

SHORT REPORT

Short Report: Evidence of Trepanation on a Female Individual from the Middle Bronze Age Necropolis of Casas Velhas (Melides, Portugal)

A. M. SILVA,^{a,b,d} P. GIL,^a J. SOARES^{b,c} AND C. T. DA SILVA^{b,c*}

^a Prehistory Laboratory, CIAS, University of Coimbra, CIAS – Department of Life Science, University of Coimbra, 3000–456 Coimbra, Portugal

^b UNIARQ – WAPS, University of Lisbon Archaeology Center, Portugal

^c MAEDS – Museu de Arqueologia e Etnografia do Distrito de Setúbal (Portugal)

^d Laboratory of Forensic Anthropology, Center for Functional Ecology, University of Coimbra, Portugal

ABSTRACT Recent reanalysis of the human remains unearthed from the grave cists of the necropolis of Casas Velhas (Melides, Portugal) from the Southwest Iberian Middle Bronze Age, with a minimal number of 25 individuals (23 adults and 2 non-adults), allowed relevant anthropological data. This culture, although widespread in southern Portugal and nearby areas of southwest Spain in the Middle Bronze Age, is characterized by the paucity of preserved human remains and thus the anthropological knowledge of these human populations. The adult female skeleton exhumed from cist 30, the last interment of this double burial, exhibit a complete perforation on the right parietal bone. The aim of this paper is to present and discuss this defect, which most probable diagnosis is trepanation.

The hole is oval shape exhibiting long term healing. A shallow remodelled area is visible around the defect, which suggests scraping method. No complications or evident reasons for the intervention were observed. In terms of mortuary practices no clear distinction was observed between this individual and others from this cemetery.

The features of this trepanation fit in the major points summarized by Silva (2003) for prehistoric Portuguese trepanation. These data sustain the existence of an old tradition of this procedure in this region of Iberia, present, at least, since the Middle Neolithic. Copyright © 2016 John Wiley & Sons, Ltd.

Key words: trepanation; Southwest Iberian Middle Bronze Age; small grave cists; adult female

Introduction

The necropolis of Casas Velhas (Melides, Portugal) was discovered during the 1970s (Figure 1). Excavations were undertaken by the Museum of Archaeology and Ethnography of the District of Setúbal during the years of 1975 and 1996 under the direction of Carlos Tavares da Silva and Joaquina Soares. This necropolis is composed by 35 graves, mostly small stone cists. The cists, vastly destroyed by agriculture, were mainly composed of four upright slabs of limestone or ferruginous breccia.

The maximum lengths of these tombs are less than 1 m. The cemetery belongs to the Southwest Iberian Bronze Age (Tavares da Silva & Soares, 1981) that was widespread across the south of Portugal (Alentejo and Algarve) and southwest Spain, including the regions of Huelva, Badajoz and Seville (Schubart, 1975). In funerary terms, this culture is characterized by individual burials deposited in lateral foetal position, mostly inside small stone cists, sometimes with funerary ceramic vessels, metallic objects and/or faunal remains. These burials are predominantly individual, but double, triple and quadruple (usually not simultaneous) interments are also documented (Silva *et al.*, 2016). In the last 125 years, many reports of Middle Bronze Age cists burials, isolated or in groups, are found in

* Correspondence to: Ana Maria Silva, Department of Life Science, University of Coimbra, 3000-456 Coimbra, Portugal.
e-mail: amgsilva@antrop.uc.pt

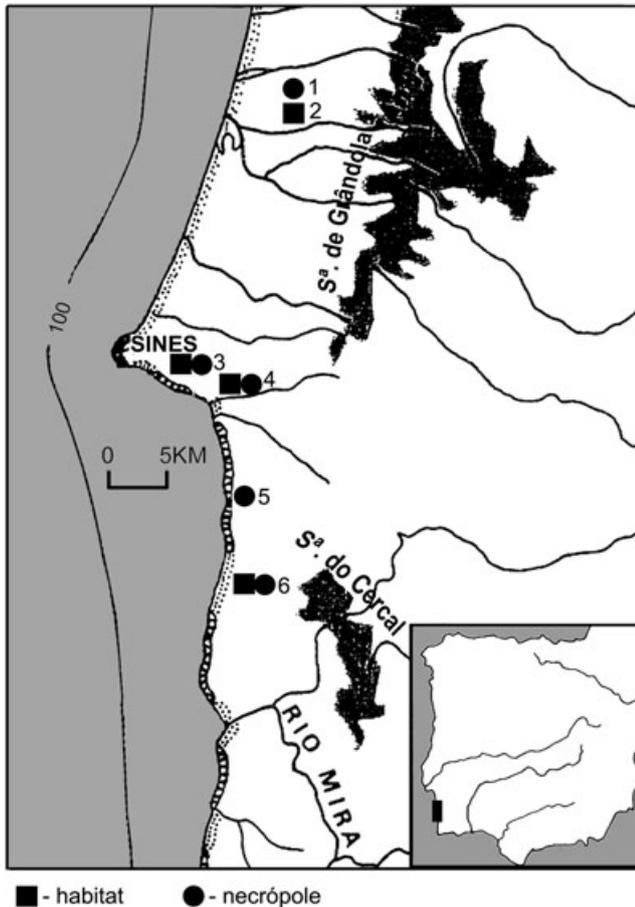


Figure 1. Geographic location of the Necropolis of Casas Velhas (Melides, Portugal).

Portuguese archaeological literature (Tavares da Silva & Soares, 1981; Silva *et al.*, 2016). The majority of them were previously destroyed or disturbed by farming activities and/or plunders. Few revealed human bones always poorly preserved. Therefore, the anthropological knowledge of the individuals buried in these tombs is scarce. To this date, Casas Velhas Necropolis represents the site with best preserved human remains in Portugal for this culture and period. Radiocarbon dating of human bones from two cists confirmed the Bronze Age chronology of these remains (cist 14 – 3255 ± 55 BP; 1670–1410 cal BC – 2 sigma; OxA-5531; and cist 35 – 3260 ± 60 BP; 1680–1415 cal BC – 2 sigma; Beta-127904) (Soares & Tavares da Silva, 1995, 1998; Tavares da Silva & Soares, 2009).

Of the 35 graves, 21 revealed human bones, but only 20 were available for detailed anthropological analysis. Of these, 16 were individual tombs, 3 double and 1 triple, corresponding to a minimum number of 25 individuals, 23 adults and 2 non-adults. Cist 30 contained the bones of two adults. The last interment of this

tomb, belonging to an adult female more than 30 years old displays signs of a remodelled cranial trauma, the subject of the present paper.

The double burial of cist 30: the human remains

The majority of the bones recovered from cist 30 (Figure 2) probably belong to the second and last inhumation in this tomb, an adult female. This female was deposited in crouched position, lying on its right side, orientated East (head) – West. The analysis of the field drawings of this cist confirmed that this tomb had been previously disturbed leading to the displacement of several bones from their initial position (Figure 3). In front of the pelvic region of this skeleton a ceramic vessel was recovered. The bones from the left forelimb of an adult individual of *Bos taurus* (radius, ulna, lunata and



Figure 2. Short grave cist number 30 from the necropolis of Casas Velhas (Melides, Portugal). This figure is available in colour online at wileyonlinelibrary.com/journal/oa

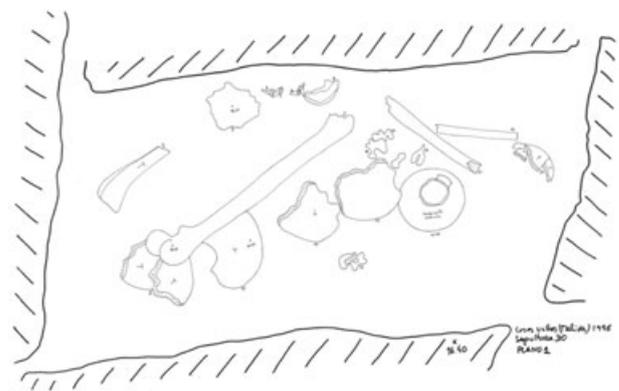


Figure 3. Field drawing from short cist burial 30 (plan 1) from the necropolis of Casas Velhas (Melides, Portugal). Note the disturbance of the human bones. The trepanned parietal bone is labelled as number 13.

scaphoid bone) were also recovered from this cist, although only the exact position of the *Bos* radius is known, apparently associated with the last interment.

This female was more than 30 years old at the time of death (sternal end of left clavicle are fused). No sign of closure of the sagittal and coronal sutures was observed. The absence of suture closures, the morphology of the auricular surface (Lovejoy *et al.*, 1985) and of the pubic symphysis (Brooks & Suchey, 1990) of the coxal bone and the moderate dental wear suggest a middle aged adult. Sex diagnosis was based on the morphology of pelvic bone (Ferembach *et al.*, 1980; Bruzek, 2002), metric analysis of distal end of the humerus (Wasterlain, 2000), calcaneus and talus bones (Silva, 1995). Height was estimated based on the right femur: 154.5 ± 3.56 cm (Olivier *et al.*, 1978). The right femur reveals flatness (platimeric index: 76.27, according to Martin & Saller, 1957) unlike the left tibia (platicnemic index: 63.88). Slight osteoarthritic changes are visible in the body of a thoracic vertebra, the distal end of left humerus and proximal end of both tibias. Minimum enthesopathic lesions were scored for the brachioradialis of the right humerus, the gluteus maximus of the right femur and both calcaneal Achilles tendons. The analysis of the dental remains reveal a moderate dental wear (mean = 3.77; $n = 11$, according to Smith scale, (1984) adapted by Silva, 1996), and no cariogenic lesions or calculus deposits were registered. Evidence of two remodelled traumas was observed: an oblique distal third fracture of the diaphysis of a proximal phalange of the hand and a cranial perforation, the subject of the present paper.

The other individual was identified through the duplication of some teeth, belonging to an adult of unknown sex. This adult revealed a lower mean dental wear, of 2.83 ($n = 6$), but was also the only individual unearthed from this necropolis with a cariogenic lesion, in the first upper left premolar. Signs of chipping were also scored in the same tooth. Besides teeth, no other bone fragment could be undoubtedly assigned to this individual.

Cranial lesion

The preserved skull bones from the last interment of cist 30 include the left and right parietal bones, fragments from the frontal, occipital and the right temporal bones. In the right parietal bone, a roughly oval-shape complete perforation was located 50 mm from the sagittal suture and 36 mm from the coronal suture (Figure 4). The hole measures around 10 mm by 6.5 mm. In the ectocranium, the hole shows bevelled

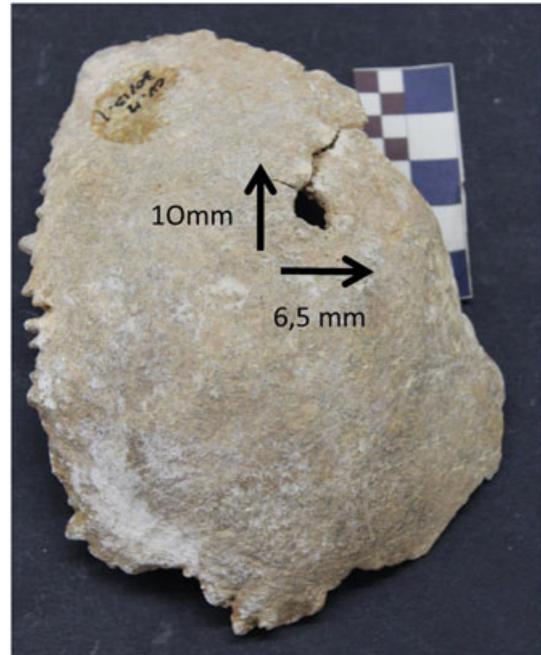


Figure 4. Complete perforation in the right parietal bone from the last interment of cist 30 – an adult female that died with more than 30 years. This figure is available in colour online at wileyonlinelibrary.com/journal/oa

edges exhibiting signs of bone healing. Smooth remodelled bone covers the diploe. The area of the defect is surrounded by a shallow area that gently slopes towards the opening (Figures 5 and 6).



Figure 5. Close up of the perforation: note the remodelled area of scraping surrounding the oval hole with signs of long healing. Laterally, to the hole, a slight depression is visible. Near its lateral limit, a small line of granulomatous aspect is visible (large arrow). The linear fractures were interpreted as taphonomic post mortem damage. This figure is available in colour online at wileyonlinelibrary.com/journal/oa

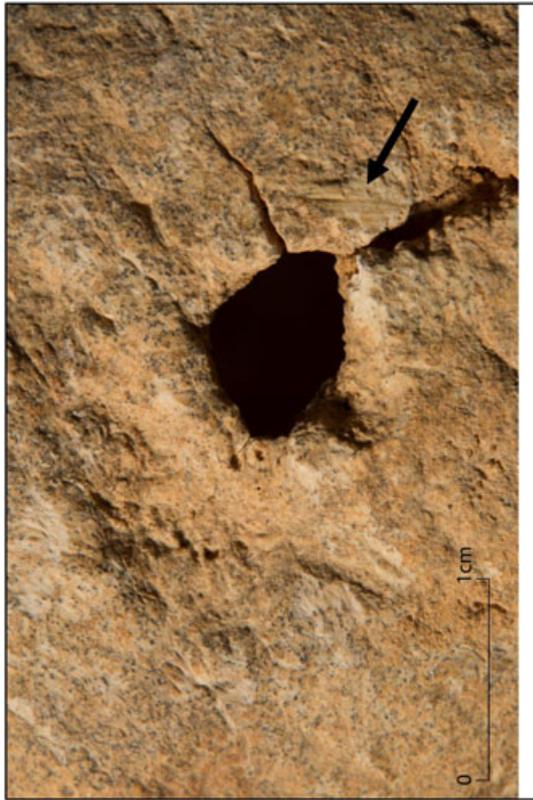


Figure 6. Detail of the lesion (exocranial view). Note the bevelling area below the perforation, as well as, taphonomic alterations (arrow) due to excavation. The margins of the hole show signs of healing; The diploe is not visible. This figure is available in colour online at wileyonlinelibrary.com/journal/oa

No signs of infection were observed. In endocranial view (Figure 7), no evidence of bevelling was observed, although some damage due to taphonomic agents makes the observations of the entire margins difficult. Laterally to this hole, a slight oval/almond



Figure 7. Endocranial view of the hole. The edges of the hole are damage because of taphonomic agents not allowing a clear interpretation of the lesion. This figure is available in colour online at wileyonlinelibrary.com/journal/oa

shape depression is visible on ectocranial view, measuring around 20 mm by 14 mm. Near the lateral limit of this depression a small line (around 0.8 cm) of granulomatous aspect is visible (Figure 5 – large arrow).

Two linear fractures towards the hole are visible, exhibiting no signs of healing.

Discussion

Nowadays, trepanation is a worldwide discussed phenomenon (Andrushko & Verano, 2008; Bereczki & Marcsik, 2005; Bereczki *et al.*, 2015; Campillo, 2007; Gresky *et al.*, 2016; Erdal & Erdal, 2011; Nikita *et al.*, 2013; Piek *et al.*, 1999; Verano, 2016, among others). Nevertheless, only since the end of the 19th century, when it was first realized that ancient people made holes in the skull of the living, has trepanation started to fascinate anthropologists, surgeons, neurologists and the general public. So it is not surprising that, shortly after, the first two cases found in Portugal were described. In 1880, during the 'Congrès International d'Anthropologie et d'Archéologie Préhistoriques' held in Lisbon, Néry Delgado (1880) described two incomplete trepanations dated to the Neolithic. The first case, recovered from the cave of Furninha (Leiria) represents a parietal bone fragment exhibiting a circular hole (20 mm per 5 mm) with signs of healing. A possible second case, unearthed from the cave of Casa da Moura, refers to an incomplete circular trepanation (20mm × 6mm) observed in a left parietal bone of an male adult without signs of healing. During the 20th century, occasional reports are published adding few more cases. More recently, in a review paper published in 2003, Silva surveyed the evidence for prehistoric trepanation in Portugal, and reported new cases. In this paper, 22 trepanations dated from the Neolithic to the Bronze Age, mostly from the former period, are discussed. Yet, the earliest evidence of trepanation from Portugal dates to the Mesolithic period (Crubézy *et al.*, 2001), as the earliest European cases (Campillo, 1977, 2007, 2011; Weber & Wahl, 2006). More recently, new cases from nowadays Portuguese territory dated from the Middle Neolithic were presented in International Meetings (unpublished data from the first author). Even so, the number of cases is rather low when compared with other regions of Europe, as France and Spain (Gama & Cunha, 2003; Silva, 2003; Campillo, 2011). However, several factors can hinder the detection of this procedure: mortuary practices, namely, the use of collective burials, which can compromise the completeness of the skulls; very low preservation rates of bones in some regions of Portugal, as

Alentejo where the soil is very acid, and old excavations without a detailed study of the bones.

The collection of Casas Velhas was recently studied, revealing important data about funerary anthropology, demography, morphology and pathology of these Bronze Age individuals buried in small cists. Among the observed pathologies, a hole in the right parietal bone of an adult female skull was noted. The regular shape of the perforation, the shallow external inclining to the opening, the remodelled margins of the defect and the surrounded area, suggests the intentional removal of bone (Weber & Wahl, 2006). The margins of the defect exhibit signs of long-term healing, and an obliterated diploe, which permits to exclude post mortem damage (Weber & Wahl, 2006). The external bevelling of the margins and the presence of a shallow area around the opening is consistent with trepanation by scraping method. This procedure involves making orifices of rounded/oval shape with large rings of abrasion around it with a wide shallow external inclination around the orifice. All these features are observed in this female skull. The presence of a sloping crater around the perforation permits to exclude the diagnosis of tangential cuts (Verano, 2016). Two linear fractures are visible in the defect, but they were interpreted as the result of taphonomic post mortem damage because they do not reveal any signs of healing (like the margins of the hole). Other possible factors that can result in bone perforation are depressed fractures, metastatic carcinoma, myeloma and infectious diseases (Kaufman *et al.*, 1997; Bereczki & Marcsik, 2005; Nikita *et al.*, 2013; Verano, 2016). However, in all these, the produced lesions are irregular in shape, which does not match the case here presented. Developmental and congenital defects can also be excluded because the defect is not localized in their typical location as around sutures lines (Kaufman *et al.*, 1997; Verano, 2016). So trepanation by scraping method seems to be the more probable diagnosis. Scraping is the oldest trepanning technique and, according to Kirkup (2003), it involves the lowest risk of damaging the brain. This method is also according to Silva (2003) the most used by 'Portuguese prehistoric surgeons', but not in nowadays Spain where drilling technique seems to be the prevalent method followed by scraping (Campillo, 1977, 2007, 2011). The former one is, however, rare in Portugal and apparently performed mostly in the earliest cases, as the only Portuguese case known from the Mesolithic period, a partial trepanation on a frontal bone belonging to a male adult individual from Moita do Sebastião (Crubézy *et al.*, 2001).

Other features of this trepanation, as location (right parietal bone) being a complete and remodelled lesion,

are in accordance with the trend observed by Silva (2003), except the sex of the individual. In Silva's compilation, trepanations were observed in male and unknown sex individuals. However, more recent described cases include female individuals (Boaventura *et al.*, 2014; unpublished data from first author). These data suggest a long tradition of this procedure in nowadays central/south Portugal dating back, at least, to the Middle Neolithic.

For this procedure, sharp-edged oval stone may have been the tool used. This, according to Löwen (1997), is a sterile surgical instrument and could be responsible for the low infection rates of these operations. Moreover, it has also been suggested that these populations had the knowledge of plants and other products with analgesic and antibiotic properties (Piek *et al.*, 1999). The knowledge and use of medicinal plants and other natural products for therapeutic reasons were still very common in rural Portugal until the middle of last century (oral communication by relatives living in these areas of the first author).

No reasons for the intervention were observed in this female skull, although some parts of the cranium are missing. The slight oval shape depression observed antero-laterally to this hole is intriguing. It is impossible to confirm if it is related to the described defect. Concerning possible aetiologies, it could represent an earlier incomplete trepanation but other aetiologies as, depressed cranial fracture, small soft tissue tumours, infections, superficial skull lesions or taphonomic agents cannot be excluded.

In terms of funerary practices, this individual was among the few from this Necropolis that were accompanied by a ceramic vessel and fauna offerings of *Bos taurus*. Still, for the majority of the burials, it was not possible to confirm the existence of these items because they were previously very disturbed. Although the anthropological knowledge of human groups belonging to the Southwest Iberian Middle Bronze Age is scarce because of the almost inexistence of human remains, this is apparently not the first case of trepanation from this culture. In 1965, F.N. Ribeiro shortly mentioned a healed trepanation in one of the four individuals found in cist 12 from the necropolis of Ulmo (Beja). Unfortunately, it was not possible, until now, to locate these human remains to confirm this case.

Final remarks

The trepanation observed in the adult female skeleton from cist 30 of Casas Velhas belongs to a culture – Southwest Iberian Middle Bronze Age – that is almost

unknown in terms of anthropological data due to the paucity of preserved human remains. Several features of this trepanation, as the location, the size, the method used and long-term evidence of healing without any signs of post-operative complications, confirm the skills and experiences of these 'prehistoric surgeons' and allows the suggestion of an old and long tradition of this practice in the present Portuguese territory since, at least, the Middle Neolithic. Recent findings, including the present case, confirm the practice of trepanation in female individual in this region of Iberia, which was an unknown aspect until recently.

Acknowledgements

The authors wish to thank the Museu de Arqueologia e Etnologia do Distrito de Setúbal for permitting the study of the human remains. We are grateful to both reviewers for their helpful comments. Lucy Evangelista for the English revision of the manuscript.

Conflict of interest

The authors have no conflict of interest to declare.

References

- Andrushko V, Verano J. 2008. Prehistoric trepanation in the Cuzco Region of Peru: a view into ancient Andean Practice. *American Journal of Physical Anthropology* **137**: 4–13.
- Berezki Z, Marcsik A. 2005. Trepined skulls from ancient populations in Hungary. *Acta Medica Lituanica* **12**(1): 65–69.
- Berezki Z, Molnár E, Marcsik A, Pálfi G. 2015. Rare types of trephination from Hungary shed new light on possible cross-cultural connections in the Carpathian Basin. *International Journal of Osteoarchaeology* **25**(3): 322–333.
- Boaventura R, Ferreira MT, Neves MJ, Silva AM. 2014. Funerary practices and anthropology during the middle-late Neolithic (4th and 3rd Millennia BCE) in Portugal: old bones, new insights. *Anthropologie LII* **2**: 183–205.
- Brooks S, Suchey JM. 1990. Skeletal age determination based on the os pubis: a comparison of the Acsádi–Nemeskéri and Suchey–Brooks methods". *Human Evolution* **5**(3): 227–238.
- Bruzek J. 2002. A method for visual determination of sex, using the human hip bone. *American Journal of Physical Anthropology* **117**(2): 57–168.
- Campillo D. 1977. Paleopatología del cráneo en Cataluna, Valencia y Baleares. Barcelona: Montblanc-Martín.
- Campillo D. 2007. La trepanación prehistórica. Barcelona: Belaterra.
- Campillo D. 2011. La trepanación prehistórica en la Península Ibérica. In *Paleopatología: Ciência Multidisciplinar*. González Martín A, Cambra-Moo O, Rascón Pérez J, Campo Martín M, Robledo Acinas M, Labajo González E, Sánchez J (eds.). Sociedad Española de Paleopatología, Universidad Autónoma de Madrid–Universidad Complutense de Madrid: Madrid; 1–24.
- Crubézy E, Bruzek J, Guilaine J, Cunha E, Rougé D, Jelinek J. 2001. The antiquity of cranial surgery in Europe and in the Mediterranean Basin. *Comptes Rendus Academy Science Paris. Sciences de la Terre et des Planètes* **332**: 417–423.
- Erdal YS, Erdal ÖD. 2011. A review of trepanations in Anatolia with new cases. *International Journal of Osteoarchaeology* **21**: 505–534.
- Ferembach D, Schwidetzky I, Stloukal M. 1980. Recommendations for age and sex diagnosis of skeletons. *Journal of Human Evolution* **9**: 517–549.
- Gama RP, Cunha E. 2003. A Neolithic case of cranial trepanation (Eira Pedrinha, Portugal). *Trepanation. History – Discovery – Theory*, R Arnott, S Finger, CUM Smith (eds.). Swets & Zeitlinger: Lisse; 131–136.
- Gresky J, Batieva E, Kitova A, Kalmykov A, Belinskiy A, Reinhold S, Berezina N. 2016. New cases of trepanations from the 5th to 3rd Millennia BC in Southern Russia in the context of previous research: possible evidence for a ritually motivated tradition of cranial surgery? *American Journal of Physical Anthropology* **160**(4): 665–682.
- Kaufman MH, Whitaker D, McTavish J. 1997. Differential diagnosis of holes in the calvarium: application of modern clinical data to paleopathology. *Journal of Archaeological Science* **24**: 193–218.
- Kirkup J. 2003. The evolution of cranial saws and related instruments. *Trepanation. History – Discovery – Theory*, R Arnott, S Finger, CUM Smith (eds.). Swets & Zeitlinger: Lisse; 289–304.
- Lovejoy C, Meindl R, Pryzbeck T, Mensforth R. 1985. Chronological metamorphosis of the auricular surface of the ilium: a new method for the determination of adult skeletal age at death. *American Journal Physical Anthropology* **68**: 15–28.
- Löwen H. 1997. Ein neurochirurgischer Eingriff an einem Schädel aus dem Grossteingrab Warburg IV. *Kreis Höxter. Archäologische Beiträge zur Geschichte Westfalens* **2**: 73–76.
- Martin R, Saller K. 1957. *Lehrbuch der Anthropologie*. Gustav Fischer Verlag: Stuttgart.
- Néry Delgado J. 1880. La grotte de Furninha a Peniche. *Congrès International d'Anthropologie et d'Archaeologie Préhistorique (compte rendu de la 9^{ème} session à Lisbonne)*: 207–278.
- Nikita E, Lahr MM, Mattingly D. 2013. Evidence of trephinations among the Garamantes, a Late Holocene Saharan Population. *International Journal of Osteoarchaeology* **23**: 370–377.
- Olivier G, Aaron C, Fully G, Tissier G. 1978. New estimation of stature and cranial capacity in modern man. *Journal of Human Evolution* **7**(6): 513–518.
- Piek J, Lidke G, Terberger T, Smekal U, Gaab MR. 1999. Stone age skull surgery in Mecklenburg–Vorpommern: a systematic study. *Neurosurgery* **45**(1): 147–151.

- Ribeiro FN. 1965. O Bronze Meridional Português. Junta Distrital de Beja: Beja.
- Schubart H. 1975. *Die Kultur der Bronzezeit im Südwest der Iberischen Halbinsel* (Madrider Forschungen, 9). Walter de Gruyter: Berlin.
- Silva AM. 1995. Sex assessment using calcaneus and talus. *Antropologia Portuguesa* 13: 85–97.
- Silva AM. 1996. O Hipogeu de Monte Canelas I (IV – III milênios a.C.): Estudo paleobiológico da população humana exumada. Trabalho de síntese. Provas de Aptidão Pedagógica e Capacidade Científica. Coimbra, Departamento de Antropologia, Faculdade de Ciências e Tecnologia da Universidade de Coimbra. Unpublished Thesis.
- Silva AM. 2003. Trepanation in the Portuguese Late Neolithic, Chalcolithic and Early Bronze Age periods. Trepanation. *History – Discovery – Theory*, R Arnott, S Finger, CUM Smith (eds.). Swets & Zeitlinger: Lisse; 117–129.
- Silva AM, Gil P, Detry C. 2016. A Necrópole de Cistas de Casas Velhas: a história revelada pelo espólio ósseo humano. *Setúbal Arqueológica* In press.
- Smith BH. 1984. Patterns of molar wear in hunter–gatherers and agriculturalists. *American Journal of Physical Anthropology* 63: 39–84.
- Soares J, Tavares da Silva C. 1995. O Alentejo Litoral no contexto da Idade do Bronze do Sudoeste Peninsular. A Idade do Bronze em Portugal: Discursos de Poder. Instituto Português de Museus: Lisboa; 136–139.
- Soares J, Tavares da Silva C. 1998. From the collapse of the Chalcolithic mode of production to the development of the Bronze Age societies in the South-West of Iberian Peninsula. *Existe uma Idade do Bronze Atlântico?* (Trabalhos de Arqueologia, 10), VO Jorge (ed.). Instituto Português de Arqueologia: Lisboa; 231–245.
- Tavares da Silva C, Soares J. 1981. Pré-história da área de Sines. Gabinete da Área de Sines: Lisboa.
- Tavares da Silva C, Soares J. 2009. Práticas funerárias no Bronze Pleno do Litoral Alentejano: o Monumento II do Pessegueiro. *Estudos Arqueológicos de Oeiras* 17: 389–420.
- Verano J. 2016. Differential diagnosis: trepanation. *International Journal of Paleopathology* 14: 1–9.
- Wasterlain RS. 2000. Morphé. Análise das proporções entre os membros, dimorfismo sexual e estatura de uma amostra da Coleção de Esqueletos Identificados do Museu Antropológico da Universidade de Coimbra. Dissertação de Mestrado em Evolução Humana. Coimbra, Departamento de Antropologia, F.C.T.U.C. Unpublished Master thesis.
- Weber J, Wahl J. 2006. Neurosurgical aspects of trepanations from neolithic times. *International Journal of Osteoarchaeology* 16: 536–545.