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Abstract: Morphological description of the cheetah in Arabia, including skull and dentition. In addition, there is information about the former distribution and last observations of the species in this area. In Oman a specimen was shot as late as 1977, and in Yemen an individual was seen in 1963. The authors consider that it may still have existed in Iraq at that time.

Key to the Arabian species of Felidae

- | | |
|--|-------------------------|
| 1: Small sized cats. Greatest length of skull less than 105 mm. | 2 |
| -: Medium or large cats. Greatest length of skull more than 105 mm. | 3 |
| 2: Fore legs without pronounced black elbow bars externally; soles of feet with short hairs only, not concealing the pads. Ears small, with only faint black tips, (Fig. 233). Tympanic bullae not greatly inflated, maximum diameter of each is less than 23 mm. | <i>Felis silvestris</i> |
| -: Fore legs with pronounced black elbow bars present externally; soles of feet with a mat of long hair concealing the pads. Ears very large, and broad with pronounced black tips, (Fig. 236). Tympanic bullae greatly inflated, maximum diameter of each is 25 mm or more. | <i>Felis margarita</i> |
| 3: Medium sized cats. Greatest length of skull less than 160 mm. | 4 |
| -: Large sized cats. Greatest length of skull more than 165 mm. | 6 |
| 4: Body with prominent pattern of stripes and spots, (Fig. 245). Cheeks with pronounced ruff of hair. Tail short. | <i>Lynx lynx</i> |
| -: Body without prominent pattern of stripes and spots. Cheeks without any pronounced ruff of hair. Tail of medium length. | 5 |
| 5: Tufts on the ear apices long, about 50 mm in adults, (Fig. 243). Body and tail uniformly coloured, without a pattern. | <i>Caracal caracal</i> |
| -: Tufts on ear apices short, about 15 mm at most in adults. Pelage pattern well developed on limbs only. Tail ringed and tipped with black. | <i>Felis chaus</i> |
| 6: Face without prominent black stripe from each eye to the mouth; spots on the body mostly rosettes. Claws with complete claw sheaths. Skull rather flat, not highly domed above, (Fig. 248). | <i>Panthera pardus</i> |
| -: Face with prominent black stripe from each eye to the mouth; spots on the body all solid, (Fig. 252). Claws without trace of sheaths. Skull highly domed above, (Fig. 253). | <i>Acinonyx jubatus</i> |

Genus *Felis* Linnaeus, 1758

1758. *Felis* Linnaeus, *Systema Naturae*, 10th ed, 1: 41.

The cats of this genus, as restricted by Pocock (1939), are of light and slender build. The paws are narrow, with weakly developed claw-sheaths and interdigital webs. The ears are high and triangular, with pointed apices, never with a white patch on the back. The pelage pattern, when retained in the adult, consists of vertical lines of spots or stripes. The skull is broad, rounded and domed, with the cranial portion short, so that the postorbital processes are situated at about the mid-point of its total length. The nasals are broad anteriorly and abruptly narrowed posteriorly. The external pterygoid plates are reduced to small triangular projections. Each posterolateral margin of the palate has a well marked emargination just internal to the molar. The outer chamber of each tympanic bulla is comparatively or very large. The small upper premolar is usually retained.

Dental formula: $i \frac{3}{3} \ c \ \frac{1}{1} \ pm \ \frac{3}{2} \ m \ \frac{1}{1} = 30$.

Felis silvestris Schreber, 1777

Wild Cat

1777. *Felis (Catus) silvestris* Schreber, *Die Säugethiere in Abbildungen nach der Natur*. ..., 3: 397. Germany.

1867. *Felis syriaca* Tristram, *Natural History of the Bible*: 67. Syria. Not of Fischer, 1829.

1895. *Felis maniculata* Yerbury & Thomas, *Proceedings zool. Soc. Lond.*: 547. Aden, Southern Arabia. Not of Cretzschmar, 1826.

1916. *Felis ornata nesterovi* Birula, *Annuaire Mus. Zool. St. Petersb.*: 21, suppl. i-ii. Nachr-Chasasch, Lower Iraq.

1921. *Felis ocreata iraki* Cheesman, *Journal Bombay nat. Hist. Soc.*, 27: 33. Kuwait, Arabia.

1944. *Felis lybica tristrami* Pocock, *Annals Mag. nat. Hist.* 11: 125. Ghor Seisaban, Moab, Palestine.

1968. *Felis silvestris gordonii* Harrison, *The Mammals of Arabia*, 2, *Carnivora, Hyracoidea, Artiodactyla*: 283. Wadi Suwera, 6 miles west of Sohar, Batinah Coast, Oman.

External characters: This is a relatively small species, with the tail densely haired throughout. The muzzle is short, the eyes large and rather forwardly directed, the forehead high and domed and the cheeks broad, (Fig. 233). The vibrissae are strongly developed and pure white. The ears have bluntly pointed tips and the apical tufts are less than 5 mm in length. The limbs are longish and slender, with the paws rounded but rather narrow. The digital, palmar and plantar pads are naked, dusky and smooth, (Fig. 237). The pelage of *F. silvestris*

tristrami is soft and dense, with abundant woolly underfur, especially in winter pelts; it is usually more luxuriant than that of domestic cats. The general colour of the dorsal surface is rather pale, varying individually from tawny grey to duller or brighter ashy grey; a fine speckling is produced by the annulation of the contour hairs. The underwool is



Fig. 233. *Felis silvestris tristrami* from Galilee, Israel. Photograph by courtesy of Dr Theodor Haltenorth.

grey at the bases and distally pale tawny buff, this colour showing through variably on the flanks. The mid-dorsal region is darkened, especially posteriorly. Obscure longitudinal striations are present on the crown of the head and nape. The backs of the ears are usually rusty brown, with the tips blackish, contrasting with the creamy white hair fringes on the anterior margins. The nose is rusty brown; there is a darkened stripe extending from the inner canthus of each eye to the rhinarium; the orbits are faintly ringed with creamy-white. The cheeks are tawny grey, fading to white below and obscurely striated with three or four longitudinal rust brown or dusky stripes, the most pronounced of these running from the posterior canthus of each eye in a sinuous curve down to the side of the neck. The ventral surface varies from whitish to rich buff, almost ochreous, not sharply defined on the flanks from the dorsal colour and with variable dusky or brownish spotting on the belly. The throat, inter-ramal region and upper lips are generally pure white. Four or five transverse dusky bands cross the outer thighs. The barring of the forelimbs is very indistinct externally; internally the broad black band is usually well defined. The tail is strongly barred with about four or five black and ash-grey bands; the tip is black.

Cranial characters: The skull is relatively small and light, with the

rostrum short and deep and the interorbital region long, narrowly constricted in its middle and abruptly widened to the postorbital processes behind, (Fig. 234). The orbits are large; the lachrymal processes minute. The postorbital region is broad; its maximum constriction is situated behind the prominent postorbital processes. The zygomatic arches are widely flared, their maxillary roots broadly expanded; in lateral view each jugal is deep, with its orbital process broad and triangular. The sagittal crest is very weakly developed, only detectable posteriorly. The lambdoid crests are prominent in adults, overhanging the supraoccipital, which is broad and low, without any median crest. The palate is triangular in shape; its median postdental extension is short. The tympanic bullae are evenly inflated, their length exceeds their width; the meati are large, without tubes. The paroccipital processes are small, thin and plate-like, closely applied to the back of the bullae. The mandible is slender, with its anterior extremity noticeably upturned.

Dentition: The dentition is weak. The upper incisors are small, the third is subequal in crown area with first and second combined. The canine is tall and slender. The first premolar is very small and single rooted; the second is laterally compressed, two-rooted, the crown elliptical in outline with a distinct posterior basal secondary cusp. The upper carnassial is narrow and long, subtriangular in outline; the inner lobe is small and situated anteriorly; the outer sectorial part of the crown has a low anterior basal cusp subequal with the protocone; the paracone and metacone are of normal carnassial type, the latter with its cutting edge nearly horizontal, meeting the paracone at an abrupt angle, marked by a deep incision in the crown. m^1 is greatly reduced and transversely compressed. The lower incisors are



Fig. 234. Skulls of Wild Cat and Sand Cat. Above: *Felis silvestris*, HZM.3.4068, Tivon Sur, Israel. Below: *Felis margarita*, HZM.3.5868, Qatar. Scale = cm.

Table 79. *Felis silvestris*: Specimens from Israel, Syria, Lebanon, Kuwait, Oman, U.A.E. & Saudi Arabia.

External measurements

	mean	range	s	n
L:	819.3	753 - 1002	89.7	12
T:	321.9	263 - 390	46.0	10
HF:	120.4	110 - 134	8.0	10
FA:	175.1	164 - 183	8.4	4
E:	59.2	47 - 67	6.2	11

Cranial & dental measurements

GTL:	89.6	81.0 - 103.8	6.0	22
CBL:	81.7	73.1 - 94.0	5.3	22
ZB:	62.4	56.3 - 74.3	4.4	21
BB:	42.2	39.6 - 47.0	1.9	20
IC:	16.0	14.4 - 19.7	1.4	23
C-M ₁ :	28.5	26.4 - 31.2	1.6	20
C-M ₂ :	31.1	28.7 - 34.7	1.9	22
M:	58.8	52.9 - 71.5	4.2	22

weaker than the corresponding upper teeth; the canine is short and recurved. The two premolars are laterally compressed and elliptical; the crown of the posterior tooth is noticeably larger and broader behind. The lower carnassial (m_1) is composed of the paraconid and protoconid only, the two cusps are subequal, their outer aspects convex, with the commissures abruptly angulated medially; the internal aspect of the crown has a deep central concavity.

Variation: There is considerable geographical variation within the species in Arabia. *F. s. tristrami* is essentially a steppe and hill subspecies found in Israel, Jordan, Syria, Lebanon, Saudi Arabia, Yemen and possibly Dubai in the east of the peninsula, (Harrison, 1971). *F. s. iraki* from Kuwait would appear to be adapted for life in the desert. The hairs on the soles of the feet are long, measuring some 15 mm. The general coloration is a uniform sandy brown, with the spinal band undifferentiated and the face and the feet whiter. The pattern on the flanks consists of very pale brownish patches; the backs of the ears are rather brighter and paler; the ventral surface is white. *F. s. nesterovi* from Iraq is also generally pale, but with the pattern more strongly marked. Unlike *F. s. tristrami*, the transverse barring on the limbs is well developed, especially on the hind limbs. The backs of the ears are paler buffy brown and the face is pale, with the median dark stripe between the eyes almost lacking. *F. s. nesterovi* appears to be an intermediate form, tending towards the spotted condition seen in *F. s. ornata* of India. *F. s. gordonii* from Oman is distinguished from all other wild cats of the region by its overall very pale coloration, lacking the olivaceous tint of *tristrami*. The feet are buffy white as in *iraki*, but the latter is a more sandy colour, with the hairs on the soles of the feet more elongated. The brown colour on the back is limited in *gordonii* to a narrow spinal band commencing behind the shoulders and contrasting strongly with the pale ashy grey flanks. The development of the pattern varies between individuals within this subspecies, but the striations are generally very indistinct. The tympanic bullae of the skull average large in *gordonii*.

Distribution: *Felis silvestris* (as here understood) is very widely distributed, with a range that includes Western Europe to north-western China and India, North Africa and subsaharan Africa south to the Cape.

In Arabia (Fig. 235), the taxon *iraki* was described from northern Kuwait. Hatt (1959) recorded specimens from Baghdad and Diwaniya, which he assigned to *F. s. iraki*, while Cheesman (1920) noted the species from Sheikh Saad. *F. s. nesterovi* was described from Nachr-Chasasch, Iraq. There is little information concerning the distribution of *F. silvestris* in Syria, although it is known from Dareya, (Berlin Zoological Museum collection) and from near Quneitra, (Harrison, 1971). *F. s. tristrami* occurs in the mountains of Lebanon, (Harrison, 1968a) and in Israel where Bodenheimer (1958) considered it to be fairly common in the hills and rocky maquis. Ilani (1986f) reported a specimen run over at Tel Adashim. In Jordan, Atallah (1966) included a record from the vicinity of

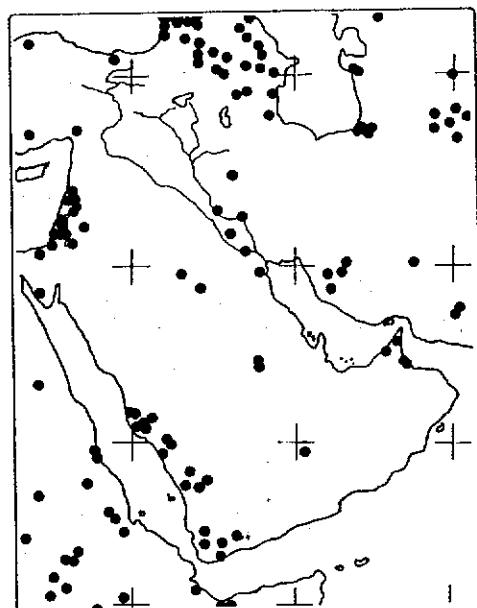


Fig. 235. Distribution of *Felis silvestris*.

Azraq Shishan; the holotype of *tristrami* was obtained at Ghor Seisaban, Moab. In Sinai, it is known from Wadi al Arish and Abu Durda Mines, (Flower, 1932). In Saudi Arabia it is found mainly in the southern Hejaz and Asir Province, (Gasperetti *et al.*, 1985; Al-Safadi & Nader, 1990); additionally it has been reported from Umm al Qurun in the southern Rub al Khali, (Dollman, 1933); Wadi Dhib; Wadi Nissah, (Lipscombe-Vincett, 1982); At-Taysiyah, (Gasperetti *et al.*, 1985) and 110 km north-west of Buraydah, (Al-Safadi & Nader, 1990). In North Yemen, it is known from Wadi Warazan; Qua'tabah; Wadi Al-Barh and Wadi Zabid, (Al-Safadi & Nader, 1990). In South Yemen, specimens recorded from the Aden district and Lahej, (Yerbury & Thomas, 1895) are possibly feral hybrids with domestic cats, (Pocock, 1951). In Oman, specimens including the type of *gordonii* are known from the vicinity of Sohar. Harrison (1971) recorded a very large specimen from Dubai, U.A.E. which he provisionally assigned to *tristrami*; a specimen from north of Dibba is possibly a very large *F. catus*, (Gasperetti *et al.*, 1985).

Remarks: Following Haltenorth (1953), Wild Cats formerly referred to *F. lybica* are here regarded as conspecific with *F. silvestris*. Bodenheimer (1935) noted that the Wild Cat is probably the ancestor of the Domestic Cat (*F. catus*) and great difficulty is sometimes experienced in distinguishing between the two. Domestication took place on a large scale in ancient Egypt, where the city of Bubastis was devoted to their worship, (Anderson & de Winton, 1902). However, there is little definite evidence to suggest the early domestication of cats in Arabia. In Oman, it appears to be strictly nocturnal and is most often found hunting in semi-desert terrain with scattered trees and bushes. It may take shelter in foxes lairs and will also hide in bushes and tall trees, such as acacias. It climbs with great agility and is capable of running at more than 32 km/hour for sustained periods. The stomach contents of specimens examined on the Batinah coast, in March, included Coleoptera, Orthoptera, lizards, mammalian fur and a date stone. The high proportion of insect remains probably resulted from the scarcity of desert rodents, resulting from a prolonged drought. A female collected on 24 February was pregnant with two embryos about 2.5 mm in length.

Felis margarita Loche, 1858

Sand Cat

1858. *Felis margarita* Loche, *Revue Mag. Zool. Paris*, (2)10: 49, pl.1. Near Negonca, Algeria.

1976. *Felis margarita harrisoni* Hemmer, Grubb & Groves, *Zeitschrift Säugetierk.*, 41(5): 301. Umm as Samim, Oman, 21°55'N, 55°50'E.



Fig. 236. *Felis margarita* from near Beihan, South Yemen, (BM.59.634). Photograph by courtesy of Zoological Society, London.

External characters: This is a small cat; its general size and build are much like *F. silvestris* but with the ears outstandingly larger. The head is rather flat; the ears are broad and set low down on the sides of the head; their tips lack an apical tuft, (Fig. 236). The vibrissae are white, the supralabial group attaining about 80 mm. The limbs are of medium length, with the paws broader than in *F. silvestris*; the palms and soles are distinctive, being covered with a dense mat of fine, long wavy hair, completely concealing the pads, (Fig. 237). The pelage is soft and dense, with abundant soft woolly

underfur. The coloration is strikingly pallid; the general tint of the back is pale sandy isabelline, finely speckled with black over the shoulders and with silvery grey on the upper flanks. A poorly differentiated spinal band is present. The crown of the head is pale sandy and marked with very faint ill-defined striations. The backs of the ears are rufous tawny, each with a more extensive apical black spot than in *F. s. tristrami*, extending half the length of the external margin. The face is marked with a dark reddish fulvous stripe from



Fig. 237. Right fore feet, ventral aspect, of Wild Cat and Sand Cat. Left: *Felis silvestris*, HZM.3.4068, Tivon Sur, Israel. Right: *Felis margarita*, BM.59.634, near Beihan, South Yemen. Scale = 30 mm.

the anterior canthus of each eye backwards across the cheeks. The chest and belly are white, with an indistinct line of demarcation on the lower flanks and a very faint buffy wash on the lower throat. The limbs are white internally; externally they are marked by at least two pronounced black elbow bars, which extend round to the internal aspect. The thighs have a fairly distinct black barring. The pattern of the flanks is composed of seven or eight indistinct reddish-brown vertical stripes, broken up into spots and lightly washed with black in places. The tail is tipped with black and has two or three subterminal black bars. The baculum is very small, not exceeding 3 mm. (Schauenberg, 1974).

Karyology: 2N= 38, FN= 72; with 32 metacentric and submetacentric autosomes and 4 acrocentric autosomes, (Schauenberg, 1974).

Cranial characters: The skull is relatively small and is distinguished from *F. silvestris* by the outstandingly larger tympanic bullae, (Fig. 234). The orbits are somewhat larger and more nearly spherical than in *F. silvestris* and the interorbital region is a little broader. The zygomatic arches are more outwardly bowed; the mastoid regions are relatively broader and the mastoid processes more outwardly projecting. The sagittal crest is strongly developed over the posterior braincase, in adults, and the lambdoid crests are also pronounced and rather squarely truncated behind. The palate is short and widened behind. The tympanic bullae are greatly enlarged in all diameters as compared to *F. silvestris*; the meati are also much larger. The mandible is small and light, but with the condyles strong and broad. The coronoid

processes are tall and backwardly slanted, with the tip of each bluntly rounded off above, not recurved as in *F. silvestris*. The angular processes are short and blunt, decidedly less salient than in *F. silvestris*.

Dentition: The teeth are essentially similar to those of *F. silvestris*. However, the inner lobe of the upper carnassial is smaller. The first lower premolar is without anterior or posterior basal secondary cusps; the second lower premolar has both secondary cusps well developed, as in *F. silvestris*, but the crown is scarcely widened behind. The upper and lower canines are powerfully developed.

Variation: Specimens from Arabia are referred to *F. m. harrisoni*, which is distinguished from *F. m. margarita* by its broader skull, relatively large tympanic bullae and large carnassials. The dorsal pelage is paler and the ear patch is relatively small and less dark; the pelage pattern in *F. m. harrisoni* is quite sharply marked and the paws are very white, (Hemmer *et al.*, 1976). Hemmer (1974) illustrated a young animal, 34 days old, which had a well developed pattern on the coat, with striking body striation; this pattern is lost in the adult.

Distribution: *Felis margarita* is found in Morocco, Senegal, Algeria, Niger and Egypt in North Africa; north Iran, Arabia, Turkestan and Baluchistan in Asia.

In Arabia (Fig. 238), it is known from Ramlat al Ghafa, (Hayman & Harrison, 1950); 20 km south-west of Ibbi, (Harrison, 1977) and Umm as Samim, (type locality of *harrisoni*) in Oman. An individual captured at Beihan, South Yemen was presented to London Zoo, (Hayman,

kitten was photographed at Wafra on the Kuwait border; a sight record from Ashayrah, suggests that this species also may occur in western Saudi Arabia, (Gasperetti *et al.*, 1985). Schauenberg (1974) included a record from the desert of Qatar; and a Qatari specimen from near the U.A.E. frontier is in the HZM collection, (Harrison, 1972). Hemmer (1978)

Table 80. *Felis margarita*: Specimens from Oman, U.A.E. & Saudi Arabia.

External measurements

	mean	range	s	n
L:	724.0	702 - 740	19.7	3
T:	270.0	250 - 300	26.4	3
HF:	110.0	110 - 110	-	3
FA:	155	155 - 155	-	1
E:	63.3	57 - 68	5.7	3

Cranial & dental measurements

GTL:	88.9	86.5 - 90.3	2.1	3
CBL:	83.2	80.4 - 85.2	2.5	3
ZB:	70.6	66.0 - 74.2	4.2	3
BB:	44.0	43.0 - 44.8	0.8	4
IC:	18.8	18.4 - 19.5	0.6	3
C-M ¹ :	28.0	27.7 - 28.3	0.3	3
C-M ² :	30.2	30.1 - 30.4	0.2	3
M:	59.4	56.3 - 61.0	2.7	3

recovered a skull from Wadi Rum, Jordan. Ilani (1986g) noted that the population in northern 'Arava, Israel was declining as a result of the spread of cultivation. A living specimen from Sinai was reported by Hemmer *et al.* (1976); further specimens were subsequently collected along the Mitla Road (approximately 30°00'N) and at Wadi Umm Hashiba, (Goodman & Helmy, 1986).

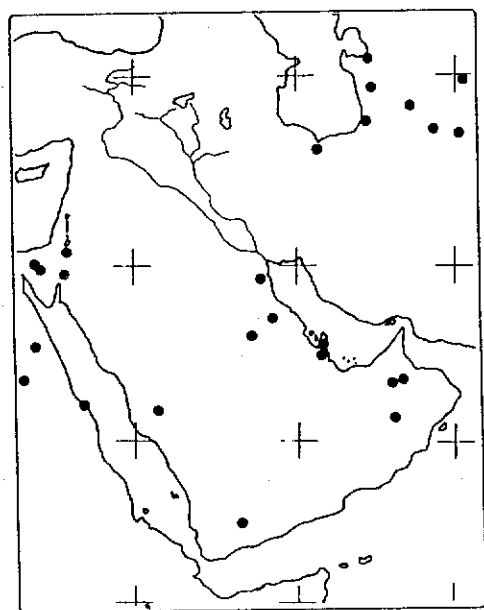


Fig. 238. Distribution of *Felis margarita*.

1952). In Saudi Arabia, a specimen captured between As Sarrar and Al 'Uwaynah (26°52'N 48°20'E) was photographed by J. P. Mandaville and then released. Lipscombe Vincett (1982) photographed an individual at Rumah. A

Remarks: The Sand Cat is specially adapted for desert life and probably prefers sand dune country, although it may be found in rocky terrain. The dense mat of hairs on the feet assists it in obtaining a grip when walking on soft sand. Ognev (1935) noted that the footprints on the sand are recognisable by the absence of any trace of the sole pads characteristic of other cats. The Turkestan subspecies lives in shallow burrows in the sand, constructed amongst the roots of saltbushes or caligonum plants. It is apparently a nocturnal creature, although during the winter it may be active during the day, (Schauenberg, 1974). It feeds mainly on small desert rodents, including *Meriones*, *Gerbillus* and *Allactaga*; it will also take reptiles, small birds and insects. An individual studied in the northern 'Arava valley moved some 8 km in one night, (Ilani, 1988g). Hayman (1952) suggests that the low-set ears may be an adaptation, enabling it to flatten itself as much as possible when stalking prey in scant cover. It is believed to be able to exist with the minimum of water, inhabiting extremely arid terrain. Ognev (1935) reported the birth of four kittens in early April; two of the kittens were immediately torn to pieces by the male; the female later devoured the other two, despite an ample supply of alternative food. Its demeanour in captivity is fierce, flattening the ears and spitting loudly. It has a distinctive call, like that of a small dog, (Hemmer, 1974)

***Felis chaus* Guldenstaedt, 1776**

Jungle Cat

1776. *Felis chaus* Guldenstaedt, *Novi Comment. Acad. Sci. Imp. Petrop.*, 20: 483. Terek River, north of the Caucasus.
1898. *Felis chaus furax* de Winton, *Annals Mag. nat. Hist.* 2: 293. Near Jericho, Palestine.
1902. *Lyncus chrysomelanotis* Nehring, *Schriften berl. Ges. naturf. Fr. Berlin*: 124, 147. Jordan, Palestine.

External characters: This cat is much larger than *F. silvestris* with longer legs and a shorter tail. The ears are large; the apical tufts are relatively well developed but do not exceed 15 mm in length. The vibrissae are only moderately developed, mixed black and white, the longest of the supralabial group about 51 mm, distinctly shorter than in *F. silvestris*. The limbs are long and slender. The digital, palmar and plantar pads are naked, like those of *F. silvestris*, but the external posterior carpal pad is lower and blunter,

Table 81. *Felis chaus*: Specimens from Iraq & West Bank.

External measurements				
	mean	range	s	n
L:	948.7	880 - 1049	88.9	3
T:	266.0	256 - 272	8.7	3
HF:	157.5	147 - 168	10.5	3
FA:	236	236 - 236	-	1
E:	72.7	71 - 74	1.5	3

Cranial & dental measurements				
GTL:	123.6	111.2 - 137.8	10.6	5
CBL:	111.7	102.0 - 122.5	8.3	5
ZB:	79.3	71.3 - 89.2	7.0	5
BB:	50.7	48.7 - 52.2	1.4	5
IC:	21.1	18.5 - 25.2	2.4	6
C-M ¹ :	40.7	38.8 - 44.2	2.0	6
C-M ₁ :	44.1	41.2 - 48.4	2.5	6
M:	82.1	74.3 - 91.8	6.4	6



Fig. 239. Skulls of Jungle Cat and Caracal. Above: *Felis chaus*, HZM.1.1824, Jazira, Iraq. Below: *Caracal caracal*, HZM.6.11629, Al Ain Zoo. Scale = cm.

apparently lacking any sharp claw-like extremity. The pelage is soft, dense and rather long, with abundant fine woolly underfur. In winter, it is a light grey-brown or tawny olive, with the spinal band darker fulvous and the fine black tips of the contour hairs producing an overall black speckling, rather more pronounced in the spinal band. The crown of the head is olive grey-brown, with only very indistinct longitudinal striations; the forehead between the eyes is whitish. A blackish stripe runs from the anterior canthus of each eye towards the rhinarium; a buffy white patch below the eye is contrasted with the grey-brown cheeks. The backs of the ears are rich fulvous brown with the tips and apical tufts black; a patch on the postero-external part, below the

tip, is distinctly paler. The chin, throat and lower abdomen are pure white. The chest and upper abdomen are a pale ochraceous cinnamon mixed with buffy white. The ground colour of the limbs is light grey brown above, similar to the flanks and fading to a uniform pale cinnamon-buff on the dorsal aspects of the feet. The outer aspect of each thigh is obscurely banded with five or six oblique dusky stripes and the forelimbs bear two or three well-marked black bands internally; the external aspects are obscurely barred. The tail has about three black rings and is tipped with black.

Cranial characters: The skull, (Fig. 239), is very much larger and more elongated than that of *F. silvestris*. The zygomatic arches are less widely flared anteriorly and the rostrum is longer. The orbits are less spheroidal, with the orbital part of the zygomatic arches less outwardly flared and rounded. The dorsal profile declines

less steeply, both in front over the nasals, which have a slight concavity over their mid-parts, and behind over the posterior braincase. The lambda projects further backwards relative to the condyles. The tympanic bullae are strongly inflated



Fig. 240. Right mandibular cheekteeth, (first & second premolars and m₁), internal aspect, of *Felis chaus*. HZM.1.1824, Jazira, Iraq. Scale = 10 mm.



Fig. 241. Skins of *Felis chaus*. Left: Adult female, HZM.I.1824, Jazira, Iraq. Right: Immature, HZM.3.3568, Kefar Ruppim, Israel. Scale = 120 mm.

and rather less evenly rounded in lateral profile than those of *F. silvestris*. The infraorbital foramina are relatively small. The coronoid process of each half mandible is broader and less backwardly recurved as compared to that of *F. silvestris*.

Dentition: The teeth are essentially similar to those of *F. silvestris*, although much more massive; the upper carnassial may attain as much as 18 mm in length. In contrast to *F. silvestris*, the upper canine has an antero-external groove and a sharp posterior cutting edge. The second upper premolar is strongly developed, with trenchant cusps and with a better developed posterior cingular shelf and cusp than in *F. silvestris*. The lower premolars are less compressed posteriorly, with the cingula broader and better developed. The cingulum of the second lower premolar forms a distinct small cusp at the base of the secondary cusp; it is also well developed anteriorly, in front of the anterior accessory cusp, (Fig. 240). The lower carnassial (m_1) usually has a minute vestige of the talonid.

Variation: Arabian specimens are referred to *F. c. furax*, which is distinguished from *F. c. chaus* by its massive dentition, although there would appear to be some intermediation with the typical subspecies in Iraq. Pocock (1951) noted that the pelage varies in thickness seasonally, but very little in length. The extent of the spinal band, leg

pattern and black tips of the ears varies between individuals. Some specimens are greyer in general tint than others and the ventral surface may be almost wholly white. Juveniles show a slightly more pronounced pelage pattern, (Fig. 241).

Distribution: *Felis chaus* ranges from Egypt through to Asia Minor, eastern Transcaucasia and north along the west shore of the Caspian Sea to the Volga delta. It is also known from Iran, Afghanistan, Chinese Turkestan, India, Sri Lanka, Burma and Vietnam.

In Arabia (Fig. 242), it is widespread along the rivers of Iraq, (Cheesman, 1920; Pitman, 1922; Bodenheimer, 1959; Hatt, 1959; BMNH & HZM collections). Sanborn (1940) reported a specimen from the desert at Hilla. Misonne (1957) noted that it was common in the marshes and along the rivers of northern Syria, in the region of Tell Abiad/Ain Aarous. Bodenheimer (1958) stated that it was fairly common in Israel and according to Nehring (1902), specimens are known from the Dead Sea and Jordan Valley. Ilani (1986j) included a sight record from Nahal Alexander on the coastal plain and specimens from Kefar Ruppim and Hazerea are in the HZM collection. The taxon *furax* was described from near Jericho.

Remarks: The Jungle Cat is an inhabitant of dense riverine thickets and low-lying jungle. In Iraq, it especially favours the tall reed beds along rivers. In the Jordan Valley, it is found in the dense jungles of tamarisk and reeds. It is primarily diurnal and occasionally may be seen hunting in agricultural land. An adult female from Jazira was one of a pair disturbed in a cotton plantation. Its diet consists

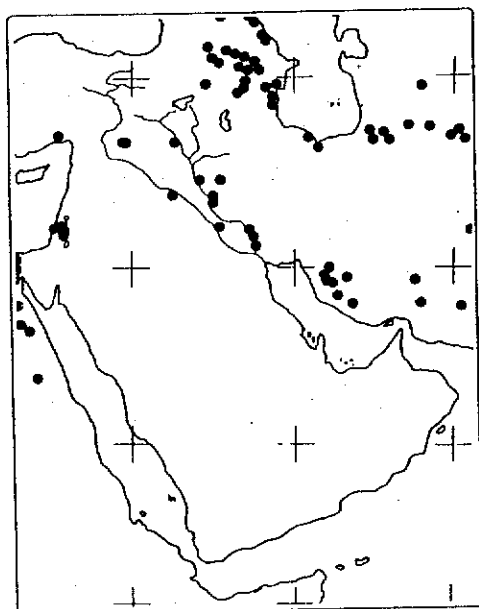


Fig. 242. Distribution of *Felis chaus*.

principally of birds, small mammals, frogs and snakes of the genus *Coluber* and *Psemmophis*. It is disliked by the country folk along the Euphrates as it frequently predares their domestic poultry as well as inflicting damage on game such as francolin and hares. This harm is to some extent balanced



Fig. 243. *Caracal caracal*, originating from Amman, Jordan. Photograph courtesy of Fox Photos Ltd.

by the number of rodents which it devours. It is a good climber and according to Ognev (1935), it will often climb trees. It is strong and swift and is known to run at up to 32 km/hour, (Halt, 1959). The den is usually made in thick, dry vegetation but the empty burrows of other mammals such as badgers and porcupines may be employed. Ognev (1935) reported three

kittens newly born in June in the West Caspian region; they were located in a reed den on the ground, beneath a bush. Females have three to five young in each litter. A juvenile specimen probably born sometime in April was collected in the Jordan Valley. Blanford (1888-91) suggested that they may breed twice a year.

Genus *Caracal* Gray, 1843.

1843. *Caracal* Gray, *List Spec. Mamm. Brit. Mus.*: 46. The *Caracal* is so readily distinguishable from true cats of the genus *Felis*, by external and cranial features, that it seems reasonable to follow Pocock (1939) in regarding it as a distinct genus. Although none of the individual characters listed below appears outstanding in morphological terms, in summation these features place the *Caracal* sharply and distinctly apart from true cats. The pelage is a uniform reddish sand-colour, without trace of a pattern, except for a few spots on the chest and inside the fore legs. The interdigital webs are shallow. The apical ear tufts are very highly developed, more than half the height of each pinna, in the adult. The nasal branches of the premaxillae are narrower, longer and more attenuated, reducing the area of contiguity between the nasals and the maxillary bones. The posterior border of the palate is without an abrupt notch, on each side, internal to m^1 and the postcanine space is relatively short. The minute upper premolar is rarely retained. Dental formula: $i\ 3/3\ c\ 1/1\ pm\ 2\ or\ 3/2\ m\ 1/1 = 28\ or\ 30$.

Caracal caracal (Schreber, 1776)

Caracal Lynx

1776. *Felis caracal* Schreber, *Die Säugethiere in Abbildungen nach der Natur*, ..., 3: pl. 106; text, 3: 413, 587 (1777). Table Mountain, Cape Town, South Africa. (For discussion of type locality and author, see J.A. Allen, 1924, *Bulletin Amer. Mus. nat. Hist.* 47: 279 and Pocock, 1939, *Fauna Br. India, Mamm.*, 1: 306).
1912. *Felis (Caracal) schmitzi* Matschie, *Schriften berl. Ges. naturf. Fr. Berlin*: 64. The Dead Sea region, Palestine.
1912. *Felis (Caracal) aharoni* Matschie, *Schriften berl. Ges. nat. Fr. Berlin*: 66. Mouth of Chabur River, on Upper Euphrates, Syria.

External characters: This is a medium-sized cat of about the same general size and build as *Felis chaus*. The tail reaches to the hocks when the animal stands erect. The face and muzzle are normal without pronounced cheek ruffs, (Fig. 243). The ears are tall and pointed above, with highly developed apical tufts, more than half the height of each pinna and often exceeding 40 mm in length, in the adult. The limbs are long and slender, in marked contrast with the massive limbs and paws of *Lynx lynx*. The creamy white claws are powerful, those of the fore feet usually attaining about 17 mm in length; the interdigital webs are notably shallow. The pelage is dense and close on the back, becoming longer, looser and woollier on the belly. The colour is very distinctive, always tolerably uniform above and on the outside of the limbs and tail; the only trace of a pattern consists of obscure spots on the underside of the chest and buffy stripes on the insides of the fore legs. Arabian specimens tend to be a uniform light sandy brown on the back, finely grizzled throughout with silvery white hair tips. The mid-dorsal region and tail are slightly darkened, the flanks and external aspect of the limbs distally, paler. The chin, anterior throat, chest and belly are creamy white; a buff

coloured collar extends across the hind throat. A narrow blackish stripe runs from the rhinarium to the anterior canthus of each eye, this is margined with white inferiorly. There is usually a prominent rectangular black spot on the forehead above each eye. The backs of the ears are black, finely frosted with white; the apical tufts are a mixture of black and white hairs. The hairs on the soles of the feet are pale sandy.

Table 82. *Caracal caracal*: Specimens from West Bank, Sinai, U.A.E., South Yemen & Saudi Arabia.

External measurements

	mean	range	s	n
L:	907.8	800 - 1070	116.2	4
T:	221.3	100 - 285	84.6	4
HF:	686.5	630 - 785	73.4	4
FA:	262	262 - 262	-	1
E:	75.3	70 - 82	6.1	3

Cranial & dental measurements

GTL:	122.1	110.3 - 136.4	8.2	10
CBL:	109.4	100.8 - 121.5	6.9	8
ZB:	84.5	74.0 - 95.8	6.5	10
BB:	53.6	49.1 - 56.5	2.3	10
IC:	23.2	19.2 - 25.6	2.2	10
C-M ¹ :	38.8	34.4 - 42.0	2.6	9
C-M ₁ :	42.0	37.8 - 45.3	2.6	9
M:	82.2	74.6 - 91.0	5.8	9

Cranial characters: The skull is more massive than that of *F. chaus*, with the rostrum moderately long, (Fig. 239). The nasal bones are short; they lack any mesial constriction and are quite broadly rounded off behind. The orbits have their antero-inferior margins thickened and more evenly bowed outwards, so that the angulation lateral to each infraorbital foramen is less pronounced. The postorbital constriction is strikingly narrow, so that the interorbital width is equal to more than three-quarters of the postorbital width. The zygomatic arches are massive and deep; they are widely flared posteriorly. The outline of the braincase differs from that of *F. chaus*, it is narrower in front and more noticeably widened behind. The sagittal crest is strongly developed posteriorly in adult skulls, forming a deep knife-like blade; the lambdoid crests are well defined. The palate differs from that of *F. chaus*; the posterior margin is without deep emarginations laterally; the median postdental extension is longer. The tympanic bullae are strongly inflated. The mandible is robust; the inferior border of each ramus has a distinct concavity between the carnassial and the angular process. The coronoid processes are more backwardly slanted than in *F. chaus*, the tips bluntly rounded.

Dentition: The dentition differs from that of *F. chaus* in that the post-canine space is smaller and the small upper first premolar is invariably lost. It is also noticeable that although the canines in adults are powerful, the cheekteeth are relatively less developed. The inner lobe of the upper carnassial is small. The second upper premolar is less widened behind, its posterior basal cusp is smaller and the anterior basal cusp larger than in *F. chaus*. The secondary cusps of the first lower premolar differ similarly, although less obviously.

Variation: Specimens from Arabia are referred to *C. c. schmitzi* which averages smaller than *C. c. caracal* and has a paler pelage colour, with a less pronounced mid-dorsal darkening. There is seasonal variation in coat thickness; it is short and sleek in summer, with little, if any, underwool. The extent of the white frosting on the backs of the ears, and the size of the supraorbital spots, are individually variable. In some specimens, for example those from Aden and the mountains north of Tor, Sinai, the general tint is more reddish brown on the back, while others, from near Ta'if, are more extensively frosted with light grey. A kitten from Kuwait has the pelage woollier and soft; it is uniformly sandy brown above, quite lacking any dorsal pattern, and without the white frosting on the back seen in the adult; the black facial markings and spots above the eyes are prominent; the ear tufts are quite lacking.

Distribution: *Caracal caracal* is widely distributed in Africa south of the Sahara, ranging from Sudan to Cape Province. In North Africa, it is found from Egypt to Morocco. In Asia, it extends from Turkey, through to Iran, north to the Sea of Aral, Afghanistan and northern India.

In Arabia (Fig. 244), it is widespread, although in most places becoming increasingly rare. In Iraq, it is known from the Basra region, (Metaxas, 1891); near Rutba (Corkill, 1930) and from 45 km north-east of Aidaha, (Thalen, 1975). Thalen (1975) also included other unconfirmed reports from the southern and western deserts of Iraq. Dickson (1949) reported it from Kuwait and a specimen from the mouth of the Chabur River, Syria was included in Matschie (1912). It is apparently not uncommon in the Dead Sea region; with

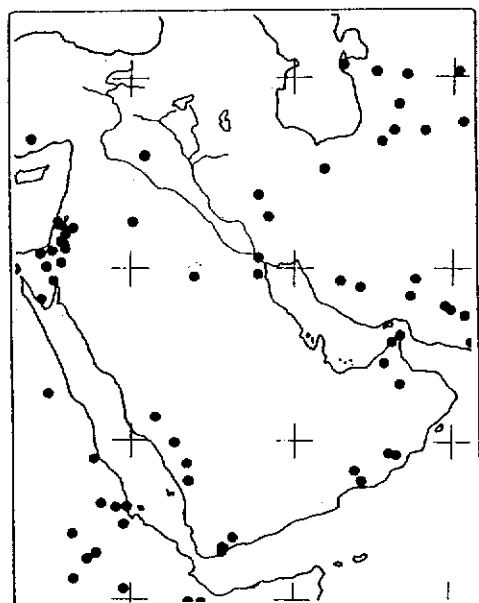


Fig. 244. Distribution of *Caracal caracal*.

specimens known from Ain ed Dschuheijir and Wadi Kelt; it is also known from Mount Herodes on the West Bank, (Harrison, 1968a). Records from Jordan include El Messra and Safje, (Matschie, 1912); a Caracal from near Amman was presented to London Zoo. Records from Israel include

specimens from Haifa; Mount Carmel and near Eilat, (Harrison, 1968a). Recently, Ilani (1986h) reported that it was becoming more numerous in the Negev, mainly in the north-west; a mating pair was recorded from En Yahav, (Ilani, 1987i), from where subsequently eight individuals were recorded, (Ilani, 1988d). Skinner (1979) includes a report from Sde Boqer. In Sinai, specimens are known from El Arish and the mountains north of Tor, (Osborn & Helmy, 1980). Records for Saudi Arabia include Qaim, near Ta'if, (Morrison-Scott, 1939); vicinity of Abha, (Nader, 1984); Wadi Khaytan; Khamis Mushayt and from between Malik and Abyam (17°16'N 43°03'E), (Gasperetti *et al.*, 1985). It is also known from Haithalhim; Habil, (Yerbury & Thomas, 1895); Wadi el Kabir, (Thomas, 1900) and Dhala (HZM collection) in South Yemen. In Oman, a specimen was recorded from Jabal Qara, (Hills, 1979); additionally it is known from Thamarit; Wadi Runib, (Gasperetti *et al.*, 1985); Habhab airstrip; Wadi Al Ayn; 90 km SSW of Yalooni and Jabal Harim in Musandam, Oman, (Gallagher, *in litt.*, 1989). Specimens from the U.A.E. include those from Tawi Suwaihan, (Harrison, 1968a) and Al Rams, (Gasperetti *et al.*, 1985).

Remarks: The sandy pelage of the Caracal is admirably suited to the arid hilly steppe desert and mountain terrain to which it is adapted, while the Arabic name "Anaq al ardh" ("Earth Lynx") indicates its habit of dwelling in rock crevices and underground lairs. It is a secretive animal and is perhaps not as scarce as the scattered records suggest. According to Ognev (1935), it sometimes hides in tamarisk thickets and other bushes along mountain streams. It is very powerful and agile. Its great jumping power enables it to catch birds flying over its head, which it ensnares between its forepaws. According to Pocock (1939), its speed surpasses that of most cats of its size and it was formerly trained like the Cheetah for hunting small game. The normal diet of the Caracal consists of birds and small mammals, although Forester & Tear (1988) note that in the Yalooni area of Oman it also feeds on gazelles, lizards and snakes. Gazelles are usually killed by suffocation following a brief chase of less than 50 metres. Typically it devours the hindlegs first; it may return for a second day to feed on the same carcass. It will also feed on offal and carrion; Skinner (1979) observed an individual, in Israel, feeding on a dead donkey. Two or three (rarely up to five) kittens are born in one litter. They are reared in the burrows of other mammals, such as porcupines, or in hollow trees or rock crevices. A young kitten from near Dhala was captured on 20 August, suggesting a season of birth in southern Arabia early in that month. Shortridge (1934) stated that in South Africa, the Caracal will hunt by day in cool or cloudy weather and is a good climber. He knew of instances in which quite large game such as young Kudu and adult ewe Springbok had been attacked and killed, as well as smaller antelopes and monkeys. Stewart (1963) records a report of a Caracal being killed by a wounded Oryx, which it had attacked in southern Arabia. Specimens in Dublin Zoo lived for 16 and 17 years respectively. According to Forester & Tear (1988), the jet-black tufts of an adult's ears are for the benefit of the kittens, allowing them to follow their mother as she stalks and catches her prey.

Genus *Lynx* Kerr, 1792

1792. *Lynx* Kerr, *Animal Kingdom*, 1: 155.

This genus is distinguished by its heavy build; the tail is short, about one seventh of the length of the head and body. The ears are strongly tufted as in the *Caracal*. A bushy ruff is developed on the cheeks from the ears to the throat. A pale patch is present on the back of each ear and when well developed, the pelage pattern consists of narrow stripes on the head and back, rounded or lanceolate spots on the flanks, spots on the legs and rings on the terminal part of the tail. The skull is essentially similar to *Caracal*, but with the external pterygoid plates reduced to inconspicuous ridges. The small upper premolar is normally missing.

Dental formula: $i\ 3/3\ c\ 1/1\ pm\ 2\ or\ 3/2\ m\ 1/1 = 28\ or\ 30$.

Lynx lynx (Linnaeus, 1758)

European Lynx

1758. *Felis lynx* Linnaeus, *Systema Naturae*, 10th ed., 1: 43. Near Upsala, Sweden.

1915. *Lynx dinniki* Satunin, *Memoires du Musee du Caucase, Tiflis*: 391. Name proposed for the North Caucasian Lynx. (see Ognev, 1935, *Mammals of USSR and Adjacent Countries*, 3: 224).

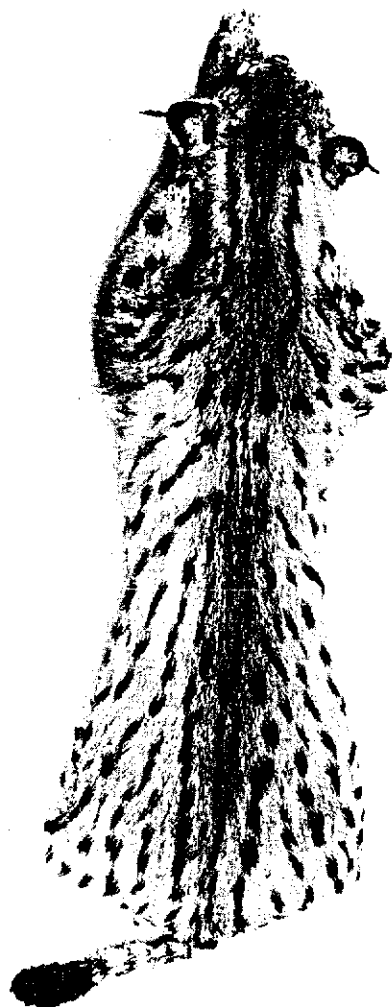


Fig. 245. Skin of *Lynx lynx*. BM.21.7.17.2, Zakho, Iraq. Scale = 120 mm.

External characters: This is a medium-sized cat with a total length of about 1060 mm, in the only known specimen from Arabia, (BM.21.17.2). The tail is short, (183 mm), and bushy at the tip, where the hairs are about 26 mm long; it appears almost docked. The face is typically feline; there are prominent cheek ruffs extending from below the ears down to the anterior throat. The ears are medium large, relatively broader than those of the *Caracal* and with well developed apical tufts, about 35 mm in length. The limbs are massive and powerful with broad paws; strikingly different from the slender build of *Caracal*. The pelage of the Arabian specimen is rather short, the contour hairs in the mid-dorsal region about 27 mm long, somewhat longer on the lower belly. The prominent cheek ruffs attain about 42 mm; they are separated from each other by the normal short pelage in the mid-line of the throat. The pelage pattern, which is illustrated in Fig. 245 consists of black markings rather sharply contrasted with the ground colour. The ground colour of the dorsal surface is fulvous brown, richer and warmer in the mid-line, especially posteriorly, fading to a uniform light buff-brown on the flanks and sides of neck; the underparts are white, except for a faint buffy wash across the lower throat. The forearms are marked with an internal broad black band on each elbow. The ventral chest and abdomen are spotted with black; the lower throat has a narrow transverse collar broken into spots in the mid-line. The tail is conspicuously tufted with black on the terminal third. Two well marked longitudinal striations are present on the cheeks, with some irregular spotting below them passing backwards below the ears to terminate in the mixed black and white tufts of the cheek ruffs. The eyes have prominent narrow white spectacle markings. The backs of the ears are delicately edged with white; the tips, central bases and apical tufts are black.

Cranial characters: Although no skulls of *L. lynx* from Arabia are available for examination, it is clear from extralimital material that the skull is more robust than that of the *Caracal*; the greatest length of skull measures between 138 and 157 mm. Otherwise, it is essentially similar, although the external pterygoid plates are reduced to inconspicuous ridges. The nasal branches of the premaxillae are very narrow; more evenly so than in *C. caracal*, usually just failing to make contact with the frontals above, but sometimes articulating with them. The interorbital region is moderately wide, its diameter subequal with that of the orbit and only a little less than the postorbital width. The postorbital processes are well developed, as in *C. caracal*, but less backwardly slanted. The braincase is evenly ovoid in outline, but with very pronounced mastoid flanges. The palate agrees with *C. caracal* in the virtual absence of any emargination on its postero-lateral margins, but the mesopterygoid space is shorter, its width fully three-quarters of its length. The anterior palatine foramina of *L. lynx* are shorter and more rounded; the posterior palatine foramina are set further back, behind the principal cusp of the carnassial. The tympanic bullae are smaller and less inflated than in *C. caracal*. The mandible may be distinguished by the more strongly upturned symphysis and the more prominent angular submental region; the coronoid processes are not so high.

Dentition: The teeth are essentially similar to *C. caracal* but more robust, with the small upper premolar normally lacking. Miller (1912) noted the presence of a minute posterior basal cusp above the rudimentary cingulum of m_1 . This is occasionally present in young specimens of *C. caracal*.

Variation: It is probable that specimens from Arabia should be referred to *L. l. dinniki* which differs from *L. l. lynx* in its slightly greater size, (Ognev, 1935); there is considerable individual and perhaps seasonal variation in this subspecies in the USSR, and although the bold patterning of the pelage is most usual, almost uniform or weakly spotted individuals are not rare.

Distribution: *Lynx lynx* was formerly more widely distributed in the forested parts of Europe, where it is now restricted to Iberia, Scandinavia, Poland and the Balkans. It also occurs in Asia Minor, Iran, USSR, Mongolia and China.

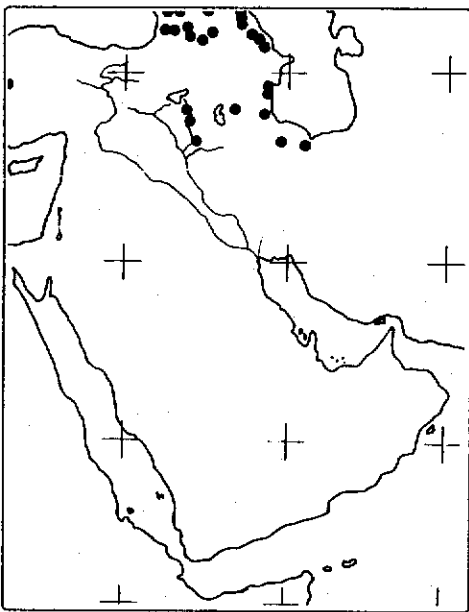


Fig. 246. Distribution of *Lynx lynx*.

In Arabia (Fig. 246), its range is very restricted. It is only known to exist, in recent times, in the mountains of Kurdistan, north Iraq, where it is probably very rare. Hatt (1959) noted a specimen in the BMNH collection from Zakho, and he also mentioned that according to Reed, two specimens were brought into Erbil Liwa during the winter of 1953-54. The occurrence of the Lynx in Palestine has never been confirmed; Tristram (1866) believed that he saw it and indeed stated that he obtained skins from locals to whom it was well known, (Tristram, 1888). It may well have existed in Israel, in former times, when the forests were more extensive. Aharoni (1930) was doubtful about its occurrence in Jordan and it seems likely that it has now completely disappeared from all these southern haunts.

Remarks: This is a forest predator, with arboreal habits. Its increasing scarcity in the northern Arabian peninsula is clearly attributable to the contraction of available habitat, resulting from progressive deforestation and also in some

regions to increased hunting pressure, as a result of the expanding human population. The species is certainly in urgent need of conservation in the region. It is a very strong animal, running rapidly and climbing trees with superb agility; it is also capable of leaping from tree to tree. It will apparently cover great distances in search of prey. According to Ognev (1935), the Lynx normally avoids water, but will swim across quite large stretches with relative ease when need arises. It will fight savagely when cornered. It hunts mostly between dusk and dawn, but may be active in the daytime, which it usually spends resting in a secluded den. It is very shy, cunning and stealthy, preying on quite large animals such as Wild Goats, Roe or Red Deer, as well as smaller mammals and birds. It has been known to attack Badgers and Foxes. Females give birth to two or three, rarely four young, early in the summer, in a nest constructed in a secluded spot under cover of tree roots, amongst boulders, in dense thickets or in an old hollow tree.

Genus *Panthera* Oken, 1816

1816. *Panthera* Oken, *Lehrbuch der Naturgeschichte Zool.*, 3(2): 1052.

These are large, formidable and powerfully built cats. The genus, as here understood (*sensu* Pocock, 1939), includes the Leopard, Lion and Tiger. The hyoid arch is modified, with the replacement of the median bone of the chain by a long elastic tendon which allows a great mobility of the larynx and distention of the back of the mouth. The tips of the digits have cutaneous lobes on each side of the claws, so that when retracted the claws are completely sheathed; the interdigital web extends to the digital pads. The skull has the dorsal profile flattish or tolerably evenly convex, not highly domed as in *Acinonyx*; the basicranial axis is nearly horizontal. The outer chamber of each tympanic bulla is small, with the partition close to the meatus.

Dental formula: $i \ 3/3 \ c \ 1/1 \ pm \ 3/2 \ m \ 1/1 = 30$.

Panthera pardus (Linnaeus, 1758)

Leopard

1758. *Felis pardus* Linnaeus, *Systema Naturae*, 10th ed., 1: 41. Egypt.

1833. *Felis nimr* Hemprich & Ehrenberg, *Symbolae Physicae Mammalium*, 2: gg. pl. 17. (Founded partly on an Abyssinian skin and partly on an Arabian one. Type locality fixed by Harrison, 1968a as Mountains near Qunfida, Asir, Saudi Arabia).

1856. *Felis tulliana* Valenciennes, *Comptes Rendus de Seances de l'Academie des Sciences, Paris*, 42: 1035- 1039. Ninfi, 40 km east of Smyrna, Western Asia Minor.

1927. *Panthera pardus saxicolor* Pocock, *Annals Mag. nat. Hist.*, 20: 213. Asterabad, Persia.

1932. *Panthera pardus jarvisi* Pocock, *Abstract Proc. zool. Soc. Lond.*: 546. Sinai.

External characters: The Leopard is the most robust of the Arabian cats; males exceed females in size. The tail is long and densely haired throughout. The face is without pronounced cheek ruffs. The ears are short, rounded off



Fig. 247. Right fore foot of *Panthera pardus*. HZM.2.4233, Mahfid District, South Yemen. Scale = 50 mm.

above and entirely lack apical tufts. The limbs are moderately long and massive, with broad, rounded paws, (Fig. 247). The claws are cream-coloured, very powerful, fully retractile



Fig. 248. Skull of *Panthera pardus*. BM.55.428, west of Beihan, South Yemen. Scale = cm. Photograph by Pamela Harrison.

and strongly curved. The claw of the pollex is highly developed. The digital, palmar and plantar pads are naked, dusky and smooth. The pelage of the Arabian subspecies *P. p. nimr* is short in the mid-dorsal region, with scanty underwool. The hairs radiate upwards from the sides of the neck, bifurcating into a Y shape on the occiput in front. On the ventral aspect, the hair is longer, soft and woolly. The coloration and pattern is subject to some individual variation. In general, the ground colour of the crown of the head and mid-dorsal region is a pale golden brown, fading to white or buffy white on the flanks, sides of the neck, cheeks and outer aspects of the limbs. The ground colour of the chest and belly is white throughout. The soles and palms are ash grey. The jet black spots and rosettes contrast very strongly with the ground colour. The rosettes are small and thick-rimmed, averaging about 22 mm in diameter on the upper flanks, their central areas pale golden brown like the mid-dorsal zone. The solid spots on the abdomen are large and numerous, those in the inguinal region, lower neck and inside of the forearms tending to coalesce into transverse bars. There is a broad, short, black band curving downwards and forwards

from the anterior canthus of each eye; however unlike *Acinonyx*, there is no prominent black stripe which extends all the way from each eye to the mouth.

Cranial characters: The skull is readily distinguishable by its robust size, heavy development and powerful dentition, (Fig. 248). The rostrum is moderately long and deep; the orbits are irregularly ovoid, with weak lachrymal projections on their antero-medial margins. The interorbital region is long, narrow and flattened above; the postorbital region is narrow and elongated, with its maximum constriction situated well behind the postorbital processes. The braincase is elongated, with distinct lateral bulges in the posterior frontals; the mastoid flanges are prominent and angular. The sagittal and lambdoid crests are well developed behind; the lambda is prominent and somewhat upturned, forming the most salient point of the skull. The palate is moderately long, with the postdental portion well developed; the mesopterygoid space is short and the external pterygoid plates are reduced to mere ridges. The tympanic bullae are moderately inflated, but with the outer chambers small; the paroccipitals are broad and closely applied to the backs of the bullae. The infraorbital foramina are nearly spherical and situated above the back of the second premolar. The mandible is robust and heavy.

Dentition: The teeth are robust; the canines are especially powerful and have well marked posterior cutting edges and a lateral groove; the postcanine space is wide. The first upper premolar is small; the second is relatively large, less laterally compressed than in *Felis*, the principal cusp with a weak secondary cusp at its anterior base internally, (absent in *Felis*), and a well developed secondary cusp above the

cingulum posteriorly, (Fig. 249). The upper carnassial is normal, with the inner lobe well developed. m^1 is small, transversely elongated and virtually functionless. The cusps

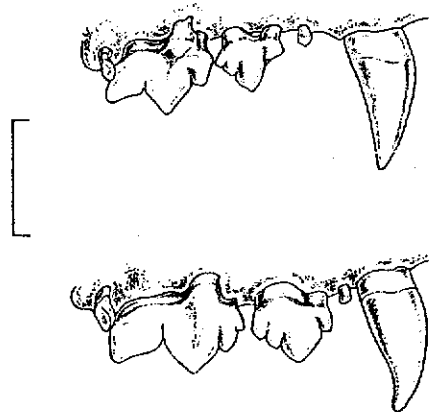


Fig. 249. Left maxillary dentition, from internal aspect. Above: *Panthera pardus*, BM.55.428, west of Beihan, South Yemen. Below: *Acinonyx jubatus*, BM.43.56, Busaiyah Wells, Iraq. Scale = 20 mm.



Fig. 250. Skins of two subspecies of *Panthera pardus*. Left: *P. p. tulliana*, BZM.4312, El Ammur, Israel. Right: *P. p. nimr*, HZM.2.4233, Mahfid District, South Yemen. Scale = 300 mm.

of the lower premolars are rather less trenchant than those of *Felis*; the first lower premolar has weak anterior and posterior basal secondary cusps. The second premolar has well developed anterior and posterior basal secondary cusps, the cingulum weak posteriorly. The lower carnassial (m_1) is without trace of a talonid.

Variation: Leopards from Arabia have been referred to four subspecies. *P. p. nimr* from peninsular Arabia is normally pale and averages small. The form *jarvisi* from Sinai is probably little more than a local variant of *nimr* with a slightly darker ground colour and brown spots; the skull of the holotype exhibits certain peculiarities but this may be individual variation. Leopards from Syria, Jordan and Israel have been assigned to *P. p. tulliana*; the colour of the mid-dorsal region tends to be decidedly tawny, darker than that of *nimr*; the rosettes are large in diameter, widely spaced and thin-rimmed; the coat is soft, smooth and long, especially in winter and the tail tends to be bushy, (Fig. 250). Specimens from the mountains of Kurdistan and Iraq are referred to *P. p. saxicolor*. This is a large form; the pelage is thick, soft and remarkably Ounce-like in winter; it is long and hairy with considerable underwool; the general colour is typically paler

than that of *tulliana* and the rosettes are smaller, thicker rimmed and less annular, they are deep chocolate brown in colour. The forms *tulliana* and *saxicolor* would appear to intergrade in western Kurdistan and eastern Turkey.

Distribution: *Panthera pardus* is widely distributed in tropical Africa. It is also known from North Africa, Asia Minor and Iran through to India, Sri Lanka, Tibet, Burma, China, Vietnam, Java and eastern Siberia.

In Arabia (Fig. 251), it is an inhabitant of the mountainous uplands and hilly steppes of the peninsula. In Iraq, *P. p. saxicolor* is known from a number of localities in the mountains of Kurdistan, although it would always appear to have been rare, (Hatt, 1959). Additionally it is known from Al Emerijje, near Rawa on the Euphrates, (Musil, 1927) and from just above Kut al Imara, on the River Tigris, (Hatt, 1959). *P. p. tulliana* is found in Syria; Von Lehmann (1965) described skins from Slenfe. Talbot (1960) noted their occurrence in the forests north of Latakia; near Jabal Akar; near the Sanjak border and in the Kassab forest. He also stated it had occurred in the vicinities of Palmyra; Nahura and Hama. It has occurred on a surprisingly large number of occasions in Israel, where it would appear to be flourishing in the Judean hills, (Ilani, 1988a). Other recent records from Israel and the West Bank include, the Samaritan Hills, (Ilani, 1986j); Enot Tzuqim; En Gedi area, (Ilani, 1986i); the vicinity of Makhtesh Ramon; Nahal Neqarot and Nahal Zin, (Ilani, 1983c). It has also been recorded many times from the hills of Galilee, although curiously never from southern Lebanon, (Harrison, 1968a). According to Ilani (1987p), Leopards were seen on the Israel/Lebanon border near Ménara; other records included Mount Hermon; the southern Golan Heights and Nahal Beqeq in the northern Jordan Valley. Jordanian records include specimens from north of Aqaba; south of Petra; Wadi Zerqa, (Hardy, 1947); Ayun Buweirdeh, (Hart, 1891); Jubal Tubayq area, (Raswan, 1935); and the Maan area, (Seton-Browne in litt.). *P. p. jarvisi*

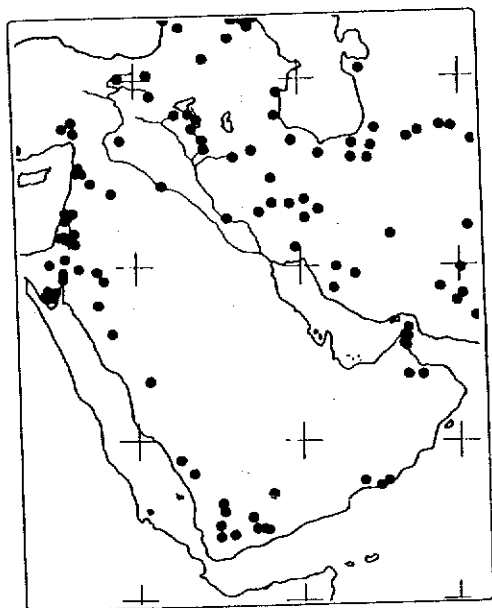


Fig. 251. Distribution of *Panthera pardus*.

is confined to the south of the Sinai peninsula, (Osborn & Helmy, 1980). *P. p. nimr* was described from the vicinity of Al Qunfida; a further specimen from the Asir (no exact locality) is in the BMNH collection and recently a live specimen was observed at Wadi Hiswa, (Gasperetti *et al.*, 1985). It is also known from the Hejaz, (Carruthers, 1909; Harrison, 1968a & 1972). According to Sanborn & Hoogstraal (1953), it was scarce but widespread in the North

strength from it. In Israel, it was observed that an old Leopard, of approximately 14 years, switched from hunting Ibex to Hyraxes when its strength began to fail, (Ilani, 1987j). Pocock (1939) noted that females give birth to two to four cubs, after a gestation of thirteen weeks, usually in a cave or secluded lair amongst boulders or sometimes in a porcupine burrow. According to Ilani (1988a), a Leopard from the Judean Desert region came into heat in March and gave birth at the end of June.

Table 83. *Panthera pardus*: Specimens from Jordan, Sinai, Iraq, Oman & Saudi Arabia.

External measurements

	mean	range	s	n
L:	1971.1	1600 - 2261	307.7	10
T:	781.2	660 - 940	93.8	10
E:	44	44 - 44	-	1

Cranial & dental measurements

GTL:	193.3	166.3 - 213.0	17.4	6
CBL:	176.9	150.7 - 194.4	16.2	6
ZB:	121.0	105.3 - 132.4	10.2	7
BB:	73.1	67.1 - 76.8	3.8	6
IC:	40.1	35.7 - 43.8	4.7	7
C-M ₁ :	62.5	53.8 - 65.9	4.6	6
C-M ₁ :	69.6	59.2 - 74.9	5.6	7
M:	130.4	110.8 - 141.9	11.3	7

Yemen highlands, seldom if ever ranging into the coastal lowlands; Scott (1942) saw one killed near Ta'iz. It is also known from the highlands behind Aden; specimens from Jabal Hasha; Mahfid and Beihan are in the BMNH and HZM collections. Bury (1911) heard one in Wadi Khatib and further east Thesiger (1949) saw tracks in the Makhia, near Tamis. It exists in the wooded hills of Dhofar, being known from Jabal Qara, (Thomas, 1932) and Jabal Samhan, (Harrison, 1980a; Usher-Smith, 1985). In northern Oman and the Musandam region it is known from the vicinity of Ibri, (Harrison, 1968a); Tawi Mahbayl; the vicinity of Lima; Wadi Maqlayi, (Gasperetti *et al.*, 1985); Khasab (photograph by Sandy Gordon) and Jabal Yenit, (Gallagher *in litt.*, 1989). It is also recorded from Masafi, (Harrison, 1968a) and Qalidda Pass, (Harrison, 1971) in the U.A.E.

Remarks: This powerful predator is found in the mountainous and hilly terrain of Arabia. In marked contrast to the Cheetah, it seldom if ever ventures onto the open plains or desert. Although everywhere scarce, the number of recent occurrences in the region is surprising, for traditionally man has feared its presence, both for his own safety and that of his domestic flocks; it has been hunted extensively, (Sanborn & Hoogstraal, 1953). In Israel, the Leopard population would appear to be increasing and expanding into previously unoccupied territories, especially in the Negev area, a direct result of careful conservation measures, (Ilani, 1983c). It is predominantly a nocturnal animal, although it is occasionally seen in daylight. Raswan (1935) came upon an adult female with her two cubs in the Jabal Tubayq region, resting in the shade and feeding on the remains of a gazelle in the open. A Sleyb hunter accompanying him killed the adult Leopard and ate its heart raw, believing he would derive

Genus *Acinonyx* Brookes, 1828

1828 *Acinonyx* Brookes, *Catalogue Anat. Zool. Mus. Joshua Brookes*: 16, 33.

These are large cats with very long thin limbs. The Cheetah presents many peculiarities of structure which have led to its inclusion in a separate subfamily Acinonychinae. The digits are without trace of cutaneous lobes which constitute claw sheaths. The claws of the four main digits on the fore and hind feet are comparatively blunt and slightly curved, only partially retractile, but the claw of each first digit is large, sharp and strongly curved. There is a characteristic black stripe passing from the anterior canthus of each eye to the mouth. The bones of the skull are remarkably light and thin; the vault is highly domed above. The cheekteeth exhibit an unusual development of the secondary cusps on the premolars. Dental formula: $i \ 3/3 \ c \ 1/1 \ pm \ 3/2 \ m \ 1/1 = 30$.

Acinonyx jubatus (Schreber, 1776)

Cheetah

1776. *Felis jubata* Schreber, *Die Säugethiere in Abbildungen nach der Natur*. ..., 3: pl. 105; text, 3: 392, 586 (1777). Cape of Good Hope, South Africa.

1821. *Felis venatica* Griffith, *The general and particular descriptions of the Vertebrated Animals*... 93. India.

External characters: This is a large cat, with a relatively small head, (Fig. 252). The ears are low and rounded, thickly haired on both aspects. The limbs are very long and slender and the claws are always more obvious than in the Leopard, owing to the lack of claw sheaths. The pelage is relatively short on the back and sides and longer on the belly. In some specimens, a distinct mane is present from the occiput to the shoulders. A black stripe, about 8 mm in width, curves downwards from the anterior canthus of each eye to the upper lip. The spots are solid, black and variable in size; the largest on the flanks is about 20 mm in diameter. The tail is ringed with black distally. The general colour of the body is tawny buff, becoming gradually paler on the flanks. The chest, belly and insides of the legs are whitish. The mane is irregularly tufted with black, giving the appearance of linear spots when the hair is depressed. The feet are tufted with brownish black around the digital pads and the bases of the claws.

Cranial characters: The skull, (Fig. 253), is remarkably light and thin-boned for its size. The nasal aperture is strikingly large. The orbits are also large, irregularly ovoid,

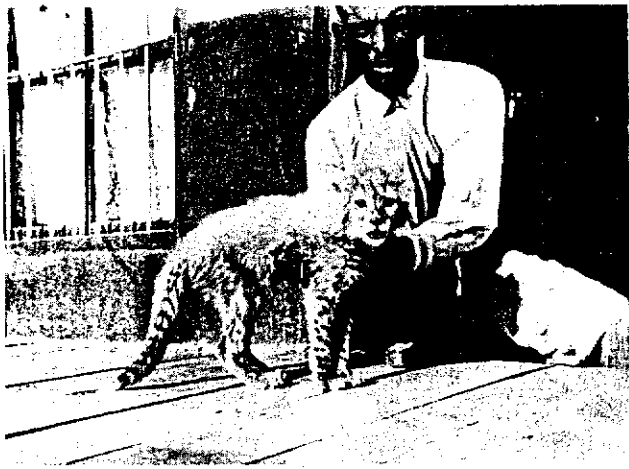


Fig. 252. Cheetah (*Acinonyx jubatus*). "Felix" obtained at Busaiyah Wells, Shamiyah District, southern Iraq. Above: approximately two months old. Below: approximately nineteen months. Photograph courtesy of Dr N.L. Corkhill.

with the antero-inferior margins decidedly less outwardly curved than in the Leopard. The interorbital region is broad and deep, owing to the highly domed vault. There is a pronounced median hollow over the fronto-nasal suture and the postorbital processes are very weak. The postorbital region is broad. The sagittal crest is only evident posteriorly, but the lambdoid crests are well developed and the supraoccipital is wide, not bilaterally compressed above the foramen magnum. The palate differs from that of the Leopard in the broader, shorter postdental portion. The mesopterygoid space is rounded off in front and widest at the hamulars. In contrast to *P. pardus*, the tympanic bullae are only separated from the glenoid processes by narrow notches. They are well inflated; the meati are rather small, without tubes. The mastoid processes are smaller than those of the Leopard but the paroccipital processes are more prominent and salient, their tips not applied to the backs of the bullae. The infraorbital foramina are small and laterally compressed, situated considerably further posteriorly than

in the Leopard; the anterior margin of each lateral plate lies obliquely above the principal cusp of the carnassial. The mandible is light, with its anterior portion not elevated, so that the alveoli of the canine and incisors are in line with those of the cheekteeth. The coronoid processes are tall and narrow, strongly backwardly slanted and with the tips a little recurved. The angulars are deep and rounded below, projecting subequally with the large condyles and with their tips less inwardly deflected than in *P. pardus*.

Dentition: The canines are less developed than those of *P. pardus*, with the wide postcanine spaces lacking. The cheekteeth are highly trenchant; the secondary cusps of the premolars are well developed. The crowns of the two inner upper incisors are expanded and spatulate, the cingulum of each forming a small cuspidate eminence behind. The upper canine of an adult male is considerably less powerful than that of a female *P. pardus nimr*; the shaft has a posterior cutting edge and lacks any cingulum; its tip is distinctly recurved. The first upper premolar is very reduced and crowded between the canine and the second premolar, which is greatly developed, two-rooted and laterally compressed, with four trenchant cusps, (Fig. 249). The upper carnassial is very powerful; its inner lobe is greatly reduced and lacks any trace of a protocone; the anterior cusp of the main sectorial part of the tooth has an additional small cingular cusp at its base anteriorly. m^1 is reduced and displaced postero-internally to the metacone of the carnassial. The crowns of the lower incisors are bifid and expanded. The lower canine is weak and possesses a distinct antero-medial cingular cusp. The two lower premolars closely resemble the upper second in form; each is laterally compressed, with four cusps. The lower carnassial (m_2) is laterally compressed and powerful, differing from that of the Leopard in the presence of a distinct small cusp at the posterior base.

Variation: Arabian specimens have been referred to the Asiatic subspecies *A. j. venaticus*, which appears doubtfully distinct from *A. j. jubatus* from South Africa. According to Pocock (1946), possible distinguishing characters may include a thinner, less woolly winter coat; the absence of a mane, probably in the summer coat; average smaller size and more inflated tympanic bullae. A specimen from Dhofar, Oman shot in November/December 1977 did have a mane on the nape of the neck.

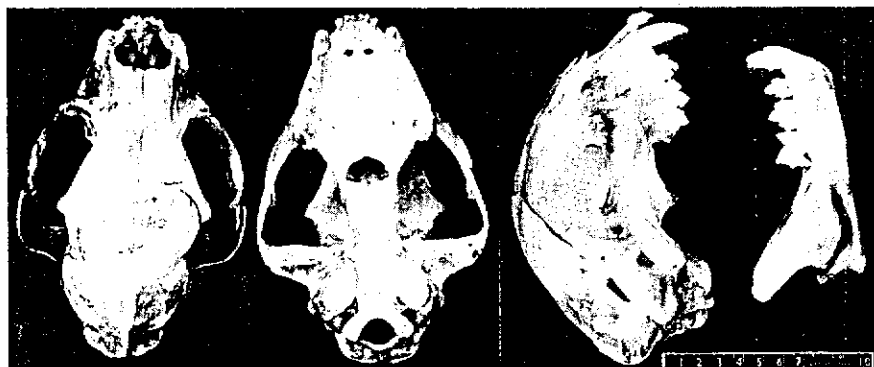


Fig. 253. Skull of *Acinonyx jubatus*. BM.43.56, Busaiyah Wells, Iraq. Scale = cm. Photograph by Pamela Harrison.

Distribution: *Acinonyx jubatus* is widely distributed, if increasingly rare, in tropical Africa, ranging from the Cape to Somalia, Lake Chad and North Africa. Its range extends eastwards to Iran, Turkmenia, Afghanistan, Baluchistan and formerly India.

In Arabia (Fig. 254), it is now probably extinct, although a specimen from near Jibjat, Dhofar, Oman was shot by tribesman as recently as 1977, (Harrison, 1983) and an individual was seen by J.T. Ducker in March, 1963, in Wadi Mitán, South Yemen, (Harrison, 1972). It is possible that it may still exist in Iraq, where formerly it was not uncommon

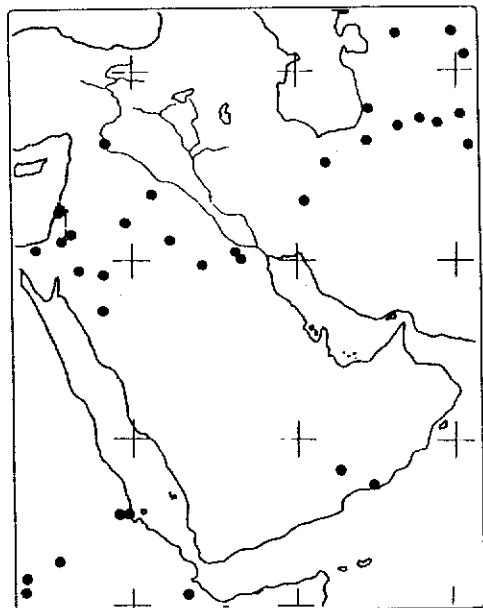


Fig. 254. Former distribution of *Acinonyx jubatus*.

in the lowland districts of the Tigris and Euphrates, (Ainsworth, 1838). Corkill (1929) told of a cub captured at Jumaimu in 1925 and two more taken near Al Busaiyah, in the desert of southern Iraq; he stated that Robert Angorley reported them to be rare in the desert west of Basra, from where one was captured in November 1926. A hunter at K3 station on the oil pipeline reported them in the Syrian Desert to the west, between the Tripoli and Haifa pipelines. Mr Ian Kirkbridge possessed photographs of a Cheetah which was killed by a car in the Syrian Desert of Iraq, between H1 and H2 pumping stations, sometime during 1947-8. Danford & Alston (1880) reported one killed near Sevi, on the Upper Euphrates, in Mesopotamia, (presumed to be Syria). Dickson (1949) reported them in the Kuwait area. Hatt (1959) noted that four individuals had been killed since 1950 by Aramco employees in northern Saudi Arabia; some of these were obtained a few kilometres east of the Saudi Arabian, Jordan and Iraq border intersection; a photograph of one individual, collected at about 31°32'N 39°35'E, was exhibited by Morrison-Scott (1951). Carruthers (1909) saw tracks in the neighbourhood of Taima Oasis; later he saw tracks on the north side of Jabal Tubaiq, Jordan, (Carruthers, 1935). According to Bodenheimer (1958), both Tristram and

Schmitz reported it from Moab and there is a specimen in the Schmitz collection from Zerqa Main, Jordan. Tristram (1866) noted the presence of a few individuals in Gilead; the vicinity of Mount Tabor and in the hills of Galilee; Cheetahs have been extinct in this area for over 100 years. Hardy (1947) mentions that two were seen in the Sinai Desert early in 1946, unfortunately without any more precise details.

Remarks: The Cheetah differs strikingly from the Leopard, both in its habits and its method of hunting. Whereas the latter is a mountain dweller, preferring dense cover and stalking its prey by stealth, the Cheetah inhabits open terrain in Arabia, hunting gazelle in the lowland steppes and deserts, (Carruthers, 1909). According to Ognev (1935), it also feeds on birds and small desert mammals, such as hares, relying on its speed to overtake and capture its prey. Its activity is mainly diurnal. It has a very large home range, an area in excess of 80 km², and may make random excursions far outside these areas. It is a solitary hunter, (Smithers, 1983). Corkhill (1929) recorded some interesting data about a cub captured in July 1928 at Busaiyah Wells, between Abu Ghar and Busaiya, in the Shamiyah Desert of southern Iraq. The cub, (Fig. 252), a male, was found in a well, the mother having been frightened off. It was playful and affectionate. Although very restless when tied up, it purred intensively when released. It slept fully outstretched and thrived on a diet of milk, cooked liver, meat and rice. This Cheetah named Felix subsequently came to London Zoo. Cheetahs are readily trained and were used by the Bedouin in the 19th century for hunting gazelle. According to Pocock (1939), they are better captured as adults for this purpose after being taught to hunt by their parents. The Cheetah lacks the normal feline trait of climbing trees, but will do so if pursued by dogs. The gestation period is said to be about 90 days; the litter numbering two to four are born blind. The eyes open

Table 84. *Acinonyx jubatus*: Specimen from Iraq.

External measurements

	mean	n
L:	1626	1

Cranial & dental measurements

GTL:	172.0	1
CBL:	156.3	1
ZB:	114.1	1
BB:	67.3	1
IC:	40.3	1
C-M ₁ :	53.2	1
C-M ₂ :	59.1	1
M:	119.6	1

after the tenth to twelfth day; by the age of three weeks the cubs are able to walk and by six weeks can follow their mother. By five or six weeks they start to be weaned and are fully weaned at three months old. By eight to twelve months, a cub may initiate a hunt and make a kill on its own, (Smithers, 1983). A specimen in Giza Zoo lived for over 15 years.