## Appendix E: Additional morphological and -metric features of skeletal and teeth element of Caprinae in Tibetan Plateau and adjacent areas used

The morphology of the humerus mediodistal margin from medial view:

* In *Pseudois*, it generally forms an oblique and/or obtuse margin, and the degree of the angle often varies in different individuals. It seems to be a form in between sheep and goats --- more obtuse than the angled margin of *Capra*, and less straight than the right-obtuse angle of *Ovis* (Götze, 1998; Fig.E.1A-F).
* In *Naemorhedus* and *Capricornis*, in vast majority cases it forms a right-obtuse angle, and the distal end of the epicondylus forms a very straight line --- it seems to be bulging out less dorsally than. Occasionally, it seems to have been cut off obliquely, but in that case the angle does not reach up high, differs from *Capra* (Fig.E.2A-F).
* The morphology of *O. ammon* is similar to that have been previously described for *Ovis* (Boessneck et al., 1964; Zeder and Lapham, 2010; Helmer and Rocheteau, 1994).

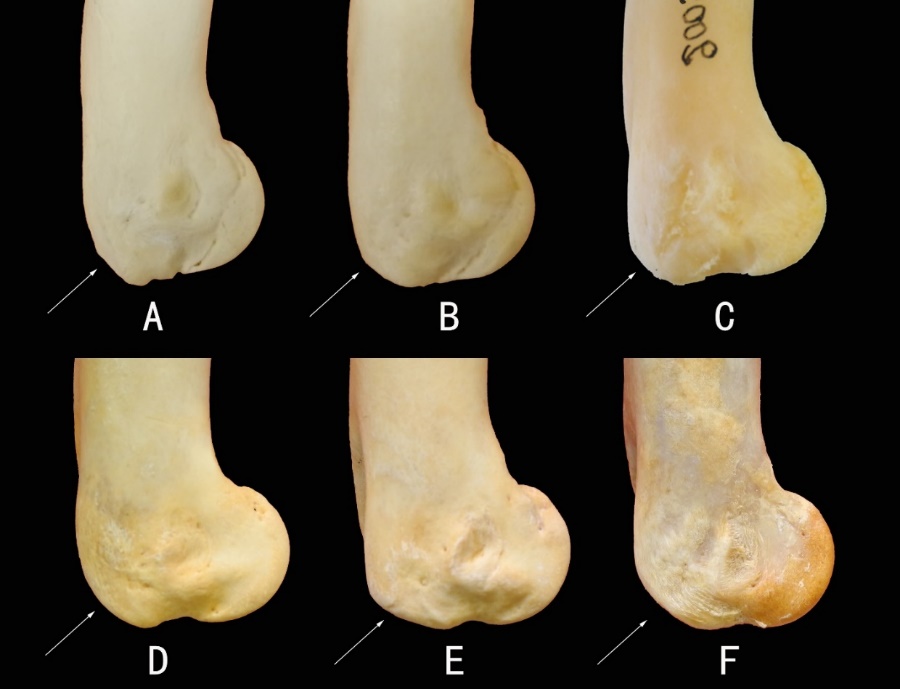


Fig.E.1 Six typical forms of the mediodistal margin from medial view in *Pseudois*.



Fig.E.2 Six typical forms of the mediodistal margin from medial view in *Naemorhedus*. (the morphology of *Capricornis* and *Naemorhedus* are very close)

The morphology of humerus epicondylus medialis from posterior view:

* In *Pseudois*, there are two typical forms: the articular surface of the medial epicondylus either reaches up to the proximal end of the trochlea (Fig.E.3A), or reaches less than half-way up to it (Fig.E.3B). In the case of the articular surface of medial epicondylus reaching up high (Fig.E.3B), the direction of the inner margin of this epicondylus is pointing more medially comparing to that of *Capra* (Götze, 1998)*.*
* In *Nemorhaedus* and *Capricornis*, the shape of this part varies – it can be either similar to that of *Ovis* or *Capra* described before (Boessneck et al., 1964; Zeder and Lapham, 2010; Helmer and Rocheteau, 1994).

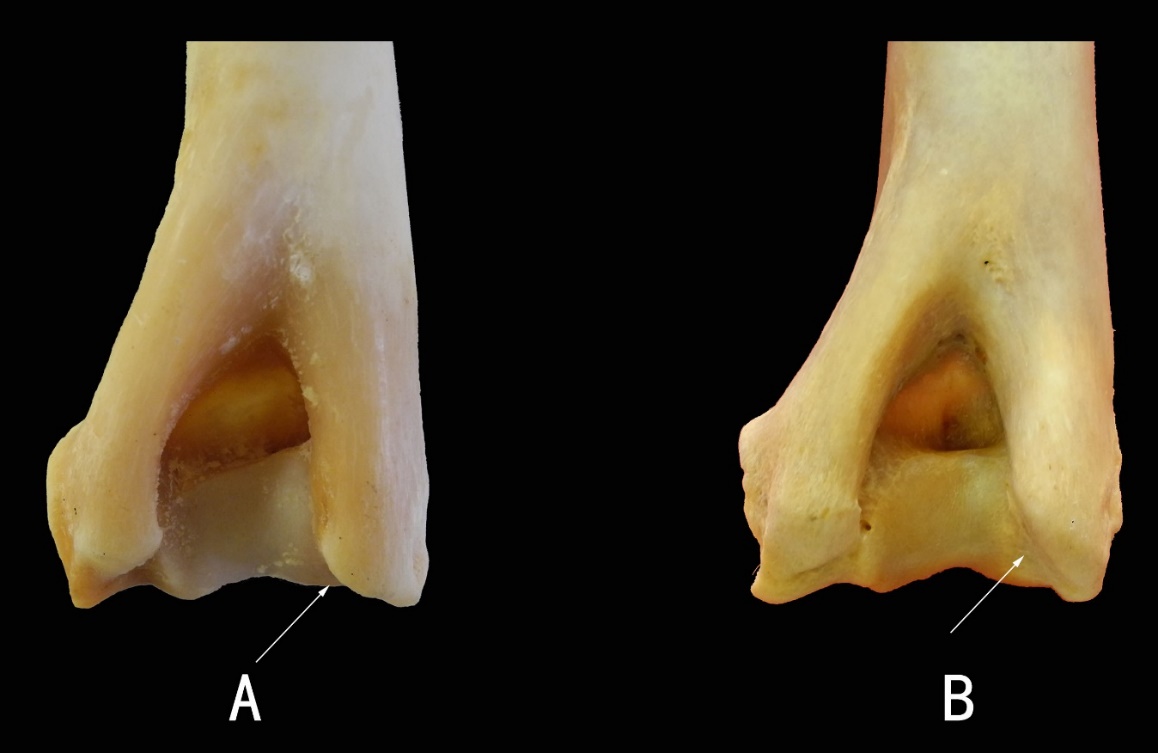


Fig.E.3 Two typical forms of the epicondylus medialis from posterior view in *Pseudois*.

Morphology of the humerus laterodistal margin from lateral view(Fig.E.4):

* In *Pseudois* (Fig.E.4A)*, Naemorhedus* (Fig.E.4B)*,* and *Capricornis* (Fig.E.4B), the caudal margin of the muscle attachment is located more caudoproximally compared to *Capra* and extends less laterally compared to *Ovis* (Götze, 1998; Boessneck et al., 1964).

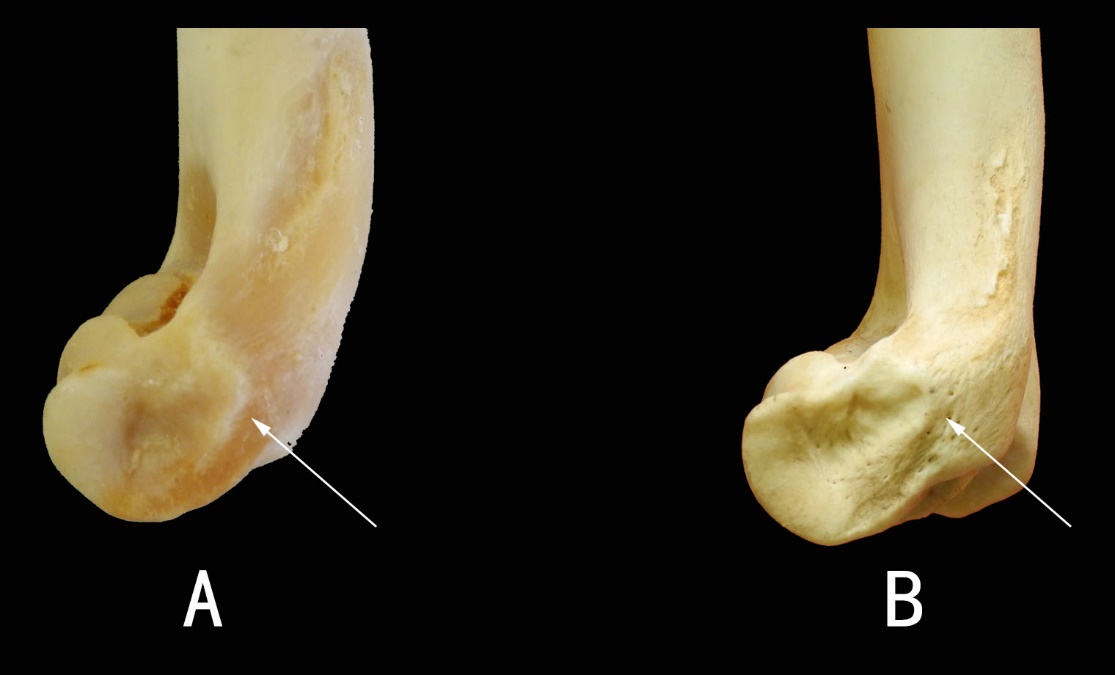


Fig.E.4. Morphology of the humerus laterodistal margin from lateral view in *Pseudois* and *Naemorhedus* (the morphology of *Capricornis* is very similar to *Naemorhedus*)

Table E. 1. Greatest length of the lateral half (GLl) of Tibetan Caprinae astraglus according to von den Driesch (1976):

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | GLl (mm) | | |
| N | Range | Mean |  |
| *Capricornis* | 1 | 39.11 | 39.11 | - |
| *Pseudois* | 4 | 33.65-34.81 | 34.14 | 0.57 |
| *O. ammon* (zoo bred) | 6 | 35.34-38.24 | 36.76 | 0.98 |
| *O. vignei* (zoo bred) | 4 | 26.33-31.29 | 29.76 | 2.31 |
| *O. orientalis* | 1 | 31.80 | 31.8 | - |
| *O. musimon* (zoo bred) | 9 | 27.40-30.94 | 29.17 | 1.09 |
| *O. aries* | 6 | 24.03-32.24 | 28.04 | 2.73 |
| *C. hircus* | 7 | 25.30-34.1 | 30.91 | 2.96 |
| *Nemorhaedus* | 6 | 30.59-43.11 | 33.88 | 4.68 |

Morphology of the astraglus medial articular ridge from dorsal view (Fig.E.5):

* In *Pseudois,* it is strong expressed, being less horizontally placed than *Ovis* while most samples are angled less obliquely in a distal direction than *Capra* (Fig.E.5AB).Nevertheless, a small portion of samples are angled as obliquely as *Capra* (Fig.E.5C; Götze, 1998)*.*
* In *O. ammon,* it is less strongly expressed than *Capra* but, in many cases, more strongly than *O. aries*. In addition, it is horizontally oriented in the majority of the samples, being similar to what previously described for *O. aries* (Fig.E.6AB). In a small portion though, it is also obliquely oriented like *Capra* or *Pseudois* (Fig.E.6C).
* In *Naemorhedus*, it is strongly expressed and oriented less obliquely than *Capra* in the majority of the samples (Fig. 7AB), but on a small portion of samples the horizontally oriented ridge also occur (Fig.E.7C).

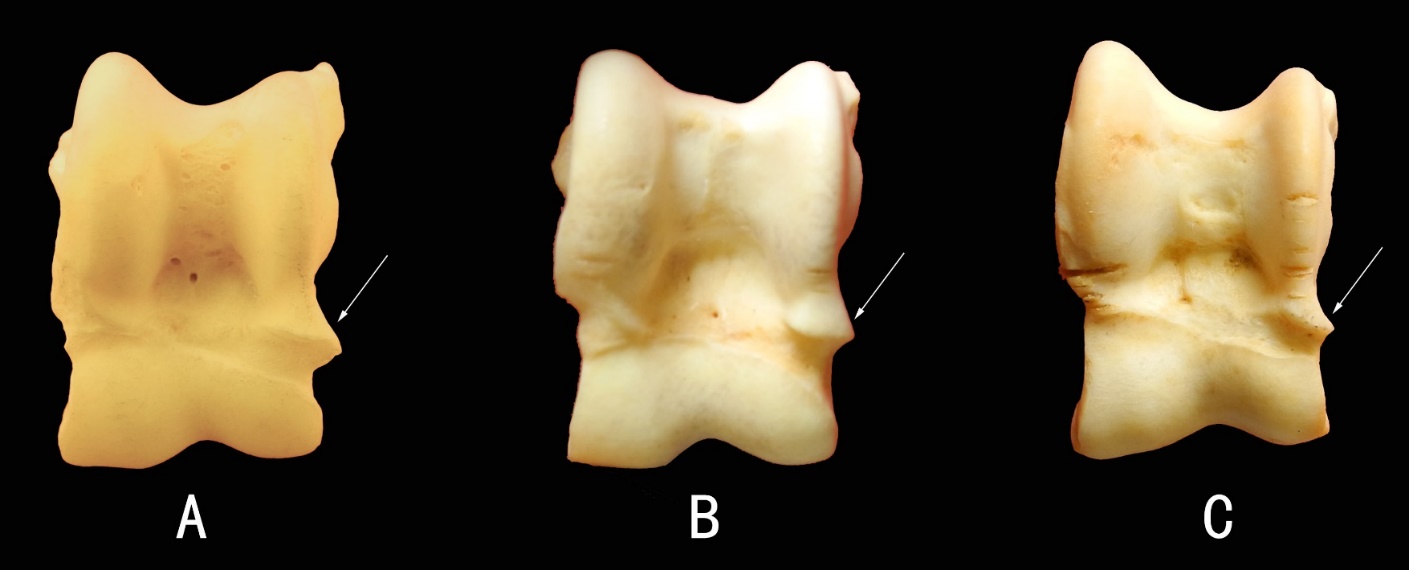


Fig.E.5. Three typical types of morphology of the astraglus medial articular ridge in *Pseudois* from dorsal view

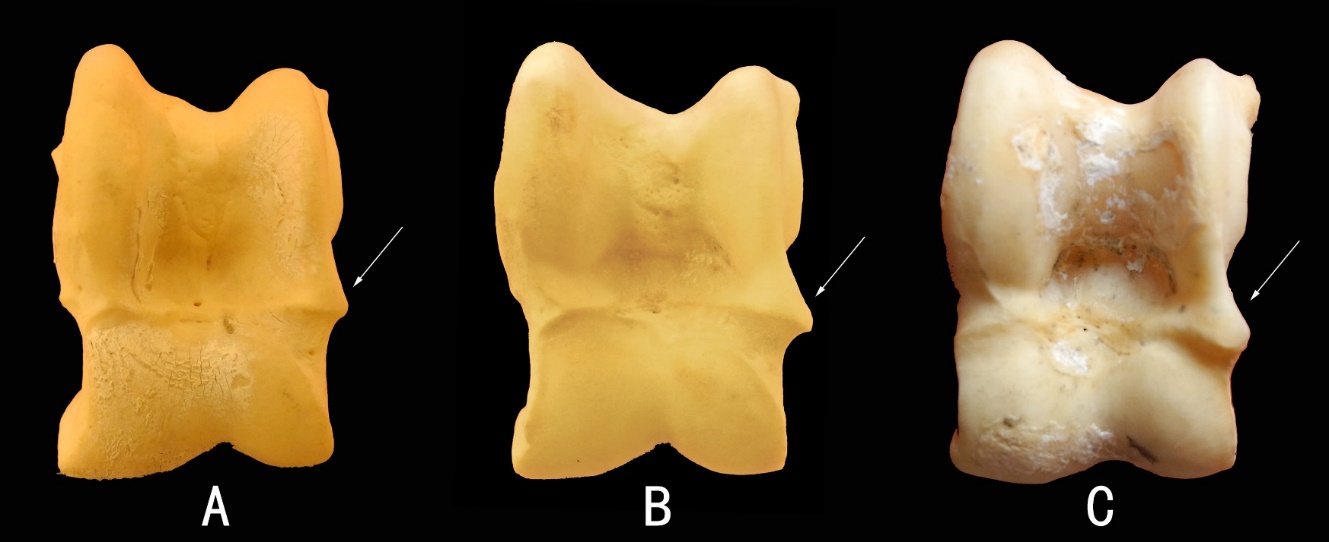


Fig.E.6. Three typical types of morphology of the astraglus medial articular ridge in *O. ammon* from dorsal view

Morphology of the astraglus distal articular surface at lateral aspect:

* In *Pseudois,* it is semi-circular in shape with a straight proximal edge running across the entire lateral face of the bone in the majority of the samples (Fig.E.8C), and with a convex proximal edge on a small portion of samples (Fig.E.8B; Götze, 1998).
* In *O. ammon*, it is similar to what has been previously described for *Ovis* (Boessneck et al., 1964; Zeder and Lapham, 2010).
* In *Naemorhedus*, there is no typical features here.

Morphology of the astraglus proximo-plantar projection of the medial articular ridge of the trochlea:

* In *Pseudois,* it forms quite a large and bulbous lobe in majority of the samples (Fig.E.9AB), but is small on a small portion of samples (Fig.E.9C; Götze, 1998).
* In *Naemorhedus*, it is mostly small and flat and maybe pointed, similar to that of *Capra* (Fig.E.10)*.*
* In *O. ammon,* the feature here is similar to what has been previously described for *Ovis* (Boessneck et al., 1964; Zeder and Lapham, 2010)*.*

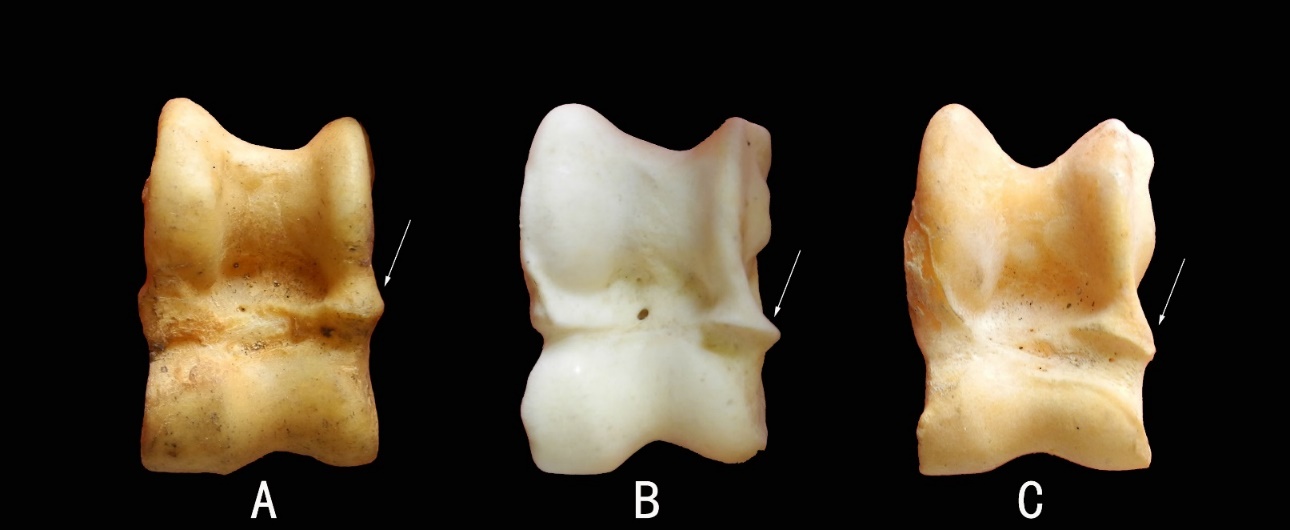


Fig.E.7. Three typical types of morphology of the astraglus medial articular ridge in *Naemorhedus* from dorsal view



Fig.E.8 Three typical types of morphology of the astraglus distal articular surface at lateral aspect in *Pseudois.*



Fig.E.9. Three typical types of morphology of the proximo-plantar projection of the medial articular ridge of the trochlea in *Pseudois*.

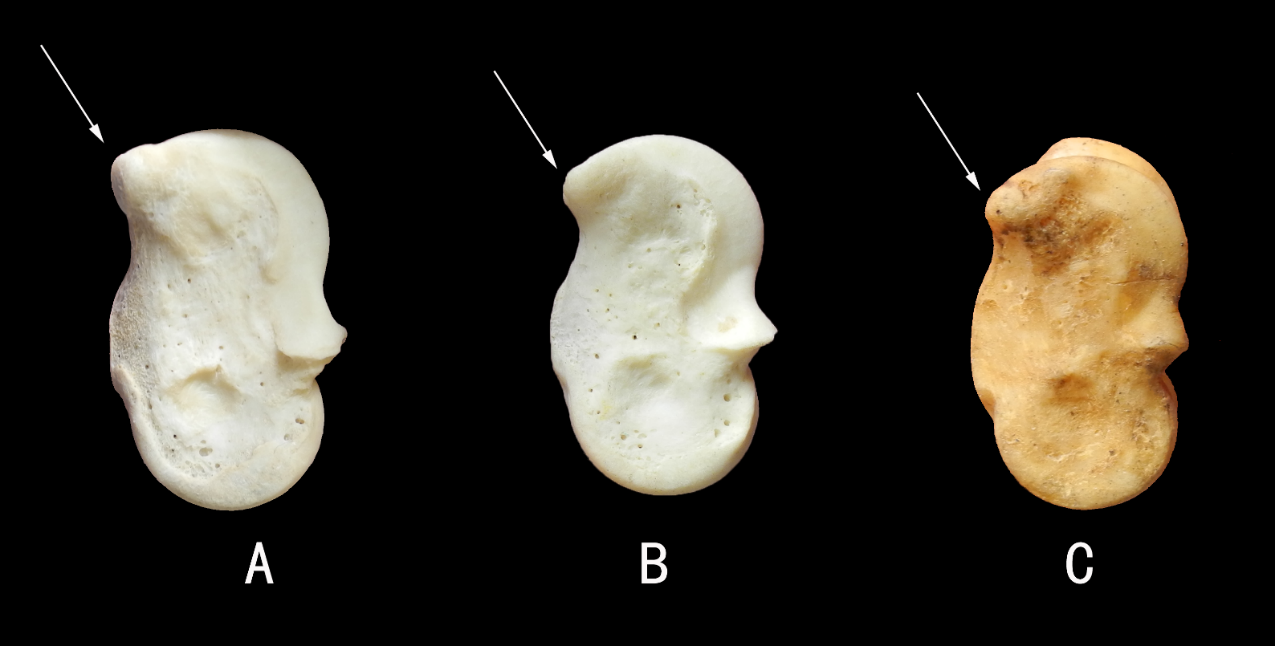


Fig.E.10. Three typical types of morphology of the proximo-plantar projection of the medial articular ridge of the trochlea in *Naemorhedus*.

Morphology of the lower P3 of *Pseudois* in occlusal view:

* In the middle of the lingual face there is a larger but weakly developed “step” compared to sheep, but less a straight line than goat in a posterior-anterior direction (Fig.E.11. P3.1; compared to Halstead et al., 2002. Fig. 2.a, P3.1)
* The distal part of the buccal edge forms less shallow and indistinct hollow in *Pseudois,* similar to that of goat (Fig.E.11.P3.2; compared to Halstead et al., 2002. Fig. 2.a, P3.2).
* The mesio-buccal quarter of the tooth tends towards a more open angle (in extreme cases, almost approaching a straight line) in *Pseudois,* similar to that of goat. N.B. the mesio-buccal ‘‘corner’’ may be a rounded angle. (Fig.E.11.P3.3; compared to Halstead et al., 2002. Fig. 2.a, P3.3)
* Overall, the tooth tends to be longer and slender than sheep, but shorter and broader than goat, but these dimensions may be altered by tooth wear and masked by tooth crowding (Fig.E.11.P3.4; compared to Halstead et al., 2002. Fig. 2.a, P3.4).

Morphology of the lower P4 of *Pseudois* in occlusal view:

* The mesio-lingual corner is typically marked by a vertical rib, projecting lingually in *Pseudois* --- similar to sheep (but this feature would be altered by tooth wear and masked by tooth crowding) (Fig.E.11.P4.1; compared to Halstead et al., 2002. Fig.2.b, P4.1).
* The mesio-buccal quarter of the tooth forms an open angle (clearly more than 90 degrees) in *Pseudois*, similar to that of goat (Fig.E.11.p4.2; compared to Halstead et al., 2002. Fig. 2.b, P4.2).
* Overall, the tooth tends to be longer and slenderer than sheep, but slightly shorter and broader than goat, but these dimensions may be altered by tooth wear and masked by tooth crowding (Fig.E.11.p4.3; compared to Halstead et al., 2002. Fig. 2.b, P4.3).

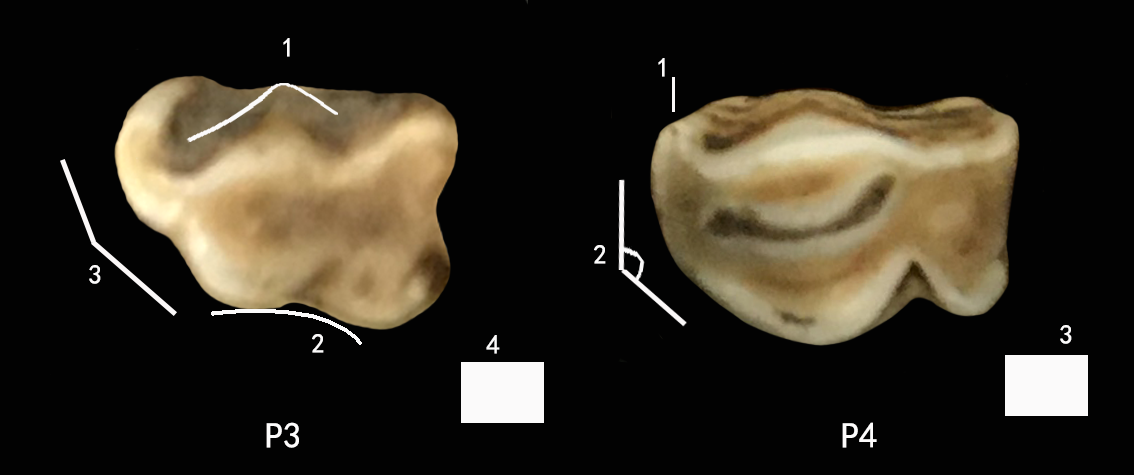


Fig.E.11 Morphology of the lower P3 and P4 of *Pseudois* in occlusal view

Morphology of the lower M1/M2 of *Pseudois* in occlusal view:

* The mesial part of the buccal edge is typically straight in *Pseudois,* but may be somewhat hollow (or goat-like) in some specimens (Fig.E.12.M1/M2.1; compared to Halstead et al., 2002. Fig. 2.c, M1/M2.1).
* The buccal edge of the disto-buccal cusp of M1 and M2 are mostly symmetrical but occasionally also have a slight posterior orientation in *Pseudois*. (Fig.E.12.M1/M2.2; compared to Halstead et al., 2002. Fig. 2.c, M1/M2.2).
* The buccal edge of M1 and M2 overall tends to a pointed ‘triangular’ appearance in *Pseudois*, similar to that of goat. Nevertheless, this feature is also heavily influenced by, and must be judged relative to, the degree of occlusal wear -- flat and pointed profile is indicative of *Pseudois* or goat in medium and light wear and less securely so in a heavily worn (stage 11G onwards) M1/M2 (Fig.E.12.M1/M2.3; compared to Halstead et al., 2002. Fig. 2.c, M1/M2.3).
* The flange on the mesial face of M3 tends to be narrow in *Pseduois* --- similar to that of goat, but this feature is heavily influenced by, and must be judged relative to, the degree of occlusal wear -- narrow flange is strongly suggestive of goat or *Pseudois* in an M1/M2 of medium or heavy wear (from, say, stage 11G onwards) and less securely so in a lightly worn M1/M2 (Fig.E.12.M1/M2.4; compared to Halstead et al., 2002. Fig. 2.d, M3.6).

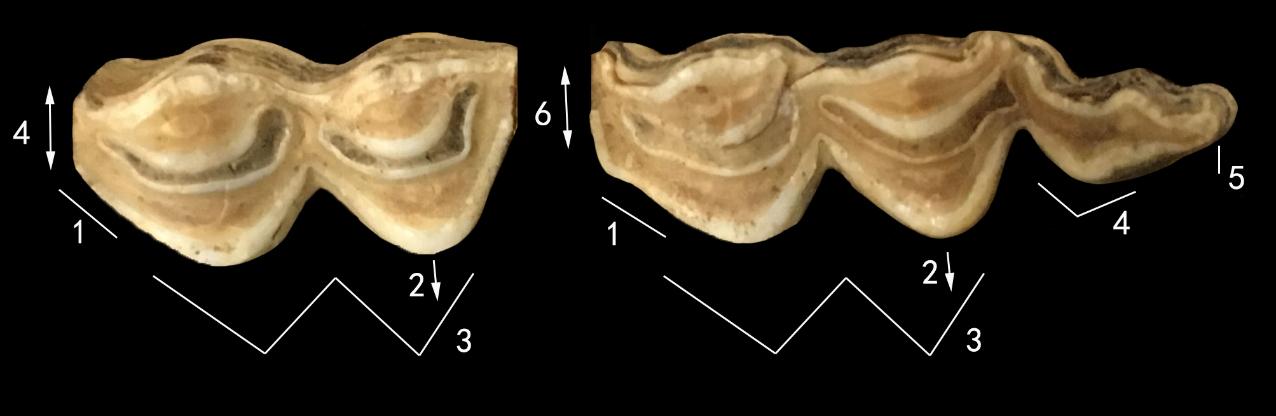


Fig.E.12. Morphology of the lower M1/M2 and M3 of *Pseudois* in occlusal view

Morphology of the lower M3 of *Pseudois* in occlusal view:

* The mesial part of the buccal edge of the mesio-buccal cusp of M3 is typically flat or slightly concave in *Pseudois*, similar to that of goat (Fig.E.12.M3.1; compared to Halstead et al., 2002. Fig. 2,d, M3.1).
* The buccal edge of the centro-buccal cusp of M3 points less strongly in a posterior direction than goat, while it is less symmetrical than in sheep (Fig.E.12.M3.2; compared to Halstead et al., 2002. Fig. 2,d, M3.2).
* The buccal edge of the mesial and central parts of M3 overall tends to a pointed ‘‘triangular’’ appearance in *Pseudois* --- similar to that of goat. Nevertheless, this feature is also heavily influenced by, and must be judged relative to, the degree of occlusal wear -- flat and pointed profile is indicative of *Pseudois* or goat in medium and light wear and less securely so in a heavily worn (stage 11G onwards) M3 (Fig.E.12.M3.3; compared to Halstead et al., 2002. Fig. 2,d, M3.3).
* The buccal edge of the distal cusp of M3 is often more or less pointed in *Pseudois* --- similar to that of goat. Thus, a pointed edge is suggestive of goat, but a rounded edge is compatible with sheep, goat, or *Pseudois* (Fig.E.12.M3.4; compared to Halstead et al., 2002. Fig. 2.d, M3.4)*.*
* The buccally defined ‘‘flute’’ at the distal margin of the distal cusp of M3 is absent in Pseudois, similar to that of goat (Fig.E.12.M3.5; compared to Halstead et al., 2002. Fig. 2,d, M3.5)
* The flange on the mesial face of M3 tends to be narrow in *Pseudois* --- similar to that of goat, but this feature is heavily influenced by, and must be judged relative to, the degree of occlusal wear -- narrow flange is strongly suggestive of goat or *Pseudois* in an M3 of medium or heavy wear (from, say, stage 11G onwards) and less securely so in a lightly worn M1/M2 (Fig.E.12.M3.6; compared to Halstead et al., 2002. Fig. 2, d, M3.6).

Table E.2. Length and breadth of *Pseudois* lower P3 at mature wear stage (12S, Payne, 1987: 610, Fig. 1) and beyond, measured near the biting surface following von den Driesch (1976):

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Length (mm) | | | Breadth (mm) | | |
| N | Range | Mean |  | Range | Mean |  |
| *Pseudois* | 8 | 5.75-7.05 | 6.54 | 0.41 | 4.21-6.25 | 4.84 | 0.63 |

**Specimens examined:**

Museums (Msm):

SAPM: the Staatssammlung für Anthropologie und Paläoanatomie, München

MNHN: the Muséum national d'Histoire naturelle, Paris

BMN: the Berlin Museum für Naturkunde

USNM: the Smithsonian National Museum of Natural History

AMNH: the Smithsonian National Museum of Natural History

MCZ: the Museum of Comparative Zoology, Harvard

FMNH: the Field Museum, Chicago

CMZ: the University Museum of Zoology, Cambridge

GCZ: The Grahame Clark Laboratory for Zooarchaeology

MHJ: the Museum für Haustierkunde “Julius Kühn”, Martin‐Luther University of Halle‐Wittenberg

IZCAS: Institute of Zoology, Chinese Academy of Sciences

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Msm | Spec No. | Genus | Age | Sex | Origin/breed | Status |
|
| SAPM | 01823 | *Pseudois* | Adult (8yrs) | m | Paris breeding | Captivity |
| SAPM | 01824 | *Pseudois* | Adult (18yrs) | f | Paris breeding | Captivity |
| SAPM | 01825 | *Pseudois* | Adult | m | Nepal | Wild |
| SAPM | 01826 | *Pseudois* | Sub-adult | f | Nepal | Wild |
| SAPM | 01827 | *Pseudois* | Adult | f | Nepal | Wild |
| MNHN | 1972-92 | *Pseudois* | Adult | f | French zoo | Captivity |
| MNHN | 1972-92a | *Pseudois* | Adult | f | French zoo | Captivity |
| MNHN | 1985-055 | *Pseudois* | Adult | f | French zoo | Captivity |
| MNHN | 1991-641 | *Pseudois* | Adult | f | French zoo | Captivity |
| MNHN | 1995-197 | *Pseudois* | Adult | m | French zoo | Captivity |
| MNHN | 1996-2097 | *Pseudois* | Adult | - | French zoo | Captivity |
| MNHN | 1966-136 | *Pseudois* | Adult | m | French zoo | Captivity |
| MNHN | 1971-245 | *Pseudois* | Adult | m | French zoo | Captivity |
| MNHN | 1968-766 | *Pseudois* | Adult | m | French zoo | Captivity |
| MNHN | 2005-569 | *Pseudois* | Sub-adult | - | Himalaya | Wild |
| MNHN | 1896-696 | *Pseudois* | Adult | f | French zoo | Captivity |
| MNHN | 1902-412 | *Pseudois* | Adult/Sub-adult | - | French zoo | Captivity |
| BMN | 14738 | *Pseudois* | Sub-adult | m | French zoo | Captivity |
| BMN | 43037 | *Pseudois* | Sub-adult | m | French zoo | Captivity |
| BMN | 43038 | *Pseudois* | Juvenile | f | - | Wild |
| BMN | 43038(1) | *Pseudois* | Juvenile | f | - | Wild |
| BMN | 68734 | *Pseudois* | Adult | f | Berlin zoo | Captivity |
| BMN | 68737 | *Pseudois* | Adult | f | Himalaya | Wild |
| BMN | 68736 | *Pseudois* | Adult | m | Himalaya | Wild |
| BMN | 68735 | *Pseudois* | Sub-adult | - | Himalaya | Wild |
| BMN | 68735(2) | *Pseudois* | Sub-adult | - | Himalaya | Wild |
| BMN | 83323 | *Pseudois* | Juvenile | f | Guangzhou zoo, China | Captivity |
| BMN | 83323(1) | *Pseudois* | Juvenile | f | Guangzhou zoo, China | Captivity |
| MCZ | 29959 | *Pseudois* | Sub-adult | m | Sichuan, China | Wild |
| USNM | 258665 | *Pseudois* | Adult | f | Sichuan, China | Wild |
| USNM | 258661 | *Pseudois* | Adult | m | Sichuan, China | Wild |
| USNM | 258662 | *Pseudois* | Adult | f | Sichuan, China | Wild |
| USNM | 258663 | *Pseudois* | Adult | f | Bhutan | Wild |
| USNM | 395251 | *Pseudois* | Adult | f | Ningxia, China | Wild |
| USNM | 240681 | *Pseudois* | Adult | f | - | Wild |
| AMNH | 22786 | *Pseudois* | Adult | m | - | Captivity |
| AMNH | 22787 | *Pseudois* | Adult | m | - | Captivity |
| AMNH | 22812 | *Pseudois* | Adult | - | - | Captivity |
| NHML | 1845-1-12 | *Pseudois* | Adult | m | Nepal | Wild |
| NHML | 70-190 | *Pseudois* | Adult | - | - | - |
| SMTD | 14576 | *Pseudois* | Adult | f | Soviet Union, Berlin zoo | Captivity |
| NHMW | 32972 | *Pseudois* | Adult | m | Paris zoo | Captivity |
| IZCAS | S23661 | *Pseudois* | Adult | - | Tibet, China | Wild |
| IZCAS | S25039 | *Pseudois* | Adult | - | Tibet, China | Wild |
| IZCAS | S25051 | *Pseudois* | Adult | - | Tibet, China | Wild |
| IZCAS | S23660 | *Pseudois* | Adult | - | Tibet, China | Wild |
| IZCAS | S37073 | *Pseudois* | Adult | - | Tibet, China | Wild |
| IZCAS | S36073 | *Pseudois* | Sub-adult | - | Tibet, China | Wild |
| IZCAS | S36019 | *Pseudois* | Sub-adult | - | Tibet, China | Wild |
| IZCAS | S36020 | *Pseudois* | Sub-adult | - | Tibet, China | Wild |
| IZCAS | S36021 | *Pseudois* | Sub-adult | - | Tibet, China | Wild |
| IZCAS | S36024 | *Pseudois* | Sub-adult | - | Tibet, China | Wild |
| IZCAS | S36025 | *Pseudois* | Adult | - | Tibet, China | Wild |
| IZCAS | S36027 | *Pseudois* | Sub-adult | - | Tibet, China | Wild |
| IZCAS | S36028 | *Pseudois* | Adult | - | Tibet, China | Wild |
| IZCAS | S36029 | *Pseudois* | Adult | - | Tibet, China | Wild |
| IZCAS | S36030 | *Pseudois* | Adult | - | Tibet, China | Wild |
| IZCAS | S36031 | *Pseudois* | Sub-adult | - | Tibet, China | Wild |
| IZCAS | S36032 | *Pseudois* | Adult | - | Tibet, China | Wild |
| IZCAS | S36033 | *Pseudois* | Sub-adult | - | Tibet, China | Wild |
| IZCAS | S36038 | *Pseudois* | Adult | - | Tibet, China | Wild |
| IZCAS | S36040 | *Pseudois* | Adult | - | Tibet, China | Wild |
| IZCAS | S36042 | *Pseudois* | Adult | - | Tibet, China | Wild |
| IZCAS | S36045 | *Pseudois* | Adult | - | Tibet, China | Wild |
| IZCAS | S36046 | *Pseudois* | Adult | - | Tibet, China | Wild |
| IZCAS | S36047 | *Pseudois* | Adult | - | Tibet, China | Wild |
| IZCAS | S36048 | *Pseudois* | Adult | - | Tibet, China | Wild |
| IZCAS | S36049 | *Pseudois* | Adult | - | Tibet, China | Wild |
| IZCAS | S36055 | *Pseudois* | Adult | - | Tibet, China | Wild |
| IZCAS | S38067 | *Pseudois* | Adult | - | Tibet, China | Wild |
| IZCAS | S38071 | *Pseudois* | Adult | - | Tibet, China | Wild |
| IZCAS | S36037 | *Pseudois* | Sub-adult | - | Tibet, China | Wild |
| IZCAS | S25977 | *Pseudois* | Adult | - | Tibet, China | Wild |
| USNM | 258831 | *Capricornis* | Adult | m | Wenchuan, China | Wild |
| USNM | 258832 | *Capricornis* | Adult | m | Sichuan, China | Wild |
| USNM | 258833 | *Capricornis* | Adult | m | Sichuan, China | Wild |
| USNM | 258671 | *Capricornis* | Adult | m | Sichuan, China | Wild |
| USNM | 258653 | *Capricornis* | Adult | f | Sichuan, China | Wild |
| USNM | 258670 | *Capricornis* | Adult | m | Wenchuan, China | Wild |
| USNM | 152165 | *Capricornis* | Adult | f | Gansu, China | Wild |
| USNM | 259025 | *Capricornis* | Adult | m | Sichuan, China | Wild |
| USNM | 259404 | *Capricornis* | Adult | m | Sichuan, China | Wild |
| BMN | 47492 | *Capricornis* | Adult | m | zoo garden Berlin | Captivity |
| BMN | 7476 | *Capricornis* | Adult | - | zoo garden Berlin | Captivity |
| MNHN | 1874-283 | *Capricornis* | Adult | m | China | Wild |
| MNHN | 1937-314 | *Capricornis* | Sub-adult | f | French zoo | Captivity |
| MNHN | 1919-28 | *Capricornis* | Sub-adult | - | China | Wild |
| MNHN | 1901-1350 | *Capricornis* | Adult | - | French zoo | Captivity |
| MNHN | 1886-1241 | *Capricornis* | Adult | - | French zoo | Captivity |
| MNHN | 1902-411 | *Capricornis* | Adult | - | China | Wild |
| AMNH | 43037 | *Capricornis* | Adult | m | Yunnan, China | Wild |
| AMNH | 54613 | *Capricornis* | Sub-adult | f | Kashmir Valley | Wild |
| AMNH | 54614 | *Capricornis* | Adult | f | Kashmir Valley | Wild |
| AMNH | 115578 | *Capricornis* | Sub-adult/Adult | m | Burma, Ngawchaung | Wild |
| AMNH | 114384 | *Capricornis* | Adult | f | Nepal | Wild |
| AMNH | 165683 | *Capricornis* | Adult | f | Japan, Honshu Island | Wild |
| FMNH | 36783 | *Capricornis* | Adult | - | Sichuan, China | Wild |
| FMNH | 31137 | *Capricornis* | Sub-adult | f | Sichuan, China | Wild |
| AMNH | 165685 | *Capricornis* | Adult | f | Taiwan | Wild |
| AMNH | 184946 | *Capricornis* | Adult | - | Taiwan | Wild |
| CMZ | H25602 | *Capricornis* | Adult | - | Burma | Wild |
| MNHN | 1963-320 | *Nemorhaedus* | Adult | m | French zoo | Captivity |
| MNHN | 1962-153 | *Nemorhaedus* | Adult | f | French zoo | Captivity |
| MNHN | 1966-198 | *Nemorhaedus* | Adult | f | French zoo | Captivity |
| MNHN | 1877-574 | *Nemorhaedus* | Adult | - | Japan | Wild |
| MNHN | 1962-197 | *Nemorhaedus* | Adult | f | Sichuan, China | Wild |
| MNHN | 1913-728 | *Nemorhaedus* | Sub-adult/Adult | - | Sichuan, China | Wild |
| MNHN | 1896-693 | *Nemorhaedus* | Adult | - | French zoo | Captivity |
| MNHN | 1896-692 | *Nemorhaedus* | Adult | - | French zoo | Captivity |
| AMNH | 43004 | *Nemorhaedus* | Adult | m | Yunnan, China | Wild |
| AMNH | 43001 | *Nemorhaedus* | Adult | - | Yunnan, China | Wild |
| AMNH | 110481 | *Nemorhaedus* | Adult | m | Wenchuan, China | Wild |
| AMNH | 40995 | *Nemorhaedus* | Adult | m | Yunnan, China | Wild |
| BMN | 83318 | *Nemorhaedus* | Adult | f | Peking zoo, China | Captivity |
| BMN | 70035 | *Nemorhaedus* | Adult | f | Tierpark Berlin | Captivity |
| BMN | 14451 | *Nemorhaedus* | Adult | f | Tierpark Berlin | Captivity |
| BMN | 70721 | *Nemorhaedus* | Adult | m | Tierpark Berlin | Captivity |
| BMN | 70589 | *Nemorhaedus* | Adult | - | Ramni Himalaya | Wild |
| FMNH | 36788 | *Nemorhaedus* | Adult | - | Sichuan, China | Wild |
| FMNH | 36922 | *Nemorhaedus* | Adult | - | Kashmir | Wild |
| FMNH | 36786 | *Nemorhaedus* | Adult | m | Kashmir | Wild |
| FMNH | 26921 | *Nemorhaedus* | Adult | - | Kashmir | Wild |
| USNM | 259398 | *Nemorhaedus* | Adult | m | Sichuan, China | Wild |
| USNM | 258677 | *Nemorhaedus* | Sub-adult | f | Sichuan, China | Wild |
| USNM | 259390 | *Nemorhaedus* | Adult | f | Sichuan, China | Wild |
| USNM | 259396 | *Nemorhaedus* | Adult | m | Wenchuan, China | Wild |
| USNM | 259397 | *Nemorhaedus* | Adult | f | Sichuan, China | Wild |
| USNM | 259023 | *Nemorhaedus* | Adult | - | Sichuan, China | Wild |
| USNM | 258678 | *Nemorhaedus* | Sub-adult | m | Wenchuan, China | Wild |
| GCZ | 1 | *Capra hircus* | Adult | - | UK | Domestic |
| GCZ | Y1 | *Capra hircus* | Adult | - | UK | Domestic |
| GCZ | 25 | *Capra hircus* | Sub-adult/Adult | - | UK | Domestic |
| GCZ | 207 | *Capra hircus* | Sub-adult | - | UK | Domestic |
| GCZ | 154 | *Capra hircus* | Sub-adult | - | UK | Domestic |
| GCZ | 167 | *Capra hircus* | Sub-adult | - | UK | Domestic |
| GCZ | 537 | *Capra hircus* | Sub-adult/Adult | - | UK | Domestic |
| GCZ | 26141 | *Capra hircus* | Sub-adult/Adult | - | UK | Domestic |
| GCZ | we wild | *Capra hircus* | Adult | - | UK | Domestic |
| SAPM | 02913 | *Capra hircus* | Adult | f | Germany | Domestic |
| SAPM | 02914 | *Capra hircus* | Sub-adult | f | Germany | Domestic |
| SAPM | 02915 | *Capra hircus* | Adult | f | Germany | Domestic |
| SAPM | 02917 | *Capra hircus* | Adult | f | Germany | Domestic |
| SAPM | 02919 | *Capra hircus* | Adult | f | Germany | Domestic |
| SAPM | 02920 | *Capra hircus* | Sub-adult | m | Germany | Domestic |
| SAPM | 02921 | *Capra hircus* | Adult | m | Germany | Domestic |
| SAPM | 02925 | *Capra hircus* | Sub-adult | - | Germany | Domestic |
| SAPM | 02928 | *Capra hircus* | Adult | - | Germany | Domestic |
| SAPM | 02929 | *Capra hircus* | Adult | m | Germany | Domestic |
| SAPM | 02938 | *Capra hircus* | Sub-adult/Adult | - | Germany | Domestic |
| SAPM | 02939 | *Capra hircus* | Sub-adult | f | Germany | Domestic |
| SAPM | 02941 | *Capra hircus* | Sub-adult | f | Germany | Domestic |
| SAPM | 02942 | *Capra hircus* | Sub-adult | f | Germany | Domestic |
| SAPM | 02945 | *Capra hircus* | Sub-adult | m | Germany | Domestic |
| SAPM | 02950 | *Capra hircus* | Sub-adult | f | Germany | Domestic |
| SAPM | 02957 | *Capra hircus* | Sub-adult | m | Germany | Domestic |
| SAPM | 02958 | *Capra hircus* | Adult | m | Germany | Domestic |
| SAPM | 02959 | *Capra hircus* | Sub-adult | f | Germany | Domestic |
| SAPM | 02960 | *Capra hircus* | Sub-adult | f | Germany | Domestic |
| SAPM | 02968 | *Capra hircus* | Sub-adult/Adult | - | Germany | Domestic |
| SAPM | 03137 | *Capra hircus* | Sub-adult | - | Germany | Domestic |
| SAPM | 03187 | *Capra hircus* | Adult | - | Iran | Wild |
| BMN | 1 | *O. ammon* | Adult | - | Berlin zoo | Captivity |
| BMN | 5391 | *O. ammon* | Adult | m | Berlin zoo | Wild |
| SAPM | 02238 | *O. ammon* | Adult | m | Munich zoo | Captivity |
| SAPM | 02235 | *O. ammon* | Adult | f | Munich zoo | Captivity |
| SAPM | 02237 | *O. ammon* | Adult | f | Munich zoo | Captivity |
| SAPM | 02236 | *O. ammon* | Sub-adult | m | Munich zoo | Captivity |
| SAPM | 02230 | *O. ammon* | Sub-adult | m | Munich zoo | Captivity |
| SAPM | 02232 | *O. ammon* | Sub-adult | f | Munich zoo | Captivity |
| MNHN | 1876-524 | *O. ammon* | Adult/Sub-adult | f | Mongolia | Wild |
| MHJ | 216, O pol hein 1 | *O. ammon* | Adult/Sub-adult | m | Xinjiang, China | Wild |
| MHJ | II, O am ltld 3 | *O. ammon* | Adult/Sub-adult | f | Altai Mountains | Wild |
| MHJ | 163,O am alt 2 | *O. ammon* | Sub-adult | m | Altai Mountains | Wild |
| MHJ | ohne, O am ltld 1 | *O. ammon* | Adult | m | Altai Mountains | Wild |
| MHJ | 218, O am ltld 9 | *O. ammon* | Adult | f | Altai Mountains | Wild |
| MHJ | 217,O am alt 3 | *O. ammon* | Adult | f | Altai Mountains | Wild |
| MHJ | ohne, O am ltld 2 | *O. ammon* | Adult | f | Altai Mountains | Wild |
| MHJ | 204, O am ltld 7 | *O. ammon* | Adult | f | Altai Mountains | Wild |
| FMNH | 25683 | *O. ammon* | Sub-adult | f | Xinjiang Uygur, China | Wild |
| FMNH | 25684 | *O. ammon* | Adult | m | Xinjiang Uygur, China | Wild |
| FMNH | 25685 | *O. ammon* | Adult | m | Xinjiang Uygur, China | Wild |
| FMNH | 25676 | *O. ammon* | Sub-adult | m | Xinjiang Uygur, China | Wild |
| USNM | 240688 | *O. ammon* | Adult | f | Shanxi, China | Wild |
| USNM | 62100 | *O. ammon* | Adult | f | Turkestan | Wild |
| USNM | 62096 | *O. ammon* | Adult | m | Taqdum bash Pamir, USSR | Wild |
| USNM | 62101 | *O. ammon* | Adult | m | Xinjiang, China | Wild |
| MCZ | 19940 | *O. ammon* | Adult | m | Shanxi, China | Wild |
| MCZ | 19941 | *O. ammon* | Sub-adult | m | Shanxi, China | Wild |
| MCZ | 19942 | *O. ammon* | Juvenile | - | Shanxi, China | Wild |
| AMNH | 45490 | *O. ammon* | Adult | m | China | Wild |
| AMNH | 45492 | *O. ammon* | Adult | m | Shanxi, China | Wild |
| AMNH | 45493 | *O. ammon* | Sub-adult | m | Shanxi, China | Wild |
| AMNH | 54931 | *O. ammon* | Adult | m | Shanxi, China | Wild |
| AMNH | 54875 | *O. ammon* | Adult | f | Russian Pamirs | Wild |
| AMNH | 54873 | *O. ammon* | Adult | m | Russian Pamirs | Wild |
| AMNH | 54865 | *O. ammon* | Adult | m | Russian Pamirs | Wild |
| AMNH | 54867 | *O. ammon* | Adult | m | Russian Pamirs | Wild |
| AMNH | 45494 | *O. ammon* | Sub-adult | m | Shanxi, China | Wild |
| AMNH | 54874 | *O. ammon* | Sub-adult | m | Russian Pamirs | Wild |
| AMNH | 54881 | *O. ammon* | Sub-adult | m | Russian Pamirs | Wild |
| AMNH | 54870 | *O. ammon* | Adult | m | Russian Pamirs | Wild |
| IZCAS | S14484 | *O. ammon* | Adult | - | Tibet, China | Wild |
| IZCAS | S37302 | *O. ammon* | Adult | - | Tibet, China | Wild |
| SAPM | 03085 | *O. aries* | Sub-adult | m | Germany/musimon | Domestic |
| SAPM | 02718 | *O. aries* | Adult | f | Germany/musimon | Domestic |
| SAPM | 02738 | *O. aries* | Adult | m | Germany/musimon | Domestic |
| GCZ | 394 | *O. aries* | Adult | f | Suffolk/soay | Domestic |
| GCZ | 404 | *O. aries* | Adult | f | Suffolk/soay | Domestic |
| GCZ | 315 | *O. aries* | Adult | f | Suffolk/soay | Domestic |
| GCZ | 436 | *O. aries* | Adult | f | Suffolk/soay | Domestic |
| GCZ | 329 | *O. aries* | Adult | f | Suffolk/soay | Domestic |
| GCZ | 495 | *O. aries* | Adult | f | England/unknown | Domestic |
| GCZ | 115 | *O. aries* | Sub-adult | - | England/unknown | Domestic |
| GCZ | Y7 | *O. aries* | Adult | - | England/unknown | Domestic |
| GCZ | Y5 | *O. aries* | Sub-adult | - | England/unknown | Domestic |
| GCZ | Y4 | *O. aries* | Sub-adult | - | England/unknown | Domestic |
| GCZ | Y28 | *O. aries* | Sub-adult | - | England/unknown | Domestic |
| GCZ | 435 | *O. aries* | Adult | - | England/unknown | Domestic |
| GCZ | Y1 | *O. aries* | Adult | - | England/unknown | Domestic |
| GCZ | Y2 | *O. aries* | Sub-adult | - | England/unknown | Domestic |
| GCZ | Y3 | *O. aries* | Adult | - | England/unknown | Domestic |
| GCZ | G64 | *O. aries* | Adult | - | England/unknown | Domestic |
| GCZ | G64 Y45 | *O. aries* | Adult | - | England/unknown | Domestic |
| GCZ | N75 | *O. aries* | Adult | f | England/unknown | Domestic |
| GCZ | 1 | *O. aries* | Adult/Sub-adult | - | England/unknown | Domestic |
| GCZ | 2 | *O. aries* | Adult/Sub-adult | - | England/unknown | Domestic |
| GCZ | 49GZH | *O. aries* | Adult | - | England/unknown | Domestic |
| GCZ | Dorset | *O. aries* | Adult | - | England/unknown | Domestic |
| MNHN | 1930-159 | *O. aries* | Adult | m | zoo/unknown | Domestic |
| AMNH | 17980 | *O. aries* | Adult | f | zoo/unknown | Domestic |
| AMNH | 21528 | *O. aries* | Adult | m | zoo/unknown | Domestic |
| AMNH | 35494 | *O. aries* | Adult | f | zoo/unknown | Domestic |
| AMNH | 10072 | *O. aries* | Sub-adult/Adult | m | Lower central Asia | Domestic |
| AMNH | 53596 | *O. aries* | Sub-adult/Adult | m | Africa, Faradje | Domestic |
| AMNH | 53598 | *O. aries* | Sub-adult/Adult | m | Faradje, Zaire | Domestic |
| MHJ | O rb 4, 8 | *O. aries* | Adult | m | Germany/Rambouillet | Domestic |
| MHJ | O rb 6, 14/75 | *O. aries* | Adult(7yrs) | f | Germany/Rambouillet | Domestic |
| MHJ | O rb 9, 15/82 | *O. aries* | Adult(8yrs) | m | Germany/Rambouillet | Domestic |
| MHJ | O rb 2, 1 | *O. aries* | Adult | f | Germany/Rambouillet | Domestic |
| MHJ | O rb 18, 432 | *O. aries* | Adult(6yrs) | f | Germany/Rambouillet | Domestic |
| MHJ | O rb 13, 20/75 | *O. aries* | Adult(8yrs) | f | Germany/Rambouillet | Domestic |
| MHJ | O rb 3, 2 | *O. aries* | Adult | f | Germany/Rambouillet | Domestic |
| MHJ | O rb 17,209/76 | *O. aries* | Adult(5yrs) | m | Germany/Rambouillet | Domestic |
| MHJ | O rb 19, 433 | *O. aries* | Adult | m | Germany/Rambouillet | Domestic |
| MHJ | O rb 10, 17/75 | *O. aries* | Adult(10yrs) | f | Germany/Rambouillet | Domestic |
| MHJ | O sfrz m 1 | *O. aries* | Sub-adult(2yrs) | f | Germany/Rambouillet | Domestic |
| MHJ | O rb 7, 14/82 | *O. aries* | Adult(8yrs) | f | Germany/Rambouillet | Domestic |
| MHJ | O rb 5, 13/75 | *O. aries* | Adult(4yrs) | f | Germany/Rambouillet | Domestic |
| MHJ | O rb/ag 87, 811/92 | *O. aries* | Adult(3yrs) | f | Germany/Rambouillet×Argali | Domestic |
| MHJ | O rb/ag 191, 1014/03 | *O. aries* | Adult(9yrs) | m | Germany/Rambouillet×Argali | Domestic |
| MHJ | O rb/ag 59,708/90 | *O. aries* | Adult(5yrs) | m | Germany/Rambouillet×Argali | Domestic |
| MHJ | O rb/ag 251,1093/02 | *O. aries* | Sub-adult(3yrs) | m | Germany/Rambouillet×Argali | Domestic |
| MHJ | O rb/ag 246, 109/97 | *O. aries* | Adult(9yrs) | m | Germany/Rambouillet×Argali | Domestic |
| MHJ | O rb/ag 311,1148/06 | *O. aries* | Sub-adult(2yrs) | m | Germany/Rambouillet×Argali | Domestic |
| MHJ | O rb/ag 286,1115/97 | *O. aries* | Adult(6yrs) | m | Germany/Rambouillet×Argali | Domestic |
| MHJ | O rb/ag 17, 986/06 | *O. aries* | Sub-adult(3yrs) | m | Germany/Rambouillet×Argali | Domestic |
| MHJ | O rb/ag 281, 1100/97 | *O. aries* | Sub-adult(2yrs) | m | Germany/Rambouillet×Argali | Domestic |
| MHJ | O rb/ag 193, 1015/95 | *O. aries* | Adult(9yrs) | m | Germany/Rambouillet×Argali | Domestic |
| MHJ | O rb/ag 190,1014/00 | *O. aries* | Adult(9yrs) | f | Germany/Rambouillet×Argali | Domestic |
| MHJ | O rb/ag 173,986/05 | *O. aries* | Sub-adult(1yr) | f | Germany/Rambouillet×Argali | Domestic |
| MHJ | O rb/ag 116,885/93 | *O. aries* | Adult(7yrs) | f | Germany/Rambouillet×Argali | Domestic |
| MHJ | O rb/ag 155, 978/94 | *O. aries* | Adult(6yrs) | f | Germany/Rambouillet×Argali | Domestic |
| MHJ | O rb/ag 126, 902/01 | *O. aries* | Adult(6yrs) | m | Germany/Rambouillet×Argali | Domestic |
| MHJ | O rb/ag 200,1030/95 | *O. aries* | Adult(7yrs) | m | Germany/Rambouillet×Argali | Domestic |
| MHJ | O rb/ag 259, 1093/08 | *O. aries* | Sub-adult(2yrs) | m | Germany/Rambouillet×Argali | Domestic |
| MHJ | O rb/ag 143,939/01 | *O. aries* | Adult(4yrs) | m | Germany/Rambouillet×Argali | Domestic |
| MHJ | O rb/ag 211,1035/95 | *O. aries* | Adult(4yrs) | m | Germany/Rambouillet×Argali | Domestic |
| MHJ | O rb/ag 258,1093/07 | *O. aries* | Juvenile(2yrs) | m | Germany/Rambouillet×Argali | Domestic |
| MHJ | O rb/ag 95,1892-1895 | *O. aries* | Sub-adult(3yrs) | m | Germany/Rambouillet×Argali | Domestic |

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