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Osteomorphological Features of the Appendicular Skeleton of Gazelles, Genus *Gazella* Blainville 1816, Bohor Reedbuck, *Redunca redunca* (Pallas, 1767) and Bushbuck, *Tragelaphus scriptus* (Pallas, 1766)

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With 9 figures

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Summary

Examined the osteomorphological features of the appendicular skeleton of Grant's gazelle (*Gazella granti*), bohor reedbuck (*Redunca redunca*) and bushbuck (*Tragelaphus scriptus*). Osseous remains of these medium sized antelopes are often encountered in African late Quaternary archaeological sites, but their specific identification poses considerable problems to the archaeozoologist.

A key has been developed to meet this recurrent problem and a number of diagnostic osteomorphological features, allowing a distinction between the bovids mentioned, are established.

The osteomorphological characteristics, typical for Grant's gazelle have also been observed in the eight other extant African gazelles and in two Asian species, the goitred gazelle (*Gazella subgutterosa*) and the mountain gazelle (*Gazella gazella*).

Introduction

The following study, undertaken within the frame of our Ph. D. research on faunal remains from late Quaternary Northeast African archaeological sites (cf. PETERS, 1986 a, 1986 b), forms a second contribution concerning the osteomorphology of the appendicular skeleton of African bovids. As explained earlier (PETERS, 1988), archaeozoologists working on bone material from such sites, are often confronted with identification problems. This is due to several factors, such as for example the diversity of bovid species in the samples and the fragmentation of the bone material. On the other hand, descriptions of osteomorphological characteristics of the appendicular skeleton of African bovids are quite rare in literature (e. g. VAN NEER, 1981; GABLER, 1985, and others).

In this paper, we describe and illustrate the distinctive osteomorphological features of three medium sized antelopes, occurring in former and present-day times in considerable numbers throughout Africa, namely Grant's gazelle, *Gazella granti* Brooke 1872, bohor reedbuck, *Redunca redunca* (Pallas, 1767) and bushbuck, *Tragelaphus scriptus* (Pallas,

1766). Besides, we also verified whether the morphological features, established for Grant's gazelle, could be likewise recognised in other gazelles. Although for some *Gazella* species, the number of skeletons available for examination was quite limited, it became apparent that all species presently living in Africa shared the same osteomorphological features as those figured for Grant's gazelle below. Skeletons of the following African species *sensu* HALTENORTH/DILLER (1979: 80–88) have been examined: Soemmerring's gazelle, *Gazella soemmerringi* (Cretzschmar, 1826), dama, *Gazella dama* (Pallas, 1767), Thomson's gazelle, *Gazella thomsoni* Günther, 1884, red-fronted gazelle, *Gazella rufifrons* Gray, 1846, Speke's gazelle, *Gazella spekei* Blyth 1863, dorcas gazelle, *Gazella dorcas* (Linnaeus, 1758), Cuvier's gazelle, *Gazella cuvieri* (Ogilby, 1840), and the rhim, *Gazella leptoceros* (F. Cuvier, 1842). Finally, we also compared the features, observed by the African gazelles, with a fair number of skeletons of two Asian gazelles, namely the goitred gazelle, *Gazella subgutterosa* (Güldenstaedt, 1780) and the mountain gazelle, *Gazella gazella* (Pallas, 1766). This comparison revealed, as far as the characteristics figured below are concerned, no morphological differences.

In the course of our study, we also collected an impressive amount of osteometrical data on the different African bovid species mentioned above. This enabled us to gain an idea as to the relative size of the different skeletal parts, and also to calculate a number of indices. These data proved to be another useful tool to distinguish between the different antelope genera and species involved. Both the osteometrical data and the osteomorphological ones figured and described below are available in an extensive technical paper (PETERS, 1986 c). Because this paper is distributed on a very limited scale, we thought it useful to publish separately the results of our morphological analysis.

Material and Methods

The following results are based on a detailed analysis of the appendicular skeleton of the different antelopes mentioned before. As to the gazelles, 80 adults, including both sexes were carefully examined. However, through the unequal representation of the different *Gazella* species in the collections studied, more than 50% of the skeletons belongs to three species, more precisely *G. dorcas* (17 Sk.), *G. granti* (13 Sk.) and *G. subgutterosa* (15 Sk.). The other members of the genus *Gazella* are represented by 4 to 8 skeletons, with the exception of the very rare *G. leptoceros*, of which we only saw two specimens. From bohor reedbuck and bushbuck we respectively examined 14 and 16 skeletons of adult animals of both sexes.

The specimens studied are mainly collected in Africa north of the equator, though a number of them are Zoo-specimens. They are stored in the following institutions: the Koninklijk Belgisch Instituut voor Natuurwetenschappen, Brussels, the Koninklijk Museum voor Midden-Afrika, Tervuren-Belgium, the British Museum Natural History, London, the Laboratorium voor Paleontologie, Gent, and the Institut für Palaeoanatomie, Domestikationsforschung und Geschichte der Tiermedizin, München.

For the osteomorphological descriptions, we have followed strictly the nomenclature proposed by the International Committee on Veterinary Gross Anatomical Nomenclature in their *Nomina Anatomica Veterinaria* (3rd ed., 1983). The figures were drawn from right limb bones with the light coming from the left hand top corner. All specimens are drawn natural size, unless a scale bar, representing 10mm, is present. Note that the phalanges figured below (Pl. 8 and 9) belong to the fourth digit. Neither the dew claws, nor the sesamoid bones are considered in this study.

Results

Osteomorphological features of the appendicular skeleton of gazelles, bohor reedbuck and bushbuck.

As already stated, the figured *Gazella* specimen is a Grant's gazelle, but its morphological features are also found in the other gazelles. In the following, the names *Redunca* and *Tragelaphus* refer respectively to *Redunca redunca* and *Tragelaphus scriptus*. The relevant diagnostic features are indicated by a number which is also given on the plates. Arrows on these plates indicate morphological differences, lines refer to differences in proportions.

Scapula

1. The position and general appearance of the tuberculum supraglenoidale and the processus coracoideus differ in the three genera: the tuberculum supraglenoidale projects cranially in *Gazella*, craniomedially in *Redunca* and rather medially in *Tragelaphus* (pl. 1, figs. 1–6, char. 1).

2. These differences are also reflected in the course of the margo cranialis (pl. 1, figs. 4–6, char. 2).

Humerus

1. The pars cranialis of the tuberculum majus is less pronounced medially in *Tragelaphus* compared with *Gazella* and *Redunca* (pl. 1, figs. 7–12, char. 3).

2. The boundary of the facies musculi infraspinati is well developed in *Gazella*; in *Redunca*, this surface has a sharply defined proximal boundary, while in *Tragelaphus* the boundary remains vague (pl. 2, figs. 1–3, char. 4).

3. The humerus of *Tragelaphus* also shows a more pronounced collum humeri (pl. 2, figs. 1–3, char. 5).

4. The crista epicondyli lateralis extends more laterally in *Gazella*, while in *Tragelaphus* it is more pronounced caudally (pl. 2, figs. 4–9, char. 6).

5. The three species can also be separated on the basis of morphological differences within the trochlea humeri, such as the position of the crista sagittalis and the ratio pars lateralis: pars medialis (pl. 2, figs. 4–9, char. 7). Unfortunately, no satisfying measuring procedures could be established to reflect these proportional differences.

Ulna

1. In *Gazella* and *Redunca*, the tuber olecrani exhibits a distinct proximal notch, which is almost lacking in *Tragelaphus* (pl. 3, figs. 1–3, char. 8).

2. The olecranon is more slenderly built in *Gazella* compared with *Redunca* and *Tragelaphus*; in *Tragelaphus*, the processus anconeus appears to be less pronounced (pl. 3, figs. 1–3, char. 9).

3. In contrast with *Gazella* and *Tragelaphus*, the ulnar diaphysis of *Redunca* is more curved, sometimes forming a spatium interosseum antebrachii distale with the radius (pl. 3, figs. 1–3, char. 10).

4. When the ulna is observed from distally, the processus styloideus is more developed laterally in *Gazella* than in its analogue in *Redunca* and *Tragelaphus* (pl. 3, figs. 4–6, char. 11).

Radius

1. The distal part of the diaphysis is more curved in *Redunca* compared with *Gazella* and *Tragelaphus* (pl. 3, figs. 1–3, char. 12; see also char. 10).

2. Owing to the morphology of the processus styloideus lateralis, the crista transversa differs in the three genera (pl. 3, figs. 4–6, char. 13).

3. The grooves for the extensor tendons and their bordering bony crests are more developed in *Gazella* compared with *Redunca* and *Tragelaphus* (pl. 3, figs. 4–6, char. 14).

4. The proportions and the morphology of the facets of the facies articularis carpea differ in the three genera (pl. 3, figs. 4–6, char. 15).

Ossa carpi

Os carpi radiale

1. The general morphology as well as the relative proportions of the os carpi radiale are different in the three genera (pl. 4, figs. 1–3, char. 16).

2. The course of the medial border of the proximal articular surface differs in the three genera (pl. 4, figs. 1–3, char. 17).

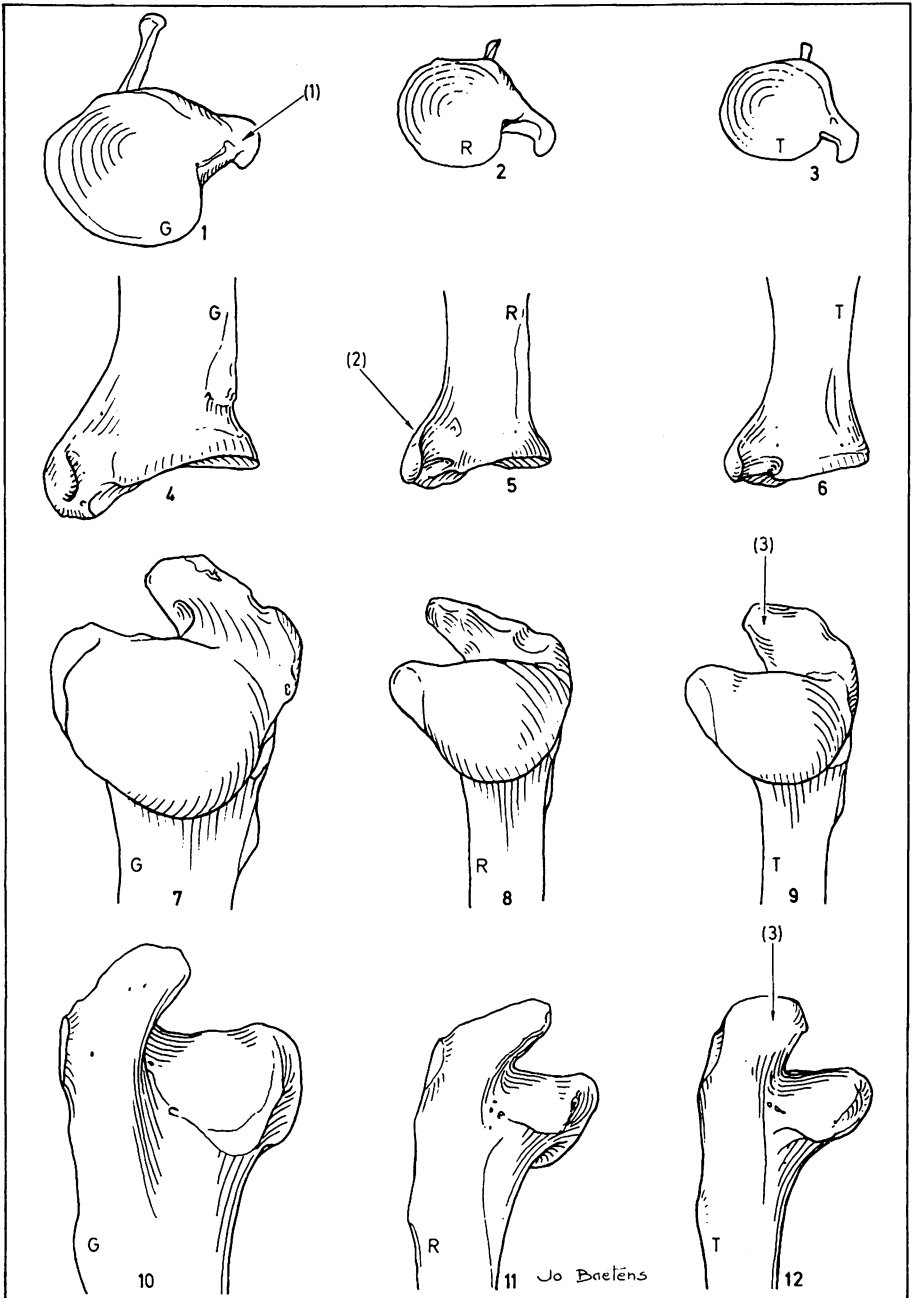


Plate I

1. Scapula, distal view, *Gazella granti*.
2. Scapula, distal view, *Redunca redunca*.
3. Scapula, distal view, *Tragelaphus scriptus*.
4. Scapula, distal extremity, medial view, *Gazella granti*.
5. Scapula, distal extremity, medial view, *Redunca redunca*.
6. Scapula, distal extremity, medial view, *Tragelaphus scriptus*.

7. Humerus, proximal extremity, caudal view, *Gazella granti*.
8. Humerus, proximal extremity, caudal view, *Redunca redunca*.
9. Humerus, proximal extremity, caudal view, *Tragelaphus scriptus*.
10. Humerus, proximal extremity, cranial view, *Gazella granti*.
11. Humerus, proximal extremity, cranial view, *Redunca redunca*.
12. Humerus, proximal extremity, cranial view, *Tragelaphus scriptus*.

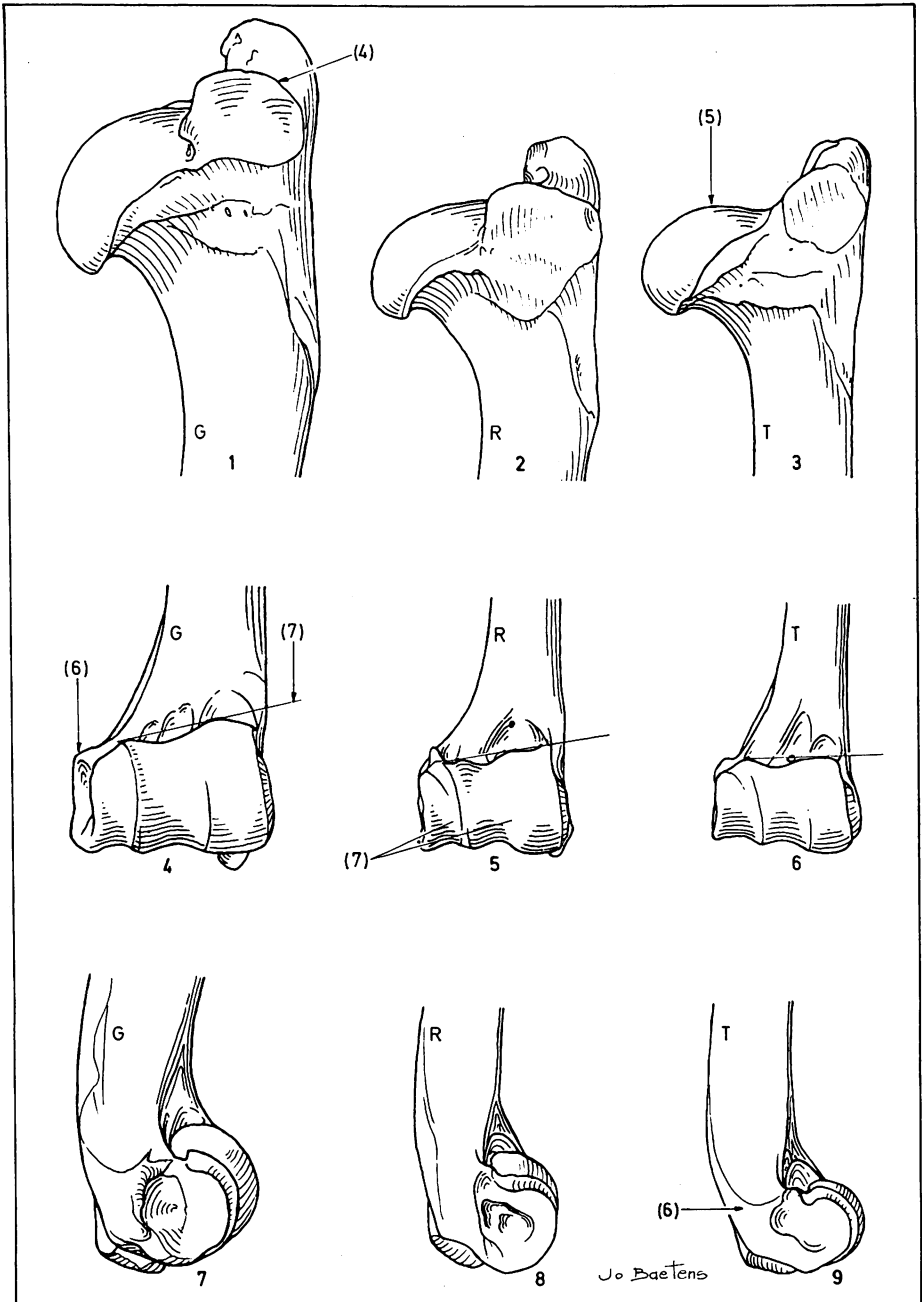


Plate 2

- | | |
|---|--|
| <p>1. Humerus, proximal extremity, lateral view, <i>Gazella granti</i>.</p> <p>2. Humerus, proximal extremity, lateral view, <i>Redunca redunca</i>.</p> <p>3. Humerus, proximal extremity, lateral view, <i>Tragelaphus scriptus</i>.</p> <p>4. Humerus, distal extremity, cranial view, <i>Gazella granti</i>.</p> <p>5. Humerus, distal extremity, cranial view, <i>Redunca redunca</i>.</p> | <p>6. Humerus, distal extremity, lateral view, <i>Tragelaphus scriptus</i>.</p> <p>7. Humerus, distal extremity, lateral view, <i>Gazella granti</i>.</p> <p>8. Humerus, distal extremity, lateral view, <i>Redunca redunca</i>.</p> <p>9. Humerus, distal extremity, lateral view, <i>Tragelaphus scriptus</i>.</p> |
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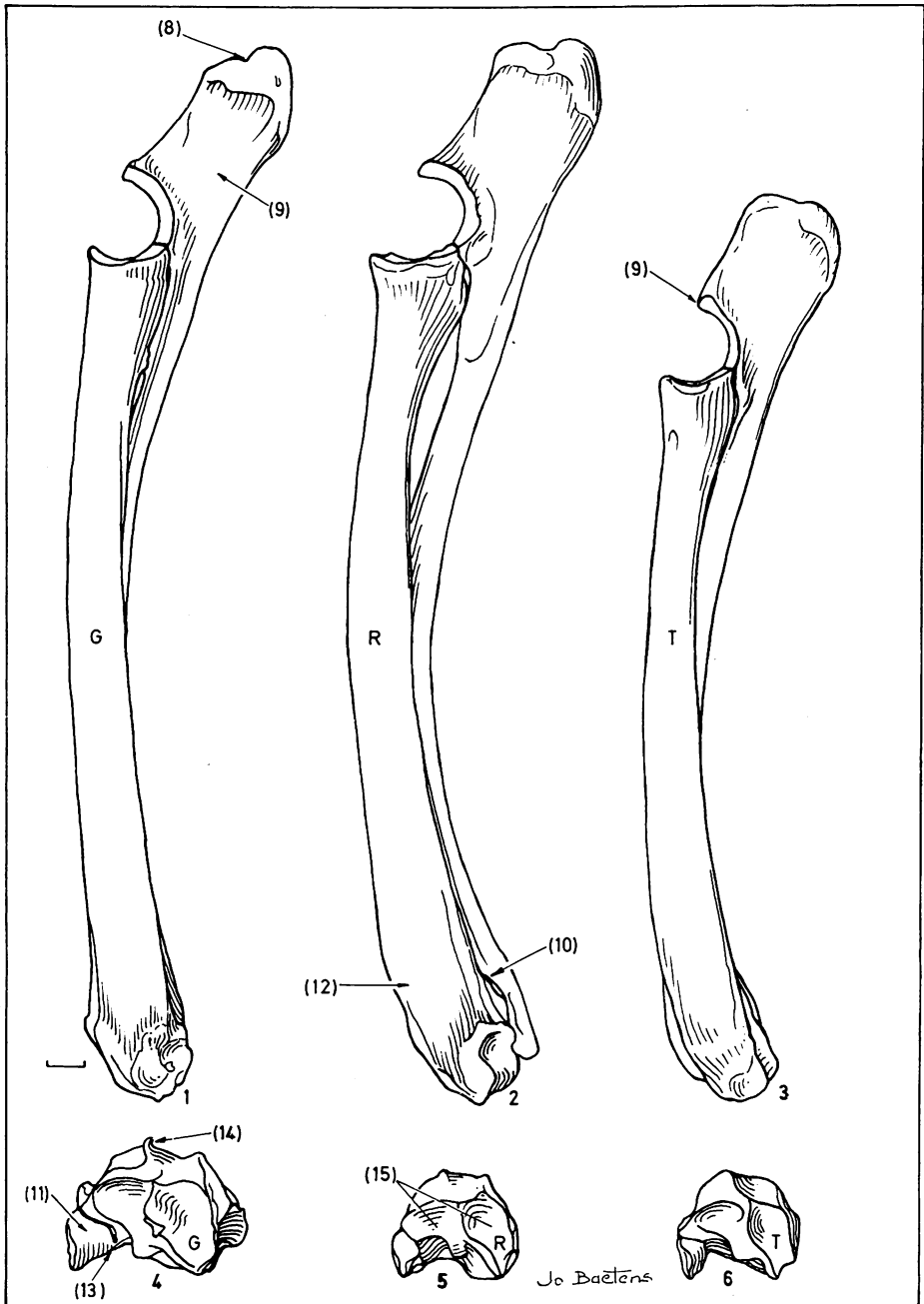


Plate 3

- 1. Radius-ulna, medial view, *Gazella granti*.
- 2. Radius-ulna, medial view, *Redunca redunca*.
- 3. Radius-ulna, medial view, *Tragelaphus scriptus*.

- 4. Radius-ulna, distal view, *Gazella granti*.
- 5. Radius-ulna, distal view, *Redunca redunca*.
- 6. Radius-ulna, distal view, *Tragelaphus scriptus*.

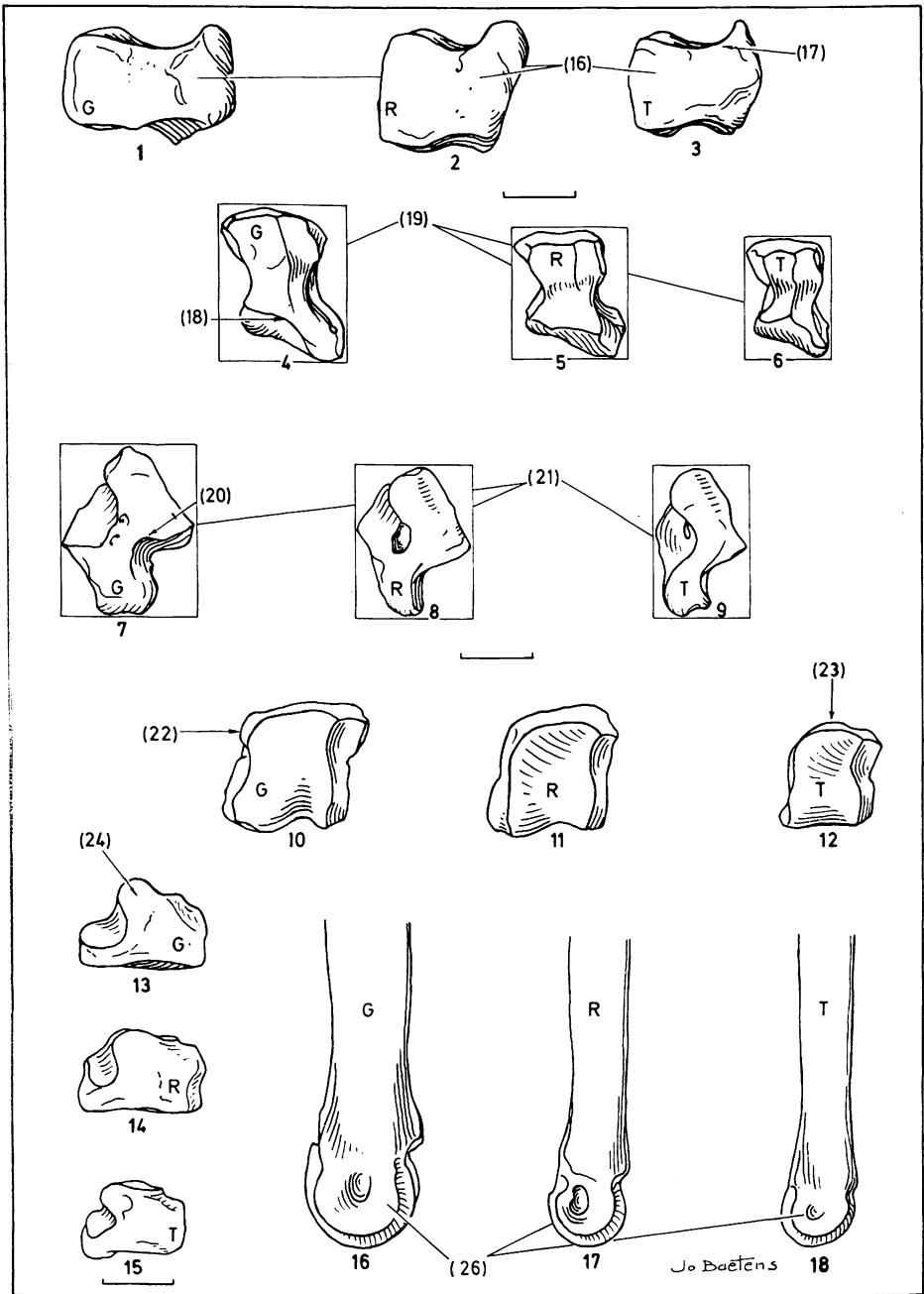


Plate 4

1. Os carpi radiale, dorsomedial view, *Gazella granti*.
2. Os carpi radiale, dorsomedial view, *Redunca redunca*.
3. Os carpi radiale, dorsomedial view, *Tragelaphus scriptus*.
4. Os carpi intermedium, distal surface, *Gazella granti*.
5. Os carpi intermedium, distal surface, *Redunca redunca*.
6. Os carpi intermedium, distal surface, *Tragelaphus scriptus*.
7. Os carpi ulnare, lateral view, *Gazella granti*.
8. Os carpi ulnare, lateral view, *Redunca redunca*.
9. Os carpi ulnare, lateral view, *Tragelaphus scriptus*.
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11. Os carpale II + III, proximal surface, *Redunca redunca*.
12. Os carpale II + III, proximal surface, *Tragelaphus scriptus*.
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14. Os carpale IV, lateral view, *Redunca redunca*.
15. Os carpale IV, lateral view, *Tragelaphus scriptus*.
16. Os metacarpale III + IV, distal extremity, lateral view, *Gazella granti*.
17. Os metacarpale III + IV, distal extremity, lateral view, *Redunca redunca*.
18. Os metacarpale III + IV, distal extremity, lateral view, *Tragelaphus scriptus*.

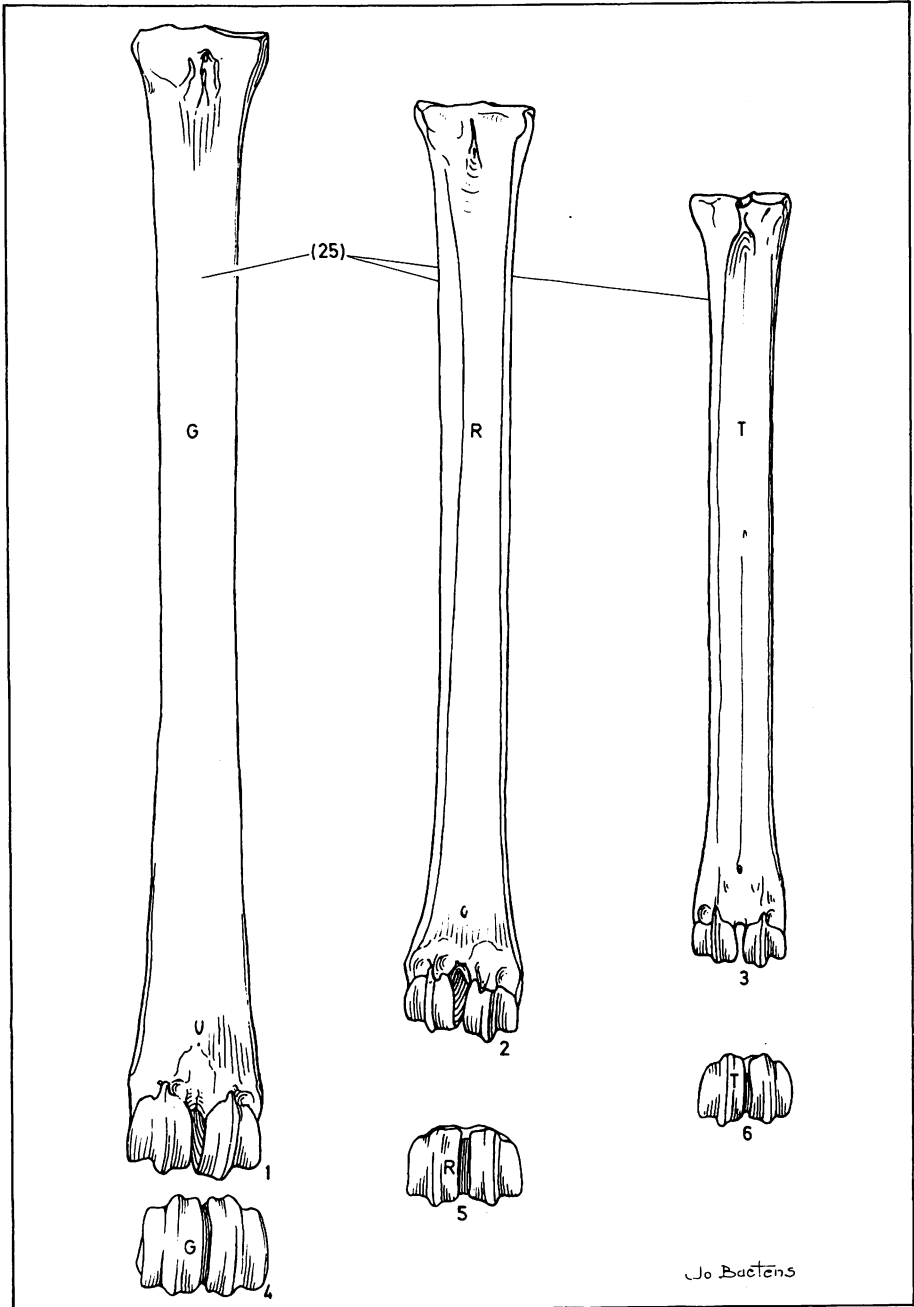


Plate 5

1. Os metacarpale III+IV, palmar view, *Gazella granti*.
2. Os metacarpale III+IV, palmar view, *Redunca redunca*.
3. Os metacarpale III+IV, palmar view, *Tragelaphus scriptus*.
4. Os metacarpale III+IV, distal view, *Gazella granti*.
5. Os metacarpale III+IV, distal view, *Redunca redunca*.
6. Os metacarpale III+IV, distal view, *Tragelaphus scriptus*.

Os carpi intermedium

1. The palmar border of the os carpi intermedium is more pronounced palmarly in *Gazella* (pl. 4, figs. 4–6, char. 18).
2. In *Gazella* and *Tragelaphus*, the general shape of the os carpi intermedium is more or less rectangular, while in *Redunca* this carpal bone tends to be squarish (pl. 4, figs. 4–6, char. 19).

Os carpi ulnare

1. In *Gazella*, the facies articularis distalis is more pronounced in a lateropalmar direction (pl. 4, figs. 7–9, char. 20).
2. The proportions of the os carpi ulnare of *Tragelaphus* differ clearly from those of *Gazella* and *Redunca* (pl. 4, figs. 7–9, char. 21).

Os carpi accessorium

No constant morphological differences were found.

Os carpale II + III

1. A proximal view of the os carpale II + III of *Gazella* shows its angular aspect; in *Tragelaphus* and *Redunca*, this carpal bone looks more rounded (pl. 4, figs. 10–12, char. 22).
2. The dorsal border of the os carpale II + III exhibits a different course in the three genera (pl. 4, figs. 10–12, char. 23).

Os carpale IV

The proximal border of the os carpale IV extends more proximally in *Gazella* compared with *Redunca* and *Tragelaphus* (pl. 4, figs. 13–15, char. 24).

Os metacarpale III + IV

1. The habitus of the os metacarpale III + IV differs in the three genera: slender in *Gazella* and relatively short and broad in *Tragelaphus*; *Redunca* occupies an intermediate position (pl. 5, figs. 1–3, char. 25).
2. The trochleae ossis metacarpalis III + IV of *Gazella* are well developed, though rather slender, with pronounced, sharp sagittal ridges. In *Tragelaphus*, these trochleae are relative small and sturdy, with less pronounced sagittal ridges. In *Redunca*, they occupy an intermediate position (pl. 4, figs. 16–18 and pl. 5, figs. 4–6, char. 26).

Os femoris

1. The caput ossis femoris merges gradually into the trochanter major in *Tragelaphus*; in *Redunca*, the edge of the caput ossis femoris forms a boundary between the medial and lateral parts of the proximal extremity, while in *Gazella*, this boundary is even more striking (pl. 6, figs. 1–3, char. 27).
2. The general appearance of the trochanter major is different in the three genera (pl. 6, figs. 4–6, char. 28).

Patella

The patella's of *Redunca* and *Tragelaphus* are in general more slender in comparison with their analogue in *Gazella* (pl. 7, figs. 10–11, char. 29). Note that no drawing of a *Tragelaphus* patella has been included in the illustrations.

Tibia

1. The general appearance of the lateral part of the facies articularis proximalis and the tuberositas tibiae differs in the three genera (pl. 7, figs. 1–3, char. 30).

2. The transition malleolus medialis/corpus tibiae is different in *Gazella* in comparison with *Redunca* and *Tragelaphus* (pl. 6, figs. 7–9, char. 31).

Os malleolare

No constant morphological differences were found.

Ossa tarsi

Talus

1. In *Redunca*, the caput tali exhibits at its facies articularis ossis centroquartalis a lateral groove, which is almost always lacking in *Gazella* and *Tragelaphus* (pl. 7, figs. 4–6, char. 32).

2. The tali of *Redunca* and *Tragelaphus* generally are more slender than their analogue in *Gazella* (pl. 7, figs. 4–6, char. 33).

3. The facies articularis medialis of the talus, which articulates with the malleolus medialis of the tibia, is more developed plantarodistally in *Gazella* (pl. 7, figs. 4–9, char. 34).

Calcaneus

1. In *Redunca* and *Tragelaphus*, the sustentaculum tali generally is well developed; in *Gazella*, the plantar side of the sustentaculum tali does not reach as far plantarly as in the two other species (pl. 7, figs. 12–14, char. 35).

2. The processus coracoideus extends more dorsally in *Tragelaphus* and *Redunca* than in *Gazella* (pl. 8, figs. 1–3, char. 36).

Os centroquartale

1. The general appearance of this tarsal bone varies: it is rather flattened in *Gazella* and *Tragelaphus*, and higher in *Redunca* (pl. 7, figs. 15–17, char. 38).

2. The lateroplantar portion of the os centroquartale exhibits in *Gazella* a well developed prominence, which is less pronounced in *Redunca* and *Tragelaphus* (pl. 7, figs. 15–17 and pl. 8, figs. 4–6, char. 38).

3. The canalis tarsi is more pronounced in *Gazella* and *Redunca* than in *Tragelaphus* (pl. 7, figs. 15–17, char. 39).

Os tarsale I

No constant morphological differences were found.

Os tarsale II + III

No constant morphological differences were found.

Os metatarsale III + IV

1. The habitus of the os metatarsale III + IV differs in the three genera: slender in *Gazella*, and relatively short and broader in *Tragelaphus*; *Redunca* occupies an intermediate position (char. 40, cf. os metacarpale III + IV, char. 25).

2. The proximal end of the os metatarsale III + IV projects more plantaromedially in *Gazella* compared with the two other genera (pl. 8, figs. 4–6, char. 41).

3. The lateroplantar facies articularis of the proximal epiphysis is more developed laterally in *Tragelaphus* in comparison with its analogue in *Redunca* and *Gazella* (pl. 8, figs. 4–6, char. 42).

4. The trochleae ossis metatarsalis III + IV of *Gazella* are well developed, though rather slender, with pronounced, sharp sagittal ridges. In *Tragelaphus*, these trochleae are relative small and sturdy, with less pronounced sagittal ridges. In *Redunca*, they occupy an intermediate position (char. 43, cf. os metacarpale III + IV, char. 26).

Ossa digitorum

1. Criteria to distinguish the ossa digitorum manus from the ossa digitorum pedis in *Gazella*, *Redunca* and *Tragelaphus*

The distinction between the phalanges of the fore and hind limbs of complete skeletons is rather easy. We do admit that this is not the case for specimens found in archaeological sites. However, some of the criteria listed below may help to establish whether in a given collection both fore and hind phalanges are present.

Phalanges proximales

1. The P. proximales manus are more slender than the P. proximales pedis (pl. 8, figs. 7–18, char. 44).
2. In *Gazella* and *Redunca*, the general appearance of the proximal end of the first phalanges is rather rectangular in the fore limb and more squarish in the hind limb (pl. 9, figs. 1–6, char. 45).

Phalanges mediae

In *Gazella* and *Tragelaphus*, the palmar part of the trochlea phalangeis mediae manus is more developed proximally compared with its analogue in the P. mediae pedis (pl. 9, figs. 7 and 9, char. 46).

Phalanges distales

The P. distales manus have a more slender facies articularis than the P. distales pedis (char. 47); this is not illustrated in the drawings.

2. Criteria to distinguish between the ossa digitorum of *Gazella*, *Redunca* and *Tragelaphus*

Phalanges proximales

1. The overall shape of the P. proximales differs within the three species considered (pl. 8, figs. 7–18, char. 48).
2. The abaxial epicondylus is more pronounced in *Gazella* compared with *Redunca* and *Tragelaphus* (pl. 8, figs. 7–18, char. 49).
3. In *Gazella*, the plantar surface of the trochlea phalangeis proximalis extends more proximally compared with its analogue in *Tragelaphus* and *Redunca* (pl. 8, figs. 7–18, char. 50).
4. When one observes the palmar or plantar side of the proximal phalanges, it becomes obvious that their proximal part bends abaxially in *Gazella* and *Redunca*; this is not the case in *Tragelaphus* (pl. 8, figs. 7–18, char. 51).

Phalanges mediae

1. The middle phalanges of *Tragelaphus* can be distinguished from those of *Gazella* and *Redunca* on the basis of their general appearance (pl. 9, figs. 7–12, char. 52).
2. In *Gazella*, the palmar/plantar boundary of the facies articularis proximalis runs parallel with the transverse axis. Its analogue in *Redunca* and *Tragelaphus* is characterized by an abaxial palmar/plantar protrusion (pl. 9, figs. 13–18, char. 53).

Phalanges distales

1. The processus extensorius differs in the three genera: it is very well developed in *Gazella*, less pronounced in *Redunca*, and nearly absent in *Tragelaphus* (pl. 9, figs. 19–21, char. 54).
2. The distal phalanges of *Tragelaphus* are also characterized by their pointed tips (pl. 9, figs. 19–21, char. 55).

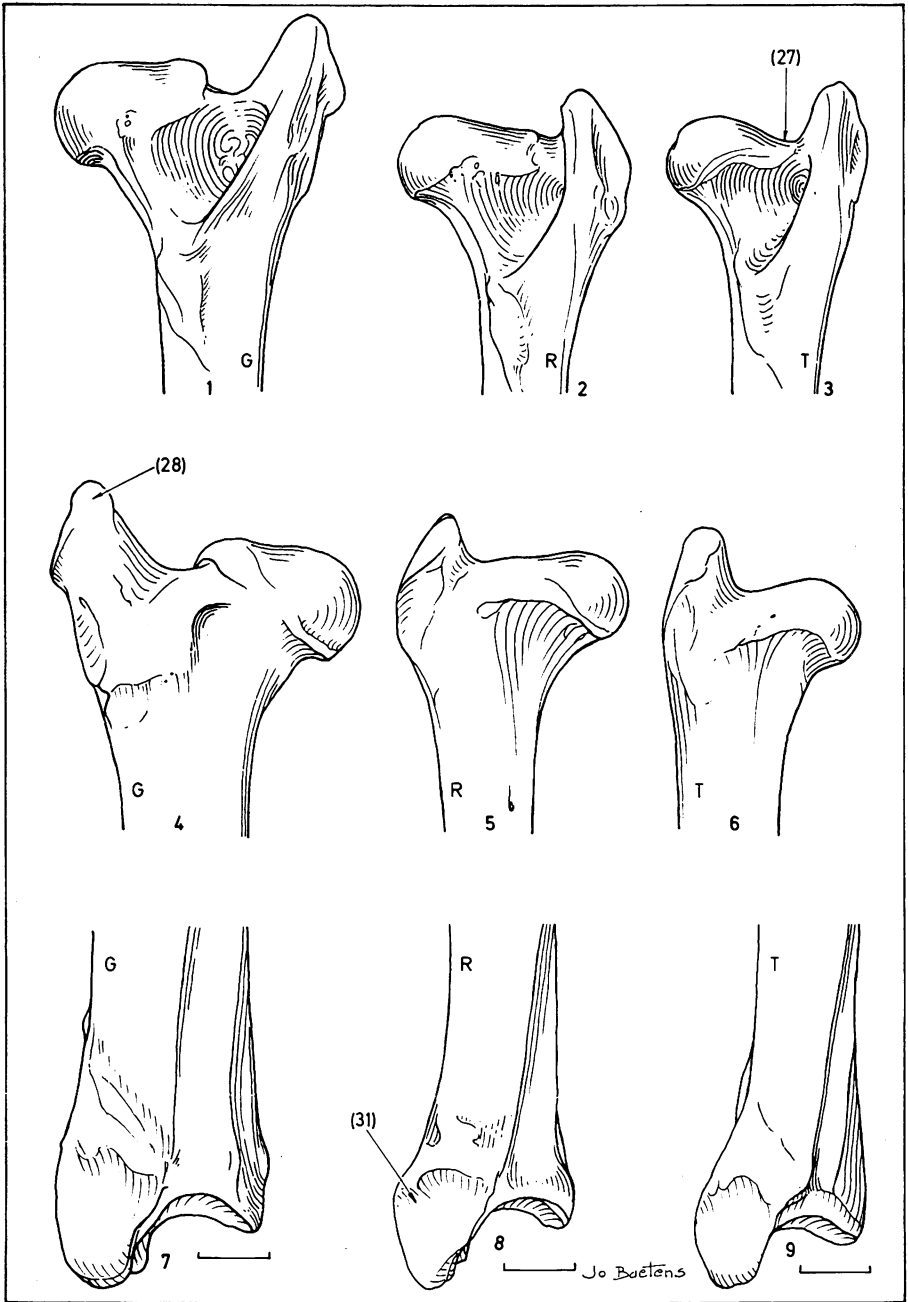


Plate 6

1. Os femoris, proximal extremity, caudal view, *Gazella granti*.
2. Os femoris, proximal extremity, caudal view, *Redunca redunca*.
3. Os femoris, proximal extremity, caudal view, *Tragelaphus scriptus*.
4. Os femoris, proximal extremity, cranial view, *Gazella granti*.
5. Os femoris, proximal extremity, cranial view, *Redunca redunca*.
6. Os femoris, proximal extremity, cranial view, *Tragelaphus scriptus*.
7. Tibia, distal extremity, medial view, *Gazella granti*.
8. Tibia, distal extremity, medial view, *Redunca redunca*.
9. Tibia, distal extremity, medial view, *Tragelaphus scriptus*.

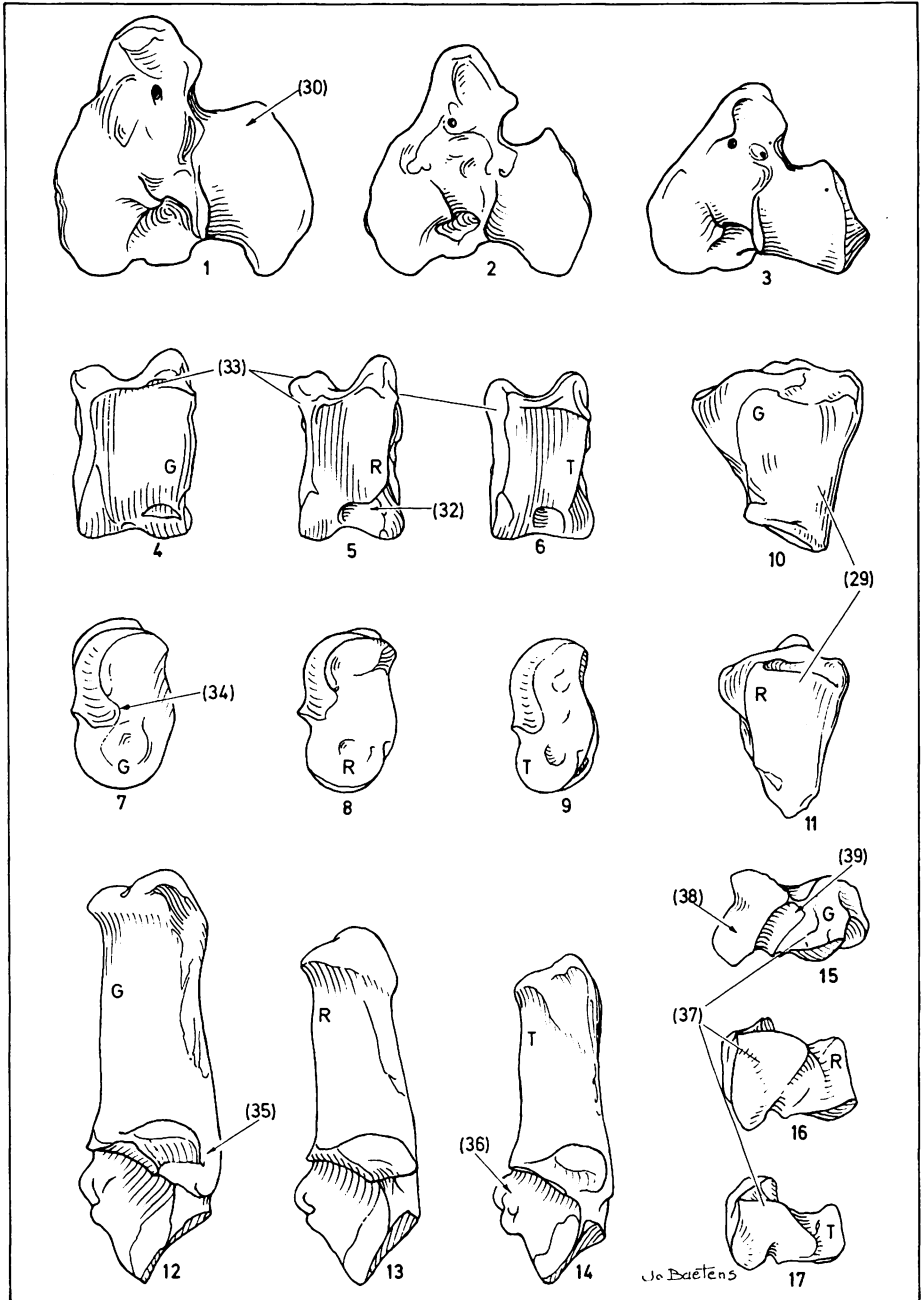


Plate 7

1. Tibia, proximal view, *Gazella granti*.
2. Tibia, proximal view, *Redunca redunca*.
3. Tibia, proximal view, *Tragelaphus scriptus*.
4. Talus, plantar view, *Gazella granti*.
5. Talus, plantar view, *Redunca redunca*.
6. Talus, plantar view, *Tragelaphus scriptus*.
7. Talus, medial view, *Gazella granti*.
8. Talus, medial view, *Redunca redunca*.
9. Talus, medial view, *Tragelaphus scriptus*.

10. Patella, caudal view, *Gazella granti*.
11. Patella, caudal view, *Redunca redunca*.
12. Calcaneus, medial view, *Gazella granti*.
13. Calcaneus, medial view, *Redunca redunca*.
14. Calcaneus, medial view, *Tragelaphus scriptus*.
15. Os centroquartale, lateral view, *Gazella granti*.
16. Os centroquartale, lateral view, *Redunca redunca*.
17. Os centroquartale, lateral view, *Tragelaphus scriptus*.

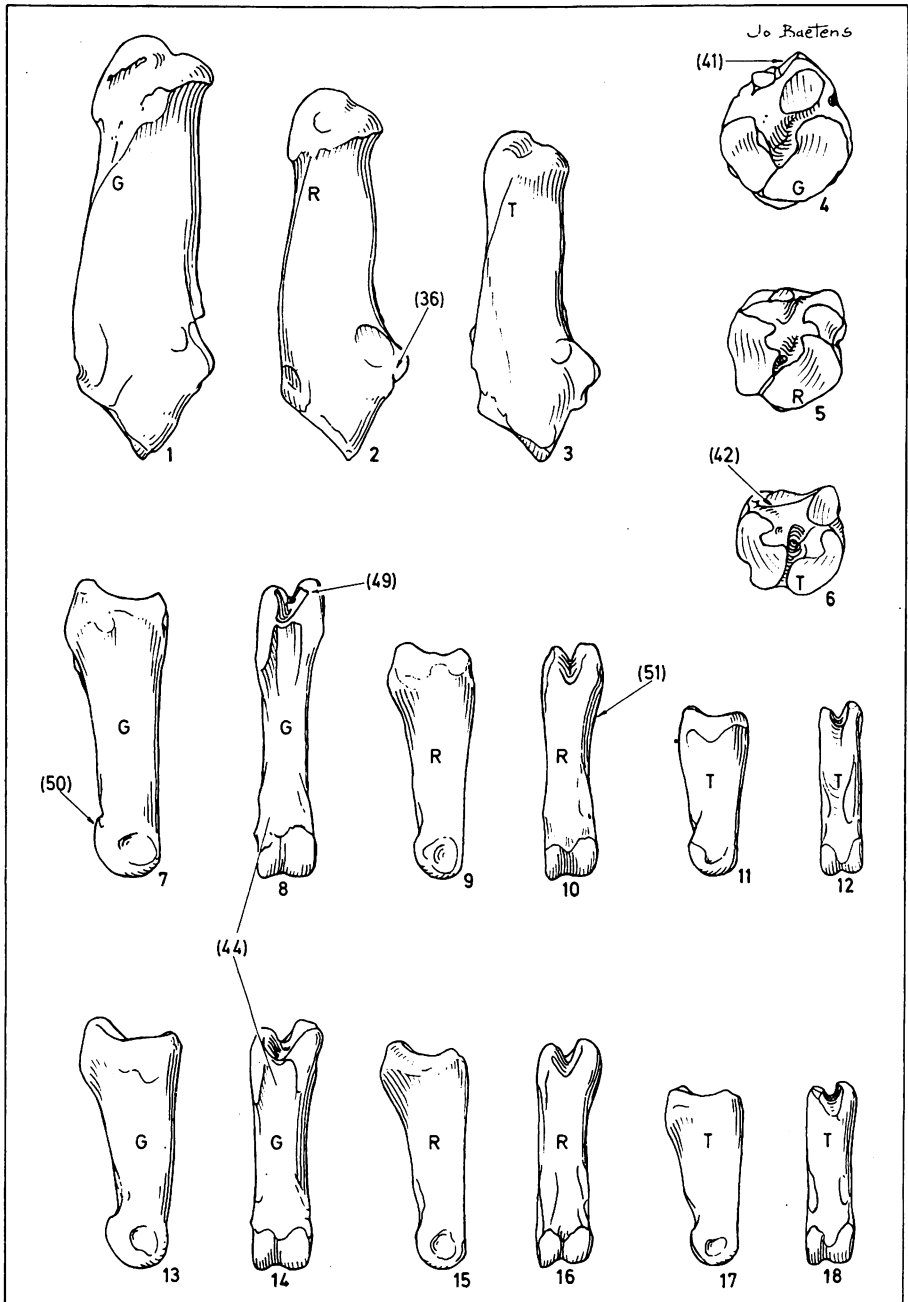


Plate 8

1. Calcaneus, lateral view, *Gazella granti*.
2. Calcaneus, lateral view, *Redunca redunca*.
3. Calcaneus, lateral view, *Tragelaphus scriptus*.
4. Os metatarsale III + IV, proximal view, *Gazella granti*.
5. Os metatarsale III + IV, proximal view, *Redunca redunca*.
6. Os metatarsale III + IV, proximal view, *Tragelaphus scriptus*.
7. P. proximalis manus, abaxial view, *Gazella granti*.
8. P. proximalis manus, palmar view, *Gazella granti*.
9. P. proximalis manus, abaxial view, *Redunca redunca*.
10. P. proximalis manus, palmar view, *Redunca redunca*.
11. P. proximalis manus, abaxial view, *Tragelaphus scriptus*.
12. P. proximalis manus, palmar view, *Tragelaphus scriptus*.
13. P. proximalis pedis, abaxial view, *Gazella granti*.
14. P. proximalis pedis, plantar view, *Gazella granti*.
15. P. proximalis pedis, abaxial view, *Redunca redunca*.
16. P. proximalis pedis, plantar view, *Redunca redunca*.
17. P. proximalis pedis, abaxial view, *Tragelaphus scriptus*.
18. P. proximalis pedis, plantar view, *Tragelaphus scriptus*.

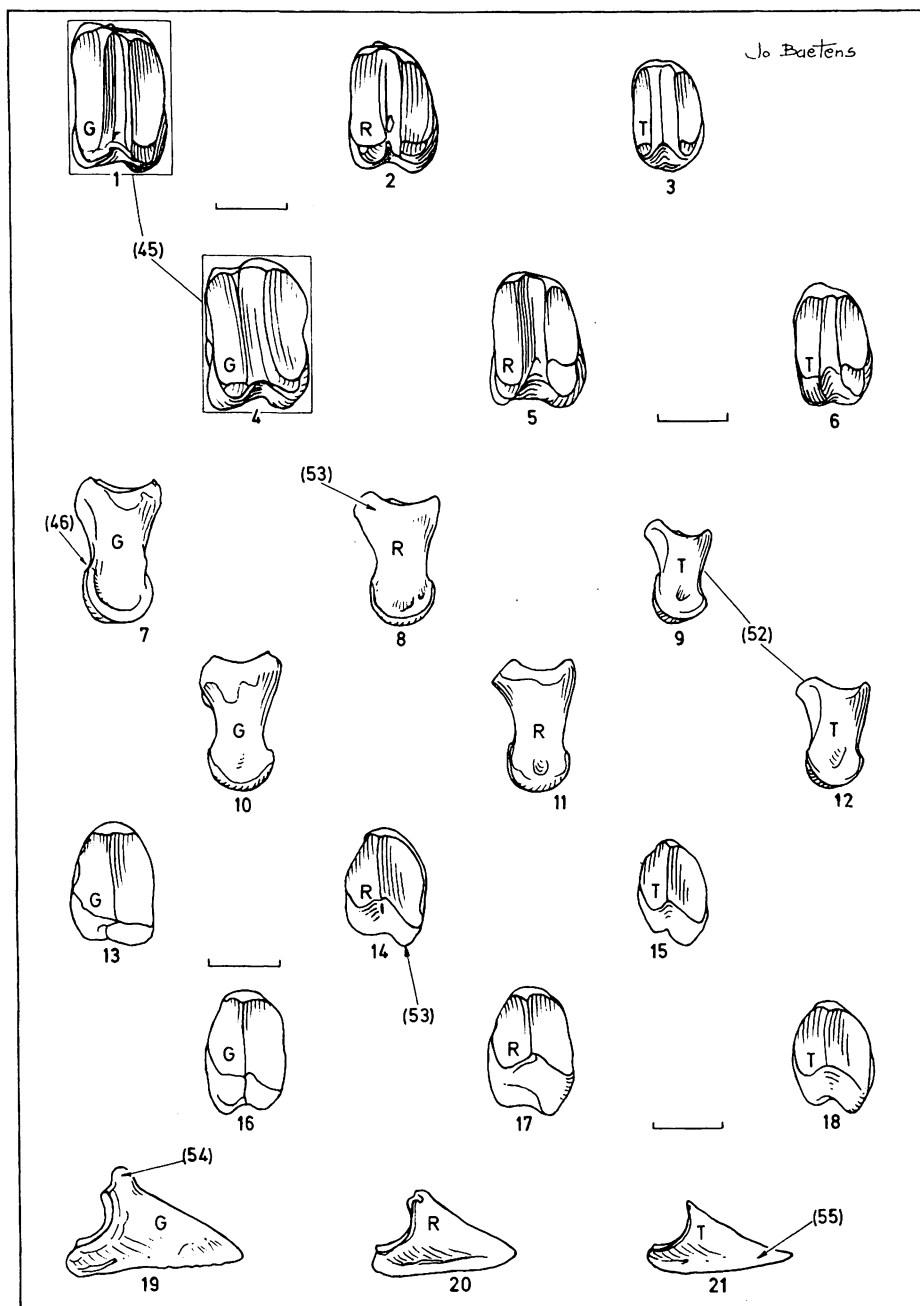


Plate 9

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| <p>1. P. proximalis manus, proximal view, <i>Gazella granti</i>.
 2. P. proximalis manus, proximal view, <i>Redunca redunca</i>.
 3. P. proximalis manus, proximal view, <i>Tragelaphus scriptus</i>.
 4. P. proximalis pedis, proximal view, <i>Gazella granti</i>.
 5. P. proximalis pedis, proximal view, <i>Redunca redunca</i>.
 6. P. proximalis pedis, proximal view, <i>Tragelaphus scriptus</i>.
 7. P. media manus, lateral view, <i>Gazella granti</i>.
 8. P. media manus, lateral view, <i>Redunca redunca</i>.
 9. P. media manus, lateral view, <i>Tragelaphus scriptus</i>.
 10. P. media pedis, lateral view, <i>Gazella granti</i>.
 11. P. media pedis, lateral view, <i>Redunca redunca</i>.</p> | <p>12. P. media pedis, lateral view, <i>Tragelaphus scriptus</i>.
 13. P. media manus, proximal view, <i>Gazella granti</i>.
 14. P. media manus, proximal view, <i>Redunca redunca</i>.
 15. P. media manus, proximal view, <i>Tragelaphus scriptus</i>.
 16. P. media pedis, proximal view, <i>Gazella granti</i>.
 17. P. media pedis, proximal view, <i>Redunca redunca</i>.
 18. P. media pedis, proximal view, <i>Tragelaphus scriptus</i>.
 19. P. distalis pedis, abaxial view, <i>Gazella granti</i>.
 20. P. distalis pedis, abaxial view, <i>Redunca redunca</i>.
 21. P. distalis pedis, abaxial view, <i>Tragelaphus scriptus</i>.</p> |
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Concluding remarks

As can be deduced from the foregoing, many diagnostic features exist which allow a distinction between Grant's gazelle, bohor reedbuck and bushbuck. Only a few smaller skeletal elements, including the os carpi accessorium, the os tarsale I and the os tarsale II + III cannot be separated yet. Due to the fact that many features are located at the epiphyses of the long bones, even fragmented bone material can now in many cases be identified to the species level.

Secondly, a thorough comparison between the appendicular skeleton of Grant's gazelle and that of eight other African and two Asian species of the same genus, revealed, as far as the characteristics figured below are concerned, no morphological differences. As to bohor reedbuck and bushbuck, additional research is necessary to establish whether their typical osteomorphological features are also present in other members of the same genera, for example southern reedbuck (*Redunca arundinum*) and mountain reedbuck (*Redunca fulvorufula*), and sitatunga (*Tragelaphus spekei*) and greater kudu (*Tragelaphus strepsiceros*), as well as in members of some related genera, including *Kobus* and *Taurotragus*. Morphological differences between some of these antelopes are described by VAN NEER (1981), but additional ones have been observed. A full account of these data will be published later.

Finally, during our analysis of fossil bones from African late Quaternary archaeological sites, it became apparent that the measurements, obtained on African gazelles, bohor reedbuck and bushbuck are equally useful to distinguish between these bovinds.

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Zusammenfassung

Osteomorphologische Unterscheidungsmerkmale am Gliedmaßenskelett verschiedener Gazellenarten (Gattung *Gazella* Blainville, 1816), des Riedbockes (*Redunca redunca*) und des Buschbockes (*Tragelaphus scriptus*)

Knochenreste von Gazellen, Riedböcken und Buschböcken werden bei archäologischen Ausgrabungen an Siedlungsplätzen aus dem Spätquartär Afrikas oft gefunden, aber ihre tierartige Bestimmung bereitet Schwierigkeiten. Die vorliegende Arbeit stellt die charakteristischen osteomorphologischen Unterscheidungsmerkmale der drei folgenden Arten zusammen: Grantgazelle, Riedbock und Buschbock. Die für die Grantgazelle erarbeiteten Kennzeichen gelten auch für andere afrikanische sowie für zwei asiatische Gazellenarten, die Kropf- und die Echtgazelle.

Résumé

Caractéristiques ostéo-morphologiques différentielles du squelette appendiculaire de plusieurs espèces de Gazelles (*Gazella species*, Blainville, 1816), de l'Antilope d'eau (*Redunca redunca*) et du Tragélaphe rayé (*Tragelaphus scriptus*)

Les caractéristiques ostéo-morphologiques du squelette appendiculaire de la Gazelle de Grant (*Gazella Granti*), de l'Antilope d'eau (*Redunca redunca*) et du Tragélaphe rayé (*Tragelaphus scriptus*) ont été examinées. Les vestiges osseux de ces antilopes de taille moyenne sont rencontrés souvent dans les sites archéologiques du quaternaire récent d'Afrique, mais leur détermination spécifique pose à

l'archéologue de considérables problèmes. Le présent travail expose les caractéristiques, ostéomorphologiques et les clés de diagnose différentielle des trois espèces ci-dessus mentionnées.

Les traits ostéologiques de la Gazelle de Grant ont été retrouvés également chez huit autres Gazelles africaines et chez deux Gazelles asiatiques: la Gazelle à goitre de Perse (*Gazella subgutterosa*) et la Gazelle vraie des montagnes (*Gazella gazella*).

Resumen

Características osteomorfológicas del esqueleto apendicular de las gacelas, Genus Blainville 1816, *Redunca redunca* (Pallas, 1767) y *Tragelaphus scriptus* (Pallas, 1766)

Se examinaron las características osteomorfológicas del esqueleto apendicular de *Gazella Granti*, *Redunca redunca* y *Tragelaphus scriptus*. Restos de huesos de estos antílopes de tamaño mediano se encuentran frecuentemente en los sitios arqueológicos cuaternarios tardíos del Africa, pero su identificación específica presenta grandes problemas a los arqueólogos-zoólogos. Para remediar este problema se desarrolló una clave diagnóstica con características osteomorfológicas que permiten una distinción entre los bovinos mencionados. Las características osteomorfológicas típicas de la gacela de Grant, se observaron también en las ocho gacelas africanas existentes y en dos especies asiáticas (*Gazella subgutterosa* y *Gazella gazella*).

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