the Arabian peninsula. Within the last twenty years, the numbers of this gazelle have diminished considerably, especially in the northern parts of the Kingdom where herds of 50 to 100 animals used to be seen. The *rīm* is probably still present in fair numbers in the sandy

areas along the eastern and southwestern An Nafud and the southern and western edges of the Rub' al-Khali.

***Gazella dorcas saudiya* Saudi dorcas gazelle, 'Ifri**

Previous records: Harrison (1968a); Nader (1989).

This report: None.

The 'Ifri is a small gazelle with shorter legs than the Idmi, usually measuring less than 600 mm at the shoulders. Male horns are long, measuring 224-304 mm rather straight and slender. Those of the female are shorter and even more slender. The general colour of the animal is rather pale brownish-fawn with the facial stripes usually distinct and the flank stripes are usually absent. The Saudi dorcas gazelle is known from a few localities in Saudi Arabia, east of the Hejaz mountains, where it inhabits the gravel plains. It is a rare gazelle in Saudi Arabia. Due to hunting from vehicles, its numbers have diminished greatly, especially in the northern parts of the Kingdom where it used to be common (Lewis *et al.* 1965). It is likely that the 'Ifri is still present in small numbers in the more inaccessible areas in the northwest of the country.

***Gazella gazella cora* mountain gazelle, Idmi**

Previous records: Harrison (1968a); Nader (1989).

This report: None.

The *idmi* is a moderately large gazelle of very slender build with relatively long limbs, measuring about 610 mm at the shoulder. The horns of the males are rather short and lyrate with the tips often strongly turned forward. Those of the females are short and slender. The mean horn length of 25 males and 5 females were 218.8 and 108.6 mm respectively (Groves 1983). The general colour is usually light brown with well marked facial and flank stripes that are usually broader than in the 'Ifri but not much darker.

G. gazella is known from the mountains and foothills of the coastal areas of the Arabian peninsula. Two subspecies of this species are recognized in Arabia. *G. g. cora* occupies most of the range of the species in Arabia. *G. g. muscatensis* is confined to the north-eastern coastal area of Oman. This subspecies is smaller, with wider and darker facial and flank markings and shorter horns in males than those of *G. g. cora*. The *idmi*, like the other species of gazelles in Saudi Arabia, have diminished in numbers throughout their range since the middle of this century. However, it is still present in small numbers in the Tihama coastal plains and in the mountains of the southern parts of the Kingdom near the North and South Yemen borders.

***Gazella arabica* Arabian gazelle**

Previous records: Groves (1983); Nader (1989).

This report: None.

The Arabian gazelle does not differ greatly from the *idmi*. According to Groves (1983) the general colour is dark ochre, the flank stripes are nearly absent, and the face is whitish. The ears are shorter and the horns measuring 272 mm in the type

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specimen longer than those of the *idmi*. The horns are nearly straight with prominent rings, with no tendency for the tips to turn in an are hardly divergent. The nasal bones are shorter and broader than those of the *idmi*. The Arabian gazelle is found only in the Farasan Islands. It was plentiful around the middle of this century, being seen in small herds even on the mainland. Since then, their numbers have diminished so much that it is regarded as an endangered species. It is hoped that these animals are pure bred and have not interbred with some of the Ethiopian gazelles that travellers and traders used to bring to the Islands. It is most encouraging that complete protection has been afforded to this graceful and endangered animal by the local authorities in the Farasan Islands.

Capra ibex nubiana Nubian ibex, Bedan

Previous records: Harrison (1968a); Gasperetti (1978); Green (1986); Anon (1986): Jiddat al-Harasis; Nader (1989).

This report: A few animals were sighted at about 200 km south of Riyadh in 1986.

The Nubian ibex is a heavily-built goat measuring about 630-840 mm at the shoulders. The male has long curved horns with flattened anterior surfaces and somewhat regular transverse bosses. Adult males have a black beard. Females have smaller horns which are not as curved as those of the males. The general coloration of the animal is brownish-fawn with black and white blotches on the fore and hind limbs. The Nubian ibex is an inhabitant of steep rocky mountain terrain, where it moves with great agility. It usually lives in small groups led by an old male. They frequent water pools as they need to drink water, a habit that makes them an easy target for hunters.

C. i. nubiana is known from numerous localities in Saudi Arabia, especially the mountainous areas in the northwest, north-central and southwest, as well as South Yemen and Oman. The numbers of Nubian ibex have diminished throughout its former range in the Arabian peninsula in general and in Saudi Arabia in particular. Fortunately, it is still present in small numbers in remote and inaccessible mountainous areas, especially in the northwestern and north-central parts of the Kingdom.

Ovis ammon wild sheep, Asiatic mouflon

Previous records: Harrison (1972); Gasperetti (1978); Nader (1989).

This report: None.

The Asiatic mouflon is a rather small wild sheep measuring 770-940 mm at the shoulders. The general colour of the animal is brown. The horns of the male are robust and tend to curve round in a circle along the sides of the head. Females have rudimentary horns or are hornless. Males have no beard; however, a black ruff is present on the front side of the neck. The status of the wild sheep in Saudi Arabia is not well documented. A young animal recorded from near Sharawah on the southwestern edge of the Rub' al-Khali (Harrison 1972) is not known for certain to have come from that area. The sighting of a few animals from the western edge of Harrat Khaybar, about 150 km north-northwest of Medina (Gasperetti 1978) needs to be

confirmed. The only other documented record of wild sheep in the peninsula is that from Wadi Kharbora in Oman (Harrison 1968b).

If the wild sheep is present in the Kingdom, it is certainly a rare animal. It might be found in some of the inaccessible areas in the northwest. The area of Harrat Khaybar is certainly in need of intensive survey to establish the presence of these animals there, its population size, age and sex structure. If wild sheep are proven to exist there, Harrat Khaybar should be declared a nature reserve.

RECOMMENDATIONS

To improve the threatened status of the large mammals of Saudi Arabia, the following recommendations are made:

- 1 Laws regulating the hunting of wild animals should be enforced by training and hiring guards and wildlife wardens to see that these laws are obeyed throughout the Kingdom and particularly in the protected areas.
- 2 A training program for wildlife guards and wardens should be undertaken utilizing some of the local tribesmen as they are naturally interested in protecting the animals in their areas.
- 3 A ban on hunting of all kinds of large animals for a limited period of about five years should be applied, with severe punishment for violaters.
- 4 Protected areas, nature reserves and more National Parks should be established in places where threatened species are still present.
- 5 The introduction of imported animals should be prevented in order to preserve the genetic composition of the local fauna.
- 6 Captive breeding programs for all endangered and, if possible, for rare animals, are needed.
- 7 A ban on the use of poison to control pests or predators should be implemented in order to save many of the endangered and rare carnivores.
- 8 Detailed studies of various biological aspects of the Kingdom's large mammals, especially the endangered species, should be undertaken immediately.
- 9 Measures required to protect the environment, and the local fauna and flora, should be emphasized in biology text books at all levels of education in addition to publicizing environmental awareness through all types of mass media.
- 10 A *Red Data Book* of the wildlife in Saudi Arabia should be prepared. Although information on the status of a large number of animals and plants of Saudi Arabia is meagre. Specialist Groups could be formed to compile lists of the rare and endangered species and supply available information on these forms. Updating these lists and the relevant data should be carried out regularly.

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