

## DISEASES IN THE LATE ANTIQUITY: PALEOPATHOLOGICAL INVESTIGATION OF TWO ANTHROPOLOGICAL SERIES FROM FRANCE (3RD TO 4TH CENTURIES A.D.)

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(Received: May 1, 1992)

### Abstract

Completing an international research program focussed on the study of activity-induced pathologies and other pathological conditions on human skeletal material, we have analyzed two osteo-archaeological samples. The skeleton remains of both cemeteries come from the Late Antiquity Period in France (Provence; South-East of France).

The cases we have examined come from the necropolises of "La Roquebrussanne" (18 skeletons) and "Solliès Toucas" (15 skeletons).

We found traces of traumas, enthesopathies, hyperostotic diseases (DISH), periostitis, perinatal infection, dental pathologies and a number of localisations of osteoarthritis. Beside other disease types, a case of a fully-developed ankylosing vertebral hyperostosis (La Roquebrussanne) and one of a serious polytraumatism (Solliès-Toucas) are presented. The relatively high level of traumas is noticeable.

The differential diagnosis was carried out by macroscopic morphological and radiological methods.

*Key words:* paleopathology, Late Antiquity, France.

### Introduction

Provence, a historical and geographical region in the South-East of France provides a very abundant archaeological and human skeletal material dating from the Late Antiquity (BRUN et al., 1985; BOYER et al., 1987; FEVRIER et al., 1989).

The results of the anthropological and paleopathological examination of some of these series, such as the series of Marseille (MAFART, 1980) Fréjus (BERATO et al., 1990; DUTOUR et al., 1991), or Costebelle (DUTOUR and BERATO, 1991; PÁLFI et al., 1992) have already been published.

The aim of the present research program is to define and diagnose the pathological conditions of two human populations of the above mentioned historical period: skeletal material coming from the necropolis of La Roquebrus-

sanne (4th to 5th centuries A.D.) and from one of Sollies-Toucas (4th to 5th centuries A.D.).

The survey is part of a research program entitled "Diseases, Activities and Environments of Ancient Populations in Central and Western Europe".

### Materials and methods

The first skeleton series we examined belongs to La Roquebrussanne-cemetery, located at 35 kms to the North of Toulon. During a rescue-excavation executed by the archaeologists of the Archaeological Center of Var Region (C. A. V.) 19 graves were explored in 1981 (LEVEN, 1981). The skeletal remains of 18 individuals were dug out of those graves; most of them were fragmentary or in a mediocre state of preservation.

The second series comes from the rescue-excavation of Sollies-Toucas (situated at 20 kms of to the North-East of Toulon) which was executed in 1991. The excavations were directed by MICHEL PASQUALINI (PASQUALINI, 1991). The state of preservation of the 15 human skeletons is a little better than in the case mentioned above. The skeletal material is stored at the collection of the Archaeological Center of Var Region.

The aim of our work was to assess the pathological changes detected on the above mentioned skeletons. That assessment and the determination of sexes and ages at death were carried out by macroscopic morphological methods and taking the corresponding special literature into consideration. We had to use X-ray analysis to be able to identify the more difficult pathological cases.

Although we examined the 33 skeleton remains of the two series with the purpose of recognizing and identifying the alterations of pathological origin, it was evidently necessary to do a preliminary anthropological analysis.

The determination of sexes was made by means of methods used in physical anthropology (FEREMBACH et al., 1986; MARTIN and KNUSSMANN, 1988). We determined the age at death of infantile or adolescent skeletons using the methods proposed by SCHINZ et al., (1952), STLOUKAL and HANAKOVÁ (1978) and UBELAKER (cit. MARTIN and KNUSSMANN, 1988). As far as the age determination of the adults is concerned, we did not carry out in practice the complex method proposed by the Workshop of European Anthropologists (1980). Though it seems to be fairly reliable, the analyses by MASSET (1982; 1986) have made doubtful the use of suture-closing in a correct age determination. The trabecular structure, frequently modified by osteoporosis (LAVAL-JEANTET and CAULIN, 1981), especially in female skeletons is not a clearly age-related characteristic either. So, based essentially on the criteria of the European Workshop, on the age-related changes at the pubic symphyses especially (NEMESKÉRI et al., 1960) and taking into consideration some other conditions (the calcification of cartilages, dental attrition, etc.), we carried out a more careful age estimation (DUTOUR, 1989). The sex and age group distributions of the two populations are presented in Table I.

### Results and Discussion

#### 1. "La Roquebrussanne" series

— Case Nr. 1: Grave Nr. 1; Male skeleton. Senile adult; mediocre state of preservation. The thoracic spine shows a right-side continuous bony overgrowth from T6 to T10. (Fig. 1). A compression fracture is seen on T11, too. The lateral X-ray of the same specimen (Fig. 2) presents the hyperostotic changes of the upper thoracic region as well. Enthesopathic osteophytes were observed in both the humerus, calcaneus, patella and the innominate bones.

Table 1.: Sex and age group distribution of the two populations  
La Roquebrussanne: R; Sollies-Toucas: S.

Sex Age at death	Male		Female		Un- determinable		Total		Total of the two series
	R	S	R	S	R	S	R	S	
Child	-	-	-	-	4,	2	4,	2	6
Adolescent	-	-	-	-	-	2	-	2	2
Young Adult	1	-	2,	2	-	-	3,	2	5
Mature Adult	2,	4	3,	1	-	-	5,	5	10
Senile Adult	1,	1	1,	2	-	-	2,	3	5
Undeterminable	2,	-	-	-	2,	1	4,	1	5
Total	6,	5	6,	5	6,	5	18,	15	33
Total of the two series	11		11		11		33		



Fig. 1 Ankylosing hyperostosis of the spine.  
Case Nr. 1: La Roquebrussanne, Grave  
Nr. 1, Male, Senile Adult.

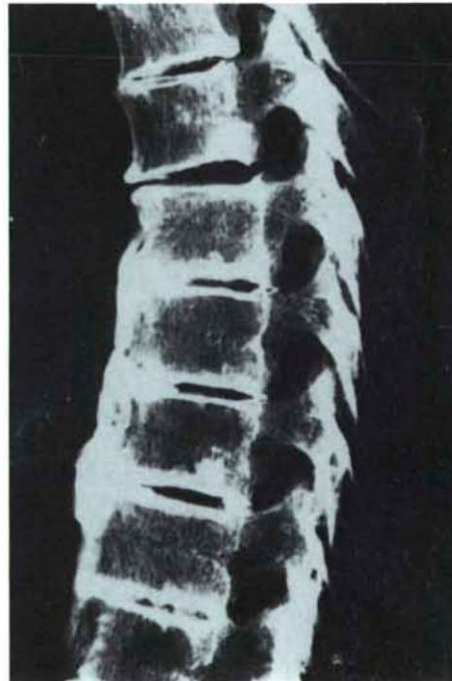


Fig. 2 Lateral X-ray of the spine belonging to  
the Case Nr. 1.

These alterations correspond correctly to the criteria of a case of ankylosing hyperostosis of the spine (FORESTIER and ROTES-QUEROL, 1950), or of diffuse idiopathic skeletal hyperostosis (DISH) after RESNICK et al. (1975). Our case is very similar to the ones described in medical (LAGIER and BAUD, 1978; ARLET and MAZIERES, 1985) or paleopathological literature (ROGERS et al., 1985, 1987; KRAMAR et al., 1990).

Beside hyperostotic changes, the skeleton presents the signs of intervertebral osteochondrosis (from C4 to C6) and the osteoarthritis of the posterior apophyseal joints (from C3 to C5). As far as the correlation of the two processes is concerned, there are, in our opinion, two independent diseases: hyperostosis and degenerative spinal disease, both of them being predominant in elderly age (LAGIER, 1982).

— Case Nr. 2: Grave Nr. 4; Male skeleton. Senile adult; mediocre state of preservation. There are signs of spinal osteophytosis from L1 to L4.

Osteoarthritis is present on the first right metatarsophalangeal joint. It is a relatively frequent consequence of an instep-depression or a primary hallux valgus (CHAOUAT, 1970).

There is a healed spiral fracture of the left tibial diaphysis (Fig. 3). Remodeling after trauma and healing by callus formation can be seen. This type of



Fig. 3 Healed spiral fracture of the left tibia.

Case Nr. 2: La Roquebrussanne, Grave Nr. 4, Male, Senile Adult.

fracture necessitates a violent trauma and a long-lasting healing (ORENGO and TAYON, 1980). A healed fracture can be seen on the right clavicle, too. Although it concerns the most frequent traumatic lesion of the skeleton (COSTAGLIOLA, 1976), the double fracture suggests a serious accident of our specimen.

— Case Nr. 3: Grave Nr. 13; Female skeleton. Mature adult; fragmentary state of preservation. Some signs of osteoarthritis can be seen on the joint surfaces of the first and third proximal interphalangeal joints on the left, and on the second right distal interphalangeal joint. The first ones correspond to a Bouchard's arthrosis, the second one to a Heberden's arthrosis (GÖMÖR and BALINT, 1989).

— Case Nr. 4: Grave Nr. 19; Male skeleton. Adult, age undeterminable; fragmentary state of preservation.

There are signs of spinal osteophytosis of the lumbar spine, from L1 to L4.

## 2. "Sollies-Toucas" series

— Case Nr. 5: Grave Nr. 1; Female skeleton. Senile adult; fragmentary state of preservation. Some signs of osteoarthritis can be detected on the left side temporomandibular joint (TMJ). The right side is not present. Our specimen's age and dental attrition of a high degree are connected with the degenerative disease, while the dental status, especially the dental attrition (HODGES, 1991), ante-mortem tooth loss and occlusal malfunction: the "TMJ disfunction syndrome" has a significant association with the TMJ osteoarthritis.

— Case Nr. 6: Grave Nr. 2; Male skeleton. Mature adult, mediocre state of preservation. There is a unilateral spondylolysis of L4 (right side). The signs of a right-side spinal osteophytosis from T10 to L3 can also be detected. Spondylolysis, described as a skeletal malformation (ORTNER and PUTSCHAR, 1981) or as a fatigue fracture (MERBS, 1983, 1989), is associated with the degenerative joint disease of the lumbar spine (BRIDGES, 1989). In our case we suggest that the static disorder of the lumbar spine caused by the unilateral spondylolysis can also be responsible of the osteophytic process.

— Case Nr. 7: Grave Nr. 4; Female skeleton. Young adult: mediocre state of preservation. Enamel hypoplasia is expressed in the form of hypoplastic transverse lines of the buccal crown surface of all the teeth except the molars.

Some signs of a healed fracture can be seen on the left fibula, a little above its distal end. We can also detect periostitic changes on the surface of the left-side fibular incisure and the enthesopathies of the interosseous ligament on the same tibia. The fracture of the fibula can be estimated as a primary factor of these alterations.

— Case Nr. 8: Grave Nr. 5; Male skeleton. Mature adult, mediocre state of preservation. There are signs of spinal osteophytosis on the thoracic spine, from T6 to T12, with ankylosis of T7 and T8.

Enamel hypoplasia is present on all of the teeth of the mandible and the upper canines. The right TMJ is characterized by an osteoarthritis, probably associated with the left-side antemortem tooth loss of the mandible. Fig. 4 presents a dental caries and the traces of an abscess of the first lower right molar.



Fig. 4 Dental caries and abscess of the first lower right molar.

Case Nr. 8: Sollies-Toucas, Grave Nr. 5, Male, Mature Adult.

There are caries of the second upper right incisor and the first upper left premolar; and the first lower left premolar.

— Case Nr. 9: Grave Nr. 8; Female skeleton. Mature adult; fragmentary state of preservation. A caries associated periapical abscess is presented on the first upper left premolar.

— Case Nr. 10: Grave Nr. 9. Male skeleton. Mature adult; fragmentary state of preservation. Both the tibiae and the fibulae are characterized by an expansive periosteal new bone formation (Fig. 5). The patellas and the right ulna also present periosteal appositions. There is a great deal of florid periosteal new bone, particularly on the tibiae. The new bone has some coarse striations and pitting (Fig. 5) and in some cases it is rugose (Fig. 6) on the tibiae. The third right metacarpal presents periostitis and an osteolytic lesion near its distal end. There are signs of hypervascularisation on the knees. We have detected some traces of a right-side tricipital enthesopathy and bilateral cribra orbitalia.

Although several pathological conditions may be associated with periosteal bone reactions, we can note that the skeletal pattern and the morphology of these lesions could refer to a treponemal infection (HACKETT, 1976; STIRLAND, 1991). Unfortunately, the very fragmentary state of preservation and the lack of several elements of the skeleton prevent us from establishing a precise diagnosis.

— Case Nr. 11: Grave Nr. 12; Incomplete skeleton of a newborn. Good state of preservation. It concerns the incomplete skeletal remains of a newborn (around 10 lunar month old after STLOUKAL and HANAKOVÁ, 1978). All the bones present for the analysis are covered by a periosteal new bone formation (Fig. 7). The reactive new bone has a thickened porous nature and gives a “hairy”-character to the bones.

As we cannot know the exact age of the child at the moment of its death, it



Fig. 5 Periosteal new bone formation on the left tibia.  
Case Nr. 10; Sollies-Toucas, Grave Nr. 9, Male, Mature Adult.



Fig. 6 Rugose periosteal appositions on the right tibia belonging to the Case Nr. 10

is impossible to decide whether it concerns a perinatal or a fetal infection. Perinatal bacterial infections, causing periosteal bone formation and being frequently lethal, are generally caused by *Staphylococcus aureus* or some *Streptococcus* species (SANTOS and HILL, 1982; BEGUE and ASTRUC, 1988). SHULTZ (1984) presented the similar pathological alterations of a prehistoric newborn skeleton, as a case of osteomyelitis. In the case of a congenital infectious disease, venereal treponematosi can provoke bilateral osteoperiostitis (NABARRO, 1954; DELAHAYE and BEZES, 1979). It cannot be excluded at all because a case of early congenital syphilis from the 4th century has already been reported from the region (PALFI et al., 1991).

– Case Nr. 12: Grave Nr. 14; Skeleton of sex undeterminable. Adult, undeterminable; fragmentary state of preservation.

It shows a bony fusion of the left distal tibia and fibia following the fracture of the last one. The simultaneous trauma of the tibia is probable but the material is too fragmentary so we could not make a diagnosis. There are signs of an osteoarthritis of the left ankle, as a possible consequence of the trauma. The osteoarthritis of the first left metatarsophalangeal joint is also detectable.

– Case Nr. 13: Grave Nr. 15; Male skeleton. Adult mature: good state of



Fig. 7 Periostitis on the humerus of a newborn.  
Case Nr. 11: Sollies-Toucas, Grave Nr.  
12, Newborn Child.



Fig. 8 Left and right humeri of the Case Nr.  
13. The left humerus presents serious  
lesions.  
Case Nr. 13: Sollies-Toucas, Grave Nr.  
15, Male, Mature Adult.



Fig. 9 Osteoarthritis of the glenoid fossa of the left scapula belonging to the Case Nr. 13.



preservation. This specimen presents several pathological alterations: Left humerus: it shows the shortened length and the destruction of the humeral head (Fig. 8). (The left humerus is 65 mms shorter than the right one.) The left shoulder joint is extremely destroyed by osteoarthritis; the involvement of the glenoid fossa of the scapula is seen in Fig. 9. The X-ray analysis presented the serious osteoarthritis of the left shoulder and an axial deformity of the humerus.

Right clavicle: there is a well healed fracture of the right clavicle.

Mandible: A healed fracture can be detected under the right mandibular condyle.

Ribs: The fragments of two ribs presenting signs of fractures were found.

The macroscopic characteristics of the left humerus reminded us of some skeletal dysplasias, especially of mucopolysaccharidosis (ORTNER and PUTSCHAR, 1981), but the skeletal dysplasias generally involve numerous bones of the skeletons and the detected traumas suggest a traumatic origin of the process. The morphological and radiological pictures reveal the possibility of a double trauma: a diaphyseal fracture and a trauma of the humeral head. The destruction of the humeral head could be explained by a rupture of blood vessels following a fracture of the anatomical neck (OLIVIER, 1983), but it does not explain the shortening of the bone. The traumatic interruption of the blood supply in a growing bone can produce abnormal shortening of the bone (ZUJovic and CARLIOZ, 1979), so we must think of some traumatism during the growth. A very likely planation is that of a severe polytraumatism of enfance/adolescence: the fracture of the humeral diaphysis, the luxation and necrosis of the proximal epiphysis; probably simultaneous fractures of the ribs, the mandible and the clavicle. These traumatic deformations — causing much suffering and pain to this man for 30–40 years after the accident — provoked numerous consequences: the severe osteoarthritis of the left shoulder, that of the right sternoclavicular and the right temporomandibular joints. The functional reduction of the left arm resulted in the atrophy of the bones of the left forearm.

Beside the alterations of traumatic origin, our specimen suffered from other diseases too. There is a complete block of the vertebrae C6 and C7 and a partial fusion of C4 and C5 (Fig. 10). As a typical consequence of a static disorder of the spine, a severe intervertebral osteochondrosis and the osteoarthritis of the apophyseal joints are detected between C3 and C6.

Our specimen suffered from a hyperostotic disease, as well. There is a spinal osteophytosis from the T11 to L5. Some extraspinal enthesopathies (calcanei, innominate bones, patellae, femora) can also be detected.

— Case Nr. 14: Grave Nr. 16; Male skeleton. Senile adult, good state of preservation. There is a spondylolysis and spondylolisthesis of L5, which provoked degenerative joint diseases of L4 and L5 (intervertebral osteochondrosis and osteoarthritis of the apophyseal joints). Spondylolysis is typically associated with higher levels of osteoarthritis around the fifth lumbar vertebra (BRIDGES, 1989).

The cervical spine (from C2 to C7) presents intervertebral osteochondrosis.



Fig. 10 X-ray picture of the cervical spine of the Case Nr. 13. Fusion of the vertebrae C6 and C7.

The osteoarthritis of the hands and feet is also detectable: there is osteoarthritis on the first left and second right metacarpophalangeal joints; and on the first left metatarsophalangeal joint.

### Conclusions

The two populations on which the present study is based, lived approximately in the same historical period and under similar geographical conditions. Carrying out the paleoanthropological and paleopathological reconstruction of the skeletons we can gather a lot of information about their morphological characteristics and pathological conditions.

Within the limits due to the unequal preservation of the skeletons we conclude a relatively higher number of skeletal diseases in the "Solliès-Toucas" series. Although the restricted number of the skeletons in both samples excludes the precise analysis of the populations and their statistical comparison, the unevenness is remarkable: La Roquebrussanne: 4 pathological cases/18 skeletons; Solliès-Toucas: 10 pathological cases/15 skeletons.

As far as the different disease types are concerned, the predominance of

hyperostotic and degenerative joint diseases is not surprising: they are the most common skeletal pathological lesions since the dawn of civilization (DUTOUR, 1989; ROTHSCHILD, 1989). In several cases (the OA of the spine and the TMJ, or, the osteoarthritis in large joints (shoulder, ankle)) the primary factors (malformations, micro-, or macrotraumas) could be discovered.

Among 5 cases presenting traumas, the two polytraumatic cases are noticeable: Case Nr. 2: 2 fractures; Case Nr. 13: 5 fractures.

In the two cases with periostitis (Cases Nrs. 10 and 11) the occurrence of the infectious diseases is evident with an uncertain etiology. The possibility of treponemal infections cannot be excluded.

In order to be able to carry out a better comparison between the pathological conditions of Late-Antiquity populations and to reveal the epidemiological questions of the diseases, the importance of the further paleopathological examinations of this period is particularly emphasized.

### Acknowledgement

This research was supported by grants from the Hungarian Foundation "Pro Renovanda Cultura Hungariae", from the Fyssen Foundation (Paris) and from the Ministry of Foreign Affairs in France.

### References

- ARLET, J. and MAZIERES, B. (1985): La maladie hyperostotique. — *Rev. Méd. Int.*, 6, 553–564.
- BEGUE, P. and ASTRUC, J. (1988): Pathologie infectieuse de l'enfant. — Flammarion, Paris. 266–294.
- BERATO, J., DUTOUR, O. and WILLIAMS, J. (1990): Incinérations et inhumations du Haut-Empire, Saint-Lambert, Frejus — Var. — *PALEOBIOS*, 6, n°2–3, 43–63.
- BOYER, R., ARNAUD, G., FATTORI, Y., PERROT, R. and VIAL, G. (1987): Vie et mort à Marseille à la fin de l'Antiquité. — Imprimerie Municipale, Marseille. 9–123.
- BRIDGES, P. S. (1989): Spondylolysis and Its Relationship to Degenerative Joint Disease in the Prehistoric Southeastern United States. — *Am. J. Phys. Anthropol.* 79, 321–329.
- BRUN, J.-P., CONGES, G., GEBARA, C. and PASQUALINI, M. (1985): L'habitat rural dans le Var à l'Époque Romaine. — *Provence Historique*, 141, 233–251.
- CHAOUAT, Y. (1970): Arthroses du pied. — *Encycl. Méd. Chir.*, Paris, Appareil locomoteur, 7, 14 328, A10, 1–6.
- CASTAGLIOLA, M. (1977): Fractures de la clavicule. — *Encycl. Méd. Chir.*, Paris, Appareil locomoteur, 9, 14 035, B10, 1–10.
- DELAHAYE, R. P. and BEZES, H. (1979): Syphilis osseuse. — *Encycl. Méd. Chir.*, Paris, Appareil locomoteur; 9, 14 018, C10, 1–6.
- DUTOUR, O. (1989): Hommes fossiles du Sahara. — Editions du CNRS, Paris. 21–37; 191–227.
- DUTOUR, O. and BERATO, J. (1991): Etude anthropologique des restes humains provenant de la nécropole. (Annexe in BORREANI, M. and BRUN, J.-P.: Une exploitation agricole antique à Costebelle) — *Rev. Archéol. de Narbonnaise*, 23, 117–151.
- DUTOUR, O., BERATO, J. and WILLIAMS, J. (1991): Sépultures du site antique de la Porte d'Orée (Fréjus). — *L'Anthropologie*, (Paris), 95, n°2–3, 651–660.
- FEREMBACH, D., SUSANNE, C. and CHAMLA, M.-C. (1986): L'homme, son évolution, sa diversité. — Editions du CNRS, Paris. 17–33.

- FEVRIER, P.—A. (1989): La présence de Rome. In: FEVRIER et al. (1989): La Provence des origines à l'an mil. — Editions Ouest—France, Evreux. 257—377.
- FORESTIER, J. and ROTES-QUEROL, J. (1950): Senile Ankylosing Hyperostosis of the Spine. — *Ann. Rheum. Diseases*, 9, n°4, 321—330.
- GOMÓR, B. and BÁLINT, G. (1989): Reumatológia. — *Medicina*, Budapest. 275—328.
- HACKETT, C. J. (1976): Diagnostic Criteria of Syphilis, Yaws and Treponarid and of Some Other Diseases in Dry Bone. — Springer-Verlag, Berlin. 411—437.
- HODGES, D. D. (1991): Temporomandibular Joint Osteoarthritis in British Skeletal Population. — *Am. J. Phys. Anthropol.* 85, 365—379.
- KRAMAR, C., LAGIER, R. and BAUD, C. A. (1990): Thoracic Spinal Hyperostosis in an Early Medieval Skeleton. — *Scand. J. Rheumatology*, 19: 163—166.
- LAGIER, R. (1982): Vieillesse et arthrose. — *Rhumatologie*, 34, n°1, 9—26.
- LAGIER, R. and BAUD, C. A. (1978): Diffuse Enthesopathic Hyperostosis — Anatomical and Radiological Study on a Macerated Skeleton. — *Fortschr. Röntgenstr.*, 129, 5, 588—597.
- LAVAL-JEANTET, M. and CAULIN, F. (1981): Radiologie de l'ostéoporose. — *Labo. Armour—Montagu*, Paris. 1—47.
- LEVEN, J. (1981): Recherches archéologiques sur la commune de La Roquebrussanne. — *Travaux du Centre de Documentation Archéologique de Toulon*, 1981, 6—15.
- MAFART, B.—Y. (1981): L'abbaye Saint-Victor de Marseille. Etude anthropologique de la nécropole des IV<sup>ème</sup> — VI<sup>ème</sup> siècles. — Editions du CNRS, Paris. 426 pp.
- MARTIN, R. and KNUSSMANN, R. (1988): Anthropologie. — Gustav Fischer Verlag, Stuttgart. 4218496.
- MASSET, C. (1982): Estimation de l'âge au décès par les sutures crâniennes. — *Univ. Paris VII: Thèse Doct. Sciences*.
- MASSET, C. (1986): Estimateurs paléodémographiques. In: FEREMBACH et al. (1986): L'homme, son évolution, sa diversité. — Editions du CNRS, Paris. 65—73.
- MERBS, C. F. (1983): Patterns of Activity-induced Pathology in a Canadian Inuit Population. — *Archaeol. Surv. of Canada*, 119, pp. 200.
- MERBS, C. F. (1989): Spondylolysis: its nature and anthropological significance. — *Int. J. of Anthrop.*, 4, n°3, 163—169.
- NABARRO, D. (1954): Congenital Syphilis. — Edward Arnold Publishers, London. 189—222.
- NEMESKÉRI, J., HARSÁNYI, L. and ACSÁDI, G. (1960): Methoden zur Diagnose der Lebensalter von Skelettfunden. — *Anthropol. Anzeiger*, 24, 70—95.
- OLIVIER, H. (1983): Fractures de l'extrémité supérieure de l'humérus. — *Encycl. Méd. Chir.*, Paris. Appareil locomoteur, 9, 14 038 A10, 1—12.
- ORENGO, P. and TAYON, B. (1980): Fractures diaphysaires. — *Encycl. Méd. Chir.*, Paris. Appareil locomoteur, 11, 14 031 A—60, 1—4.
- ORTNER, D. J. and PUTSCHAR, W. G. J. (1981): Identification of Pathological Conditions in Human Skeletal Remains. — Smithsonian Institution Press, Washington. 55—81, 180—210, 334—336.
- PÁLFI, GY., DUTOUR, O. and BERATO, J. (1991): Tréponématose vénérienne et migration humaine. In: *Résumés du XX<sup>ème</sup> Colloque des Anthropologistes de Langue Française*. — C. E. S. I., Roma.
- PÁLFI, GY., DUTOUR, O., BORREANI, M., BRUN, J.—P. and BERATO, J. (1992): Pre-Columbian Congenital Syphilis from the Late Antiquity in France. — *Int. J. of Osteoarchaeology*. London. 2, 245—261.
- PASQUALINI, M. (1991): Sollies-Toucas. Les fouilles de 1991. — *Ann. SSNATV*, 43, n°4, 245—247.
- RESNICK, D., SHAUL, S. R. and ROBINS, J. M. (1975): Diffuse idiopathic skeletal hyperostosis: Forestier's disease with extrapinal manifestations. — *Radiology*, 115, 513—524.
- ROGERS, J., WATT, I. and DIEPPE, P. (1985): Paleopathology of spinal osteophytosis, vertebral

- ankylosis, ankylosing spondylitis, and vertebral hyperostosis. — *Ann. Rheum. Dis.*, 44, 113–120.
- ROGERS, J., WALDRON, T., DIEPPE, P. and WATT, I. (1987): Arthropathies in Palaeopathology: The Basis of Classification according to Most Probable Cause. — *J. of Archaeol. Sci.*, 14, 179–193.
- ROTHSCHILD, B. M. (1989): Skeletal Paleopathology of Rheumatic Diseases: the Subprimate Connection. in: *Textbook of Rheumatology*; ed: McCARTY, D. J. — Lea & Febiger, Philadelphia. 1–7.
- SANTOS, J. I. and HILL, H. R. (1982): Bacterial Infections of the Neonate. In: WEDGWOOD et al.: *Infections in Children*. — Harper & Row, Philadelphia. — 179–235.
- SCHINZ, H., BAENSCH, W., FRIEDL, E. and UEHLINGER, E. (1952): Ossifikationstabelle. In: *Lehrbuch der Röntgen-Diagnostik*. — 5. Aufl. Thieme, G., Stuttgart. 1–4.
- SCHULTZ, M. (1984): The diseases in a series of children's skeletons from Ikiz Tepe, Turkey. In: *Proceedings of the Vth European Meeting of the Paleopathology Association*; ed: CAPECCHI, V. and RABINE MASSA, E. — Siena University, Siena. 321–325.
- STIRLAND, A. (1991): Pre-Columbian Treponematosis in Medieval Britain. — *Int. J. of Osteoarchaeol.*, 1, 39–47.
- STLOUKAL, M. and HANAKOVÁ, H. (1978): Die Länge der Längsknochen altslawischer bevölkerungen — Unter besonderer Berücksichtigung von Wachstumsfragen. — *Homo*, 29, 53–69.
- Workshop of European Anthropologists (1980): Recommendations for age and sex diagnosis of skeletons. — *J. Human Evol.*, 9, 519–549.
- ZUJOVIC, J. and CARLIOZ, H. (1979): Généralités sur les fractures de l'enfant. — *Encycl. Méd. Chir.*, Paris. Appareil locomoteur, 3, 14 031 B10, 1–14.