

Gazella leptoceros



*Tassili N'Ajjer : Erg Tihodaine. Algeria.
© François Lecouat*

**Pierre Devillers, Roseline C. Beudels-Jamar, ,
René-Marie Lafontaine and Jean Devillers-Terschuren
Institut royal des Sciences naturelles de Belgique**

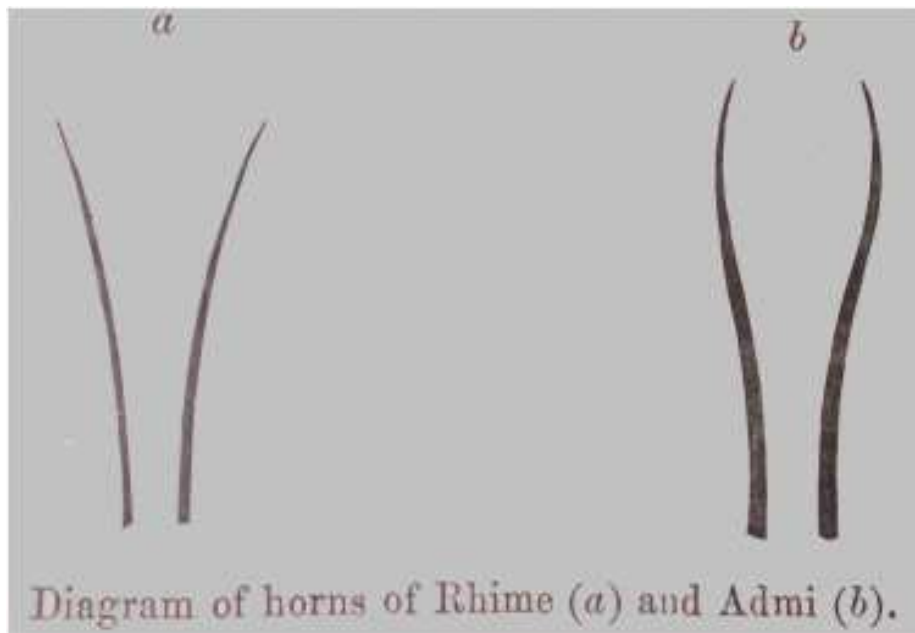


Diagram of horns of Rhime (a) and Admi (b). Pease, 1896. The Antelopes of Eastern Algeria. Zoological Society.

Gazella leptoceros

1. TAXONOMY AND NOMENCLATURE



Gazella leptoceros. Sidi Toui National Parks. Tunisia.
© Renata Molcanova

1.1. Taxonomy.

Gazella leptoceros belongs to the tribe Antilopini, sub-family Antilopinae, family Bovidae, which comprises about twenty species in genera *Gazella*, *Antilope*, *Procapra*, *Antidorcas*, *Litocranius*, and *Ammodorcas* (O'Reagan, 1984; Corbet and Hill, 1986; Groves, 1988). Genus *Gazella* comprises one extinct species, and from 10 to 15 surviving species, usually divided into three sub-genera, *Nanger*, *Gazella*, and *Trachelocele* (Corbet, 1978; O'Reagan, 1984; Corbet and Hill, 1986; Groves, 1988). *Gazella leptoceros* is either included in the sub-genus *Gazella* (Groves, 1969; O'Reagan, 1984), or considered as forming, along with the Asian gazelle *Gazella subgutturosa*, the sub-genus *Trachelocele* (Groves, 1988). The species comprises two sub-species, *Gazella leptoceros leptoceros* of the Western Desert of Lower Egypt and northeastern Libya, and *Gazella leptoceros loderi* of the western and middle Sahara. These

two forms seem geographically isolated from each other and ecologically distinct, so that they must, from a conservation biology point of view, be treated separately.

1.2. Nomenclature.

1.2.1. Scientific name.

Gazella leptoceros (Cuvier, 1842)

Gazella leptoceros leptoceros (Cuvier, 1842)

Gazella leptoceros loderi (Thomas, 1894)

1.2.2. Synonyms.

Antilope leptoceros, *Leptoceros abuharab*, *Leptoceros cuvieri*, *Gazella loderi*, *Gazella subgutturosa loderi*, *Gazella dorcas*, var. 4

1.2.3. Common names.

English: Slender-horned Gazelle, Loder's Gazelle, Sand Gazelle, Algerian Sand Gazelle, Rhim

French: Gazelle leptocère, Gazelle des sables, Gazelle des dunes, Gazelle blanche, Rhim, Gazelle à longues cornes

German: Dünengazelle

Arabic: Rhim

Tamacheq: Hankut, Edemi

1.2.4. Description

A medium-sized gazelle with a very pale yellowish beige back, separated from the white belly by a slightly darker band on the flank. The face and neck are concolourous with the back. Facial markings are faint. The ears are long and narrow. Horns are long, erect, divergent and nearly straight in both sexes. (Groves, 1988), with 20-25 well-defined rings. They are appreciably thicker and longer in males, up to 350-400mm. Outer hooves are broader than the inner ones. (Kingdon, 1997), the widening of the surface facilitating movements on sand (LeBerre, 1990). The rump patch is white with very little outline. The tail is short, terminated by a tuft of black hair.

The Slender-horned Gazelle is a poorly known species, compared with the other gazelles.

TL (male and female): 100 (90-110) cm

T (male and female): 15-20 cm

Height: 65-72 cm

Mass (male): 24 (20-27) kilos
Mass (female): 16 (14-18) kilos
Horns : (Groves, 1969)
G.l.leptoceros M 337.3 ± 28.3 (n=6); F: 273 (n=2)
G.l.loderi M 297.5 ± 15.8 (n=6); F: 248.4 ± 19.0 (n=5)

2. BIOLOGY OF THE SPECIES

2.1. General Biology

2.1.1. Habitat.

Gazella leptoceros leptoceros occupies *Acacia raddiana* woodlands, sandy outskirts of oases supporting *Nitraria retusa*, and interdunal depressions with *Cornulaca monacantha* (Osborn and Helmy, 1980). It consumes a significant amount of foliage (Saleh, 1997). *Nitraria retusa*, a halophyte plant, *Pituranthos tortuosus*, *Acacia raddiana*, *Cornulaca monacantha*, *Launaea capitata*, and *Calligonum comosum* are part of its diet (Osborn and Helmy, 1980). The Slender-horned Gazelles are mostly twilight and nocturnal animals, eating and moving during these periods of the day, and resting during the hot hours in the shade or in hollowed-out depressions (Osborn and Helmy, 1980).

Gazella leptoceros loderi is principally linked to ergs (Schnell, 1977; White, 1983, units 69, 70, 71; Ozenda, 1991) which seem to constitute its only habitat, at least in the central Sahara (Sclater and Thomas, 1898; Lavauden, 1926; Heim de Balsac, 1936; Dupuy, 1967). It mainly grazes on *Aristida pungens* (Heim de Balsac, 1936) but it also uses plants with a high hydric content, such as *Anabasis articulata*, *Arthrophytum schmittianum*, *Helianthemum kahiricum*, and the fruits of *Colocynthis vulgaris*, to meet its water needs (Kacem *et al.*, 1994).

2.1.2. Social behaviour.

Gazella leptoceros lives in small groups of 3-4 individuals, consisting generally in an adult male, several adult females and their offsprings. Solitary individuals, couples, and clubs of young males are also observed. Gestation lasts 165 days. Twin births are common.

2.2. Distribution.

Endemic of the sand-dune (erg) regions of the Sahara, west of the River Nile.

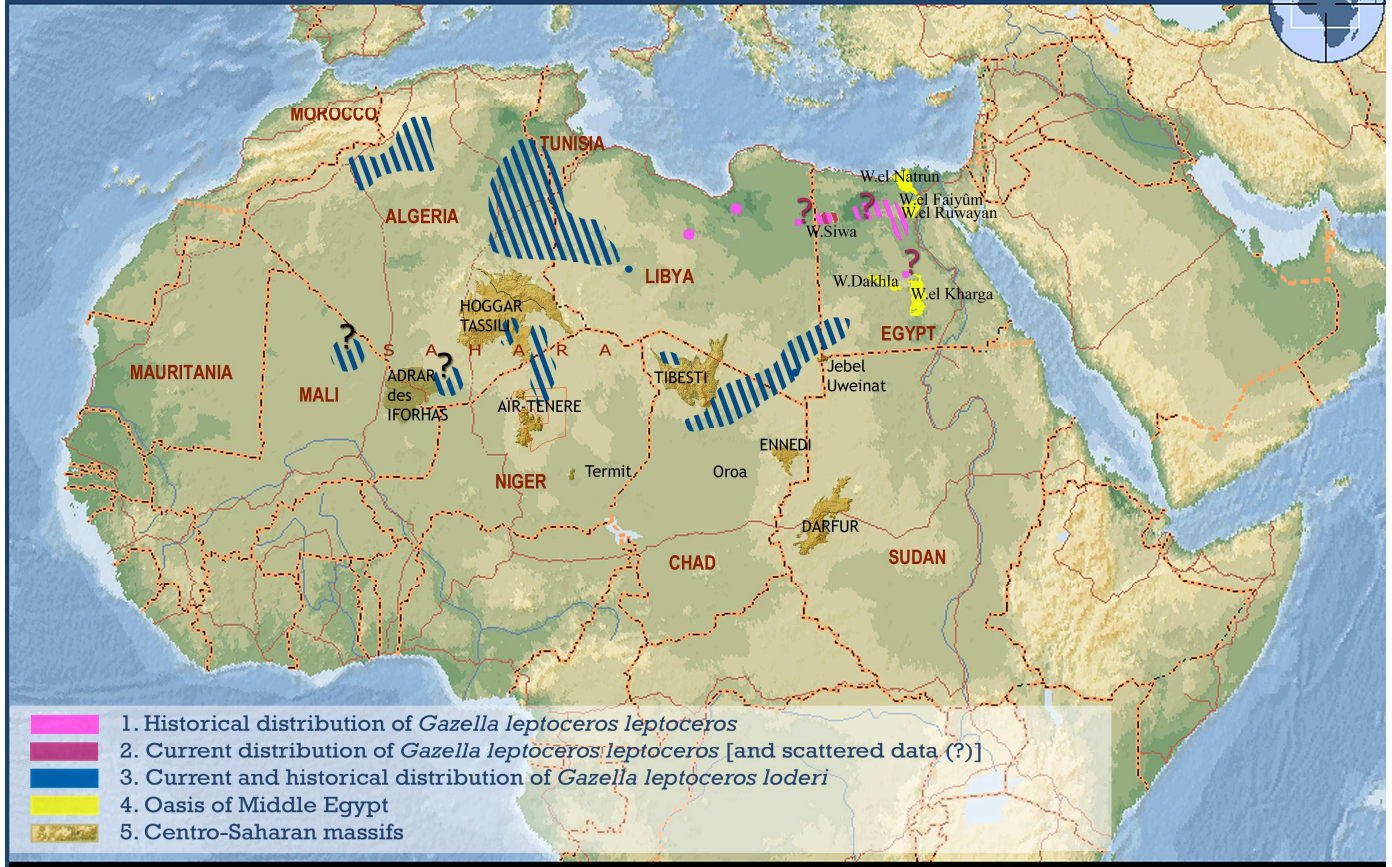
2.2.1. Historical distribution.

Gazella leptoceros leptoceros is characteristic of and almost endemic to the northern part of the Egyptian Western Desert. It seems linked to the great oases formed in aeolian depressions reaching the water table, a land feature characteristic of this desert, and to the interdunal valleys populated with acacias (Flower, 1932; Osborn & Helmy, 1980; Ayyud & Ghabbour, 1986; Le Houérou, 1986; Goodman *et al.*, 1986; Saleh, 1987, 1997; Zahran & Willis, 1992). It is or was noted in Siwa in the northwest, the Quattara depression, Wadi Natroun and Wadi el Ruwayan near the lower Nile, in the Nile valley, in dune fields between Faiyum and the Quattara depression (Osborn & Helmy, 1980), in Bahariya (Saleh, 1987), and in Kharga (Elbadry, 1998). It has also been found in the same chain of oases beyond the Libyan border in Jaghbub (Bundy, 1976; Essghaier, 1980; Goodman *et al.*, 1986). The Slender-Horned Gazelles noted more to the west in Libya, in particular near Ajdabiyah in western Cyrenaica and near Dahra, north of Zella (Hufnagl, 1972; Essghaier, 1980), may also belong to the nominal form.



Gazella leptoceros. Enclosure. Djebil NP. Tunisia. 2005.

© Tania Gilbert. Marwell Preservation Trust.



Gazella leptoceros. Enclosure. Sidi Toui and Oued Dekouk NP. Tunisia.
 © Renata Molkanova & Roseline.C. Beudels. IRScNB

Gazella leptoceros loderi is a typically Saharan antelope, linked to sand deserts, and characteristic of the central Sahara (Dragesco-Joffé, 1993). Its distribution does more or less coincides with that of the large zones of Saharan ergs (Walter & Breckle, 1986). Loder's Gazelle seems however to be absent in the westernmost complexes, to have its principal distribution in the central archipelago, and to be rare or absent in the southeast periphery. In the west, it has not been found either in the great dunal group, mostly Mauritanian, of the Ouarane-Djoug-Majâbat Al-Koubra, or in the Algero-Mauritanian group of the Iguidi and Chech ergs (Lavauden, 1926; Monod, 1958; Dupuy, 1967; De Smet, 1989; Kowalski & Rzebik-Kowalska, 1991; Dragesco-Joffé, 1993). The only observation of *Gazella leptoceros* in Morocco comes from the region of Boumia southeast of the High Atlas during the 1950's (Loggers *et al.*, 1992). This record, situated outside the species' habitat, corresponds to the movements of large amplitude observed in years of great drought (Heim de Balsac, 1928). The center of gravity of the distribution of *G.l.loderi* is located in the Great Western Erg, the Great Eastern Erg, the sandy zone which stretches from the Hamada de Tinrhert in Algeria to the Fezzan in Libya, and the smaller ergs in the periphery of the central Saharan massifs of the Hoggar and the Tassili des Ajers, in particular the Ahmer erg (Setzer, 1957; Dupuy, 1967; De Smet, 1989; Kowalski & Rzebik-Kowalska, 1991; Dragesco-Joffé, 1993; Kacem *et al.*, 1994; Khattabi & Mallon, 1997), a region where its presence has long been known and in which it was thought limited (Sclater & Thomas, 1898; Trouessart, 1905; Lavauden, 1920, 1926; Joleaud, 1929). Its distribution in the ergs surrounding the massifs of the Hoggar and the Tassili could extend to Mali in the Tanezrouft (De Smet, 1989) and to the vicinity of the Adrar des Iforas (Pavy, 1996). In the ergs of the southern and eastern Sahara, data are very few, either because the species is very rare, or because of the difficulties of observation. Precise data are grouped in three regions: the Ténéré in Niger, the periphery of the Tibesti, and the ergs which lay from the Borkou in northeastern Chad to southeastern Libya. The Great Ténéré Erg is poor in vegetation, yet a plant community is growing there which is similar to the formations of *Aristida*, *Cornulaca*, and *Calligonum* in the central Sahara (Quézel, 1965; Ozenda, 1991), formed by the perennial graminids *Stipagrostis acutiflora*, *S. plumosa*, *S. uniplumis*, *S. vulnerans*, *Cyperus conglomeratus*, the suffrutescent *Molkiopsis ciliata*, and the ligneous *Cornulaca monacantha* (Poilecot, 1996a, annex 17). Jones (1973) and Newby observed the species there, in small numbers, on the edge of the Air (Jones, 1973; Grettenberger & Newby, 1990; Poilecot, 1996b). In the Tibesti, the species was noted by Malbrant (1952) near Bardaï and Soborom, in the north of the massif. A small number of data, relatively indirect, delimit an area of presence between the zone of the Erdi and the Mourdi depression in the Borkou of northeastern Chad and the Jebel Uweinat at the borders of Libya, Sudan, and Egypt. This is a region in which a number of dunal systems stretch more or less from southwest to northeast. At the Chadian extremity of this zone, Edmond-Blanc *et al.* (1962) gathered, secondhand, some indications of presence. At the Libyan extremity, Misonne (1977) found three skulls on the border of the Jebel Uweinat massif. Recent data also exist from the Gilf El Kebir in Egypt (Elbadry, 1998). The subspecific affinities of these southern and southeastern animals are not known, but what is known of their ecology brings them close to *G. l. loderi*. Outside these regions, hypotheses of presence exist but apparently not observations. Mentions of it in Mali (Heringa, 1990; Duvall *et al.*, 1997) are based on its inclusion in a table by Newby (1982) without there seeming to be any data, except perhaps from nearby Algerian regions. Sayer (1977) and Sidiyène & Tranier (1990) indicate its absence in the entire country, and in the Adrar des Iforas in particular. Mentions of it in Sudan (Wilson, 1980) come from an optimistic interpretation of Edmond-Blanc *et al.*'s data from Chad (1962).

2.2.2. Decline of the range.



Niger. Sand, dunes and accacia. © John Newby

Gazella leptoceros leptoceros has vanished from most of its range in the Egyptian Western Desert. In the 1980's, the species was considered extinct in 5 of its 6 known localities in the eastern part of the Western Desert and very rare in the last, the complex of the Wadi el Ruwayan and its extension, the Wadi Muweilih, where a small group of about 15 animals was surviving; this group was later exterminated (Saleh, 1987, 1997). In the western part of the desert, around the Quattara depression and the Siwa oasis, its status was uncertain (Saleh, 1987). The situation was not known, either, in Libya, where in the 1970's, Essghaier (1980) noted groups of 10 to 20 around Jaghub.

For *Gazella leptoceros loderi* there is no objective indication of range contraction. There are however incontestable signs of decreasing numbers.

2.2.3. Residual distribution.

G. l. leptoceros was eliminated from the biggest part of its range of distribution in the Egyptian Western Desert. In the 1980s, the species was considered extinct in five of its six known localities in the eastern part of the Western Desert and very rare in the sixth, the complex of the Wadi el Ruwayan and its extension, the Wadi Muweilih. In the western part of the desert, around the Quattara depression and the Siwa oasis, its status was uncertain (Saleh 1987). The small group of about 20 animals that was surviving in the Wadi el Ruwayan has been exterminated since then (Saleh 2001). Small groups (2-6) of Slender-Horned Gazelle were observed and photographed west of the Siwa oasis in 1998 (T.J.Wacher pers. comm.), but the situation has become uncertain since reports of more than 20 being killed by a single hunting party in that region in 2005. Small numbers may possibly persist in other parts of the the Quattara depression, the Jaghub oasis, and the Kharga oasis (Devillers et al. 1999, 2006; Saleh 2001). It's current status in Libya is unclear

There are relatively recent observations in most of the historical zones of distribution of *Gazella leptoceros loderi*. In Algeria, the species is distributed east of a line Saoura - Wadi Messaoud, in the Great Western Erg, the Great Eastern Erg, the Hamada de Tinrhert, and the smaller ergs around the central Saharan massifs of the Hoggar and the Tassili des Ajjers, in particular the Ahmer erg (Sclater & Thomas, 1898; Trouessart, 1905; Lavauden, 1926; Joleaud, 1929; Dupuy, 1967; De Smet, 1989; Kowalski & Rzebik-Kowalska, 1991; Dragesco-Joffé, 1993). In Tunisia, *Gazella leptoceros loderi* is present in unknown numbers, probably relatively low, in the Great Eastern Erg (Lavauden, 1920; Dragesco-Joffé, 1993; Kacem *et al.*, 1994). In Libya, the distribution of central Saharan populations of *Gazella leptoceros loderi* includes the sandy zones of the Fezzan where there have been recent observations (Setzer, 1957; Hufnagl, 1972; Khattabi & Mallon, 1997). The species probably still occurs in Mali. The range of populations of *Gazella leptoceros loderi* living in the ergs surrounding the massifs of the Hoggar and the Tassili indeed probably extends as far as Mali in the Tanezrouft (De Smet, 1989) and in the vicinity of the Adrar des Iforas (Pavy, 1996).

2.2.4. Recolonisation prospects.

Gazella leptoceros leptoceros

The habitats in most of the oases of the Lybian Desert of Egypt have been profoundly modified by agriculture and urbanization (Goodman *et al.*, 1986). For a small species linked to the dunes and the peripheral acacia formations, it is probable that sufficient potentialities have survived around most of them (Saleh, 1987). Some of these have nevertheless been gravely affected by major infrastructure work (Saleh, 1987, 1997). The Siwa oasis is probably a particularly important site, for this species as for other antelopes. The two areas mentioned by Essghaier, the regions of Al Jaghub and Al Haruj al Aswad, should also be prospected.



Gazella leptoceros. Male. Female and her fawn. Young born in Sidi Toui National Park. Tunisia. © Renata Molcanova

Gazella leptoceros loderi

The erg habitat which Loder's Gazelle prefers is affected relatively little by the anthropic pressures that bear on most of the Sahelo-Saharan region, although Le Houérou (1986) and Karem *et al.* (1993) note the mutilation of ligneous species for firewood. The reoccupation of possibly lost range would thus not seem very difficult, especially since the species has a high rate of reproduction and exhibits migratory or erratic behaviour, two characteristics that suggest a reasonable colonisation potential. Locally, restoration of the vegetation cover might be necessary, and in all cases protection against human predation and excessive disturbance should be ensured.

2.3. Evolution and estimation of populations.

At the beginning of the 1980's, *Gazella leptoceros leptoceros* was only surviving in small, widely dispersed groups, especially near uninhabited oases and in the Wadi El Rayan (Saleh, 1987). The numbers which seem to survive in the Egyptian northwest and perhaps in Kharga are certainly very low (Elbadry, 1998). It is probably the same for the possible remnant Libyan populations.

Population size of *Gazella leptoceros loderi* is very difficult to estimate. It seems clear, however, that it was much more abundant in the Algeria-Tunisia Great Ergs at the end of the 19th century and at the beginning of the 20th century than it has been in recent years. Large numbers were found, apparently relatively easily, by several naturalists of this period (Sclater & Thomas, 1898; Lavauden, 1926; Heim de Balsac, 1928, 1936) whereas Le Houérou (1986) notes having seen only one throughout twenty-five years of prospecting for mapping the vegetation of North Africa.

Recent surveys in Tunisia (CMS, Jan-Feb and April-May 2006) confirm that the Slender-horned Gazelle is still present through the Tunisian part of the Great Oriental Erg from Djebil National Park to Senghar National Park, but that densities are probably very low. Evidence of poaching and disturbance is high. Observations suggest it is possible the Tunisian population may number a few hundred individuals, but more data are needed to verify this preliminary assessment (T.Wacher, pers.comm. 2006)

2.4. Migration.

Loder's Gazelle and the Slender-horned Gazelle move frequently between desert depressions in search for food (Kacem *et al.*, 1994; Saleh, 1997). Larger movements, likely to carry the species far from its preferred habitat, take place under the effect of long and severe droughts (Heim de Balsac, 1928).

These migrations have a cross-border character, at least between Algeria and Tunisia and between Egypt and Libya. It is also possible between Algeria and Mali, between Libya and Chad, and perhaps between Libya, Egypt or Chad and the Sudan.

3. CONSERVATION STATUS, BY PARTY

Morocco : Accidental

The only observation of *Gazella leptoceros* in Morocco is from the region of Boumia, southeast of the High Atlas, during the 1950's (Loggers *et al.*, 1992). This record, situated outside the species' habitat, corresponds to the movements of large amplitude observed in years of great drought (Heim de Balsac, 1928).

Algeria: Probably endangered

The centre of gravity of the range of *Gazella leptoceros loderi* is in Algeria, east of a line Saoura - Wadi Messaoud, in the Grand Erg Occidental, the Grand Erg Oriental, the Hamada de Tinrhert, and the smaller ergs around the central Saharan massifs of the Hoggar and the Tassili des Ajjers, in particular the Ahmer erg (Sclater and Thomas, 1898; Trouessart, 1905; Lavauden, 1926; Joleaud, 1929; Dupuy, 1967; De Smet, 1989; Kowalski and Rzebiak-Kowalska, 1991; Dragesco-Joffé, 1993).

Tunisia: Probably endangered

Loder's Gazelle is present in unknown, probably relatively low, numbers in the Grand Erg Oriental (Lavauden, 1920; Dragesco-Joffé, 1993; Kacem *et al.*, 1994).



Gazella leptoceros in semi-captivity, in an enclosure at 180 km south of Brezina. El Bayadh Province – South-East of Alger. 2002. Algeria. © Amina Fellous - ANN

Libya: Probably endangered

The distribution of central Saharan populations of *Gazella leptoceros loderi* includes the sandy zones of the Fezzan, where there have been recent observations (Setzer, 1957; Hufnagl, 1972; Khattabi and Mallon, 1997). *Gazella leptoceros leptoceros* is noted in the surroundings of the Jaghbub oasis, where small groups have been observed (Essghaier, 1980). Slender-horned Gazelles noted more to the west in Libya, in particular, near Ajdabiyah in western Cyrenaica and near Dahra, north of Zella (Hufnagl, 1972; Essghaier, 1980), may also belong to the nominate form.

Egypt: Endangered

The principal range of *Gazella leptoceros leptoceros* was situated in the northern part of the Egyptian Western Desert (Flower, 1932; Osborn and Helmy, 1980; Ayyud and Ghabbour, 1986; Le Houérou, 1986; Goodman *et al.*, 1986; Saleh, 1987, 1997; Zahran and Willis, 1992). It is or was noted in Siwa in the northwest, in the Quattara Depression, Wadi Natroun and Wadi el Ruwayan near the lower Nile, in the Nile Valley, in dune systems between Faiyum and the Quattara Depression (Osborn and Helmy, 1980), in Bahariya (Saleh, 1987), and in Kharga (Elbadry, 1998). It seems to survive west of the Siwa oasis (Elbadry, 1998), perhaps also around the Quattara Depression (Salet, 1987, 1997; Elbadry, 1998) and the Kharga oasis (Elbadry, 1998). *Gazella leptoceros loderi* perhaps survives in small numbers in the extreme southwest of the country (Saleh, 1987, 1997; Elbadry, 1998).

Mali: Status uncertain

The population of *Gazella leptoceros loderi* living in the ergs surrounding the massifs of the Hoggar and the Tassili probably extend as far as Mali in the Tanezrouft (De Smet, 1989). The one mentioned in the vicinity of the Adrar des Iforas (Pavy, 1996) is now probably extinct (Lamarque, com. pers.).

Niger: Probably endangered

The species was noted in small numbers in the contact zone between the Aïr and the Ténéré (Jones, 1973; Grettenberger and Newby, 1990; Poilecot, 1996b).

Chad: Probably endangered

The species seems rare in Chad where it is noted in two regions, the north of the Tibesti (Malbrant, 1952) and the region of the Erdi and the Mourdi depression in the Borku (Edmond-Blanc *et al.*, 1962; Thomassey and Newby, 1990). There do not seem to be recent data in either of these regions.

4. ACTUAL AND POTENTIAL THREATS

4.1. Degradation and decline of habitats.

Gazella leptoceros leptoceros

The subspecies occupies habitats (acacia woodlands, dunes surrounding oases) which are directly threatened by human pressure. Projects of putting desert depressions under water (Quattara, Wadi El Rayan) are a direct and indirect threat to some of the most important habitats for the survival of residual populations of this subspecies.

Gazella leptoceros loderi

The habitats of this subspecies are less sensitive to human pressure than those of other Sahelo-Saharan antelopes. However, Le Houérou (1986) and Karem *et al.* (1993) document clear cases of overexploitation and degradation of erg vegetation, especially its ligneous components.

4.2. Direct exploitation.

The decline of *Gazella leptoceros loderi* and the near extinction of *Gazella leptoceros leptoceros* have to be attributed primarily to uncontrolled hunting (Saleh, 1987, 1997; Kacem *et al.*, 1994). Traditional hunting could have had a substantial impact on local populations (Sclater and Thomas, 1898) but it is modern hunting with firearms and motor vehicles (Newby, 1990) which constitutes the primary threat, likely to drive the species to extinction. .

4.3. Other threats. There are no other known threats.

5. REGULATORY PROVISIONS

5.1. International.

Bonn Convention: Appendix I, Resolution 3. 2, paragraph 4.
Washington Convention (CITES): Appendix III (Tunisia)

5.2. National.

Totally protected in Algeria, Tunisia, Libya, Egypt, and Niger



Gazella leptoceros. Enclosure. Djebil NP. Tunisia. 2005.
© Tania Gilbert. Marwell Preservation Trust.

6. CONSERVATION MEASURES, BY PARTY

6.1. Ban on taking.

Algeria, Tunisia, Libya, Egypt, Niger : protected

6.2. Habitat conservation.

Algeria

The Hoggar and the Tassili des Ajjers National Parks probably have populations of the species (Bousquet, 1992) or would be capable of harbouring them.

Tunisia

Djebil National Park was designated especially for the conservation of the species (Dragesco-Joffé, 1993; Kacem *et al.*, 1994).

Niger

The species is present in the Air-Ténéré National Nature Reserve (Poilecot, 1996b).



Public awareness and data gathering
© Marie-Odile Beudels-IRScNB.

6.3. Attenuation of obstacles for migratory animals.

Only protection within a network of protected areas, especially cross-border protected areas, is plausible.

6.4. Regulations concerning other detrimental factors.

Such regulations can only be taken within a framework of management plans for protected areas. This paragraph consequently merges with paragraph 6.2.

6.5. Other measures.

The species appears to exist in captivity in about twenty institutions in North Africa, Europe, and North America. It does not seem that the sub-species *Gazella leptoceros leptoceros* is part of this stock of mainly Tunisian origin (Kingswood, 1995, 1996).

7. RESEARCH ACTIVITIES

7.1. Public authorities.

7.2. N.G.O.s

8. NEEDS AND RECOMMENDED MEASURES

Recommended measures are included in the CMS Action Plan (Beudels *et al.*, 1998).



Acacias and dunes. Niger © John Newby



*in P.L. Sclater & Thomas. 1897.
The book of Antelopes.*

Gazella cuvieri



The Chambi massif is part of the tunisian dorsale. It is constituted by a remarquable succession of vegetation communities with

**Roseline C. Beudels-Jamar, René-Marie Lafontaine and Pierre Devillers
Institut royal des Sciences naturelles de Belgique**

Gazella cuvieri

1. TAXONOMY AND NOMENCLATURE



1.1. Taxonomy.

Gazella cuvieri belongs to family Bovidae, subfamily Antilopinae, tribe Antilopini, which comprises about twenty species in genera *Gazella*, *Antilope*, *Procapra*, *Antidorcas*, *Litocranius*, and *Ammodorcas* (O'Reagan, 1984; Corbet & Hill, 1986; Groves, 1988). Genus *Gazella* comprises one extinct species, and from 10 to 15 surviving species, usually placed in three subgenera, *Nanger*, *Gazella*, and *Trachelocele* (Groves, 1969, 1988; Corbet, 1978; O'Reagan, 1984; Corbet & Hill, 1986). *Gazella cuvieri* is generally included in the subgenus *Gazella* and considered a monotypic species (O'Regan, 1984; Corbet and Hill, 1986). Groves (1969) treated it as a northern representative of the Sahelo-Sudanese gazelle *Gazella rufifrons*, but later (Groves, 1988) confirmed, on the contrary, its isolation in the genus *Gazella*, and made it the only element in one of the five groups into which he divides this difficult genus.

Gazella cuvieri. Chaambi NP. Tunisia.
© R.Cl. Beudels-Jamar - IRScNB

1.2. Nomenclature.

1.2.1. Scientific name.

Gazella cuvieri (Ogilby, 1841)

1.2.2. Synonyms.

Antilope corinna, *Antilope cuvieri*, *Gazella vera*, *Gazella cineraceus*, *Gazella kevella*, *Dorcas subkevella*, *Dorcas setifensis*

1.2.3. Common names.

English: Cuvier's Gazelle, Edmi Gazelle, Edmi, Atlas Mountain Gazelle

French: Gazelle de Cuvier, Gazelle de montagne

German: Echgazelle

Arabic: *Edmi*, *Ledm* or *Edem* (Algeria and Tunisia), *Dama* (Eastern Morocco), *Harmouch* (South-western Morocco)

1.2.4. Description.

Cuvier's Gazelle is a fairly robust gazelle, larger than the Dorcas and Slender-horned Gazelles. The hair is rather long, rough and coarse. The general colour of the coat is dull fawn, darker than that of the Dorcas Gazelle. Face markings are distinct. The central band is brownish fawn, with a black patch on the top of its nose. The front of the muzzle is white. A dark line joints the mouth to the eye. There is a brown band, darker than the back, along the flanks. The belly and rump patch are white, the rump patch surrounded by a fairly indistinct dark band. The tail is black. The horns are long (25-37 cm), thick in the male, strongly annulated, fairly straight, rising vertically before diverging slightly out and back; the smooth tips curving in and forwards. (Slater and Thomas, 1897; Groves, 1988; Kingdon, 1997). Shoulder and hindquarter heights are similar (Panouse 1957). Females are smaller than males (average weight for female = 30 kg, for male = 35 kg, Abaigar, comm. pers.).

TL (male and female): 105-116 cm;
T (male and female): 19 - 21 cm;

Greatest length of skull about 20 cm; facial stripes well marked; males without a swelling on the throat (N.W Africa) (Corbet, 1978).

H: 60-80 cm

Shoulder height: up to 68 cm

Pp: 33 cm; Ear: 17 cm;

Weight : 15-35 kg; Female: 15 - 20 kg (33 - 44 lb); Male: 20 - 35 kg (44 - 77 lb).

Horns: 309.7 +/- 21.1¹ (3 Males); 204.2 +/- 22.8 (6 Females) Groves, 1969

Trophy: Record 378 mm, Algeria, G.K. Whitehead.

2. BIOLOGY OF THE SPECIES

2.1. General Biology

2.1.1. Habitat.

Cuvier's Gazelle occurs from sea level to an altitude of 2.600 m (Cuzin, 2003). It lives mainly in hills and low mountains, but may frequent piedmont plains as well as very steep slopes, of up to 45° (Cuzin, 2003). It avoids heavy snow cover areas, where it may be present only in summer (Cuzin, 2003). The species seems mainly characteristic of the middle and low slopes of the folds in the Maghreb, occupying the relatively dry forests of semi-arid Mediterranean type dominated by *Pinus halepensis*, *Juniperus phoenicea*, *Tetraclinis articulata*, *Cedrus atlantica*, *Quercus ilex*, *Argania spinosa* and perhaps, before their destruction, *Olea europaea*, with an undergrowth of maquis or garrigue which can be relatively thick or relatively open, and often includes *Rosmarinus officinalis*, *Phyllirea angustifolia*, *Pistacia lentiscus* and *Globularia alypum* (Sclater & Thomas, 1898; De Smet, 1989, 1991; Karem *et al.*, 1993; Kacem *et al.*, 1994, Cuzin, 2003, Abaigar, comm. pers.). In arid Mediterranean climate, it also frequents steppes of *Stipa tenacissima* and *Artemisia herba-alba* (De Smet, 1991; Karem *et al.*, 1993), and various other kinds of steppes (Cuzin, 2003). These forests were formerly much more widespread (Le Houérou, 1986); steppes of *Stipa tenacissima* constitute the first stage of substitution and have themselves greatly regressed (Le Houérou, 1986). In the Saharan part of its range its distribution appears limited to *Argania spinosa* and *Acacia* spp. woods (Cuzin, 2003).

2.1.2. Social behaviour and food preferences.

Cuvier's Gazelle lives in small groups of 5- 6 individuals, or solitary. It favours young alfa shoots (*Stipa tenacissima*), and other grasses, young leaves of leguminous plants and Holm Oak's acorns (*Quercus ilex*). Cuvier's Gazelle needs to drink regularly. Gestation lasts around 170 days. Births, usually of a single calf, occur in April and May.

2.2. Distribution.

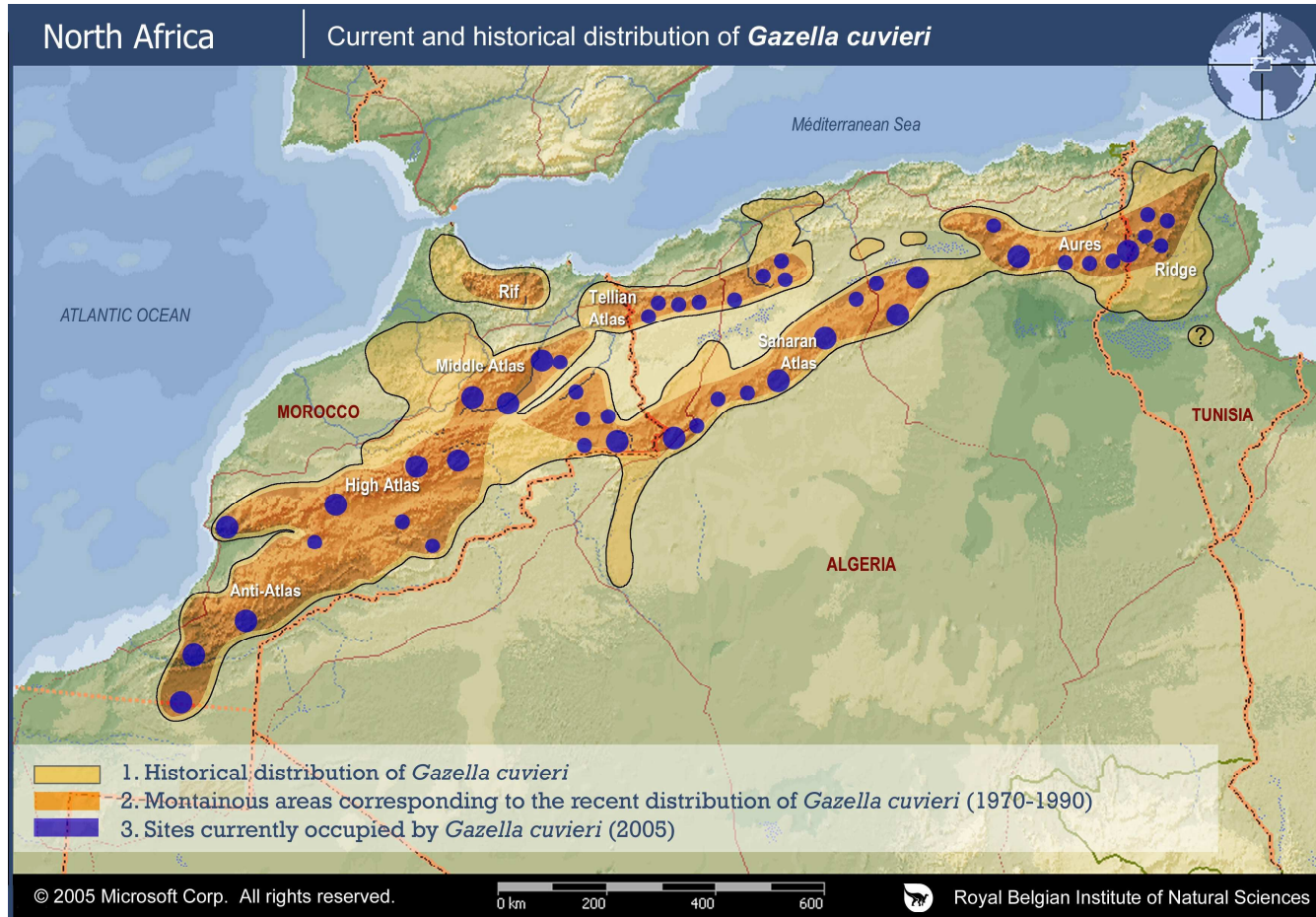
Atlas and neighbouring ranges in Morocco, Algeria and Tunisia, to the lowlands in western Morocco.

2.2.1. Historical distribution.

Cuvier's Gazelle is a species endemic to the mountain and hill ranges of the Maghreb. Its historical range locally reached the Mediterranean and Atlantic coast (e.a. Ben Slimane and the Ajou Mountains). In Morocco, it occupies all the mountain chains (eastern Rif, Middle Atlas, Great Atlas, westernmost Saharan Atlas, Anti-Atlas, pre-saharian mountains, Aydar south of the Drâa) and the associated plateaux with the exception of the western Rif. In Algeria it occupies or occupied the slopes of the Tellian chains, those of the more southern massif formed by the Saharan Atlas, the flat regs between the Saharan Atlas and the Ergs, and the massifs in the eastern part of the country (De Smet, 1991). In Tunisia it occupied the entire Dorsale and the pre-Saharan massifs (Sclater & Thomas, 1898; De Smet 1989, 1991; Kowalski & Rzebik-Kowalska, 1991; Loggers, 1992; Kacem *et al.*, 1994; Cuzin, 1996). Erlanger (1997), in his account of hunting safaris of 1896 and 1897, reported its presence in the massifs south of the chotts. De Beaux (1928) notes the discovery of a Cuvier's Gazelle horn in Al Jaghbug, in the east of Libya, specifying that its source was unknown. It is the only mention of the species for the country; its occurrence in Libya is not otherwise confirmed.

2.2.2. Decline of the range.

In Morocco, the range of *Gazella cuvieri*, which covered the whole of the mountain chains and associated plateaux, diminished considerably during the 20th century: in the 1930's (or possibly later), it disappeared from the lower Seguia El Hamra, in the 1960's, from the region of Rabat and Casablanca, from several localities in the Middle Atlas at the same time (Cuzin, 1996).



In Algeria, it occupied the slopes of the Tellian chains, those of the more southern massif formed by the Saharan Atlas, and the massifs in the eastern part of the country (Tristam, 1860; Loche, 1867; Pease, 1896; Joleaud, 1929; Heim de Balsac, 1936). It disappeared from a large part of the Tellian Atlas to the east of Teniet el Had, but it was still noted in a few areas of the Mediterranean coast until about 1930 (Joleaud, 1926; Lavauden, 1929; Seurat, 1930).

In Tunisia, where it occupied the area from the Ridge to the region of Tunis, and the pre-Saharan massifs, it was still fairly abundant in 1936 in the entire Tunisian Ridge from the Algerian border to the Djebel Bou Kornine 17 kilometers south of Tunis (Kacem *et al.*, 1994). The species no longer survived in the 1970's except in the vicinity of the Djebels Chambi and Khchem El Kelb between Kasserine and the Algerian border (Kacem *et al.*, 1994); in Dghoumes National Park east of Tozeur, it survived until 1992 (A.Chetoui, head of nat.park, pers.comm.).

2.2.3. Residual distribution.

If until the recent past, the general distribution of Cuvier's Gazelle had not changed much in relation to its historical range, the species is now in sharp geographical decline in Morocco. In most of its range (Eastern Morocco, High, Middle and Saharan Atlas), populations seem to be highly fragmented. Recent discoveries, confirming older data, made it possible to localise substantial populations in Western Anti Atlas and further in the South, in North-western Sahara, with an extension of known range towards the south between the lower Drâa and the Aydar massif (Aulagnier *et al.*, 2001; Cuzin, 1996, 2003).

In Algeria, the range of distribution of Cuvier's Gazelle is limited to the northern part of the country: it is not found anymore in the north of the Tellian Atlas. The species has only recently disappeared from a few localities and these are mainly in the north of its range of distribution. The populations of the western Tellian Atlas, Batna-Biskra, and the Aurès mountains are no longer contiguous, and some groups of the Saharan Atlas were recently eliminated (De Smet & Mallon, 2001).

In Tunisia, after having reached very low numbers, the population currently seems to be increasing and is spreading out again (Kacem *et al.*, 1994), essentially as a consequence of the efficient conservation measures implemented in and around Chambi National Park. For the Ridge in general, observations made in 1991 in the region of Siliana indicate that it is progressing towards the northeast, mainly from the principal population core in the surroundings of the Chambi National Park.

2.2.4. Recolonisation prospects.

This species is mobile and can rapidly recolonise sites occupied in the past insofar as passages remain possible, in particular if calm zones with waterholes exist between the sites. The Tunisian project of fixation of the species and natural recolonisation has had good results, and the Tunisian Government proposes continuing the implementation of a network of protected areas in which management measures similar to those applied in the Khchem el Kelb Reserve will be taken to encourage the redeployment of Cuvier's Gazelle along the full length of the Dorsale. In Morocco, the recent localisation of substantial populations in the south between the lower Drâa and the Aydar massif opens up new, interesting prospects for the conservation of the species.

2.3. Evaluation and evolution of populations.

Current numbers

Estimated numbers : 1450-2450 (Morocco: 600-1500; Algeria: 560 ; Tunisia: 300-400).

In **Morocco**, the total population is currently estimated at between 600 and 1500 individuals including a population of several hundred individuals recently rediscovered in the lower Drâa (Aulagnier *et al.*, 2001, Cuzin, 1996, 2003). The main populations are in the Western Anti Atlas (population increasing) and in the Lower Drâa-Aydar area (population decreasing), but small groups are spread on the Southern slopes of the High Atlas, in the Eastern High Atlas, in the Saharan Atlas, in the Central and Eastern Anti Atlas, and on the Southern slopes of Middle Atlas (Cuzin, 1996, 2003; Caron *et al.*, 2004).

In **Algeria**, a study of the distribution and numbers of the species carried out at the end of the 1980's estimated the population at 445 individuals (Sellami *et al.*, 1990); De Smet in 1987 estimated the population at minimum 400 individuals and perhaps 500 (De Smet, 1987); in 1991 his estimates were of 560 individuals of which 235 in the Tellian Atlas (sites 1 to 5 in the table below), 140 in the Saharan Atlas (sites 6 to 12, 14 and 15), 135 in the east (sites 16 to 19), and 50 in the central group of the Mergueb (site 13) (De Smet, 1991); the table summarizing the distribution and numbers of *Gazella cuvieri* is taken from De Smet (1991):

1	Sidi Bel Abbes-Tlemcen-Telagh	50 individuals
2	Saida	20
3	Mascara	20
4a	Tjaret Frenda	100
4b	Djebel Nador	30
5	Ouarsenis Mountain	15
6	El Bayad - Brezina	10
7	Aflou-Laghout	10
8	Ain Sefra-El Abiod Sidi Cheik	10
9	Bechar-Taghit	20
10	Djebel Senalba (Djelfa)	30
11	Djebel Sahari Hunting Reserve	20
12	Guelt es Stel	10
13	Mergueb Nature Reserve	50
14	Bou Saada	20
15	Djebel Bou Kahil	10
16	South Aurès (including Beni Imloul and Barika)	30
17	East of Biskra	15
18	Némentcha Mounts	10
19	Forests of Tebessa	80
	Total	560

In **Tunisia**, the number of Cuvier's Gazelles is not known with precision; currently, the main population in the region of Chambi National Park is estimated at 300 individuals (Kacem *et al.*, 1994), and the total population is at least a little higher. The species is found, in fact, in 13 hunting reserves and massifs, listed below (Kacem *et al.*, 1994):

1	Djebel Khchem el Kelb	2900 ha (Faunal Reserves 300 ha)
2	Dj. Serraguaia	3000
3	Dj. Gaubeul	3000
4	Dj. Tamesmida	5000
5	Dj. Dernaia	16000
6	Dj. Chambi	10000 (National Parks 6723 ha)
7	Dj. Semmama	12000
8	Dj. Seloum	8000
9	Dj. Es Sif	10000
10	Dj. Hamra	3500
11	Dj. Bireno	3000
12	Ain Bou Driss 1 st Series	3000
13	Oum Djeddour	3000
	Total	82400 ha

There is no precise figure on the former numbers of Cuvier's Gazelle, but it was reputed to be common and locally abundant (e.a. Heim de Balsac, 1936). Harper (1945) cites Cabrera who mentioned it in 1932 as particularly numerous in the central part of the Middle Atlas, the territories of Beni Mguild and Ait Aiach, and the length of the contact line between this chain and the High Atlas. Also in 1932, Carpentier notes that it was formerly abundant in the Zaian district near Sidi Lamine and Khenifra (central Morocco).

2.4. Migration.

Joleaud (1929) mentions erratic movements and a somewhat nomadic life. On the Southern slopes of the High Atlas, animals are able to climb towards high altitude (up to 2.600m) in summer. In the High and Anti Atlas, gazelles were often present in pastures where cattle were not allowed; in the Souss plains, after the opening of a pasture to cattle, gazelles settled at a distance of 18 km (Cuzin 2003). In Northern Sahara, animals coming from the Aydar are moving in winter as far as the High Sequia El Hamra, where they are absent in summer (Cuzin 2003), and, in the Lower Drâa, animals are absent in dry pastures, and come back within a few weeks after a rainfall (Cuzin, pers. obs.).

3. CONSERVATION STATUS, BY PARTY

Morocco: Endangered

The state of conservation of the species in Morocco was described recently by Cuzin (1996, 2003), on the basis of data found in Loggers *et al.* (1992), completed by new data gathered by the Water and Forest Service, by his personal observations, and by the observations of resident and visiting naturalists; it is primarily these recent data which are used here. The species is probably extinct in north-eastern Morocco since 1985. Its range has been greatly reduced in the Ida massif or Tanane, north of Agadir. The species was recently discovered on the southern gradient of the eastern Middle Atlas, towards Outat Oulad El Haj, as well as on hills of the High Plateaux, slightly more to the east (Cuzin, 1996, 2003; Caron *et al.*, 2004). Some small groups have also been observed on the southern gradient of the central and eastern High Atlas, from the region of Ouarzazate to that of Rich, reaching an altitude of 2600 meters south of Imilchil, where the species is clearly transhumant: numerous testimonies indicate the presence of the species in summer, and its absence in winter (Cuzin, 1996, 2003). Outside of the Middle and Great Atlas, Cuvier's Gazelle was recently observed at the western extremity of the Saharan Atlas in the region of Djebel Grouz (Caron *et al.*, 2004).

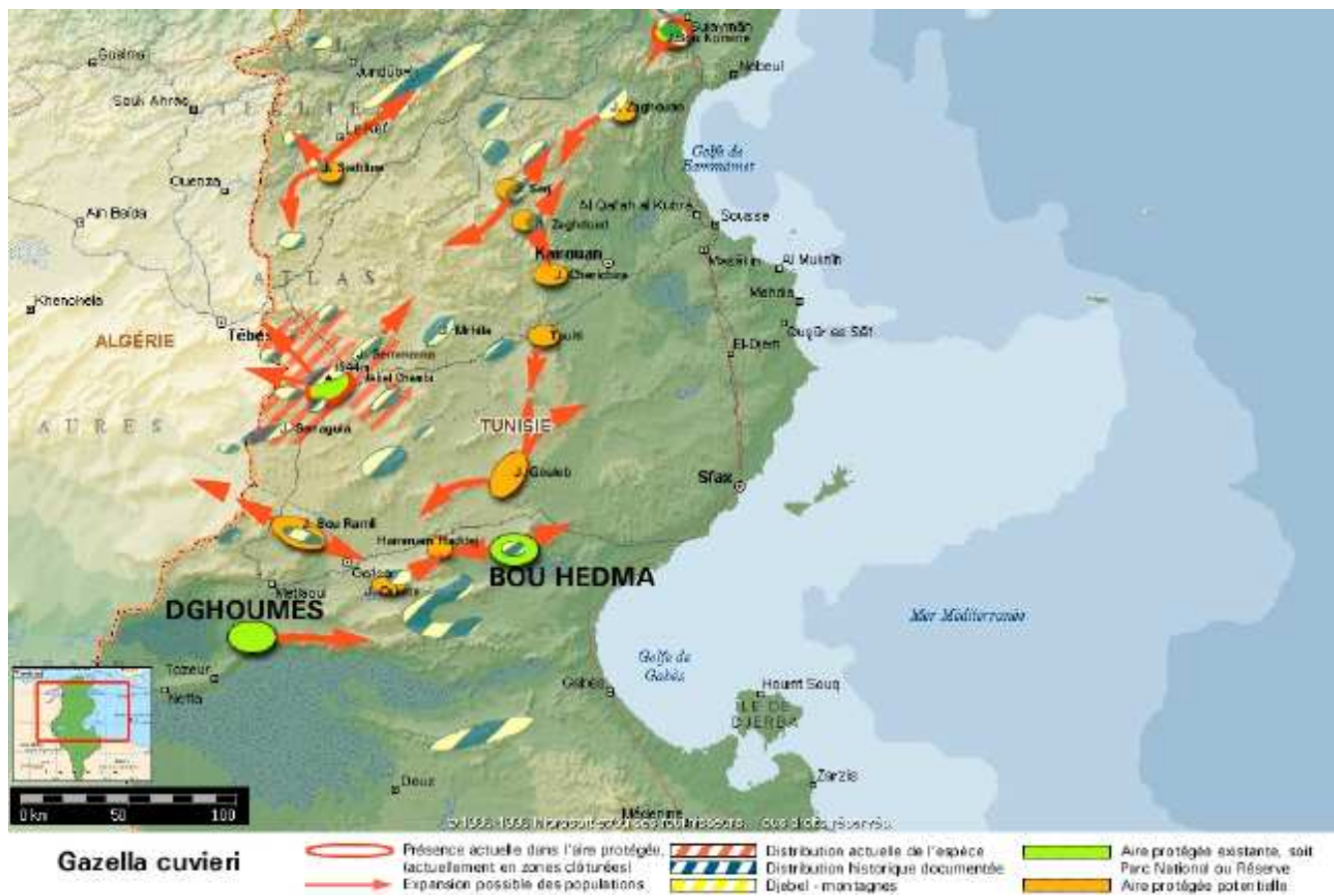
Further towards the Sahara, recent discoveries indicate substantial populations in the western Anti Atlas and the northwestern Sahara, with an extension of known range towards the south between the lower Drâa and the Aydar massif (Cuzin, 1996, 2003). A group of three animals was observed south of Foug Zguid, in 1994. In 1995, the species was found in the entire region situated from the Drâa Wadi, at about a hundred kilometres upstream from its mouth, to the last relief north-east of Smara in the Aydar. This confirmed older data (Morales Agacino, 1949; Aulagnier & Thévenot, 1986) and pushed the southern limit of known distribution southwards by about sixty kilometres (Cuzin, 1996).

Algeria: Endangered

The state of conservation of the species in Algeria was recently described by De Smet (1989, 1991) and De Smet *et al.*, (in press), and it is mainly these recent data which are used here. In the northwest of the country, Cuvier's Gazelle is much more widespread than what was thought. Almost all the large national forests of Aleppo Pines (*Pinus halepensis*) shelter small populations and there are contact zones between the majority of these populations. It is also relatively common in the hills between Mascara, Relzane, Tiaret, and Freneda, living there in open countryside with a mosaic of grain crops, vineyards, and pasture lands at the top of the hills. In the Saharan Atlas, most of the summits which are higher and less disturbed still harbour small groups of Cuvier's Gazelle, the most substantial one of these being near Djelfa (Khirreddine, 1977). The most recent information indicates that some of these populations are growing. The most eastern populations are found in the Aurès, the Némentcha mounts, and the hills near the Tunisian border. Near Tebessa there is a concentration of Cuvier's Gazelles, which move to and from the Chambi National Park in Tunisia; further south, they also cross the border back and forth in the Tamerza region.

Tunisia: Endangered

In the 19th century, Cuvier's Gazelle was present in all the Tunisian mountains, especially in the high chains of the Ridge in the region of Kasserine, in the northern chains of the Ridge near Ghardimaou, Tunis, and Zaghouan, and in the southern pre-Saharan chains around Gafsa and Tamerza. Its range of distribution had considerably decreased until the 1970's, before the Forest Office took energetic measures, and the numbers had fallen very low. Important measures of habitat management for Cuvier's Gazelle, combined with measures to protect the species, have recently enabled the Tunisian Forest Office to greatly improve the state of conservation of Cuvier's Gazelle; the objectives of the Tunisian program aim to naturally recolonize the historical range of distribution.



4. ACTUAL AND POTENTIAL THREATS

The species has declined over its entire range owing to the increase in human pressure, essentially in the form of direct taking, but also because of the transformation of wooded zones into pastures and cropland.

4.1. Degradation and decline of habitats.

The degradation and decline of habitats is mainly due to the continuous expansion of pastureland for livestock and the deforestation for agriculture or charcoal. As a consequence, the numbers have been severely reduced and the range

fragmented. This cause was identified, at least in Morocco, as the main threat at the present time (Aulagnier and Thévenot, 1986). The vast majority of natural forests have now been destroyed and it is not sure that Cuvier's Gazelle can adapt to plantations of rapid-growth pines. *Gazella cuvieri* seems less tolerant of disturbance than *Gazella dorcas*.

Tolerance to disturbance seems very variable. In areas inhabited, Cuvier's Gazelle can tolerate the proximity of humans, and seems capable of surviving in areas less than 2 kilometers from small villages, and regularly cross important local roads. In desertic areas, the gazelles will disappear even in presence of temporary settlements. However, even in inhabited areas, Cuvier's gazelles prefer unused or forbidden pastures where food is abundant and disturbance reduced (Cuzin 2003).

4.2. Direct exploitation.

Excessive hunting and taking have strongly contributed to the decline of Cuvier's Gazelle. Even though its preferred habitat ensures a better protection against hunters in vehicles than that of other species of North African gazelles (De Smet *et al.*, in press), the species is still subject, at least locally, to high poaching pressure. Its populations have thus been reduced, in places, to a few dispersed groups.

4.3. Predation by dogs.

In inhabited area, Cuvier's Gazelle reproduction is rare. Young predation by dogs are at least very possible (Cuzin 2003).

5. REGULATORY PROVISIONS

5.1. International.

Bonn Convention : Appendix I, Resolution 3. 2, paragraph 4. Washington Convention (CITES): Appendix I

5.2. National.

Completely protected in Algeria, Tunisia, and Morocco

6. CONSERVATION MEASURES, BY PARTY

6.1. Ban on taking.

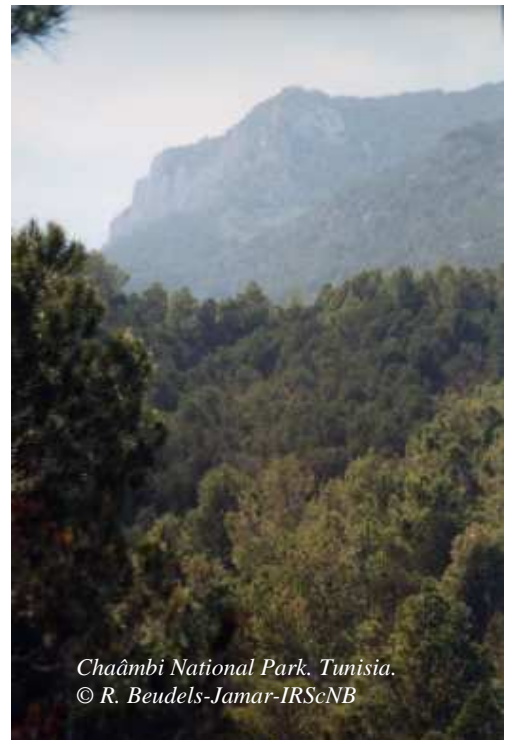
The species is protected legally and may no longer be hunted, in Morocco since 1958, in Tunisia since 1966 and in Algeria since 1975.

6.2. Habitat conservation.

Morocco: small populations are currently preserved, especially in the Outat el Haj Royal Hunting Reserve (15) and in the forestry reserve at Tafingoult (60), but in the last one, conceived for Argan tree regeneration, cattle grazing is authorized and gazelles are not present anymore. A large population, probably the largest population in the country, numbering several hundred animals, survives in pre-Saharan regions (Cuzin, 1996); a proposal currently exists to create a protected area in this region, i.e. in the basin of the lower Drâa (Müller, 1996). The creation of such a protected area would open up invaluable conservation prospects for the persistence of the species in Morocco.

Algeria : the species is found in the following protected areas: the Saharan Atlas National Park (20,000 ha; 100 gazelles), Belezma National Park (26,500 ha; number unknown), Nature Reserve of the State of Mergueb (32,000 ha; 50 gazelles), and the National Forest of the State of Djebel Senalba (20,000 ha; 30 gazelles). Small numbers of Cuvier's Gazelle also exist in three hunting reserves: the Djebel Achch Hunting Reserve (400 ha), Djebel Nadour Hunting Reserve (200 ha), and the Djebel Aissa Hunting Reserve (500 ha).

Tunisia: since 1974, the regions frequented by the Mountain Gazelle have been designated as hunting reserves, and in 1980 Chambi National Park (6723 ha) was established. Recent observations indicate that Cuvier's Gazelle is moving back again towards the northeast in the massifs of the Tunisian Dorsale. Active management measures in the Djebel Khchem el Kelb



Reserve were put into place as of 1975; the installations include fence laying on three sides of the reserve, the creation of permanent waterholes, fire trenches, provision of salt stones, additional food, and plantations of unarmed *Opuntia* cactus (rich in water and calcium). This measure is to be handled with caution, as this is an introduced species which can behave in a seriously invasive manner.

6.3. Attenuation of obstacles for migratory animals:

not relevant

6.4. Regulations concerning other detrimental factors.

It does not seem necessary to consider other special regulations for Cuvier's Gazelle in Morocco, Algeria, or Tunisia.

6.5. Other measures.

The Almeria Park, in Spain, shelters a collection of animals which reproduce in captivity. The Rabat Zoo also has captive animals.

Animals originating from Djebel Chambi were introduced into Libya (Smith, 1998), but the results of this introduction are not known.

7. RESEARCH ACTIVITIES

7.1. Public authorities.

Special attention should be devoted to the identification of bottlenecks likely to prevent or impede the dispersal and reinstallation of Cuvier's Gazelle populations, in particular in the Tunisian Dorsale, but also elsewhere in the range of the species.



*Enclosure. Bou Kornine National Parc Tunisia.
© R.C. Beudels-Jamar - IRScNB*

7.2. N.G.O.s

8. NEEDS AND RECOMMENDED MEASURES

Recommended measures are detailed in ASS-CMS Action Plans (Beudels *et al.*, 1998). The principal needs that they meet are listed below.

8.1. Total protection of the species.

Cuvier's Gazelle is included in Class A of the African Convention. Consequently, it can only be hunted or collected with the authorisation of the highest competent authorities and only in the interest of the nation or for scientific reasons. Tunisia and Morocco have ratified the African Convention while Algeria has signed it but still not ratified it.

8.2. Conservation measures.

The principal need is to ensure adequate protection, in particular by the creation of a dense network of reserves allowing the species to disperse and re-extend its range. The development of other hunting reserves, on the basis of the model of Khchem El Kelb in Tunisia, should thus enable other sites to effectively play their relay role, especially between Chambi and Bou Kornine National Parks in the Tunisian Dorsale, as well as elsewhere in the range of the species.

8.3. Localisation and monitoring of residual populations, and definition of their ecological requirements.

It seems that on the whole these populations are well-known and relatively well monitored, and this measure does not seem to be a first priority at the present time. The newly rediscovered population in the lower Drâa in Morocco deserves, however, a very special effort of censusing and protection.

8.4. Reinforcement of populations and reintroduction into the potential range.

Reinforcement of populations by individuals born in captivity has been proposed as a measure aimed at accelerating the redeployment of the species in its former range (Kacem *et al.*, 1994), for instance at Belezma National Park and Teniel el Had National Park in Algeria, or at Bou Kornine National Park in Tunisia. Such measures contribute to the overall protection strategy for the species only to the extent that the connections between the sites are ensured and permanently secured.



Gazella cuvieri. Habitat. Chaambi NP. Tunisia. © R. Beudels-Jamar - IRScNB



Gazella cuvieri. Enclosure. Bou Kornine National Parc Tunisia. © R.C. Beudels-Jamar - IRScNB



Tunisian Dorsale. One of the best known habitat of Cuvier's Gazelle. Djebel Zagouhan. © R.C. Beudels-IRScNB