ANTHROPOLOGICAL DATA FOR THE HUMAN SKELETON FROM *BABA* CAVE[*]

Andrei Dorian SOFICARU[**]

Keywords: *Baba Cave, anthropological analysis, plagicephaly, violent life.*
Cuvinte cheie: *Peștera Baba, analiză antropologică, plagiocefalie, viață violentă.*

Abstract. *This study is about a human skeleton discovered in 2008 during the archaeological excavations in the Baba Cave. This belongs to male who died at 35-40 years old. The deformation of the skull shows an occipital plagiocephaly caused by a lambdoidal synostosis. Also, can be noticed an enamel hypoplasia due to a deprivation in childhood. During the life he suffered violent injuries: blows to the head, broken nose, and the fracture of a rib. The active life is suggested by osteoarthritis of articulations.*

Rezumat: *Prezentul studiu are în vedere scheletul uman descoperit în Peștera Baba în timpul cercetărilor arheologice întreprinse în anul 2008. Acesta aparține unui bărbat decedat la vârsta de 35-40 de ani. Deformarea craniului indică o plagiocefalie occipitală cauzată de o sinostoză lambdoidă. De asemenea, poate fi observată o hiplopazie de smalț provocată din timpul copilăriei. În timpul vieții a suferit răni violente: lovituri la cap, nas rupt și fractură de coastă. Osteoartrita articulațiilor sugerează o viață activă.*

Introduction

The skeleton was discovered in 2008 during the archaeological excavations in the *Baba* Cave (Cheia village, Grădina Township, Constanţa County) by a team supervised by Dr. Valentina Voinea (Museum of National History and Archaeology from Constanţa) and Dr. Bartłomiej Szmoniewski (Institute of

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The archeological data for the skeleton found at "Grindu lui Dănilă" have obtained from Dr. Ion Motzoi-Chicideanu and those for the Independenţa from Dr. Alin Frânculeasa (Prahova County Museum of History and Archaeology); I appreciate the help from both of them.

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[**] Andrei Dorian Soficaru: Centrul de Cercetări Antropologice "Francisc J. Rainer", București; e-mail: asoficaru@yahoo.com.

Archaeology and Ethnology from Kraków). The depth of grave was 0.50-0.80 m with an orientation of W-E, and the skeleton has a warrior inventory: iron pieces of harness, two bronze buckles, and pieces of animal bones from a bow, an iron sword with wooden scabbard[1]. Based on the inventory the grave is dated between middle of 10th to middle of 11th century[2].

Material and methods

The skeleton analyzed is almost complete (only the tibias, fibulas and foot bones are missing) and well preserved but with some damage of bones. Description and identification of bones is according to an osteological atlas[3].

For the sex determination were used morphological features of the skull and pelvic region[4]. Age was estimate based on the phases of evolution from sternal ends of the ribs[5]. The pathological affections were identified visually[6]. For measurements of bones has been used Martin system[7]. Stature was calculated using Pearson formula[8].

Anthropological analysis

Bones inventory:

- the skull is almost complete, but there are some missing parts in the inferior side of occipital, right mastoid, and sphenoid; the mandible has present all teeth, but the coronoid processes are broken **(Fig. 1-4)**; dentition: permanent teeth positions = 31, permanent teeth = 24, permanent teeth lost *ante mortem* = 2;
- the hyoid bone is present and complete, with right horn unfused;
- from the vertebral column are present seven cervical, twelve thoracic and four lumbar (two of them fragmentary);
- the sternum is present with *manubrium* and *corpus sterni* complete; all the ribs are present and they are complete from the right side and fragmentary on the left one;
- from shoulder girdle clavicles are complete but the scapulas are fragmentary;
- all the bones of arms are present and complete;
- hand bones, left side = scaphoid, lunate, triquetral, trapezium, trapezoid, capitate; metacarpals; proximal phalanges; fourth intermediate phalanx; third, fourth and fifth distal phalanges;
- pelvic girdle is fragmentary; could be identified fragments from the sacrum, pubis symphyses, ischiopubic ramus, ischial tuberosity, illium, etc;
- from the bones legs only femurs are present, left one complete and the right one is broken below the lesser trochanter.

[1] CCA 2008, p. 17. Cheia; SZMONIEWSKI, PETCU 2008, p. 37, fig. 4, 9.
[2] ШМОНИЕВСКИЙ, ВОИНА 2011, p. 1-11.
[3] WHITE, FOLKENS 2005.
[4] BUIKSTRA, UBELAKER 1994, p. 15-20; WALKER 2008, p. 47.
[5] LOTH, IŞCAN 1989, p. 105-135.
[6] LARSEN 1997; ORTNER 2005.
[7] BRÄUER 1988, p. 160-232.
[8] RÖSING 1988, p. 586-599.

Sex determination:

- cranial and pelvic morphological features indicate a male;
- also, the results for discriminant functions applied for skull are negatives, which indicate a male.

Age estimation:

- the sternal ends of the ribs has the phase 5, respective 33-42 years;

Stature:

- 161.78 cm based on the Person' method (maximum length of left femur = 435 mm);

Pathology:

Congenital

The skull is flattened on the right side of occipital and posterior area of right parietal; the shape is oval with the left side of frontal deformed; the base with sphenoid and temporals is asymmetrical **(Fig. 1, 2)**. Also, the postcranial skeleton of the individual is normal. This subject presents plagiocephaly of type II according to the Di Rocco and Velardi classification[9].

The name of plagiocephaly is from the Greek *plagios* (oblique) and *kephale* (head) and the term is used for patients with this type of cranial asymmetry. This affection occurs in infants during the intrauterine life and other causes could be congenital muscular torticollis, abnormalities in the brain shape, premature fusion of a single coronal or lambdoidal suture. After birth the defect is accentuated by the preferential sleeping position and some of cranial base abnormalities. The actual studies estimate the incidence of plagiocephaly about 8.2% of all live births[10].

In plagiocephaly two mechanisms of deformation can be identified: first is the malformation caused by the premature synostosis of some cranial sutures and second is the deformation caused by the position but without synostosis. This craniofacial asymmetry involves the skull skeleton and the bones of face which can result in occlusion defects of the permanent teeth. Present hypotheses explain that synostosis of some cranial sutures appear when the bone supporting processes occur prematurely or from increased osteoblastic cell maturation[11].

Traumas

In the vertex of the skull (about 36 mm from the cranial osteometric point bregma) there is a healed trace of a trauma with dimensions of 19.71 x 14.69 mm; around of that is a pitting surface **(Fig. 5)**. The position in the top of the skull and healing reaction suggest a possible necrosis due to a blow on the head[12].

On the left side of the frontal near by the coronal suture a button lesion with

[9] CAPTIER 2003, p. 231.

[10] DAVID, MENARD 2000, p. 367; MILLER, CLARREN 2000, p. 1; TEICHGRAEBER 2002, p. 582.

[11] CARSON *et al*. 1997; CAPTIER 2003, p. 227-231.

[12] ORTNER 2003, p. 129-130, fig. 8-16 and 8-17.

of dimensions 4.54x5.45 mm was identified (figure 6). Another one is on the mandible under the right first molar with of dimensions 10.87x12.45 mm **(Fig. 7)**. The etiology of button lesion could be developmental, traumatic, infection or is assign to benign tumors[13]. In this case they might be traumatic because the skull shows other traces of a violent life.

Both nasal bones are broken and healed. The left one present a fracture in the middle and after the healing the bone remain curved to the interior. The right one show also the fracture but is not complete due to postmortem breakage **(Fig. 8)**. This is a common trauma for the interpersonal violence[14].

Enamel hypoplasia was identified on the incisors and mandibular canines **(Fig. 9)**. This is one of the dental enamel defects which are caused by systemic diseases and nutritional deprivation during childhood[15].

On the posterior side of the left mandibular condyle were identified four parallel grooves. At the first sight they seem to be by cutmarks, but later, using magnifying lens (8x and 10x) those have identified with rodent marks. All of them are one after another and their dimensions are about 0.77-1.53 mm **(Fig. 10)**. The marks have "U" shape and present linear striations which suggest incisors of a mouse[16].

A fracture of the sternal end of the fifth right rib was observed. The trauma occurs about 15 mm from the sternal end and was healed complete with a small callus. The position suggests a blow in the chest **(Fig. 11, 12)**.

Articulations of shoulder girdle, arms' bones, femurs and vertebral column present modifications as a result of osteoarthritis. The right glenoid cavity display osteophytes on the margin, but the clavicles have moderate modification of sternal ends. Marginal osteophytes are present also on the proximal and distal articulations of humeri (**Fig. 13, 14)**, ulnae **(Fig. 15)**, radii **(Fig. 16)**, and femurs. The vertebral bodies are more affected and show marginal lipping. The main factors for changes in articular surfaces are physical activity and mechanical stress, but other diseases and age variation or sexual dimorphism influenced their prevalence[17].

Discussion

The skeleton analyzed belongs to male who died at 35-40 years old. The skull shows an occipital plagiocephaly possible caused by a lambdoidal synostosis. In childhood suffered of deprivation as the mandibular incisors and canine indicate the enamel hypoplasia. Also, during the life he suffered some injuries caused by violence: some blows on the head, broken nose, and the fracture of a rib. Osteoarthritis which affected some articulations and the muscles insertions suggest an active life.

From the same time period there are another four anthropological analyses of graves assigned to the nomadic people. Below their data are summarized in the table.

[13] ESHED 2002, p. 229-230; ORTNER 2005, p. 516.
[14] WALKER 1997, p. 154-163.
[15] LARSEN 1997, p. 44-46.
[16] HAGLUND 1997, p. 406, fig. 1.
[17] LARSEN 1997, p. 162-178.

Site	Sex / Age	Pathology	Stature	Literature
Tangâru (Giurgiu County)	Male/ 17-18 years	Left occipital plagiocephaly	164.6 cm[a]	Maximilian, Haas 1959, 155
Curcani-Ilfov (Călăraşi County)	Male / 45 years old	Caries	–	Bibiri 1971, 458
Grindu lui Dănilă (Dolj County)[b]	Male / 30-40 years		160.4 cm[c]	Personal data
Independenţa (Prahova County), M 2 / 2007[d]	Male / 45-50 years	*Hyperostosa porotica*, osteoarthrosis	159.52 cm[e]	Personal data
Baba Cave (Constanţa County)	Male / 35-40 years	Right occipital plagiocephaly, cranial trauma, rib fracture, osteoarthritis	161.78 cm	Present analysis

Metrics

Skull

Dimension / indices	Values
1. Maximum cranial length (g – op)	167
2. Glabello – inion length (g – i)	166
3. Glabello – lambda length (g – l)	162
8. Maximum cranial breadth (eu – eu)	138
9. Least frontal breadth (ft – ft)	90
10. Maximum frontal breadth (co – co)	116
11. Biauricular breadth (au – au)	128
12. Biasterionic breadth (ast – ast)	113
23. Horizontal circumference (g – op – g)	510
25. Total sagittal arc (n – o)	356
26. Frontal longitudinal arc (n – b)	127
27. Parietal longitudinal arc (b – l)	114
28. Occipital sagittal arc (l – o)	115
29. Nasion – bregma chord (n – b)	111
30. Bregma – lambda chord (b – l)	102
31. Occipital sagittal chord (l – o)	95

[a] Calculated for maximum length of femur = 450 mm.

[b] Discovered during an archaeological survey in 2005 by Dr. Ion Motzoi-Chicideanu from; the site "Grindu lui Danila" there is about 4 km south of Plosca Village, Bistreţ Township, Dolj County.

[c] Calculated for maximum length of left femur = 428 mm.

[d] Archaeological excavations made in 2009 by Dr. Alin Frânculeasa (CCAR 2007, 81. Independenţa; CCAR 2008, 106. Independenţa).

[e] Calculated for maximum length of right femur = 423 mm.

43. Outer biorbital breadth (fmt – fmt)	99
45. Byzigomatic breadth (zy – zy)	128
46. Bimaxillary breadth (zm – zm)	96
47. Total facial height (n – gn)	107
48. Nasoalveolar height (n – pr)	61
51. Orbital breadth (mf – ek)	40
52. Greatest height of orbit	28
54. Nasal breadth	24
55. Nasal height (n – ns)	54.5
65. Maximum breadth outside the condyles (kdl – kdl)	118,5
66. Bigonial breadth (go – go)	101
68. Projective length of the mandibular body	77
69. Height of mandibular symphyses (id – gn)	30
79. Mandibular angle	130
I 1. Cranial index (8:1)	82.63
I 12. Transversal frontal index (9:10)	77.59
I 13. Transversal fronto-parietal index (9:8)	65.22
I 13a. Coronal – parietal index (10:8)	84.06
I 14. Transversal parieto-occipital index (12:8)	81.88
I 16. Sagittal fronto-parietal index (27:26)	89.76
I 17. Sagittal fronto-occipital index (28:26)	90.55
I 18. Sagittal parieto-occipital index (28:27)	100.88
I 19. Fronto-sagittal arc index (26:25)	35.67
I 20. Parieto-sagittal arc index (27:25)	32.02
I 21. Occipito-sagittal arc index (28:25)	32.30
I 22. Sagittal frontal index (29:26)	87.40
I 24. Sagittal parietal index (30:27)	89.47
I 25. Sagittal occipital index (31:28)	82.61
I 38. Total facial index (47:45)	83.59
I 39. Facial superior index (48:45)	47.66
I 40. Jugomandibular index (66:45)	78.91
I 42. Orbital index (52:51)	70.00
I 48. Nasal index (54:55)	44.04
I 62. Mandibular index (68:65)	64.98

Sternum

Dimension / indices	**Values**
1. Length of sternum	159
2. Length of manubrium	54
3. Maximum length of *corpus sterni*	106.5
4. Maximum breadth of *manubrium sterni*	61.5
5. Greatest breadth of the body	38
6. Minimum breadth of *manubrium sterni*	29.5
7. Thickness of *manubrium sterni*	8.17
Length – breadth index (5:1)	23.90

Length – breadth index of *corpu seterni* (5:3)	35.68
Breadth – thickness index (7:6)	27.69

Clavicle

Dimension / indices	Values – left / right	
1. Maximum length	131.82	137.95
4. Vertical diameter of mid-shaft	11.68	10.49
5. Sagittal diameter of mid-shaft	11.72	15.18
6. Circumference of mid-shaft	38	44
Length – circumference index (6:1)	28.83	31.90
Cross-section index (4:5)	99.66	69.10

Scapula

Dimension / indices	Values – left / right	
12. Glenoid height	37.62	39.21
13. Transverse diameter of the glenoid fossa	27.85	27.51
14. Depth of the glenoid fossa	5	5
Length – breadth index (13:12)	74.03	70.16

Humerus

Dimension / indices	Values – left / right	
1. Maximum length	308	315
5. Maximum diameter of mid-shaft	21.36	22.03
6. Minimum diameter of mid-shaft	18.8	18.76
7. Least circumference of mid-shaft	61	63
8.Circumference of the head	142	152
9. Transversal head diameter	48.3	48.61
10. Longitudinal diameter of the head	43.81	45.25
Robusticity index (7:1)	19.81	20.00
Cross-section diaphysis index (6:5)	88.01	85.16
Cross-section head index (9:10)	110.25	107.43

Radius

Dimension / indices	Values – left / right	
1. Maximum length	248	250
3. Minimal circumference	37	39
4. Maximum transverse shaft diameter	15.54	15.85
5. Minimum sagittal shaft diameter	11.34	11.92
Cross-section diaphysis index (5:4)	72.97	75.21

Ulna

Dimension / indices	Values – left / right	
1. Maximum length	264	268
3. Minimal circumference	36	37

11. Dorso-ventral shaft diameter	13.77	14.08
12. Transverse shaft diameter	15.82	15.95
Cross-section diaphysis index (11:12)	87.04	88.28

Femur

Dimension / indices	Values – left / right	
1. Maximum length	435	–
2. Physiological length	432	–
6. Antero-posterior diameter of the mid-shaft	28.69	27.77
7. Medio-lateral diameter of the mid-shaft	27.34	28.71
8. Circumference of the mid-shaft	87	86
9. Subtrochanteric transverse diameter	33.39	–
10. Subtrochanteric anterior-posterior diameter	24.43	–
15. Vertical diameter of the neck	32.04	32.27
16. Anterior-posterior diameter of the neck	24.59	26.16
17. Circumference of the neck	92	94
18. Medio-lateral head diameter	46.02	45.13
19. Transverse diameter of the head	46.56	–
20. Head circumference	148	–
Robusticity index (6 + 7: 2)	35.02	–
Pilastric index (6:7)	104.94	96.73
Platymeric index (10:9)	73.17	–
Cross-section index of the neck (16:17)	26.73	27.83
Cross-section index of the head (19:18)	101.17	–

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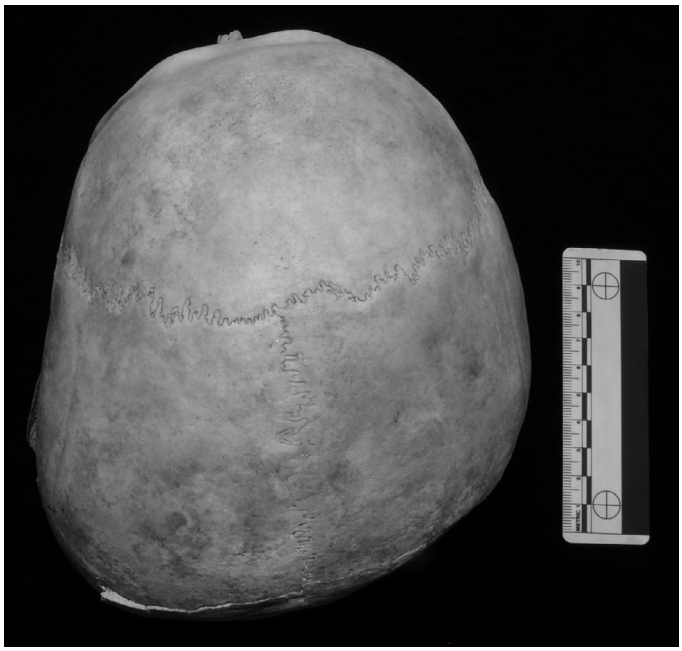

Fig. 1. The skull, superior view.

Fig. 2. The skull, anterior view.

Fig. 3. The skull, lateral left view.

Fig. 4. The skull, lateral right view.

Fig. 5. Detail of the blow from vertex.

Fig. 6. Detail of the button lesion from the frontal.

Fig. 7. Detail of the button lesion from the mandible.

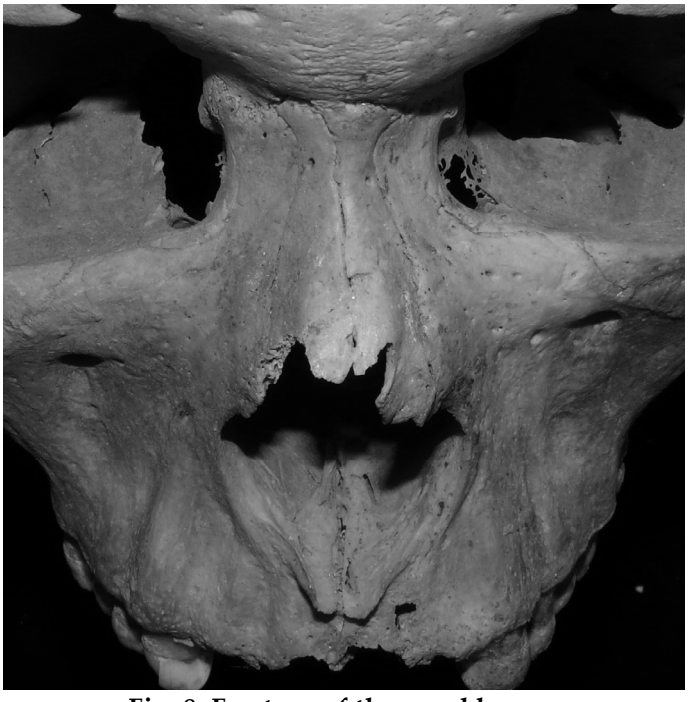

Fig. 8. Fracture of the nasal bones.

Fig. 9. Enamel hypoplasia on the left mandibular canine.

Fig. 10. Rodent marks on the posterior side of the left mandibular condyle.

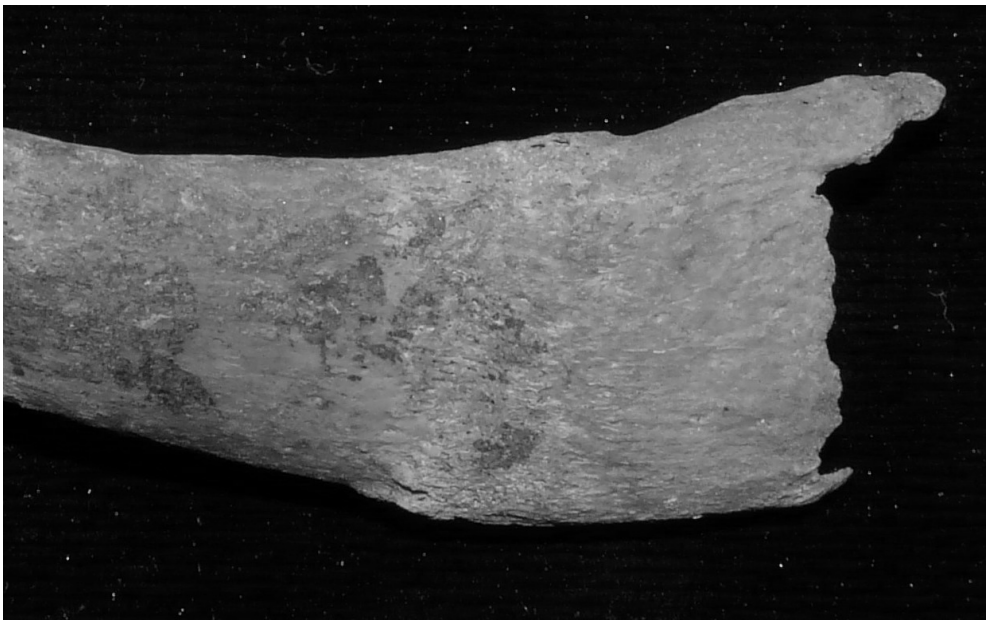

Fig. 11. Fracture on the fifth rib, superior view.

Fig. 12. Fracture on the fifth rib, inferior view.

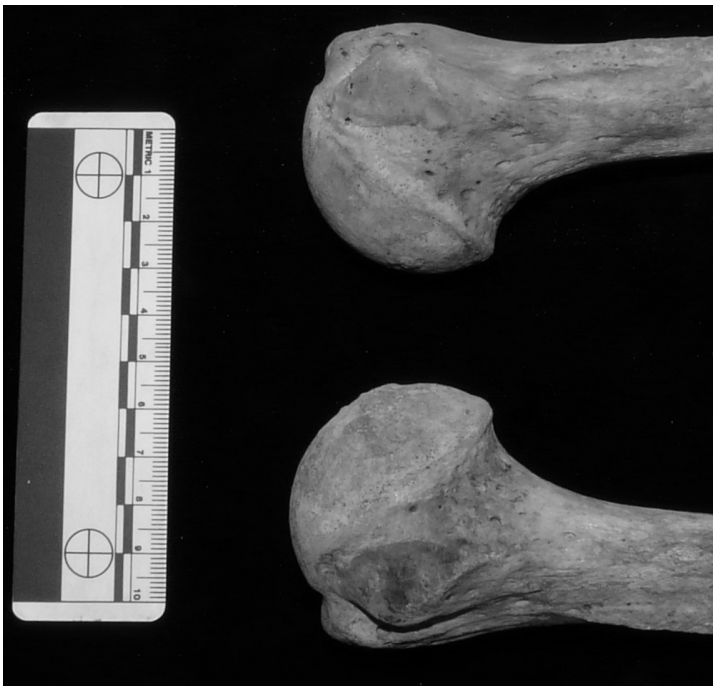

Fig. 13. Osteoarthritis of the humeral proximal epiphyses.

Fig. 14. Osteoarthritis of the humeral distal epiphyses.

Fig. 15. Osteoarthritis of the ulnar proximal epiphyses.

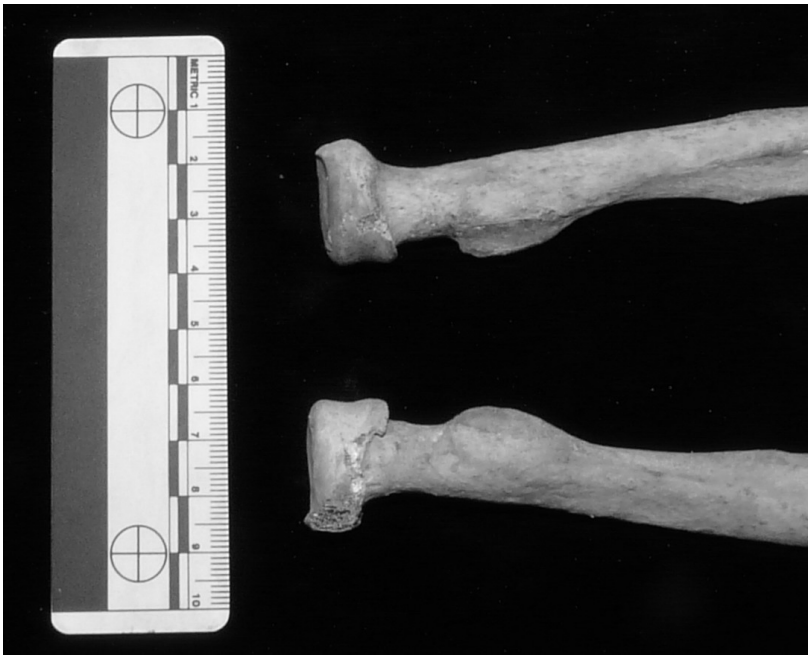

Fig. 16. Osteoarthritis of the radial proximal epiphyses.