TRADITION AND MODERNITY IN VETERINARY MEDICINE, 2023, vol. 8, No 2(15): 64–69

DENTAL PATHOLOGIES IN THRACIAN IRON AGE DOGS (6th–4th CENTURY BCE)

Stella Nikolova[1*], Petar Stamberov[2]

[1]National Archaeological Institute with Museum – Bulgarian Academy of Science, Bulgaria
[2]University of Forestry, Faculty of Veterinary Medicine, Sofia, Bulgaria
E-mail: stella.nikolova97@gmail.com

ABSTRACT

Three dog skeletons were excavated within the archaeological settlement near Chirpan in the historical region of Ancient Thrace, Bulgaria. All animals are of adult age, two females and one male, and with present dental pathologies. According to the osteometry, the dogs are of medium height of a mesaticephalic type. Pathological alterations affect, mainly, the carnassial teeth (M1 and M2). Radiographic images of the teeth detect different types of periodontic and possible endodontic damage. These cases contribute to the study of past animal health regarding the relationship between man and dogs in the past.

Key words: dental pathology, archaeology, dogs, paleopathology.

Introduction

The archaeological site is in the vicinity of the city of Chirpan. It was researched during rescue excavations by a team led by Dr. Milena Tonkova from 2020 to 2022 due to the construction of a new railway system (Тонкова *et al.* 2021). It is located within the Thracian valley, an important agricultural region in Bulgaria, with a rich historical past. The site is a multilayered settlement with two major occupation phases. The first, being the Late Iron Age (6^{th}–4^{th} century BCE) and the second, the Medieval period (12^{th}–14^{th} century CE). It yielded a vast faunal assemblage with several articulated skeletons, mostly dating to the Medieval period. During the archaeological campaign of 2022 three articulated dog skeletons, placed in two pits, were unearthed. The dogs' cranium was of mesencephalic type which is the most common morphotype for premodern dogs (Попов 1932). Upon examination, it was discovered that all three had significant oral pathological alterations. Based on the archaeological findings (pottery shards) all three were dated to the Late Iron Age phases (6^{th}–4^{th} century BCE). Dental pathologies in this period occur as attrition, abrasion, periodontal disease, and bone loss. Even nowadays periodontal disease is the most common medical condition among dogs, affecting approximately 80% of young dogs over the age of two. At an early stage, bacteria attack the gingiva causing inflammation of the soft tissues (Harvey 1998; Kortegaard *et al.* 2008). Accumulation of bacterial plaque on teeth and gingiva is considered the leading cause of pathological processes of the teeth. The most commonly affected are the carnassial teeth (Bartosiewicz 2013, Tutt 2006).

Materials and methods

The skeletons were discovered on–site (*in situ*) and a gross examination for any apparent causes of death and visible underlying health issues was undertaken. Osteometric measurements were taken according to the protocols of Von den Driesch (1976) and wither height estimations were calculated using the indexes of Harcourt (1974). All three individuals were attributed as “mature”, based on the full fusion of the epiphysis. The radiographs of the teeth reveal a slender pulp cavity,

more characteristics of dogs over 4 years of age (Van de Broeck *et al.* 2022). Sex was estimated based on the presence or absence of the baculum.

The imaging examinations (X–ray and CT scan) were performed in MVC–Bulgaria with the kind collaboration of the staff. The dental pathology was analyzed radiographically using a Siemens Mobilett XP X–ray apparatus. Computed tomography (CT) was performed with CT Siemens Healthineers, Somatom, Germany. Post–processing of the recorded scans was analyzed in the Radi-Ant DICOM Viewer.

Results

The dog skeletons were discovered in two separate pits (features 349 and 544) in the utmost eastern section of the site. They were in proximity to one another. Two of the dog skeletons were discovered within pit 349 and a single dog skeleton was excavated on the bottom of pit 544. Both pits were most probably used as storage facilities and the dog carcasses were deposited when the facilities were no longer in use. A description of the discovered skeletons is as it follows:

The two dog skeletons in Pit 349. The first discovered dog skeleton (individual #1) was heavily damaged as several rocks were placed above the body. Originally the dog was laid on its back, with lifted limbs, which became disarticulated as they decayed. The head was tilted in an unnatural position left of the ribcage. It laid on its left side with the snout facing down to the body. The individual was mature and was determined to be male, based on the presence of a baculum (*os penis)*. Wither height could not be estimated due to the absence of preserved long bone length. The left mandibula displays pathological alterations (fig. 1). Radiographs showed changes in carnassial teeth with bone loss (fig. 2). The carnassial tooth (M1) exhibited a significant malformation, as an abnormal enamel growth extends bilaterally on the distal root and towards the mesial root of the second molar. A significant degradation of the mesial root of the M2 can be observed (fig.2).

The second dog skeleton (individual #2) was discovered beneath the first dog. The dog laid on its left side with bent limbs close to the body and head pointing to the chest. It is, also, mature, but of female sex. Again, the morphotype is mesaticephalic. The wither height is estimated to be 51 cm, based on the length of the radius and humerus. The visible pathological alteration affects the maxilla and mandibula, as all molars exhibited significant attrition. The dentin of the molars is entirely exposed, and the second molar is almost completely rotted (fig.1).

A few meters away from pit 349 in a northeastern direction, a third dog skeleton was discovered in the bottom of pit#544. The dog was laid on its left side with its back limbs slightly bent. The cranium became detached from the body after the flesh had rotted and it was discovered tilted on the ventral side, with the snout facing in the northern direction. The individual was a mature female dog, also mesaticephalic. The wither height estimation is 50 cm, again based on the length of the humerus and radius. The left mandibula displayed a unilateral bone loss at the alveolar margin of the first molar (fig. 1). Radiographically, there may have been an abscess on the mesial root of this carnassial tooth (fig. 2).

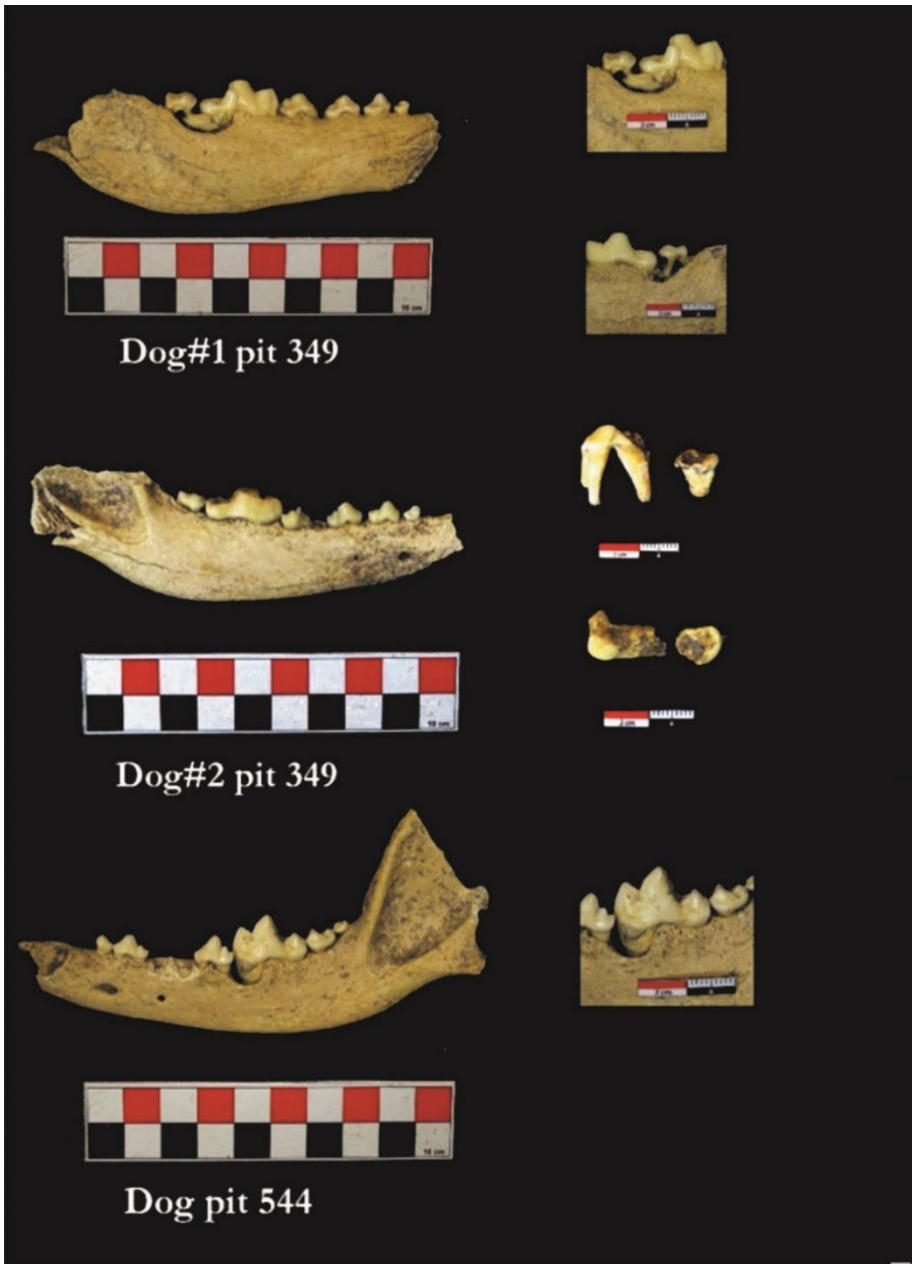

Figure 1: Dog #1 pit 349: Malformation carnassial tooth (M1) with bilateral enamel growth. Dog #2 pit 349: Completely obliterated dentin on the molars and M2 is almost putrid. Dog pit 544: Unilateral alveolar margin loss of the M1.

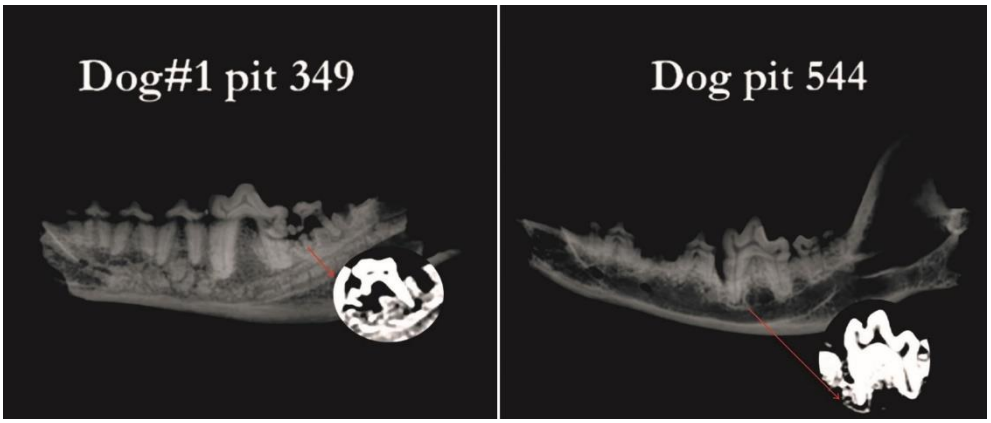

Figure 2: Radiographic Images (X–rays and CT) of the mandible of dog#1 pit 349 displayed periodontal disease and degradation of the mesial root of the M2. The dog in pit 544 also showed periodontitis and an endodontic abscess of the M1.

Discussion

Paleopathological analysis is becoming more and more prominent in zooarchaeology (Bartosiewicz 2013). The discovery of complete animal skeletons in archaeological sites gives the opportunity to carry out such examinations. The most commonly reported dental pathologies like periodontal–endodontic diseases, irregular attrition, bone loss, and decay are present in this research. The dog#1 in pit 349 displays a dental pathology that may have resulted from a complicated odontoma with malformed dental tissues (Chandra *et al.*, 2010). Similar lesions could result from ameloblastoma (Munday *et al.* 2017), but we do not have histological results to confirm this at this time. While dental diseases are some of the most commonly reported paleopathological alternations (Bellis, 2018), cases of odontoma on archaeological dog specimens from Bulgaria and in general have not been reported. This is probably because odontomas in dogs are fairly rare (Simons, 2015). Archaeologically very few cases of tumors and odontomas have been published for other species (Baker and Brothwell 1980; Anderson and Andrews, 1993). Abscesses and caries are also rarely reported in archaeological specimens compared to dental crowding and tooth loss (Bellis 2018). As pit 349 contained two dogs skeletons that in no doubt belonged to the same period, there could also be a genetic link between the two animals and their conditions. This is interesting, as premodern dogs were more genetically diverse, as they were not subjected to systematic crossbreeding, and little is known regarding their genetic predisposition to certain health conditions. Although all three dog skeletons display visible oral alterations, enamel hypoplasia is not observed. Also, the mature age of the individuals, obstructs us from concluding the presence of earlier distemper infection (Dubielzig *et al.* 1981), where severe periodontal disease may have been due to immunodeficiency (Janssens *et al.* 2018). During this ancient period, the presence of rabies should not be excluded, given the deposited dog skeletons. No other skeletal element displayed any visible macroscopic pathological alterations.

The presence of an underlying health condition most probably influenced the way the animals were treated and deposited. While carbon–14 dating (^{14} C) is needed to confirm that the dogs date to the Late Iron Age, not the latter Medieval phase for this article we will stay with the determined date, based on the presence of pottery shards. During the Late Iron Age (6^{th}–4^{th} century BCE) in Bulgaria, while dogs were used as hunting companions and guards, their meat was occasionally

utilized, as some of the other dog bones from the same site display a series of butchery marks. A similar trend was observed in Anatolia about the Iron Age dogs (Siddiq *et al.* 2021).

The discovery of articulated skeletons means that the animals were not deemed edible, and it is most probable that their underlying health conditions were the reason. The mandibles and maxillae of all three animals do not show teeth crowding but have attrition of the enamel, which is more prominent on one side of the jaw. The exposed dentin led to the penetration of bacteria and the development of caries and endodontic infections. Only individual one in pit#349 shows a defect of odontogenic origin. Malnutrition and improper diet, probably due to bone gnawing, have worsened dental conditions and growth.

Conclusion

This study presents the first description of dog oral pathologies from archaeological contexts in Bulgaria. While contemporary breeds have predispositions to certain types of o disease, in this case, the Late Iron Age dog's pathological alterations of the teeth are typical for poor–quality diets and poor growing conditions.

Acknowledgements

This work was supported by the Bulgarian Ministry of Education and Science under the National Research Program „Young scientists and postdoctoral students –2" approved by DCM 206 / 07.04.2022.

References

1. Popov, R. (1932). *Edna kucheshka rasa (Canis familiaris) ot V–ti v. pr. Hr.* Trudove na balgarskoto prirodoizpitatelno drujestvo, Tom 15–16, 269–288.
2. Tonkova, M. Stamberova, M., Dankova, G. (2021). No.55. *Mnogosloen obekt ot kasnoarhai`nata, klasicheskata, rannoelinisticheskata i srednovekovnata (XII v.) epoha pri Chirpan*. Arheologièski otkritiq I razkopki prez 2020, Bulged OOD, 502–506.
3. Anderson, T., Andrews, J. (1993). *A recently excavated odontome from medieval Canterbury, Kent.* International Journal of Osteoarchaeology, 3 (2), 99–104. doi:10.1002/oa.1390030206
4. Baker, J., Brothwell, D. (1980). *Animal Diseases in Archaeology*, Studies in Archaeological Science, Academic Press.
5. Bartosiewicz, L. (2013). *Dental anomalies and oral pathology, Chapter 13: Lame Ducks, Shuffling Nags*. The archaeology of animal disease, Oxbow Books.
6. Bellis, L. (2018). *Reviewing the Pathology and Welfare of Dogs in Roman Britain. Care or Neglect?* Evidence of Animal Disease in Archaeology Proceedings of the 6th meeting of the Animal Palaeopathology Working Group of the International Council for Archaeozoology (ICAZ), Budapest, Hungary, *2016*, Oxbow books, 97–116.
7. Chandra, S., Bagewadi, A., Keluskar, V., & Sah, K. (2010). *Compound composite odontome erupting into the oral cavity: A rare entity. Contemporary clinical dentistry*, 1 (2), 123–126. https://doi.org/10.4103/0976–237X.68591
8. Dubielzig, R. R., Higgins, R. J., & Krakowka, S. (1981). *Lesions of the enamel organ of developing dog teeth following experimental inoculation of gnotobiotic puppies with canine distemper virus*. Veterinary Pathology, 18 (5), 684–689.

9. Harcourt, R. A. (1974). *The dog in prehistoric and early historic Britain.* Journal of archaeological science, 1(2), 151–175.
10. Harvey, C. E. (1998). *Periodontal disease in dogs. Etiopathogenesis, prevalence, and significance.* The Veterinary Clinics of North America. Small Animal Practice 28, 1111– 1128.
11. Janssens, L., Giemsch, L., Schmitz, R., Street, M., Van Dongen, S., Crombe, P. (2018). *A new look at an old dog: Bonn–Oberkassel reconsidered.* Journal of Archaeological Science, 92, 126–138.
12. Kortegaard, H. E., Eriksen, T., Baelum, V. (2008). *Periodontal disease in research beagle dogs – an epidemiological study.* Journal of Small Animal Practice 49, 610–616. DOI: 10.1111/j.1748–5827.2008.00609.x
13. Lobprise, H.B. (2012). *Blackwell's Five–Minute Veterinary Consult Clinical Companion Small Animal Dentistry.* Wiley–Blackwell, Texas, 152–157.
14. Munday, J. S., Löhr, C. V., Kiupel M. (2017). *Tumors of the alimentary tract.* Meuten D. J., editor. Tumors in domestic animals. Fifth. Vol. 1. Ames, Iowa: Wiley/Blackwell, 499–601
15. Siddiq, A.B., Onar, V., Mutuş, R., Poradowski, D. (2021). *The Iron Age dogs from Alaybeyi Höyük, Eastern Anatolia.* Animals 11, 1163. https://doi.org/10.3390/ani11041163
16. Simons, K. (2015). *Oral tumours in dogs: a retrospective study of 110 cases (2002–2014),* Master thesis Utrecht University, https://studenttheses.uu.nl/handle/20.500.12932/20071
17. Tutt, C. (2006). *Small Animal Dentistry A manual of techniques,* Oxford; Ames: Blackwell Publishing 2006, 173–184.
18. Van den Broeck, M., Stock, E., Vermeiren, Y., Verhaert, L., Duchateau, L., & Cornillie, P. (2022). *Age estimation in young dogs by radiographic assessment of the canine pulp cavity/tooth width ratio.* Anatomia, Histologia, Embryologia, 51(2), 269–279.
19. Von den Driesch, A. (1976). *A guide to the measurement of animal bones from archaeological sites (Vol. 1)*. Peabody museum press.