

TERRESTRIAL MAMMALS

THE NATIONAL CHECKLIST OF TERRESTRIAL MAMMALS, including 8 species of bat, runs to 43 species, although other species possibly occur. At least three species on the checklist, and possibly as many as six, have become extinct within the UAE in recent historical time. Three or more species listed have been introduced recently, but none of these, apparently, has yet established a self-sustaining population.

A brief introduction is given for each of the mammalian orders and families represented in the UAE, with separate accounts being given for each individual species, summarising what is specifically known about their local ecology, distribution and abundance.

HEDGEHOGS AND SHREWS (INSECTIVORA)

Two species of hedgehog and a single species of shrew are known from the UAE. The Savi's pygmy shrew, perhaps the smallest mammal in the world, was discovered in the UAE only as recently as 2000. None is regarded as threatened, although there is certainly a data deficiency regarding the true status of the shrew.

ETHIOPIAN HEDGEHOG *Paraechinus aethiopicus*

The Ethiopian hedgehog occurs over much of north-east Africa and throughout Arabia and is the most frequently encountered hedgehog in the UAE, most often seen as a result of road-kills. It can survive in desert environments, although not in extensive mobile dunefields. UAE records are from gardens, cultivations and plantations, as well as open wooded habitats, sandy and stony plains and desert, and the mountain flanks (Jongbloed *et al.* 2001). It is found on the both sides of the Hajar Mountains, and to the west reaches the Arabian Gulf coast (Hellyer 1992a; b). It has been widely introduced, including to some of Abu Dhabi's islands.

Hedgehogs have poor eyesight but an acutely developed sense of smell, enabling them to detect food. Favoured prey includes beetles, termites, centipedes, millipedes, grasshoppers and moths. Essentially carnivorous, besides arthropods, they are known to eat small mice, lizards and the eggs and chicks of ground-nesting birds, and their diet even occasionally features amphibians, plant matter and fruit.

Both hedgehog species in the UAE become less active during the hottest months, particularly in the deserts.

BRANDT'S HEDGEHOG *Paraechinus hypomelas*

The Brandt's hedgehog ranges from India to Afghanistan and Central Asia, south to Iran and Arabia, where its population is widely disjointed. Larger than the preceding species, it differs in having larger ears, white-based dark spines and a black face and snout. It is commonest in rocky areas, but not at the highest elevations, although this may not necessarily reflect the species' true preference, rather its dislike of purely sandy terrain. It is regularly recorded around the suburbs of Al Ain, overlapping here with the Ethiopian hedgehog, and has also been recorded from



Dhaid, around Hatta, in the Wadi Bih area, Ra's al-Khaimah, and from the East Coast, at Dibba, (Hellyer 1994a) and the hills west of Khor Fakkan (Cunningham, in litt.). Harrison, in Sachell (1978), describes Brandt's hedgehog as a highland relict species.

Predominantly nocturnal, Brandt's hedgehog becomes active only after sundown when the temperature drops, although after rainfall, they may be active during daylight, thus taking advantage of the abundance of emerging insects.

They rest curled up into a ball in debris, in the shade of dry bushes or in holes in the ground. Resting places are changed daily or made semi-permanent by females with young until they are old enough to move with her on foot.

MAIN PHOTOGRAPH: *Brandt's hedgehog* *Paraechinus hypomelas*

ABOVE: *New-born hedgehogs*
RIGHT: *Ethiopian hedgehog* *Paraechinus aethiopicus*



ARABIA’S SMALLEST MAMMAL

SAVI’S PYGMY SHREW
Suncus etruscus
Smallest of the mammals of Arabia is the Savi’s pygmy shrew (also known as the pygmy white-toothed shrew) *Suncus etruscus*, discovered for the first time in the UAE in August 2000 during routine inspection of traps at the Sharjah Breeding Centre for Endangered Arabian Wildlife. A second individual was trapped in the same locality two months later.

Savi’s pygmy shrew has an extensive global range including North Africa, Ethiopia, Madagascar, the Canary Islands, southern Europe, southern USSR, Iran, India, south-west China, Thailand, Malaysia and Borneo. In southern Arabia, specimens

have previously been recorded from Aden and Lahej in southern Yemen, the island of Socotra, Bahrain and from the plains of Salalah in Dhofar, southern Oman (Harrison and Bates 1991).

Savi’s pygmy shrew measures a mere 69 millimetres from nose to tail tip. It has mouse-like features of a long tail, tiny eyes and rounded ears projecting from dense velvety, grey-coloured fur. Characteristic to the family is its long pointed snout, which juts beyond the bottom lip. The heart of the Savi’s pygmy shrew is believed to beat at a remarkable 20 times a second. They appear to be exceptionally nervous creatures and are extremely difficult to keep alive in captivity.



Its metabolic rate is so high that it cannot survive for more than a few hours without food. They consume vast amounts of their preferred diet of insects, usually more than their own body-weight every day.

Jane Ashley-Edmonds

BATS (CHIROPTERA)



Little is known of the composition of the bat community of the UAE. Only limited research has been undertaken, and it is probable that several species recorded in northern Oman also occur in the UAE.

Bats and rodents represent the two most diverse mammal groups to be found in the UAE. Two suborders of bat occur: megachiroptera (fruit bats) and microchiroptera (insectivorous bats). In the first of these groups only one species occurs, the Egyptian fruit bat *Rousettus aegyptiacus*. Amongst the UAE microchiroptera, there are at least seven species representing four separate families (see checklist on page 367). While the microchiroptera are generally recorded close to human habitation or plantations, they also occur in remote areas of both deserts and mountains, where they roost in crevices of rocky outcrops or in abandoned buildings.

EGYPTIAN FRUIT BAT *Rousettus aegyptiacus*
This species has a wingspan of approximately 60 centimetres and is substantially larger and heavier than any of the microchiroptera, although the latter are far more numerous. Feeding on fruit, fruit bats play an important role in pollination and seed dispersal of native plants. They readily turn to commercial fruit trees, sometimes with devastating effect to a season’s crop, particularly of mangoes *Mangifera sp.*, so are seasonally common in fruit-growing parts of the UAE, notably Ra’s al-Khaimah and Fujairah, but also occur inland around Al Ain, again primarily when fruit is ripening, where ten or more individuals have been found roosting in a date palm grove in October (Cunningham, in litt.). They have also been recorded at higher elevations in the Hajar Mountains (Feulner

Egyptian fruit bat Rousettus aegyptiacus



2000). Indications are that some local, if not longer distance migration must take place. In November 1998, the first two live specimens were noted in Abu Dhabi, roosting by day in a mango orchard in the city centre (Aspinall, pers. obs.).

This species ranges from southern Africa to south-west Asia.

MUSCAT MOUSE-TAILED BAT *Rhinopoma muscatellum*
This species appears to be the most common of the UAE’s insect-eating bats. It is known from Al Ain, Ra’s al-Khaimah and Khatt (Harrison and Bates 1991) and Khor Kalba (C. Stewart, pers. comm.), but probably has a much wider distribution. A preference is shown for rocky areas where caves are used for roosting, those on Jebel Hafit and Qarn Nazwa being two particularly important sites. As with leaf-nosed bats, individuals roost openly, hanging downwards from a rock ceiling or wall, clinging by their feet.

This species has a somewhat restricted range compared to all other species of bat found locally, being found only in south-east Arabia and south-west Asia (Iran, Afghanistan and Pakistan).

NAKED-BELLIED TOMB BAT *Taphozous nudiventris*
This species has been recorded both in mountain districts of the UAE, including Al Ain and Jebel Faiyah, and, remarkably, also on Das Island, some 100 kilometres out into the Arabian Gulf (Hellyer 1988b). It typically roosts colonially in crevices and fissures, in both natural and man-made settings. They are more easily located than most bats as their squeaking is clearly audible, while

ABOVE: Egyptian fruit bat Rousettus aegyptiacus
RIGHT: Mouse-tailed bats in a cave in the UAE

tell-tale accumulations of strong-smelling guano are invariably present below roosts. This species flies at high levels and reportedly travels long distances to feed.

The subspecies *T. n. zayidi* is known to exist in Al Ain, where the type specimen was collected in 1954, being shot by the late President HH Sheikh Zayed bin Sultan Al Nahyan, then Ruler’s Representative in Abu Dhabi’s Eastern Region, and duly presented to visiting naturalist David Harrison, who subsequently described it (Harrison 1955; Hellyer 2001). The Das specimen, now in the Harrison Zoological Museum in Britain, has been identified as being of the larger Iraqi subspecies, *T. n. magnus* (Harrison and Bates 1991).

Confusion can occur with a second species, *T. perforatus*, not yet recorded in the UAE but which may exist here, and which is known from Sohar, on the Batinah coast of Oman, east of Al Ain (Harrison 1981).

This species ranges from West Africa to Myanmar.

TRIDENT LEAF-NOSED BAT *Asellia tridens*
The trident leaf-nosed bat is also widespread in the UAE and is one of the smallest bats present, measuring just 78 millimetres in length. It is colonial and roosts in a hanging position. Seasonal movements are pronounced, with large roosts being vacated and reoccupied during the course of a year. The species emerges to feed at dusk, with the flight typically twisting and at low level. Its distribution in the UAE is centred on the mountain flanks and outlying isolated jebels. Published records are from Al Ain, where it was first noted in 1954 (Harrison 1955), and from Sharjah.

This species occurs across much of Africa, throughout the Middle East and into south-west Asia.

PERSIAN LEAF-NOSED BAT *Trienops persicus*
Reported to have similar habits to the preceding species, but to be somewhat scarcer throughout its range, the Persian leaf-nosed bat has been recorded in Al Ain (Harrison 1955), where it was found roosting in covered *falaj* channels, and also in neighbouring parts of Oman, including Sohar. *Falaj* roost sites are often shared with *A. tridens* (Harrison and Bates 1991), with which it may be confused.

The species occurs from East Africa to Pakistan, but has a relatively restricted distribution within Arabia.



SIND SEROTINE BAT *Eptesicus nasutus*

The Sind serotine bat was first recorded in the UAE in 1991 at a verdant housing complex at Ruwais in the Western Region of Abu Dhabi, then in 1993 at a roost in a rock outcrop in the sandy desert just inland of Ra's Ghanadha (Duckworth 1996). A third site was found in March 2003, in the Shah oilfield, in the deep sands south of the Liwa arc (Drew, pers. obs.). At Ruwais, where this species is still regularly recorded (Aspinall, pers. obs.), individuals are attracted to night-flying insects (which are attracted to streetlights), large numbers being observed feeding in close proximity, typically swooping down to within a metre of the ground while feeding. Bat roosts in craggy outcrops along the Abu Dhabi coastline, noted only from the presence of droppings (Aspinall, pers. obs.), may in some instances relate to this species.

This species apparently only occurs in south-west Asia and eastern Arabia. It is probably more common within the UAE than records currently suggest.

KUHL'S PIPISTRELLE *Pipistrellus kuhlii*

The Kuhl's pipistrelle is probably the commonest bat in urban areas of the UAE, both on the coast and inland. Recorded from Sharjah,

Dubai, Khor Kalba and Al Ain (Harrison and Bates 1991; Jongbloed *et al.* 2001), it was first recorded in 1954 in Al Ain, where small numbers were found roosting in a *falaj* tunnel (Harrison 1955). It has also been recorded on the island of Marawah, Abu Dhabi, some 20 kilometres offshore (Aspinall, pers. obs.). It roosts colonially in crevices, roof spaces and buildings. When disturbed, the squeaking of these bats is easily audible.

The world range extends from South Africa to southern Europe and the Caucasus, eastward to Pakistan.

HEMPRICH'S LONG-EARED BAT *Otonycteris hemprichii*

Within the UAE, this species has been recorded only from Ra's al-Khaimah (Harrison 1977) although it is also known from Oman, Qatar and eastern Saudi Arabia.

Roosting in rock fissures or in the cracks of buildings, this large insectivorous species has been collected elsewhere in the Middle East by mist-netting over pools.

It is wide-ranging in arid zones, occurring across the Maghreb to Egypt, and through the Middle East to Tajikistan and Kashmir (Harrison and Bates 1991).

CARNIVORES (CARNIVORA)

Of 11 species of carnivore recorded in the UAE, one, the Indian grey mongoose, is an introduction. Arabian wolf and striped hyaena may have become locally extinct, while the Arabian leopard remains critically endangered. The cheetah is now certainly extinct, if ever it occurred. Remarkably, Blanford's fox, one of the three fox species to occur, was found to be present in the UAE only in 1995, although it is now known to be common.

Four extant species of cat are known from the UAE, including Arabia's most threatened land mammal, the Arabian leopard. While persecution is largely to blame for the decline of this species, the Gordon's wildcat, a subspecies found only in the UAE and northern Oman, is threatened by interbreeding with feral cats. Caracal is reportedly widespread in mountain districts, though rarely sighted, while the sand cat is something of a desert phantom, even its tracks being rarely observed, the thick fur protecting the pads preventing tracks from being identified with certainty.

WOLVES AND FOXES (CANIDAE)

ARABIAN WOLF *Canis lupus arabs*

The Arabian wolf once inhabited both the mountains and desert plains of the UAE, although it is now thought to survive only in captivity. Populations survive in Oman, Saudi Arabia and Yemen, although it is vulnerable throughout this range, persecution and inter-breeding with feral dogs having drastically reduced numbers (IUCN/SSG Conservation Breeding Specialist Group CAMP Workshop 2000). It was recorded as being present on Jebel Hafit in the late 1940s (Thesiger 1949). In 1984, one was shot in Al Ain Zoo, while scavenging with feral dogs (Gross 1987), while in 1994, a wolf that had been shot was photographed hanging from a tree near Ayeem, north of Masafi (Hellyer 1994b), although the specimen was not collected.

Residents of Wadi Safad in Fujairah have reported seeing and hearing wolves at night, but state that they are now much less common (Hellyer, pers. comm.). Some may survive in the mountains, although these may no longer be pure-bred.

Similar in size and stature to a medium-sized domestic dog, the Arabian wolf is the largest canine in Arabia but smaller than its North American and European counterparts. Short-haired, their coat varies from pale brown to grey on the back and flanks, the neck and belly being creamy-white. During winter the coat is noticeably thicker and longer, especially around the neck. The Arabian wolf normally has yellow eyes, sightings of animals made elsewhere in Arabia with brown eyes being evidence of hybridisation with feral dogs.

Unlike the packs formed by wolves in other areas, the Arabian wolf generally lives in pairs or small family groups. Although able to catch and kill prey such as gazelles and goats, birds, rodents, reptiles and carrion form most of their diet, with plants, fruits and berries also taken. Foraging wolves travel great distances and can reappear in formerly occupied as well as new areas.

Very little is known about breeding behaviour in the wild, but in captivity three to five pups are normally born between January and March after a gestation period of approximately nine weeks.

They are fully furred, but deaf and blind, at birth. They grow rapidly and are weaned at about eight weeks, when they will begin to emerge from their burrows.

ARABIAN RED FOX *Vulpes vulpes arabica*

Among the most cosmopolitan and prolific of all the carnivores, the Arabian red fox is found throughout the UAE in a variety of habitats, from arid rocky mountains to sandy desert, coastal plains and even small offshore islands. Highly adaptable, the species has benefited from the expansion of human habitation, particularly from the associated rat and mice populations. Although once probably absent from the deep desert, over 25 red foxes were disturbed in 1992 while feeding on the refuse tip at the Shah oilfield, south of Liwa (Hellyer 1993a). Opportunistic and omnivorous, red foxes will eat almost anything they can catch or find, including a variety of small mammals, birds, insects, carrion, plants and fruits.

As with most other Arabian mammals, they are smaller and lighter than their European equivalents, although within Arabia itself there is also much individual variation (Harrison and Bates 1991). Primarily reddish-brown in colour, the throat and belly vary from black to off-white, the tail is greyish-buff with a white tip; the large ears have black tips and a white anterior margin. This is the largest of the three fox species in the UAE, weighing approximately 2.7 kilograms.

The vixen gives birth to up to five cubs, usually in early spring in a den situated between boulders, in natural cervices or a burrow dug for herself. At seven or eight weeks of age the cubs are weaned and begin foraging with the vixen, before dispersing to seek out new territories.

RÜPPELL'S FOX (SAND FOX) *Vulpes rüppelli*

Shy and secretive, the Rüppell's fox is a true desert species. As development has moved further into arid regions, the range of

Juvenile Arabian red fox *Vulpes vulpes arabica*



Arabian wolf
Canis lupus arabs





LEFT: Rüppell's fox *Vulpes rüppelli*
BELOW: Blanford's fox *V. cana*

restricted to the rocky mountains of the peninsula, avoiding the foothills and plains inhabited by *V. vulpes*.

Slightly bigger than *V. rüppelli*, this beautiful fox, also known as the royal or king fox, has been extensively hunted for its fur in other regions. It is readily distinguished by its long, bushy tail, which can be almost the same length as the body, and by its large, prominent ears. The soft, woolly fur, much thicker in winter, has a reddish-brown tint or greyish-buff cast. A dark mid-dorsal band

extends from the neck to the extremely bushy tail, which can have either a black or white tip. Sharply defined black tear marks extend from the internal angle of the eye to the upper lip. The feet are smaller than those of *V. vulpes* or *V. rüppelli* and, unlike these species, the pads are bare, providing sure footing in rocky terrain.

Extremely agile and exceptional jumpers, these nocturnal animals feed on invertebrates, reptiles, small mammals and fruit. Very little is known about their social structure. In captivity two to four pups are normally born between February and April after a gestation period of approximately 50 days.

the red fox has increased, apparently forcing that of the smaller Rüppell's fox to contract. It is now believed to be confined mainly to the remoter regions of Abu Dhabi Emirate, such as Umm az-Zumul, Liwa and the Dhafra region in the south-west (Osborne 1992a; 1992b), although it has recently been recorded in the Al Maha desert resort in Dubai (Jongbloed *et al.* 2001).

Superficially similar to *V. vulpes*, they are considerably smaller, weighing only 1.5 kilograms and have proportionately larger ears. A uniform creamy-white to pale rufous colour, these foxes blend in perfectly with their surroundings. The pads of their feet are almost completely concealed by hairs, presumably as an adaptation to walking in loose sand. They appear to form monogamous pairs (Harrison and Bates 1991), sharing a den from which they emerge shortly before sunset to spend the night hunting for small mammals, reptiles and insects.

Rüppell's fox ranges across North Africa, and eastwards from Arabia to Afghanistan and Pakistan.

BLANFORD'S FOX *Vulpes cana*

Blanford's fox occurs over a disjointed range in Arabia, including southern Oman and Saudi Arabia, as well as north-east Iran, Afghanistan, Central Asia, India and Pakistan (Cunningham and Howarth 2002). Its presence in the UAE was only confirmed in 1995 (Stuart and Stuart 1995), although subsequent research has since shown it to be common throughout the Hajar Mountains (Llewellyn-Smith 2001) and Jebel Hafit. The mountain equivalent of *V. rüppelli*, their range is



MONGOOSES (HERPESTIDAE)

INDIAN GREY MONGOOSE *Herpestes edwardsii*

An Oriental species, the Indian grey mongoose was almost certainly introduced into the UAE. Records of this species exist from the Northern Emirates (Gross 1987), while two unidentified mongooses recorded in Abu Dhabi in 1985 and 1988 may also have been this species (Hellyer 1989).

It is the smallest carnivore in Arabia, active mainly by day, with an apparently native subspecies, *H. e. ferruginens*, widely distributed along the Gulf coast of Saudi Arabia (Harrison and Bates 1991), although the subspecies introduced into the UAE may be the nominate race (Duckworth 1996). They have a greyish and strikingly long coat, coarsely speckled black and white. The muzzle, cheeks and margins of the just visible ears have a rusty brown wash.

Dependence on water may limit their UAE range, although the expansion of habitats such as palm groves and gardens may facilitate further dispersal. They appear to breed year round and give birth to two to four pups that remain within the family group for some time.

Other species of mongoose may also have been introduced, with a recent unconfirmed report of the African suricate *Suricata suricatta* having been released in Abu Dhabi.

WHITE-TAILED MONGOOSE *Ichneumia albicauda albicauda*

Like *V. cana*, the white-tailed mongoose is a mountain-dweller, avoiding open desert, and normally found near permanent water. In the UAE, they have been recorded from Ra's al-Khaimah, Fujairah, Masafi, Siji, Shawkah and near Al Ain (Jongbloed *et al.* 2001), also occurring in Oman, southern Saudi Arabia and Yemen (Harrison and Bates 1991).

One of the larger species of mongoose, it is noticeably larger than *H. edwardsii* with longer legs and bigger ears and is more fox-like in appearance. The coat is coarse, with a speckled effect produced by alternating black and creamy bands on the hairs. Distally, the tail is similar in colour, becoming progressively lighter with the last third pure white. The long legs are predominantly black, with pads naked to the wrist.

Essentially nocturnal, it survives on a diet of reptiles, small mammals, insects, birds and their eggs and carrion, but has adapted to living in close proximity to man. Pairs share a territory and raise a single pup, rarely two, which in captivity is normally born between June and July. Vocalisations are minimal but, if scared or startled, they give a high-pitched bark akin to that of a dog.

This native species ranges from south-east Arabia to north-east Africa and thence south to the Cape.

HYAENAS (HYAENIDAE)

STRIPED HYAENA *Hyaena hyaena sultana*

The striped hyaena has been severely persecuted in Arabia because of its unfounded reputation as a grave-robber and because it is believed to kill livestock (Mills and Hofer 1998). Thesiger (1949) reported that it occurred on Jebel Hafit, while during the 1980s one was reported dead on the Al Ain to Dubai road (Duckworth 1996). There have been no confirmed sightings of hyaena in the Emirates since 1984, when an animal was seen crossing a track between Awhala and Khor Kalba (Gross 1987). It may be locally extinct, although reports suggest that it may still be present on the fringes of the Rub-al-Khali (Mills and Hofer 1998). A probable sighting was reported from between Al Ain and Sweihan in December 1996, with another report from villagers in Wadi Helou, near Kalba, in June 1996 (Hellyer 1997). In 1999 spoor thought to be that of hyaena was found south of Liwa (C. Drew, pers. comm.). These reports suggest that some individuals at least visit from time to time. Residents of the higher Musandam reported that it used to exist there (Jongbloed *et al.* 2001), even if now absent.

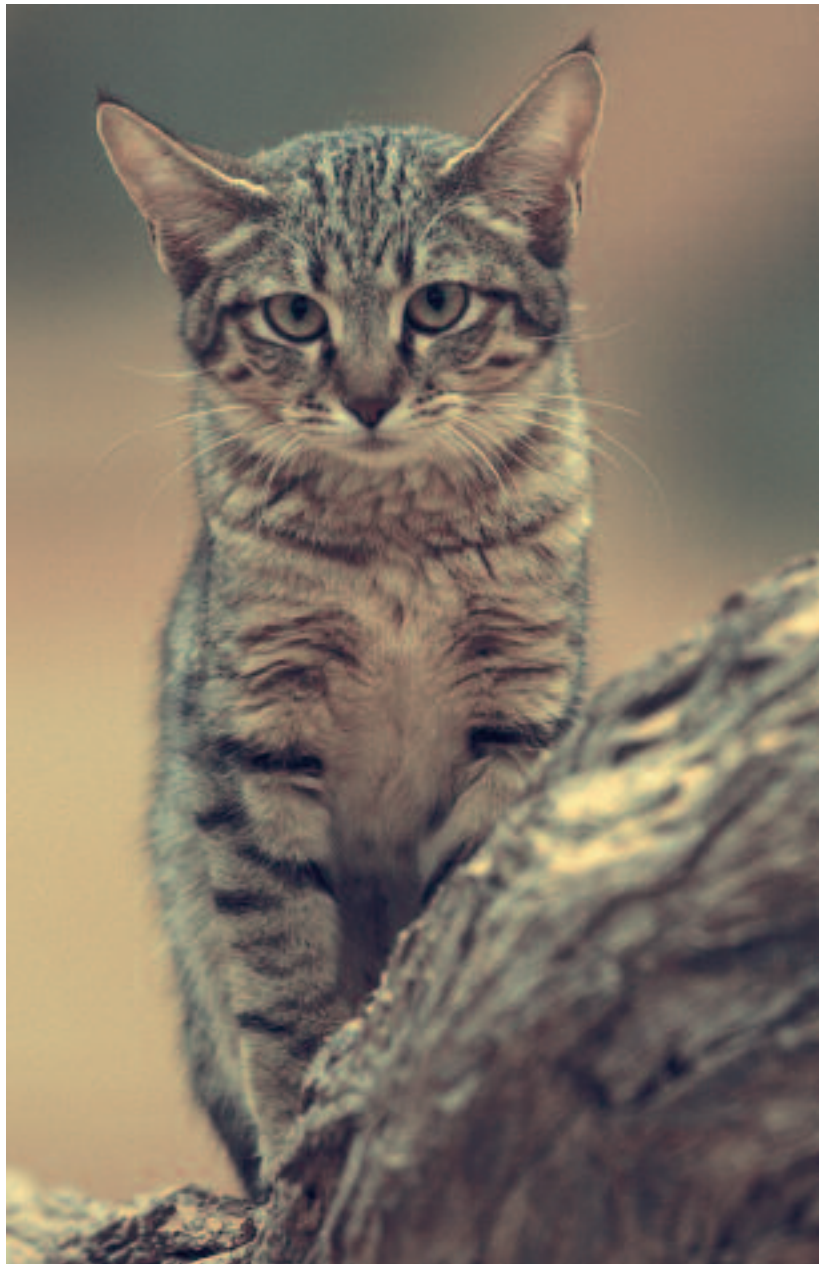
The hyaena's characteristic shape and gait are due to the well-developed forequarters, used for digging, and the shorter, less muscular hindquarters. The coat is marked with several distinctive vertical stripes along the flanks and irregular bands on the legs. Dark elongated hairs along the back form a crest or mane, which can be erected and is used as a signalling device during social interactions (Mills and Hofer 1998).

Unlike their larger African counterparts, striped hyaenas are solitary, travelling great distances in search of food. Predominantly scavengers, but capable of crushing large bones, hyaenas feed off the remains of kills, but also eat a wide variety of live vertebrates and invertebrates, vegetables, fruit and refuse. They appear to have large home ranges, with a core area situated around their breeding dens, where up to four young are born after a gestation of 90 to 100 days.

The striped hyaena has a range throughout Africa, and from west Asia north and east to Central Asia and Nepal.



CATS (FELIDAE)

LEFT: *Gordon's wildcat* *Felis silvestris gordoni*BELOW: *Sand cat* *Felis margarita harrisoni*

The genetic purity of the Gordon's wildcat, which is restricted to the UAE and northern Oman, is under severe threat as a result of interbreeding with feral domestic cats.

Wildcats occur in semi-desert, on open plains and in more rocky terrain and are not found in the true desert areas of the peninsula, which lack shrubs and rocks for cover. Their home ranges usually have several den sites, ensuring that the safety of a burrow is never far away. A male's home range often overlaps with that of two or three females, although contact between the cats only occurs during the breeding season, November to January. Litters of up to 4 kittens are born following a gestation of 55–60 days.

Wildcats are almost entirely nocturnal, stalking rodents, small birds, insects, lizards and snakes. Their water needs are met from their food. Although a predominantly carnivorous diet is preferred, wildcats will also eat some vegetable matter.

Highly adaptable, wildcats are now found with increasing regularity in and around human settlements where, unfortunately, they are perceived as pests and controlled.

SAND CAT *Felis margarita harrisoni*

The sand cat is Arabia's smallest felid, being slightly smaller than Gordon's wildcat, from which it can be easily distinguished both by its conspicuously large ears and broader head and by its sandy colour.

The average weight is around 2 kilograms, and the body length 70 centimetres. There is very little external difference between the sexes. Generally the coat is uniformly sandy brown or golden yellow in colour, finely speckled with black above the shoulders and fairly distinct black barring on the thighs. The paws are larger

**GORDON'S WILDCAT***Felis silvestris gordoni*

These small cats, belonging to the genus *Felis*, have characteristic features that include a hairless strip along the front of the nose and claws that can be withdrawn into sheaths. When resting, the front paws are tucked beneath the body by bending at the wrist and the tail is wrapped around the body, although they remain ready to flee rapidly if disturbed. Unlike large cats, which lie down to feed, the small cats, including this species, crouch over their food and also, unlike larger cats, cannot roar.

The Gordon's wildcat has several diagnostic identification features, important in separating them from domestic cats, with which they are known to inter-breed: the backs of their short, pointed ears are rusty brown with a black tip; the tail has three distinct black bands around the tip and there are also black bands in the axis of the forelegs, and the naked pads of the feet are black (many domestic cats have pink pads). Fine black hairs are present between the pads.

than those of *F. silvestris*, with long wiry sandy-coloured hairs growing between the black pads and almost covering them, which assist them in walking on loose sand. The ears are also protected by coarse hairs, which prevent sand from entering.

Unlike most other cats (although like the Gordon's wildcat), the sand cat digs itself a den, which is used throughout the year (Gross 1996). Predominantly nocturnal, it emerges at night to hunt, always returning to its den before sunrise. The diet consists mainly of small rodents, although insects, reptiles and the occasional small bird are also taken. Adapted perfectly for life in sandy deserts, the sand cat rarely drinks, obtaining most, if not all, of the moisture it requires from its food.

Little is known about breeding behaviour but it is likely that births are timed to coincide with the cooler months. Litter size varies from two to four, the kittens being born after a gestation of approximately two months.

There are very few confirmed sightings of sand cat from the UAE, records being both infrequent and geographically widely dispersed. Arabia is at the centre of the sand cat's range and the species is clearly adapted for sandy deserts, although occasionally recorded in rocky areas. The range extends north as far as Central Asia, while to the west it crosses the Sahara (Kingdon 1990).

ARABIAN CARACAL *Caracal caracal schmitzi*

Caracal means 'black ears' in Turkish and it is this characteristic, together with the long tufts of black hair on the tips of the ears that, together with the short muzzle, makes this species so distinctive. Reddish-sandy in colour, they blend well with the arid landscape that comprises their home. Their relatively short tail looks almost as if it has been partly amputated.

In the UAE, the caracal is primarily found in the mountains and adjacent areas, although occasional unconfirmed reports have come from the deep sands of western Abu Dhabi (e.g. Hassan Al Suwaidi, pers. comm.). It was recorded near Sweihan in 1968 (Harrison and Bates 1991) and a dead animal was seen on the Al Ain to Dubai road, around 60 kilometres from Al Ain in 1983 or 1984 (Duckworth 1996). With no subsequent confirmed sightings or other evidence of their presence away from the mountains, it was long believed that its range had contracted, probably as a result of development and the recent disturbance to desert habitats.

However, in August 2003, a caracal was seen at night in the fodder fields at the Al Wathba Camel Track, only 40 kilometres east of Abu Dhabi (Andrew Twyman,

pers. comm.). Ample prey is available in the area, such as the abundant grey francolin *Francolinus pondicerianus* and small mammals.

The expansion of vegetation along the main highways and in the desert, along with the presence of suitable prey species, may facilitate a progressive recolonisation westwards and further fieldwork away from the mountains is required.

As with most desert animals, caracals can survive for long periods without drinking water, obtaining fluids from their prey. Predominantly nocturnal, they will also hunt in the cooler early morning and late afternoon hours to catch birds, rodents, reptiles and even young or small ungulates. A remarkable jumper, the caracal is known for its ability to catch birds in flight, aided by the large 'goalkeeper' paws and long claws. Their long canine teeth are highly specialised for catching, holding and killing live prey, while the teeth of the lower jaw are used to tear or slice food into smaller pieces.

The caracal is a solitary animal, only making contact with a mate during breeding. Harrison and Bates (1991) suggest that, in southern Arabia, there may be a breeding season or peak during the month of August. Two or three kittens are born and reared generally in the burrows of other mammals, under slabs or in caves.

In the past, the caracal would have been a key predator in areas not occupied by the Arabian leopard. Its continued presence may serve as an indication of declining leopard populations. Although this species is less vulnerable than many other carnivores in Arabia, experts believe that their numbers are steadily declining (IUCN/SSC Conservation Breeding Specialist Group CAMP Workshop 2000).

The caracal occurs throughout Africa and Arabia, across much of west Asia north to Kazakhstan, and east to northern India.

RIGHT: *Caracal* *Caracal caracal schmitzi*

ARABIAN LEOPARD *Panthera pardus nimr*

OF THE FEW MAMMALS ENDEMIC to the Arabian Peninsula, the Arabian leopard *Panthera pardus nimr* is arguably the most discussed, and yet it is one of the least well known. Its reputation as a killer of domestic livestock and ferocious predator has undoubtedly contributed to the decrease in its numbers through hunting and trapping.

The Arabian leopard is the largest and most powerfully built of the Arabian cats, but is the smallest of the 15 subspecies of leopard. Males weigh approximately 30 kilograms, compared with around 20 kilograms in adult females. They are substantially smaller than their southern African relatives, which can weigh anything between 50 and 70 kilograms (Skinner and Smithers 1990: 398). Predominantly pale golden yellow-brown, the coat fades to a pale yellow or white on the belly and is interspersed with widely spaced rosettes, adaptations that help to camouflage the leopard in rocky terrain. The long tail is used to balance while climbing or when reclining in trees.

Leopards favour the rugged mountains of the region and once may have occurred wherever there was permanent water and sufficient prey. Their distribution extended

from the Musandam in the north-east, along an almost continuous band parallel to the coast, through southern Oman into Yemen, and north to Tabuk in Saudi Arabia (Conservation Assessment and Management Plan (CAMP) for the Threatened Fauna of Arabia's Mountain Habitat 2002). Although perhaps never common, persecution by man, together with rapid development, has seen their range decrease dramatically. Experts estimate that the total population numbers less than 250 individuals, now scattered in small, isolated populations in Oman, Saudi Arabia, the UAE and Yemen. As numbers of traditional prey species such as the Arabian tahr *Hemitragus jayakari*, Nubian ibex *Capra ibex nubiana*, mountain or Arabian gazelle *Gazella gazella cora* and the birds, chukar *Alectoris chukar* and the sand partridge *Amnoperdix heyi*, have decreased, the UAE leopards have been forced to prey upon domestic

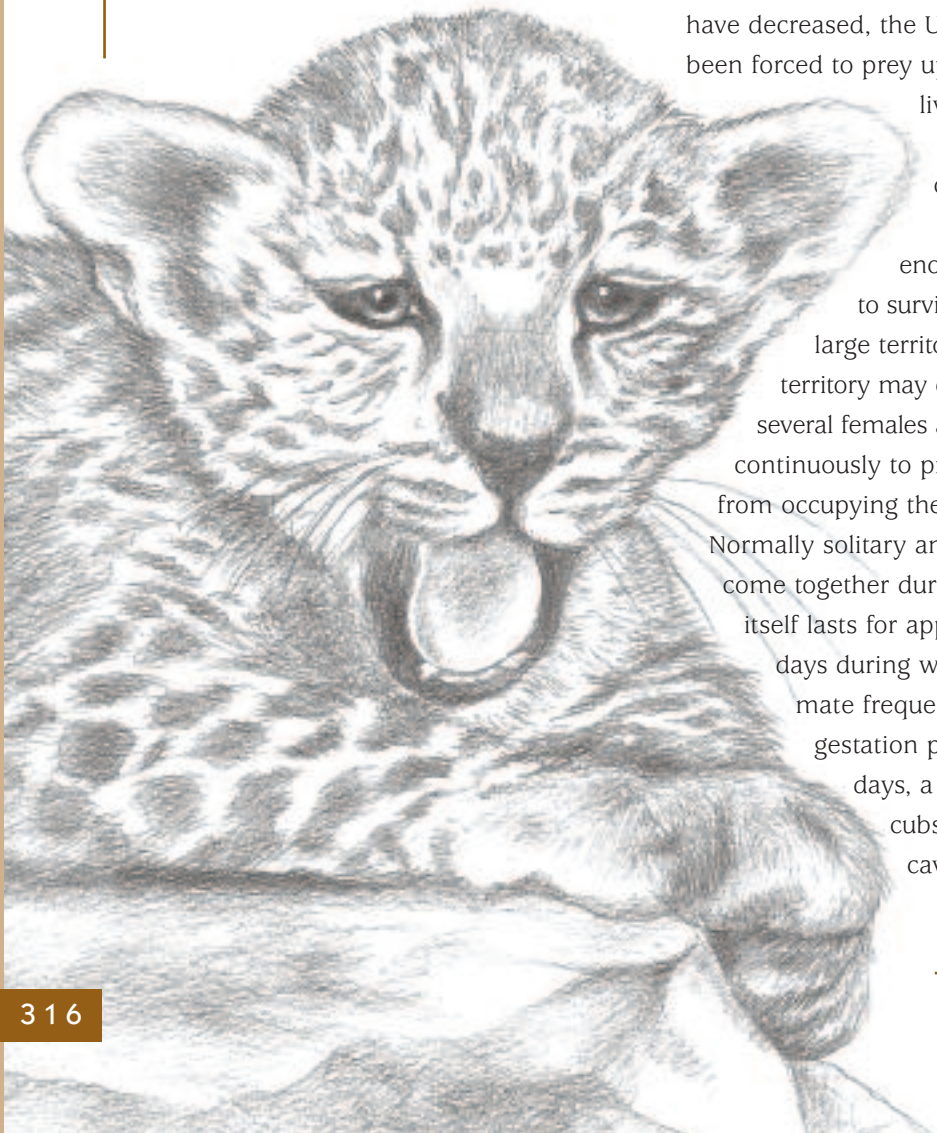
livestock, bringing them into direct conflict with man.

In order to find enough food and water to survive, leopards require large territories. A male's territory may overlap those of several females and is patrolled continuously to prevent other males from occupying the same territory. Normally solitary animals, leopards only come together during mating, which itself lasts for approximately five days during which time they will mate frequently. After a gestation period of up to 100 days, a litter of one to three cubs is born hidden in a cave or under an

overhang. The cubs are deaf and blind at birth, and although their eyes open after five to six days it is not until they are two weeks old that they will begin to explore their immediate surroundings in the den. They generally do not emerge from the security of the den until they are at least four weeks old, by which time their coordination has improved dramatically. During these first weeks the female will move the cubs from one den to another several times to reduce the risk of their being discovered. The cubs remain with their mother for up to two years whilst learning the skills necessary to survive on their own. Females will not breed again whilst cubs are still at foot. Such a slow reproductive rate is a major factor in the species' decline.

Very few suitable protected areas exist within Arabia and even though legislation protects the leopard within their range states, implementation and enforcement is thus far ineffective. In the UAE, protection has been proposed for an area of the Ru'us al-Jibal Mountains that is at least visited by leopards (Llewellyn-Smith 2002), although the proposal has yet to be accepted. Reports and sightings of leopard are rare and fearing legal action, hunters rarely report kills. Knowledge of such occurrences is, therefore, based upon hearsay that is quickly forgotten when official enquiries are made (Llewellyn-Smith, pers. comm.). This lack of local information may ultimately have the greatest effect on the survival of the UAE population.

In the past 20 to 25 years, there have been reports of eight leopards being shot in the UAE. One was wounded on Jebel Hafit in approximately 1978. In July 1986, a male was shot in Ra's al-Khaimah, as was a female with two young in December.



In the Wadi Bih area, two leopards were killed and one wounded during hunts that took place in 1992 (Jongbloed 2001) and 1993 (*Khaleej Times* 1993). An individual was chased and captured alive near Manama in February 1991, reputedly escaping its bonds in transit and shredding the interior upholstery of the Range Rover that was carrying it to Dubai.

Recognising the threat to the species, Sultan Qaboos of Oman initiated the

establishment of a captive-breeding programme during the early 1980s. Three leopards, a male and two females, were captured from the wild and moved to a special breeding centre near Muscat. By the early 1990s, six cubs had been successfully bred and reared.

In the Emirates, action to conserve the leopard and other threatened species began in 1993, with the formation of a non-government organisation, the Arabian Leopard Trust (ALT), which later gained the support of the Sharjah Ruler and UAE Supreme Council member, HH Dr Sheikh Sultan bin Mohammed Al Qasimi. The ALT worked together with international experts in 1995 to conduct a survey of the UAE mountain habitats. It was during this survey that evidence was found to confirm leopards still survived in the Emirates, although in very small numbers.

Also during 1995, the ALT arranged to obtain a wild caught male leopard (*Nimrod*) from Yemen, and later that year reached an agreement with the Oman Mammal Breeding Centre for the loan of a female (*Hesra*).

Recognising the need for a purpose-built breeding facility, Dr Sheikh Sultan then gave instructions for the construction of the Breeding Centre for Endangered Arabian Wildlife, (BCEAW) and Arabia's Wildlife Centre, which form an integral part of the Sharjah Desert Park. The Breeding Centre was officially opened in May 1998 followed by the Wildlife Centre a year later. Almost immediately, an additional two leopards were transferred to the facility; a second female (*Nesra*) from the Oman Mammal Breeding Centre and a male (*Nimr*) on breeding loan from the private collection of the Dubai Crown Prince and UAE Minister of Defence Sheikh Mohammed bin Rashid Al Maktoum. *Nimr* was the animal caught near Manama in 1991, and is the only known wild caught leopard in captivity that originated from the UAE.



ARABIAN LEOPARD *Panthera pardus nimr*

In July 1998, the first two leopard cubs were born at the Breeding Centre. Unfortunately, the combination of intense summer heat and the inexperience of the mother, *Hesra*, resulted in an abandoned litter. By the time staff at the Breeding Centre were able to access the den, one of the cubs, a female, was already dead. The surviving male cub was extremely weak and was, therefore, removed and hand-raised. Since this first success, a further nine cubs have been born which include two from a second-generation female, *Carla*, who herself was born at the Breeding Centre. At present there are 11 leopards held at the Breeding Centre, 3 wild-caught and 8 captive-born. *Nimrod*, the first male to arrive in Sharjah, has been transferred to Oman on breeding loan. Negotiations to arrange for the transfer of other individuals continue.

During the same period the National Wildlife Research Centre in Ta'if, Saudi Arabia and both National Zoos in Yemen acquired wild-caught leopards from local sources. The leopards held in Yemen have also bred successfully although, unfortunately, the six cubs that have been born are the offspring of a brother-sister pair. Co-operative management is required to ensure this in-breeding is avoided in future offspring.

Since the first CAMP workshop held at the BCEAW and hosted by the Environment and Protected Areas Authority of Sharjah in 2000, representatives of the four range states have been able to initiate co-ordinated regional management plans. Annual CAMP workshops have been instrumental in establishing awareness of Arabian wildlife using management tools presented by the Conservation Breeding Specialist Group (CBSG) from the USA. Staff at the Breeding Centre have also recently accepted the responsibility of tracking the progress of the captive population and of maintaining the



Arabian Leopard Regional Studbook.

As a consequence of the increased co-operation and new management strategies, representatives from Oman, Yemen, Saudi Arabia and the UAE formed the Arabian Leopard Working Group in 2001, which is concerned solely with the regional management of the Arabian leopard in captivity.

The reintroduction into the wild of large carnivores is still a controversial issue, and without the strict enforcement of improved legislation

and the declaration of suitable protected areas, such a project would be destined to fail. Today, facilities such as the BCEAW and Arabia's Wildlife Centre in Sharjah play an important role in the conservation and protection of endangered wildlife. The successful release of captive-bred Arabian leopards into the wild in the UAE is many years away, if ever it proves possible. The success of the captive breeding programme at the BCEAW, however, has at least secured the continued survival of this unique and remarkable Arabian predator.

Kevin Budd and Jane Ashley-Edmonds



HYRAXES (PROCAVIDAE)

A single introduced species occurs in the UAE, but has thus far failed to become naturalised.

ROCK HYRAX *Procavia capensis*

Rock hyrax was released on the island of Sir Bani Yas in *ca.* 1995 (Hellyer, pers. obs.), and escaped, or was deliberately released, on Jebel Hafit in 1998 or 1999 (Cunningham 1999). They have failed to become established in the former locality but remain in the latter (2005). The subspecies present is either *syriaca* or *jayakari*, from Syria and Dhofar, Oman, respectively.

Although native to southern and western Arabia, this species is not known to have existed in the wild in the UAE.



EVEN-TOED UNGULATES (ARTIODACTYLA)

Seven species of ungulate are recorded from the UAE, although there is some dispute over the exact provenance of captive-held specimens of two or three of these species. One native species, the Arabian tahr is critically endangered, while Arabian oryx became extinct in the wild by the mid-twentieth century, although some captive-bred animals have recently been released. The former status of three other species (ibex, wild goat and mouflon) that might once have occurred in the UAE has not been

determined. The mountain gazelle (*idhmi*) and sand gazelle (*rheem*) remain relatively widespread, although the populations of both are substantially depressed compared with their former abundance, and most often supplemented by a continuing programme of releases.

Breeding feral donkeys are widespread in the mountains and on the alluvial plains of the eastern UAE, as are feral goats in the mountains.

GOATS, SHEEP AND ANTELOPES (BOVIDAE)

ARABIAN TAHR *Hemitragus jayakari*

The tahr is an endemic 'shaggy goat' found only in the mountains of the UAE and northern Oman. It has been recorded in wadis on the UAE East Coast (Smith, pers. comm.; Cunningham, pers. comm.), while there is also a critically small population on Jebel Hafit.

Weighing approximately 23 kilograms, the tahr is relatively small, although it is both strong and agile. The stocky males have

compact, solid horns, impressive manes that extend right down the back and reddish-tinted leg tassels. With age, their manes grow longer and their striped faces become blacker. In contrast, the females have slender horns, much shorter, less obvious manes and lack the leg tassels. The lightweight summer pelt becomes a coarsely shaggy coat in winter to provide insulation. They have developed rubbery hooves that provide traction on steep slopes and cliffs.

There have been reports of births almost throughout the year, with Harrison and Bates (1991) suggesting that November may be the only month when kids have not been born. Gestation is 140–145 days. According to Munton (1985), if tahr are found in groups, these are always small, consisting of a female and kid or a male and female with a kid. Males are more often than not solitary, and never consort with another male.

Highly territorial, males scrape the soil with their hooves, marking it with dung and urine. Vegetation in the area is also 'horned'. Kingdon (1990) states that tahr exude glandular secretions from the sternal skin and rub their chests against rocks to scent-mark.

This species requires access to water to survive, usually visiting favourite waterholes in the late evening or early morning. This dependence has led to a steady population decline as hunters lie in wait to ambush them. At other times, tahr retreat rapidly across precipitous slopes at the first sign of danger. The continued survival of this species in the UAE is uncertain.



ARABIAN ORYX *Oryx leucoryx*

ENDEMIC TO THE PENINSULA, the Arabian oryx is not considered critically endangered by the World Conservation Union, IUCN, although it became extinct in the wild during the late 1960s or early 1970s (Harrison and Bates 1990) and survives only as a result of captive breeding programmes.

Several reserves have been established in Arabia for reintroduction programmes of this large ungulate, believed to have been the origin of the legend of the unicorn. No such reserve has yet been established in the UAE, although the Al Maha resort in Dubai has a free-ranging herd.

The local name for the species is *al maha*, although it is also known as *baqr al-washah* meaning wild cow (Kingdon 1990).

Oryx meet virtually all their water requirements by eating plants with high water content and by feeding at a time when water from fog and dew is at its maximum. Oryx are known to have gone without fresh water for nine months or more. Besides reflecting solar radiation, the white colour of the Arabian oryx may permit members of a group to keep in contact while wandering in search of grazing (Kingdon 1990).

Well adapted to desert life, the oryx feeds at night during the summer months, resting under shady plants during the heat of the day, while in winter they feed during the daytime, sheltering from cool desert winds at night. When oryx are subjected to high ambient temperatures, their body temperature increases, excess heat being lost later, by radiation during the cooler night hours (Taylor 1969).

Oryx possess a complex method of ensuring that the temperature of the blood reaching the brain remains substantially below that of their body. Warm arterial blood on its way to the brain is cooled by passing through a sinus of cool venous blood returning from the nasal passages, where panting increases the airflow to cool the blood.

Oryx rarely run but can walk long distances at a steady pace, covering up to 50 kilometres in a night (Harrison and Bates 1990). These journeys are often made to find fresh grazing, it having been claimed that they follow the smell of rainfall ahead. They eat a wide range of desert plants, the succulent roots of some being dug up with their hooves.

Pregnancy lasts for eight and a half months but the mother can delay birth for a short period if conditions are not suitable. The calves are born a uniform sandy colour to provide camouflage in the sands. For the first three weeks the calf lies in the shade of a bush, drinking from its mother who will visit up to 14 times a day. Nursing of calves within a herd appears to be synchronised, probably because nursing takes places after the adults have had bouts of resting and ruminating (Skinner and Smithers 1990).

Jane Ashley-Edmonds



ARABIAN (MOUNTAIN) GAZELLE *Gazella gazelle cora*

ENDEMIC TO EASTERN AND SOUTHERN ARABIA, Arabian or mountain gazelles were once common and widespread, although today the total global population is estimated to be no higher than 20,000 (IUCN/SSG Conservation Breeding Specialist Group CAMP Workshop 2000). The species is currently divided into four subspecies: *erlangeri*; *muscatensis*; *farasani* and *cora*. The only subspecies definitely recorded in the UAE is *G. g. cora* (Harrison and Bates 1991).



The mountain gazelle or *idhmi* inhabits the gravel plains, foothills and mountains along the periphery of peninsular Arabia, its range often being associated with *Acacia*. Unlike many ungulates, the mountain gazelle is generally seen singly or in small groups.

Many private collections exist in the UAE, some believed to have originated partly from wild stock. In the wild, mountain gazelles have been reported from the Hajar Mountains as well as from the desert between Jebel Ali and Sweihan (Hornby 1996b), although the construction of fences and roads in recent years has had a serious impact on their habitat and also denied safe access to the limited supplies of spring and running water.

Fawns are usually born singly during January and August and remain hidden in a hollow or under shrubs for the first few days. Females are able to give birth twice a year, as their gestation period is just less than six months, although this is uncommon, even amongst captive herds.

The chest, belly, backs of the limbs and inner thighs are pure white. The dominant dorsal colour is a light reddish, sandy brown, with a darker band along the mid-dorsal trunk. Individual variation is extensive, with the lateral stripes in some individuals substantially darker than in others.

All gazelle have a characteristic gait of bouncing or 'pronking' along stiff-legged with all four limbs landing together, this generally being seen when they are playing or alarmed.





SAND GAZELLE *Gazella subgutturosa marica*

THE SAND GAZELLE HAS AN EXTENSIVE RANGE from Arabia and south-west Asia to the Transcaucasus, Central Asia, Mongolia and western China. It is quite distinct from Arabian gazelle and only very distantly related. Males and females have differently-shaped horns, males often having sharp hooked tips to their horns that are broader in diameter than those of the females.

Unlike many other antelopes, the male sand gazelle has large scent glands on his face. The territories of ungulates are very large, and constantly changing as herds search for the best grazing, making scenting seemingly futile. However, sand gazelle may have small winter territories where the ability to mark with scent glands is an advantage.

These elegant gazelles are light buff-coloured above, with a white under-belly and face, the only contrast being their black nose and mouth and large black eyes. They usually rely on concealment to escape detection, their first response to danger being to freeze. Only on a predator's continued approach do they flee.

Sand gazelle often give birth twice in a year, usually in spring and autumn, and

are the only antelope that regularly give birth to twins. The young are hidden for the first few days until they are strong enough to move with the herd.

The historical distribution of sand gazelle in Arabia is of disjointed populations (IUCN/SSG Conservation Breeding Specialist Group CAMP Workshop 2000). In the UAE, a wild population is known only from the Abu Dhabi desert (Jongbloed *et al.* 2001), where some populations are probably the result of restocking programmes. It is no longer possible to differentiate between these and truly wild groups and individuals. *Dhabi* is a generic name used by Gulf Arabs for gazelle, and gave Abu Dhabi Island its name 'place (or 'possession') of the gazelle'.

Sand gazelles also occur on several

inshore islands, with at least one population, on Futaisi, reported to be at least partly of native coastal stock. During the lowest spring tides individuals can and do cross to neighbouring islands. Some island populations doubtless relate to released animals, even if, also reportedly, having been obtained from inland desert areas. Others are clearly of captive origin and remain in a semi-feral state, with food and water being provided.

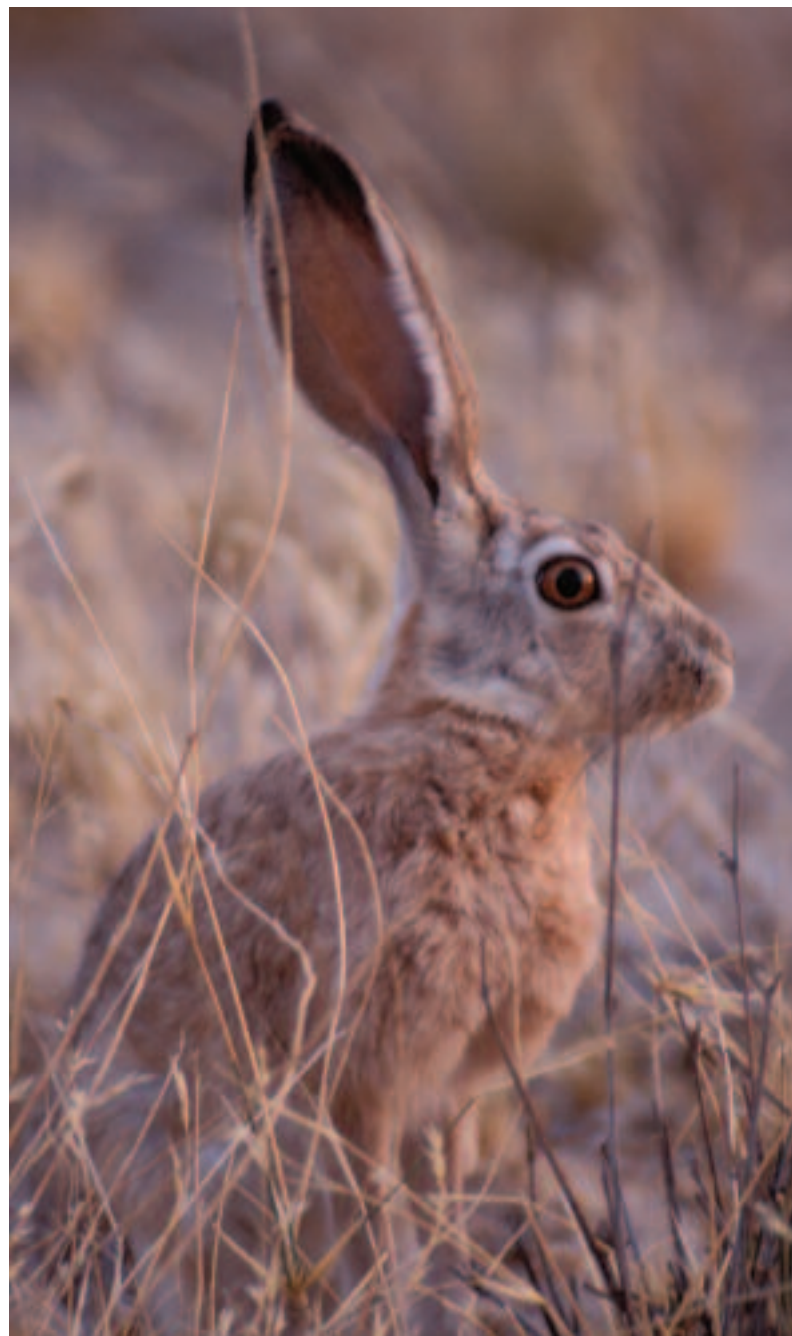
Gazelles are mainly browsers, eating grass, herbs and woody plants depending on availability, competing with domestic sheep and goats. On islands, the tubers and shoots of the parasitic desert hyacinth *Cistanche tubulosa* are frequently sought by sand gazelles (Hornby, in litt.), with *idhmi* also being known to try them (Gillett 2002).



CAPE HARE *Lepus capensis*

TO SURVIVE THE HYPER-ARID DESERTS, high summer temperatures and low rainfall of the United Arab Emirates, animals have evolved adaptations in their morphology, physiology and behaviour. One mammal to display these is the Cape hare *Lepus capensis* (order Lagomorpha). Its high surface area to volume ratio means that it would readily absorb heat if exposed to the sun, yet it barely excavates anything more than a shallow scrape in the sand in which to lie up. Temperatures in the UAE desert regularly exceed 45.4°C, the lethal body temperature for the North American black-tailed jackrabbit *L. californicus* (Schmidt-Nielsen *et al.* 1965).

The Cape hare has a wide range, across numerous habitat and climatic types, from South Africa, up to and across North Africa and south-west Europe into the Middle East and Central Asia to east China. By 1980, 80 subspecies had been described (Angerman and Flux 1990). The Cape hare was, until recently, thought to be the same species as the European hare *L. europaeus* (also known as the brown hare). The taxonomy of both is under review (Franz Suchentrunk, pers. comm.)



Of the eight subspecies of Cape hare in Arabia, two are restricted respectively to Masirah island, off Oman, and to Bahrain. Three are native to the UAE: *L.c. cheesmani* (sand hare); *L. c. arabicus* (Arabian hare); *L. c. omanensis* (Omani hare). These three are collectively known locally as Arabian or desert hares. Regional and seasonal differences in pelage colour within the same subspecies (if they genuinely are subspecies) create difficulties in taxonomic identification and the literature makes no attempt to distinguish between subspecies.

The desert hare is found throughout Abu Dhabi Emirate (Drew 2000), including many islands. Its distribution elsewhere in the UAE is not clearly known, although it is most common in well-vegetated scrub. It is probably entirely absent from the mountains, although it was recorded on the gravel plains in the vicinity of Jebel Hafit (Stuart and Stuart 1998). Hunting of hares is illegal, and no 'bag record' data is available, so the population is difficult to estimate. The number of hare pellets in areas free from domestic grazing is, however, greater than in areas with high grazing pressure or anthropogenic impact (Drew 2000).

Nocturnal herbivores, desert hares emerge from shallow scrapes (or forms) or short burrows shortly after sunset, usually returning to the same resting-place at or around sunrise. Flushed from its form, a hare is unlikely to return for several months (C. Drew, pers. obs.). Scrapes and burrows are generally located in soft sand at the bases of large *nabkha*-forming shrubs. Hares also use abandoned fox and spiny-tailed lizard burrows, excavated in the harder substrate of gravel plains and inter-dunal depressions.

Desert hares are small, having an average weight of approximately 1 kilogram (Drew 1999) compared to 3.9 kilograms for a European hare (Pielowski 1971). Within the species *L. capensis*, there is huge variation – the mean body mass of Cape hares in China is approximately 2.2 kilograms in autumn (Lu 2000), whilst Cape hares of the Sahara desert utilise a different type of habitat altogether and are reportedly much larger (J. Newby, pers. comm.)

Desert hares have evolved a number of morphological, physiological and behavioural adaptations to survive the desert's hot summer days and cold winter nights. Whilst many mammals sweat or pant to keep cool, hares cannot afford the water loss which results; jackrabbits reduce water loss by excreting dry faeces, concentrating their urine and allowing body temperature to increase during the day (Dunn *et al.* 1982). Jackrabbits also increase blood flow to the ears, resulting in increased convective

and radiative heat loss (Schmidt-Nielsen *et al.* 1965). Convection of air through the summer coat is higher than through the winter coat (Harris *et al.* 1985). Desert hares have a much lower metabolic rate than European hares, keeping body temperature down, and can also tolerate drinking water of 6 per cent salinity, (sea water is about 3.5 per cent), compared to 2 per cent salinity for European hares (Kronfeld and Shkolnik 1996). When it is too hot for their ears to radiate body heat, desert hares may restrict blood flow to the ears and press them flat against their body, thus providing shade.

Although desert hares breed throughout the year, winter is the main breeding season. In good conditions, they can breed rapidly, having one or two offspring at a time. Females can become pregnant immediately following delivery. During the breeding season males are often seen chasing each other as they try to attract females. European hares are often seen boxing each other, usually a female fighting off a male's unwanted attention – the same behaviour has been observed in the UAE. Offspring are born approximately 42 days after conception and are fully furred and open-eyed (precocious) at birth, unlike rabbits. The mother leaves the young within hours, meeting up daily to allow the young hare (leveret) to suckle. Both mother and offspring return shortly after sunset to the birth site where the leverets suckle for less than 15 minutes. Once suckling has finished, the mother leaves and the young return to a secure resting place (Broekhuizen and Maaskamp 1980). Desert hares have been observed feeding young early in the morning.

Desert hares have a home range of between 11–30 hectares (0.11–0.3 square kilometres). Home ranges often overlap, especially between males and females during the peak breeding season. In summer they are more likely to be found on the fringe of sand dunes where, typically, there are shrubs such as *Haloxylon salicornicum* beneath which they can excavate burrows. In winter they are found most commonly on vegetated plains or flat sandsheets. The movement from dunes in summer onto flat areas in winter may be related to mate selection and reproductive activity.

Desert hares obtain water from their food and, thus, prefer succulent plants such as *Zygophyllum mandevillei*. They also eat fresh shoots of Acacia shrubs *Acacia ehrenbergiana* and most grasses, especially *Panicum turgidum* and *Pennisetum divisum*. Another favourite food plant is the small perennial *Limeum arabicum*.

Traditionally, hares were an important food resource for the Bedouin, being hunted both with falcons and saluki dogs (sometimes in combination) or being caught by hitting them with sticks as they fled from their holes (Thesiger 1959).



The expansion of human settlement into the UAE deserts and the impact of camel grazing on the flora have had a significant effect on the hare's habitat. Many plains formerly covered by succulent vegetation are now totally barren, through over-grazing and, possibly, over-extraction of groundwater. Moreover, many forestry plantations have large numbers of feral cats *Felis cattus* and red fox *Vulpes vulpes* – these being the main predators of hares. Other predators include desert monitor lizard *Varanus griseus*, horned viper *Cerastes gasperetti*, carpet viper *Echis carinatus*, desert eagle owl *Bubo (bubo) ascalaphus* and long-legged buzzard *Buteo rufinus*. Resource competition from rodents (directly through eating young plants or indirectly through eating the seeds and, thereby, reducing recruitment of new vegetation) may also be significant.

Chris Drew

RODENTS (RODENTIA)

AT LEAST 11 SPECIES OF RODENT OCCUR IN the UAE. One, the Persian squirrel, has only recently been introduced, although both black rat and brown rat and house mice are long-standing immigrants. Together with bats, rodents are the most diverse mammal group

in the country, successfully occupying all terrestrial habitats represented, from the most arid deserts to the highest mountains and offshore islands, even if, in some instances, only in close association with man.

SQUIRRELS (SCIURIDAE)

PERSIAN SQUIRREL *Sciurus anomalus*

The Persian squirrel is native to Asia Minor, the Transcaucasus, northern Arabia and southern Iran. Free-ranging individuals survived for several years from at least 1999 to 2003 in parks and

gardens on Abu Dhabi Island, having been originally imported for the pet trade. The species is active by day and readily observed both on the ground and in arboreal settings. There is no evidence to date of successful breeding by this species within the UAE.

JERBOAS (DIPODIDAE)

LESSER JERBOA *Jaculus jaculus*

The lesser jerboa has strikingly longer hindlegs than forelegs, and moves swiftly with the bounding gait of a kangaroo. The long, dark-tipped tail is used as a counter-balance for leaps, which can cover over a metre. This animal has large ears and eyes and a curiously stubby snout, as with most small desert mammals, it is exclusively nocturnal.

Jerboas are most commonly seen on gravel plains and flat sandsheets and, as might be expected, have tufts of hair between their toes. In the UAE, they are mainly known from the deserts of

Abu Dhabi (Jongbloed *et al.* 2001; Drew, pers. comm.), although they have also been noted near the Jebel Ali coast. Jerboas can survive without drinking, obtaining water through the metabolism of the starch in seeds and plants eaten.

Jerboa is a phonetic adaptation of the Arabic word for this animal, which ranges across North Africa to Mauritania, south to Somalia, and throughout Arabia into extreme south-west Asia.

Like most small desert mammals, the lesser jerboa Jaculus jaculus is an exclusively nocturnal rodent.



RATS AND MICE (MURIDAE)



ABOVE: The Egyptian spiny mouse *Acomys cahirinus dimidiatus* is found on Jebel Hafit and along the edge of the Hajar Mountains.

BLACK RAT *Rattus rattus*

The black ship or house rat is commensal with man and is common and widespread in urban areas of the UAE, including inland. It has been present since at least the early second millennium BC (Mosseri-Marlio 2003). An accomplished tree climber, it spends more time off the ground than the following species, and builds conspicuous nests in the tree canopy. Its distribution in the UAE has benefited from the spread of urbanisation, where it is bold and frequently observed by day.

BROWN RAT *Rattus norvegicus*

The brown or Norwegian rat, at least until recently, has been less successful in establishing itself in Arabia. It is now, however, common in towns and villages, as well as in desert oilfield camps. Rats noted on certain offshore islands have not yet been identified to species.

HOUSE MOUSE *Mus musculus*

The highly adaptable house mouse is almost ubiquitous in and around human settlement. It is only absent from uninhabited desert areas, few of which remain in the UAE. Numbers reaching plague proportions have sometimes been noted on certain Gulf islands.

EGYPTIAN SPINY MOUSE *Acomys cahirinus dimidiatus*

The Egyptian spiny mouse was first recorded in the UAE in 1971, at Jebel Faiyah, Sharjah, but was not noted subsequently until a specimen was picked up dead off the road near Ghayl, Ra's al-Khaimah, in 1991. It has subsequently proven to be relatively widespread and numerous at lower elevations along the edge of the Hajar Mountains, particularly where *Acacia tortilis* is present. It is also found on Jebel Hafit, where it occurs at all elevations including barren rock faces near the summit.

Its range extends from West Africa through East Africa and the Middle East to south-west Asia. The taxonomy of the species is under review and the Arabian form (*A. c. dimidiatus*) may be accorded status as a separated species.

GERBILS AND JIRDS (CIRCETIDAE)



ABOVE: *Baluchistan gerbil* *Gerbillus nanus*
 RIGHT: *Cheesman's gerbil* *Gerbillus cheesmani*
 BELOW: *Sundevall's jird* *Meriones crassus*

BALUCHISTAN GERBIL *Gerbillus nanus*

The Baluchistan gerbil lives in sand and salt flats, but its distribution within the UAE remains poorly mapped. Very few confirmed records exist of this species, which is not easy to differentiate from *G. dasyurus*, although their respective habitat preferences seem to be completely opposing, or from *G. cheesmani*, with which there is certainly some overlap, and even some instances of co-occurrence locally (Aspinall, pers. obs.). Individuals have recently been found at Sweihan (Drew, pers. comm.) and in Sharjah Emirate (Cunningham, in litt.).

The species' range extends from North Africa to Baluchistan.

WAGNER'S GERBIL *Gerbillus dasyurus*

The Wagner's gerbil has a distinct preference for rocky terrain, hence its scientific name. It has been recorded in the Hatta area (Cunningham, in litt.), at Masafi and Fili in the Northern Emirates (Hellyer 1995), and from Jebel Hafit. As with the preceding species, its distribution and ecology is relatively poorly known.

The species is restricted to Arabia and Egypt.

CHEESMAN'S GERBIL *Gerbillus cheesmani*

The Cheesman's gerbil is widespread in sand and gravel desert areas, and has been shown by fieldwork undertaken by the Environment Agency – Abu Dhabi (EA–AD) (formerly ERWDA) to be common in Abu Dhabi Emirate (Drew, pers. comm.). Generally nocturnal, it may emerge from its burrow before sunset. The soles of its feet, in common with lesser jerboa and certain other desert species, are thickly haired.

The species ranges throughout Arabia but thereafter only to extreme southern Iran.

LIBYAN JIRD *Meriones libycus*

The Libyan jird is diurnal throughout much of its range, although this is not apparently the case in the UAE, where live jirds are generally encountered only through trapping. This species has



dark claws which, together with a larger tail tuft, distinguish it from the following species. It is found primarily in stabilised sand and gravel desert, but is absent from mountain areas. Colonies are typically found in vegetated hummocks or *nabkha*.

The Libyan jird has an extensive range, occurring from the western Sahara to Egypt, Arabia and eastwards to Sinkiang, China.

SUNDEVALL'S JIRD *Meriones crassus*

Sundevall's jird has distinctive ivory-coloured claws. Like the Libyan jird, it is colonial and nocturnal or, at best, occasionally crepuscular. It favours desert with bushes growing from the centre of *nabkha* mounds, again being absent from mountain areas. The distribution of this species, as with that preceding, is imprecisely known in the UAE, although it appears to be the more common of the two. They have been recorded in the deserts of Abu Dhabi, as well as in the Aweer area of Dubai and further north into the Al Madam Plain.

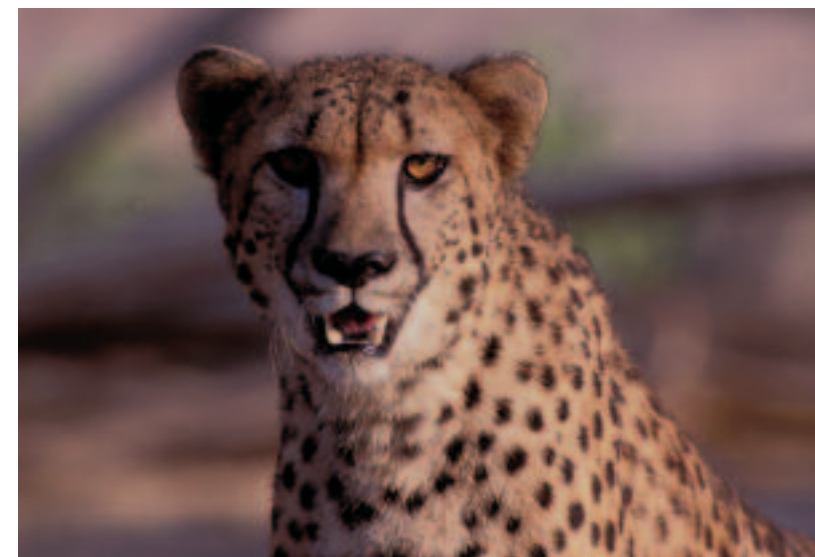
This species is widely distributed, being present across the Maghreb to Arabia, south to the Sudan, and thereafter north through south-west Asia to Central Asia.



SPECIES EXTINCT IN THE UAE, OR PRESENCE NOT PROVEN

LONG-EARED HEDGEHOG *Hemiechinus auritus*

Earlier reports of this species from the UAE appear to be in error. The closest known population is found in Gulf regions of the Eastern Province of Saudi Arabia with a single record from the island of Bahrain. Its range is from Libya to Asia Minor, through Arabia into south-west Asia and beyond to Central Asia and Mongolia.

**CHEETAH** *Acinonyx jubatus*

As a result of hunting, and, presumably also due to environmental change during the Holocene period, the cheetah is now extinct in Arabia, the last report being of one shot in Oman in 1977 (Harrison and Bates 1991). Although the gravel plains in the south-east of the UAE and adjacent areas of Oman would appear to have been suitable for cheetahs, there are no historical records of the species from the Emirates, or any other evidence in support of its former presence.

IBEX *Capra ibex*

Ibex may once have occurred in the UAE, being possibly represented in rock art found in the mountains of Fujairah (Ziolkowski 1998). Unconfirmed reports (Hellyer 1994b) from mountain residents of the presence of *wa'el*, the name by which ibex is locally known, can be misleading, since the same name is also believed to be used for the Arabian tahr.

Ibex still occur in parts of the higher mountains of Oman, but its range over most of Arabia has been severely depleted, presumably as a result of hunting.

WILD GOAT *Capra aegagrus*

A single record exists of a captive wild goat apparently taken as a kid in the mountain foothills near Masafi in 1967 (Gross 1987). While there is no question over its identity, it is the only record for peninsular Arabia and there is, not surprisingly, some doubt over its exact provenance (Harrison and Bates 1991). The known range of wild goat is south-west Asia and Asia Minor, and the UAE record would represent a somewhat improbable range extension.

MOUFLON *Ovis ammon*

Wild sheep or mouflon (*argali*) are native to south-west Asia and may formerly have occurred in the UAE. They are still present in Oman and at least one UAE specimen is known from near Hatta (Gross 1987). Duckworth (1996) considered that wild individuals of native stock, if any should exist, would almost certainly have been subsumed by feral sheep.

RATEL (HONEY BADGER) *Mellivora capensis*

This species was first definitively recorded in the UAE in August 2005, as this book was in press, when three specimens, two live and one dead, were recorded near Ruwais in western Abu Dhabi (Eng. Mubarak Saad, pers. comm). This important discovery provides evidence, yet again, that there is much still to be discovered about the fauna of the UAE.

Tracks were reported in the late 1940s between Liwa and the Sabkha Matti (Thesiger 1949). Recently, a set of tracks seen between Liwa and Umm az-Zamul in 1991 were thought probably to represent this species (Duckworth 1996), as were others seen in Baynunah in 1992 (Mackinlay and Macdonald 1992).

In Arabia the species occurs in Saudi Arabia and in eastern Yemen, and perhaps also in Oman, with its world range extending through much of Africa and Asia east to Nepal.

Simon Aspinall, Peter Hellyer and Chris Drew
 with Christian Gross, Jane Ashley-Edmonds and Kevin Budd



ABOVE LEFT: *Cheetah* *Acinonyx jubatus*
 ABOVE RIGHT: *Ibex* *Capra ibex*