

PALEOPATHOLOGICAL STUDY OF SKELETAL REMAINS OF URSIDS OF THE PLEISTOCENE-HOLOCENE FROM THE IBERIAN PENINSULA.

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Antecedents.

An exhaustive paleontologic study of skeletal remains of Ursids of the Pleistocene-Holocene from the Iberian Peninsula was realized by one of us (Torres, 1984). Many of the pieces studied here were selected by this author. Other pieces proceed from recent excavations in the exceptional site of Ibeas, from the Sierra de Atapuerca, Burgos, Spain, of the Middle Pleistocene, which is providing human remains.

Torres (1984) made a detailed analysis of the Phylogeny and Stratigraphic and geographic distribution of the Ursids in the Pleistocene-Holocene from Spain and Portugal, and among other aspects, he reported some epidemiological facts (morbidity, mortality in relation to sex, and senility in populations).

Material.

The material consists of 36 skeletal pieces belonging to 3 species of the genus Ursus: U.spelaeus, U.arctos and U.deningeri.

Descriptive study.

In the first place, we report two examples of Pseudopathology: a right third metacarpal of Ursus deningeri, B.1747 from Cueva Mayor, Atapuerca (plate 1, fig.1). On the external surface of the dorsal face there are multiple osteolytic circular images. The confluence of many of them, originates an excavated bed of irregular relief. In the radiography there are no signs of osseous regeneration. These lesions have a biological origin, very probably due to a colonization by Lichens, of which there is evidence on some zones of the piece. The distributing pattern of the lesions is notable, located on the most inextensible mechanical position. It is not probable that the bone would be sedimented on this face. It could be the wall of the stratum in which the bone was, and the rest of the piece would be protected. The time of exposition of the zone affected was very long.

The other example is a patella of Ursus arctos from the Cueva de la Bodega, Sotres, Asturias (Holoceno). The articular facet of the posterior face has suffered denudation of posthumous origin. The piece

also has lost the zone of insertion of the rotulian ligament. The excess of osseous density observed on the radiography (plate I, fig.2) with loss of all vestige of trabecular structure is due to infiltration of clay.

In the following examples there is evidence of maxillo-dental affections:

T.2501. Fragment of right upper maxillary from the Cueva del Reguerillo, Patones, Madrid (age upper to 32.000 years). It corresponds to the posterior third, and conserve M² (plate I, fig.3). The molar suffered a great attrition. At the level of the apex of the distovestibular root, a lesion of trapezoidal shape is observed. It is 12,6 mm. on the anterior part, 6,6 mm. on the posterior, and is 11 mm. of deep in the center. The vestibular cortical is reabsorbed in all its extension. This reabsorption is propagated towards the mesial face, destroying the interdental septum among M¹ and M². There is, therefore, advanced periodontal disease. The lateral radiological projection confirms the presence of an apical abscess of periodontal etiology.

Similar alterations are repeated in several examples:

A. 1516. Left hemimandible of *Ursus spelaeus* from the Cueva de Arrikutz, Oñate, Guipúzcoa (Würm III) (Plate I, Fig. 4). It conserves M₃, with a great attrition, C, and the alveolus of M₂. There are signs of osteitis on the walls of the alveolus of the mesial and distal roots of M₂, and generalized periodontal disease, with destruction of the external and internal cortical laminae. M₁ was lost intra vitam for this reason. At the level of the mesial and distal roots of M₂ there are chronic alveolar abscesses.

S/s. Left hemimandible of *Ursus arctos* from the Cueva de la Bodega (plate I, fig.5). M₃ was lost during life. The animal suffered an alveolar abscess propagated towards lingual and vestibular, of periodontal etiology. There is evidence of periodontitis at the distal level of M₂ and mesial of M₃. A tendency to polycaries is deduced. The caries are located on the distal face of M₁, in the crown, on the occlusal surface of M₂, and on the distal and vestibular faces of M₂, affecting this last, part of the enamel and of the cement of the distal root.

P-2. Mandible of senile female of *Ursus arctos* from the Sima de la Cuña, Cervera, Palencia (Holoceno). It also suffered periodontal disease and abscess. The alveolar process shows an elevated degree of reabsorption generalized. P₄ was lost shortly time before death. The loss of the left molar sector occurred later than the right. The margins of the left alveolus of M₃ show signs of reabsorption and osteitis, very notable at the level of the lingual cortical.

T-2999. Incomplete right hemimandible with M₂ and M₃ of *Ursus spelaeus* from the Cueva del Reguerillo. In the some manner, it suffered periodontal disease generalized and chronic alveolar abscesses at the level of the mesial and distal roots of M₁.

A-440. Incomplete right hemimandible, senile, with M₂ and M₃, of *Ursus spelaeus* from the Cueva de Arrikutz. It presents a strong grade of attrition. It also suffered periodontal disease generalized, very

advanced, especially of the alveolar arc. It is more notable at the level of the sector compressed between P₄ and M₂. There is evidence of a great chronic alveolar abscess. The radiography (plate I, fig.6) reveals signs of generalized osteitis at this level.

A. 464. Incomplete right hemimandible of Ursus Spelaeus from the Cueva de Arrikutz. Also with evidence of periodontal disease generalized (there is destruction of the vestibular and lingual corticals, and a great abscess of periodontal etiology at the level of the distal root of M₁ and mesial of M₂).

A. 1762. Incomplete left hemimandible senile of Ursus spelaeus, with C₁ M₂ and M₃ from the Cueva de Arrikutz. The periodontal process generalized affects the three molars. P₄ was lost during life. Two alveolar abscesses are located on the alveolar apex of the mesial and distal root of M₁.

In the following example there is evidence of osteomyelitis:

A. 446. Left hemimandible of Ursus spelaeus from the Cueva de Arrikutz, with C and M₃, which has very advanced wear C (plate I, fig. 7). There is evidence of an osteomyelitic process on the diastema, where an irregular cavity of approximately 2 cm. of maximal diameter is observed. This process destroyed the vestibular and lingual cortical. On the bottom of the cavity, a reaction of osteitis is extended towards the vestibular zone. There are also signs of advanced periodontal process, and of abscess at the level of the root of M₂.

In continuation, we report an example of pathological attrition:

SH-B. 4963. Little fragment of left upper maxillary of Ursus deningeri from Cueva Mayor, with M₂ (plate I, fig. 8). There is an incipient caries at mesial level. More notable is the evidence of a great facet of wear, of approximately 0,5 cm. deep. It is circular, and is placed among the four principal cusps. At the level of the talon there is another smaller similar facet. We have not criteria for explaining this morphology, but a displacement of the antagonist could explain this type of attrition.

In 3 dental pieces isolated of Ursus deningeri from Cueva Mayor there is evidence of caries of neck:

SH-B. 4422. Left M₁. There is a great facet of wear on the distal face on the crown, due to a strong attrition. The talonid is conserved, and of the trigonid, only the posterior zone of the metaconid. The piece has a great caries of neck on the distal root. The lesion is extended towards the lingual face of the root until the zone of the bifurcation.

SH-B. 4364. Left P₄. A careous process affects the upper third of the root destroying the lower third of the coronary portion on the lingual face.

SH-B. 4146. Right P₄. A careous process at level of the neck is located among the vestibular and lingual faces.

Finally, we report a case of pulp exposure through attrition:

SH-B. 4091:

Right P⁴. The exposition is located on the distal portion of the vestibular face.

In remains of the intracranial skeleton, we have encountered several examples of traumatic lesions and postraumatic sequels:

S/s. Two proximal caudal vertebrae of Ursus spelaeus from the Cueva del Reguerillo (plate II, figs.1 and 2). There is evidence of vertebral synostosis as sequel due to a traumatism caused by violent mechanical action, which had its impact on the dorsal face of the more caudal vertebra. This last vertebra has suffered subluxation of the articular surface, which has been displaced towards the ventral face. A scoliosis has been produced, with inclination of the proximal and distal articular facets, which form an angle with respect to the horizontal of approximately 30°.

B. 3093. Proximal fragment of right ulna of Ursus deningeri from Cueva Mayor (plate II, figs.3 and 4). The interosseous edge of the sigmoidal cavity shows signs of arthrosis. On the radial articular surface (corresponding to the medial side) it suffered atrophy because of disuse, due to luxation of the radial head, or fracture of this bone. To continuation of the insertion zone of the biceps and brachial muscles, on the interosseous face, a periosteal reaction is observed, the origin of which seems to be traumatic. It represents a callus of trabecular structure, that is extended along the anterior face, and it could correspond to an incomplete fracture, at the level of the surgical neck. The traumatic luxations of the radial head, coincide usually with fractures of the cubital diaphysis (Monteggia's Fracture). We may not identify our example with this typical lesion, where the fracture in the ulna is complete.

S/s. Left scaphoid and first cuneiform of Ursus deningeri from Cueva Mayor (plate II, fig.5). A synostosis of both bones is observed, affecting the distal and medial facets, due to a traumatism. There is a moderate periosteal reaction on the medial surface of the first cuneiform. Arthrosis is located on the articular facet of the scaphoid with the second cuneiform.

SH-B. 5737. Left scaphoid of Ursus deningeri from Cueva Mayor (plate II, fig.6). An osseous prolongation is observed at the disto-medial position, which does not seem to be an osteophytic excrescence. It seems to correspond better to a supernumerary bone. In this case, there would be a synostosis between this bone and the scaphoid. Another possibility is that it is a matter of an osseous callus. The scaphoid would suffer a fracture in the internal limit of the distal articular facet.

D.61. Left third metatarsal of Ursus arctos from the Cueva de Saldarrañao, Espinosa de los Monteros, Burgos (Holoceno). The piece has a healed fissure which corresponds to an overboard fracture. A notable periosteal reaction is located on the anterior and external lateral facets, where the traumatism was produced (plate II, fig.7). Also there is evidence of a calcified tendinous insertion.

SH-B. 6566. Second phalange and epiphysis of the third one of Ursus deningeri from Cueva Mayor. It corresponds to an infantile individual, which suffered a traumatism. In the radiography (plate II, fig.

8), a fissure is recognized, in the anterolateral direction. The medullar cavity is obliterated at the level of the fissure. The synostosis among the two phalanges is a postraumatic sequel. There is another possible example of postraumatic sequel represented on a piece at the same locality: SH-B. 6346. Second phalange and epiphysis of the first one of Ursus deningeri of an infantile individual. The synostosis observed among the two phalanges could be due to a traumatism, although there is no evidence of it, nor of infectious process.

S/s. Right patella of Ursus spelaeus from the Cueva del Regue-rillo. Has had post mortem loss of osseous substance on the anterior face. The articular surface shows a typical image of patello-femoral arthrosis.

B. 3265. Left third cuneiform of Ursus deningeri from Cueva Mayor. In the distal joint osteophytic proliferations on the anterior edge express a degenerative arthrosic process.

Also there is another example of calcified tendinous insertion: on the piece P.8. Left humerus of Ursus arctos from the sima de la Cueva (plate II, fig.9). The lesion is situated in the inferior third of the external epicondylea crest, corresponding to the insertion of the first external radial. The exostosis measures approximately 1 cm. x 0,7 cm.

Evidence of infectious process can be recognized on some other bones:

LB. Left second metacarpal of Ursus arctos from the Cueva de la Bodega (plate II, fig.10). There is osteomyelitic foci in the diaphysis, with evidence of perifocal reaction on the lateral face from below the articular facet with the third metacarpal; arthrosis on the proximal and distal joints, and a notable hypertrophic process at the sides of the extensor tendon of the fingers.

B. 1594. Caudal vertebra of Ursus deningeri from Cueva Mayor (plate II, fig.11). A pathological alteration affects the contour of the bone. On the anterior half of the vertebral body there are detached apositions as periosteal thickenings, which project as marginal pricks, especially in the anterior edge over the vertebra. After making differential diagnostic among diverse processes (brucellosis, tuberculosis, acromegaly - where the vertebral bodies can be enlarged for peripheric osseous neoformation - Edeiken and Hodes, 1977)) we think that the lesions coincide better with that described in the brucellosis (Kohler and Zimmer, 1959).

An alteration consistent with the existence of flat foot is observed on another bone:

SH-B. 5971. Left fifth metatarsian of Ursus deningeri from Cueva Mayor (plate II, fig.12). The articular facet with the cuboids has suffered a displacement towards the dorsal face, compression and deformation. The articular facet with the fourth metatarsal shows signs of atrophy. There is no evidence of fracture nor of osseous regeneration.

There are other several examples with non-specific alterations:

T.4979. Right second metacarpal of Ursus spelaeus from the Cueva del Reguerillo. A periosteal generalized reaction is identified without other signs of pathological condition. It is a matter, in all the cases studied, of benign osseous neoformations, of compact and uniform osseous density.

t. 2714. Left second metacarpal of Ursus spelaeus from the Cueva del Reguerillo (plate II, figs.13 and 14). The bone is notably hypertrophied along the diaphysis. The medular cavity has not suffered alteration. There is no evidence of osteomyelitic process. Although this image is not characteristic, Paget's disease can not be rejected.

SH-B. 5487. Right fifth metacarpal of Ursus deningeri from Cueva Mayor. It presents a slight periosteal reaction, extended on the anterior face of the diaphysis.

SH-B. 6017. First phalange of Ursus deningeri from Cueva Mayor. A periosteal reaction is also located on the anterior face, in the 2/3 upper of the bone. There are no signs of traumatic lesion nor infection, but the alteration would have one of these origins.

Finally, the following alterations have been observed on phalanges (the first two belong to Ursus deningeri and proceed from Cueva Mayor):

SH-B. 6011. First phalange with evidence of calafield interphalangeal ligament.

SH-B. 6359. Second phalange (plate II, fig.15). The bone is noticeably flattened and thick, without any other abnormal radiologic signs. It could be a case of nanism, which is not unusual in the Ursids.

T. First phalange of Ursus spelaeus from the Cueva del Reguerillo (plate II, fig.16). There is periostitis with a notable increase of osseous density, and deformation of the proximal articular facet, which shows widening and inclination. This alteration could have been produced by several types of rheumatism, as gouty tophus or including rheumatoid arthritis.

Summary and conclusions.

In our study, we have observed fractures and luxations caused by violent mechanical action, posttraumatic sequels, an overload fracture, arthropaties of a degenerative nature, infections process, and some non-specific alterations, which could correspond to a disease caused by deficiency, systemic diseases, or some other origin no clearly determined.

Our pathologies coincide basically with the most usual described in the literature by several authors in Ursids (Pales, 1930; Tasnadi-Kubacska, 1962; Brothwell, 1971; Neiburger, 1984).

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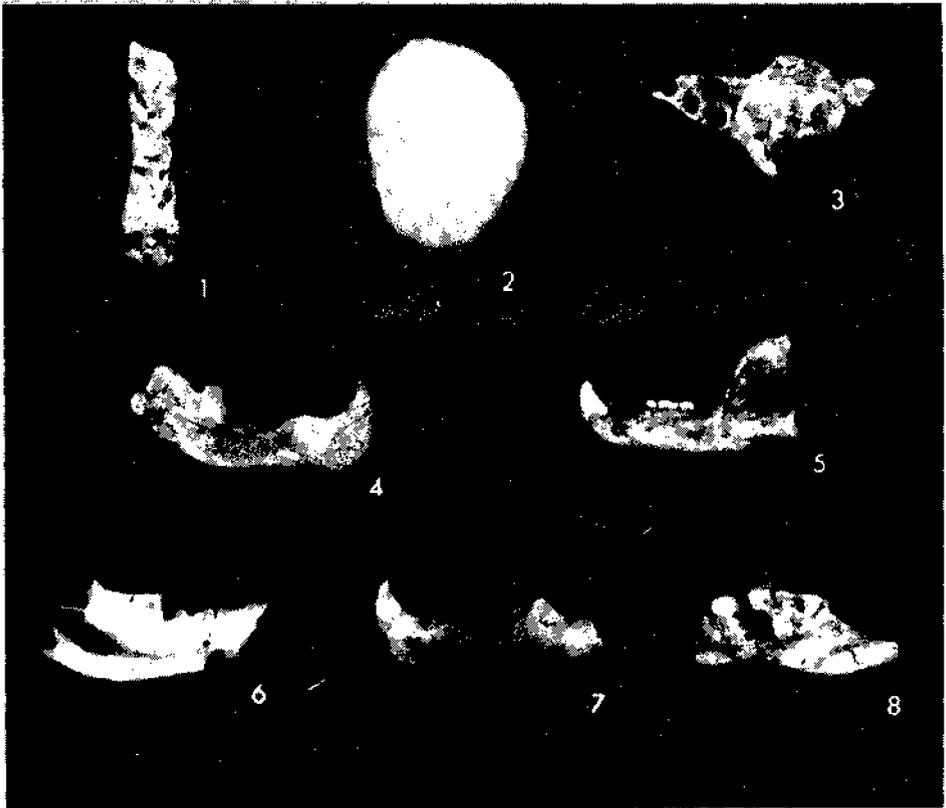


PLATE I - 1.- B1747 Right third metacarpal of Ursus deningeri. 2.- LB. Right patella of Ursus arctos (Radiography). 3.- T.2501. Right Upper maxillary of Ursus spelaeus. 4.- A.1516 Left hemimandible of Ursus spelaeus. 5.- s/s Left hemimandible of Ursus arctos. 6.- A.440 Right hemimandible of Ursus spelaeus (Radiography). 7.- A.446 Left hemimandible of Ursus spelaeus. 8.- SH-B 4963. Fragment of Left upper maxillary of Ursus deningeri, with M².

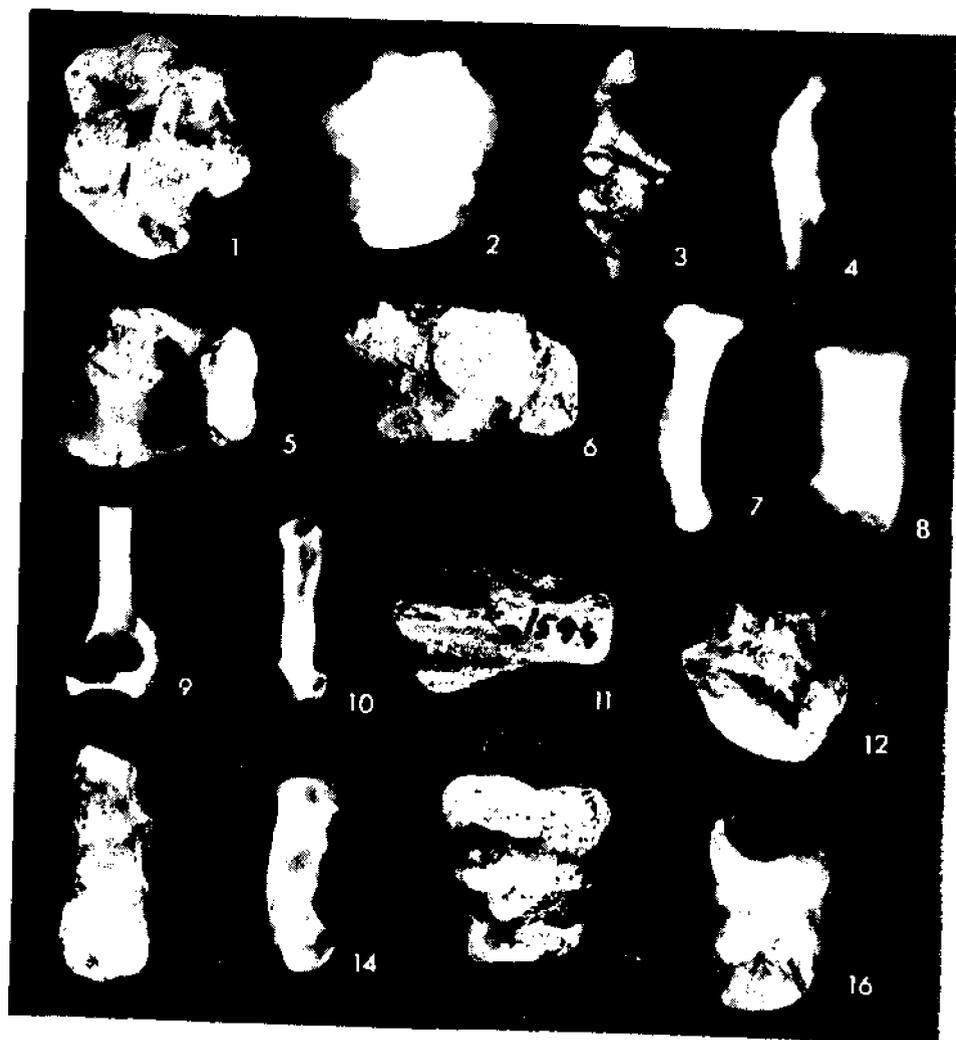


PLATE II

1-2.- s/s. Two proximal caudal vertebrae of Ursus spelaeus. Anatomical piece and radiography. 3-4.- B.3093. Proximal fragment of right ulna of Ursus deningeri. Anatomical piece and radiography. 5.- s/s. Left scaphoid and first cuneiform of Ursus deningeri. 6.- SH-B.5737. Left scaphoid of Ursus deningeri. 7.- D.61. Left third metatarsal of Ursus arctos. Radiography. 8.- SH-B. 6566. Second phalange and epiphysis of the third one of Ursus deningeri. Radiography. 9.- P.8. Left humerus of Ursus arctos. 10.- LB. Left second metacarpal of Ursus arctos. Radiography. 11.- B.1594. Caudal vertebra of Ursus deningeri. 12.- SH-B. 5871. Left fifth metatarsian of Ursus deningeri. 13-14.- T.2714. Left second metacarpal of Ursus spelaeus. Anatomical piece and radiography. 15.- SH-B. 6359. Second phalange of Ursus deningeri. 16.- T. First phalange of Ursus spelaeus.