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Anthropological and epidemiological characterization of Great-Moravian population in connection with the social and economic structure

Dental Morphological Traits in a Population from a Settlement of the Mikulčice Agglomeration

Kristina Krchová[1] – Petr Velemínský[2]

This study is devoted to research the dental morphological traits in old Slavonic population in Mikulčice agglomeration (9th-10th century A.D.). The sample consists from two burial sites – Mikulčice-Kostelisko and Mikulčice-Klášteřisko. Dental traits could be evaluated in 401 adult individuals from both burial sites. Of these, 110 were men, 147 women and the rest were individuals of undetermined sex. The twenty-two morphological traits were studied for teeth of the upper jaw and the seventeen traits for teeth of the lower jaw according to ASU DAS methodology. As sexual dimorphic were statistically proven the hypocone on the upper third molars and one-rooted of the first upper premolars – this traits were more frequent in females. While in males were more frequent the two-rooted the first upper premolars. The inter-population comparison between Great Moravian sample from Mikulčice and Scandinavian samples indicate the highest concordance in occurrence of the dental morphological traits.

Key words: Great Moravian population – dental traits – sexual dimorphism – inter-population comparison

1. Introduction

Dental morphological traits (non-metric or dental variety) may be divided into three groups: traits that occur on the crown itself, traits associated with the morphology of teeth roots, and traits associated with the size and number of teeth or their position within the dental arch. On the crowns of teeth, we monitor the number and size of cusps (e.g. tuberculum Carrabelli, the fifth cusp on the lower molars), the position of grooves (interruption groove on the upper incisors), the shape of grooves (the pattern of grooves on the lower molars) and the course of grooves (deflecting wrinkle), the incidence of accessory ridges (mesial accessory ridge). We also monitor the number of roots of premolars and molars. Finally, it is possible to evaluate the position of teeth within the dental arch and deviations in the number of teeth (hypodontia, hyperdontia).

Dental morphological traits have been known since the mid 19th century, when a cusp located on the lingual edge of the medial cusp of the first upper molar was described and termed tuberculus *anomalus*, later named *tuberculum Carabelli* after its discoverer (Hillson 1996). Until the 1920s, only the presence/absence of morphological non-metric traits was evaluated. A number of traits, in reality, are of morphognostic character, i.e. continuous developmental intermediate stages exist between the absence and "clear" presence of these traits. The first person to reflect this fact in his research was Aleš Hrdlička who proposed an evaluation classification of the shovelling of upper incisors of the native inhabitants of North America (e.g. Turner/Nichol/Scott 1991, Hillson 1996). The American anthropologist

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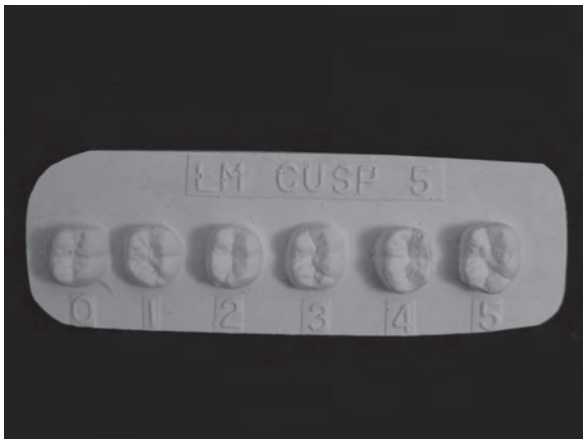

Fig. 1. Plaster model of ASU DAS (Turner/Nichol/Scott 1991).

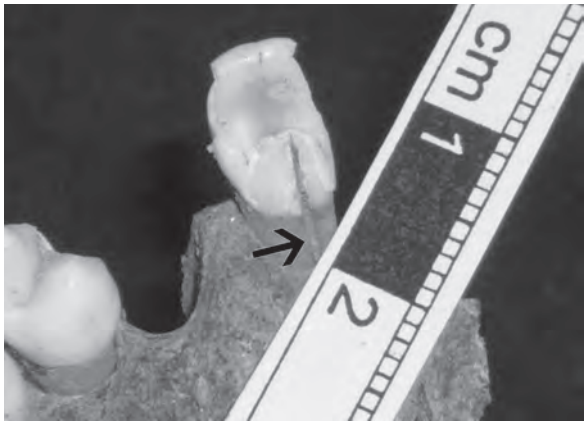

Fig. 2. Interruption groove U1P (Mikulčice grave No 1256).

Dahlberg then contributed significantly to the elaboration of a methodology for evaluating dental variations. He proposed a multi-stage classification – plaster models of individual stages – of dental variations for other traits (Turner/Nichol/Scott 1991). Later on, the Americans Scott and Turner from Arizona State University based themselves on his work and created the co-called "Arizona State University Dental Anthropology System"(ASU DAS) (Turner/Nichol/Scott 1991). This is a method of evaluation of 23 traits described on the teeth of the upper jaw and 21 traits described on the teeth of the lower jaw. Apart from proposing a classification for evaluating new traits, they unified the methodology for evaluating variations already studied previously. The plaster models of the developmental stages of individual teeth variations may be considered to be the greatest advantage of ASU DAS (Fig. 1). These, along with the description itself help unify the evaluation of various researchers and decrease the probability of inter-observer error. Currently, most studies consecrated to dental traits apply the ASU DAS. This relates not only to both American continents (Griffin 1989; Haydenblit 1996; Scherer 2004; 2005; Bartolomucci 2006), but also to Asia (Tsai et al. 1996; Hsu et al. 1999; Matsumura 2005; Matsumura/Hudson 2007), Africa (Irish 1997; Edgar 2002, 2007) and partially Europe (Manzi/Santandrea/Passarello 1997; Coppa et al. 1998). In Europe, apart from the ASU DAS, we may encounter the method of evaluation of dental traits proposed by K. Alt (e.g. Alt 1991; Alt/Vach 1998; Desideri 2007) while in Eurasia we may come across the methodology of A.A. Zubov (Kaczmarek 1992; Tóth 1992).

At the beginning, it was presumed that monogenic type of heredity could apply to teeth variations. In the inter-war period, though, it was shown that a number of traits demonstrate a polygenic type of heredity, with a various range of developmental traits. The issue of dental trait heredity has been the subject of studies involving mono- and dizygomatic twins and "family" research (e.g. Berry 1978; Wood/Green 1969; Goose/Lee 1971; Biggerstaff 1973; Townsend et al. 1992; Staley/Vance/Louck 1998). Dental morphological traits started being used for inter-population comparisons in the 1960s, in parallel with discrete (epigenetic) morphological traits described on the skeleton. Apart from resolving relationships/similarities associated with the effort to clarify previous population migration, and the course of ethnogenesis in various geographical regions (e.g. Turner 1967; Irish 1997, 2006; Hsu et al. 1999; Matsumura 2005, 2006; Khamis et al. 2006), dental traits are also used in the area of human evolution studies. An example of this may be the resolution of the issue of the relationship between modern man and his evolucionary predecessors (e.g. Irish 1998;

Bailey 2000, 2006; Skinner et al. 2008). For example, S.E. Bailey (2006) focused in her work on the variability of dental traits in Neanderthal forms, whilst proving more or less the continuity of the incidence of these traits in the evolutionary line Homo erectus – early form of Homo neanderthalensis – early forms of Modern Man from the Near East and finally Upper Palaeolithic anatomically Modern Man. Similarly, J.D. Irish (1998) in his work states that a number of traits typical of the Sub-Saharan population also appear in early hominids, as well as in primates.

A prerequisite for comparing various population groups on the basis of dental or osteological traits is the verification whether their incidence is not statistically significantly sex-dependent. In the case of bilateral traits, it is then suitable to verify whether an asymmetrical incidence is or is not preferred. Naturally, the basic condition is to determine the frequency of individual traits within population groups.

To date, a statistically significant sexual dimorphism valid simultaneously for several population groups has not been proven for any dental trait (Manzi/Santandrea/Passarello 1997; Ullinger et al. 2005). The association of traits with sex must thus be tested in every population studied.

Inter-population comparisons have shown statistically significant differences in the incidence of dental traits between the inhabitants of certain continents. An example of this is the tuberculum Carrabelli typical of the European population, or the marked medial ridge on the upper incisors and the diastema mediale typical of the African population, especially Bushmen, and the shovelling of upper incisors that has a high incidence among Asian populations (Yaacob/Narnbiar/Naidu 1996). Based on these results, the so-called "Mongoloid, Caucasoid and African dental complex" has been introduced. The Mongoloid dental complex includes shovelling of the upper incisors, cusp 6 and 7 on the lower molars, deflecting wrinkle and protostylid on the first lower molar. On the contrary, the Caucasoid dental complex is characterised by the following

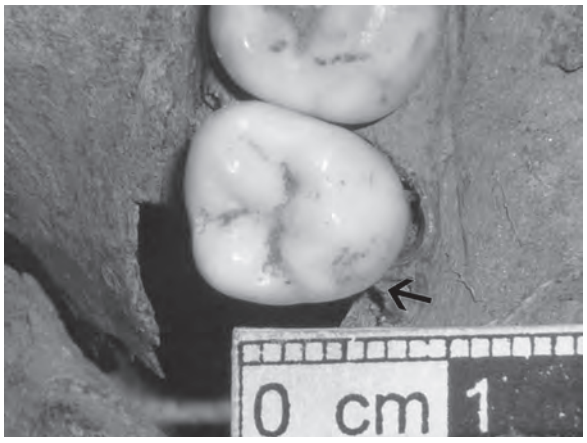

Fig. 3. Hypocone absent U3M (Mikulčice grave No 1174).

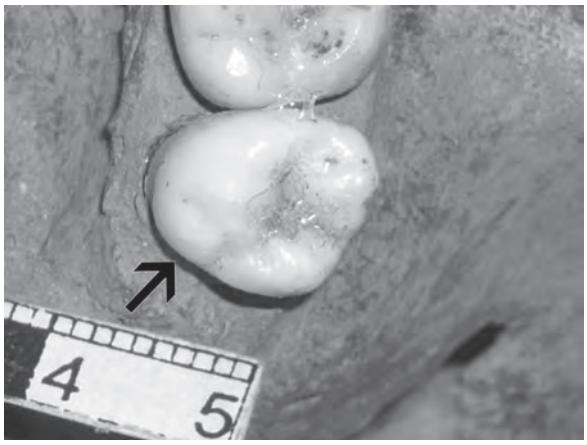

Fig. 4. Hypocone UM3 (Mikulčice grave No 1174).

traits: absence of the shovelling trait on the incisors, absence of additional cusps on premolars, low frequency of the cusp 6 and 7 traits, frequent incidence of the tuberculum Carrabelli, protostylid and winging (Hillson 1996).

During the study of dental morphological traits in previous populations, researchers encounter several problems. Naturally, the biggest problem is the incomplete preservation of dentition and especially dental abrasion in adult individuals. A number of teeth cannot be evaluated also because of the presence of caries. This means that from an apparently large burial site with several hundred burials, in the end only tens of individuals can be evaluated. Our research is after all a good example of this. Problems then arise if we wish to compare the group studied with

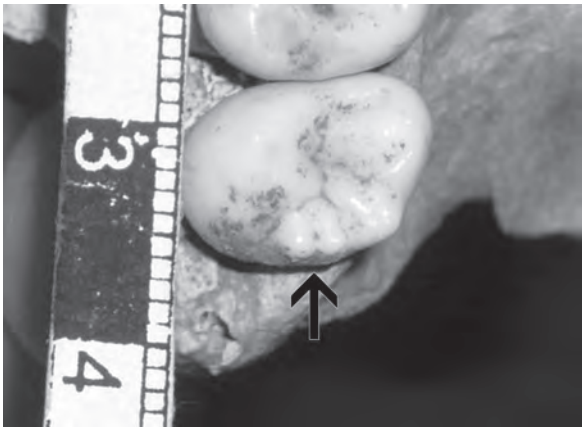

Fig. 5. Metaconule UM3 (Mikulčice grave No 1323).

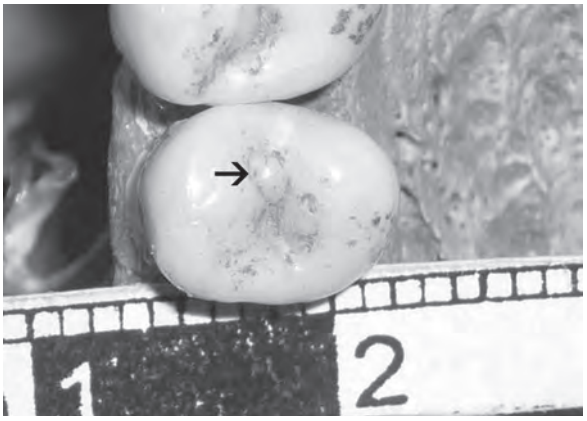

Fig. 6. Odontome U2P (Mikulčice grave No 1323).

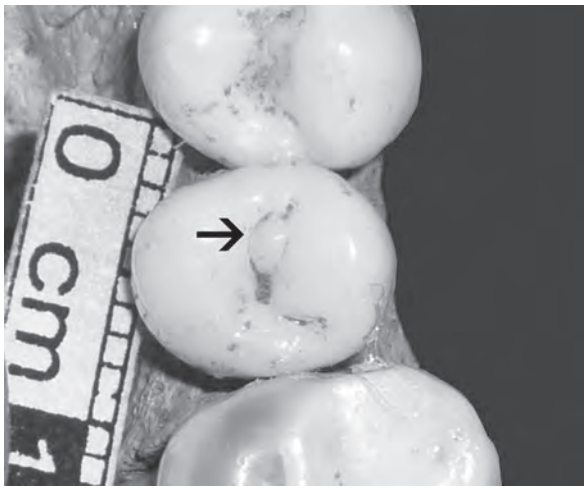

Fig. 7. Odontome UP2 (Mikulčice grave No 1323).

other populations. For comparison it is suitable to choose populations where the dental traits were evaluated using the same method. In view of the fact that most Central and East European groups were previously evaluated on the basis of A. A. Zubov's method (Tóth 1992; Kaczmarek 1992), there is a lack of comparative data. Finally, not even a unified methodology can guarantee problem-free inter-population comparison. It has been shown that not even authors who use the ASU DAS determine the presence of traits with multi-stage evaluation on the basis of the same developmental stages (e.g. Edgar 2002; Scherer 2004; Bartolomucci 2006). This results in variations in the frequency of the same trait due to the more lenient or stricter limit for acknowledging its presence. If studies publish "limit" stages, then there is no problem, as the frequency may be calculated. Furthermore, even in the case of the ASU DAS, the subjective view of the given researcher plays a role – allocation to a concrete developmental stage may be controversial. 3D imaging methods and the subsequent application of sophisticated computer and statistical software may contribute towards a more exact and objective evaluation of dental traits (e.g. Mayhall/Kageyama 1997).

The aim of our contribution is to determine the frequency of selected dental morphological variations in the Great Moravian Population from a settlement of the Mikulčice agglomeration and to compare this population group with other, analogically dated populations of Central Europe.

2. Material and method

We studied the dental morphological traits in individuals from two burial sites from a sub-castle of the Mikulčice power centre. These included the burial site at Klášteřisko, where 301 graves were uncovered (Stloukal/Hanáková 1985) and the burial site located in the Kostelisko position, the second largest Mikulčice burial site with 425 graves (Velemínský et al. 2005). Both burial sites had not been explored completely (Poláček/Marek 2005).

Dental traits could be evaluated in 401 adult individuals from both burial sites. Of these, 110 were males, 147 females and the rest were individuals of undetermined sex. All individuals

with an evaluable dentition were processed from the Kláštěřisko burial site (N=185), while only individuals with excellent or very good preservation of dentition were evaluated from the Kostelisko burial site (N=216). We extended the group to include the individuals for Kostelisko because of the insufficient number of individuals with evaluable dentition buried at the Klášteřisko site.

During the evaluation of dental traits, we based ourselves on the methodology proposed by Ch. G. Turner (Turner/Nichol/Scott 1991; Scott/Turner 1997). As stated above, this is the so-called Arizona State University Dental Anthropology System (ASU DAS), which apart form verbal definitions of traits and developmental stages also includes their plaster models. We evaluated 22 morphological traits for teeth of the upper jaw and 17 traits for teeth of the lower jaw (see Table 1). Apart from variations with evaluation of presence/absence, we also studied traits of a morpho-gnostic character, i.e. where the presence of a given trait is presented by various, continuous developmental stages. Finally, this study also included traits for which every "category" is evaluated as an independent trait. This group included the following traits: winging of the upper incisors (1A, 1B-bilateral rotation, 2-unilateral rotation, 3-direct, 4-inverse winging), interruption groove of upper incisors (0-absent, 1-mesial groove, 2-distal groove, 3-concomitant mesial and distal groove, 4-medial groove), the number of cusps on the lower molars (4, 5, 6), groove pattern of lower molars (Y, X, +, others) and the number of roots of premolars and molars.If premolars or molars are missing, the number of roots can be determined according to the preserved teeth alveoli.

Before statistical processing, it was necessary to calculate the incidence of bilateral traits per "individual", as recommended by the authors of the ASU DAS (Turner/Nichol/Scott 1991). When expressing the incidence per individual, the trait is taken to be present on the one hand if it is present on both the right and left tooth (1-1), and on the other if it is present only on one side (1-0, 1-*). The trait that is missing both on the right and on the left side (0-0) is naturally taken to be absent.A different situation arises if the trait is absent on one side and cannot be evaluated on the other (0-*). In this case, if we express the incidence per individual, we consider this trait to be non-evaluable (*), as the absence/presence of this trait on the missing side cannot be ruled out.This procedure is respected by most current studies (e.g. Haydenblit 1996; Manzi/Santandrea/Passarello 1997; Irish 2006; Edgar 2007; Krchová/Velemínský/Peterka 2007).

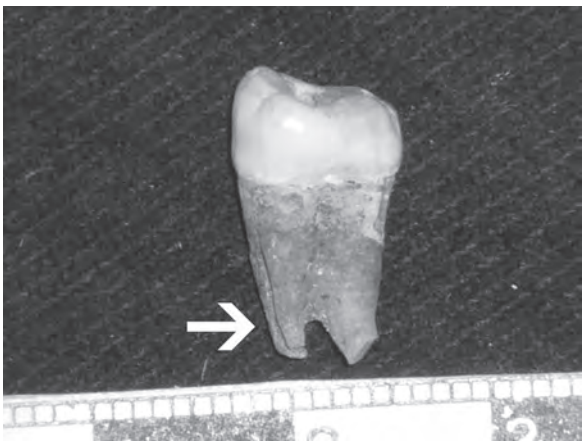

Fig. 8. Triple-rooted U2P (Mikulčice grave No 969).

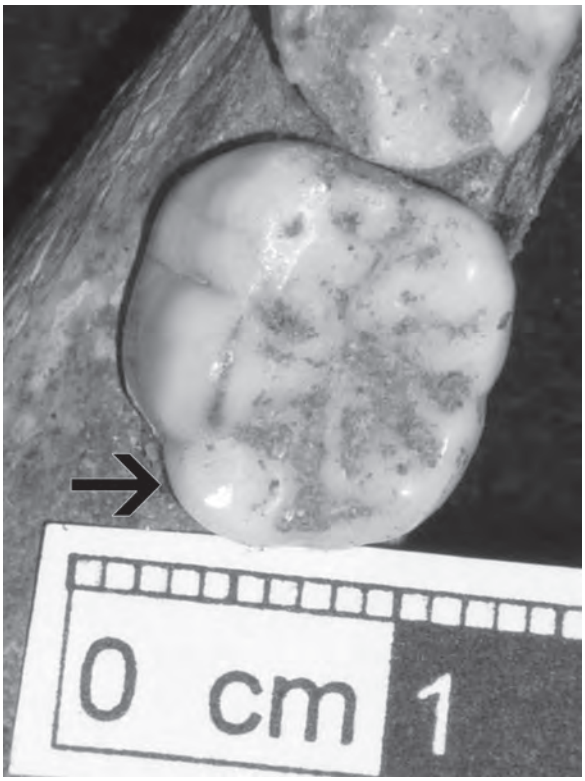

Fig. 9. Cusp 5 LM1 (Mikulčice grave No 1253).

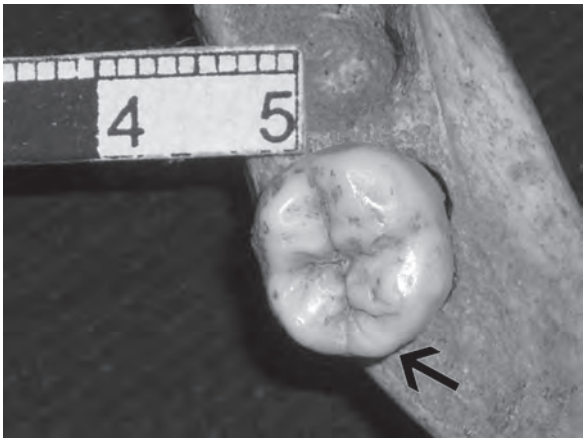

Fig. 10. Cusp 5 L3M (Mikulčice grave No 1327)..

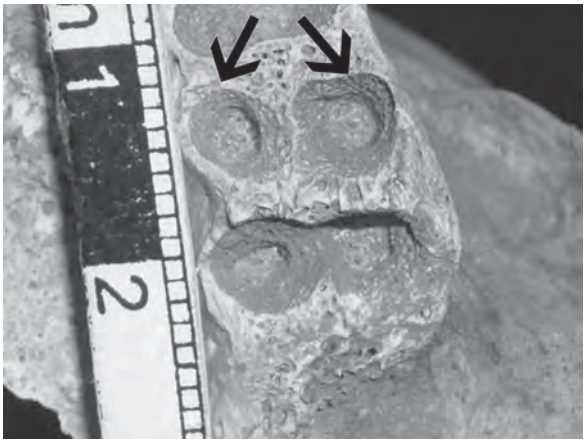

Fig. 11. Double-rooted UP1 and UP2 (Mikulčice grave No 1348).

Fig. 12. Shovelling UI1, UI2, UC (Mikulčice grave No 1286).

The original aim to compare the Great Moravian population from Mikulčice with a similarly dated and geographically close European population group in which the ASU DAS was applied could not be undertaken because of the absence of such a study. From Central Europe, the only population group available was the recent Czech population of children and adolescents aged between 7 and 21 years (Krchová/Velemínský/Peterka 2007). We further chose a Middle Ages population from Scandinavia. This included three groups: from the period when Greenland was settled (OG, dated in 10Th century) and from the medieval Greenlandic (SvG) and Norway (Nor) groups (Scott/Alexandersen 1992). Finally, the last population used in the comparison dates to the Roman Imperial period, more precisely the 2nd century AD. This includes individuals buried in the agricultural village of Lucus Feroniae and the city of Portus Romae (Isola Sacra necropolis) (Manzi/Santandrea/Passarello 1997).

Statistical processing was conducted using the MS Excel 2003 and Statistica 6.0 programs. We tested the zero hypothesis – the frequency of the incidence of dental traits in both sexes does not differ statistically – using the χ^2 test of good concordance. Inter-population comparison was conducted again using the χ^2 test of good concordance (e.g. Zvárová 2004). The levels of statistical significance of both tests were set at p=0.05. If the frequency did not reach at least a value of five, calculation of the Yates correction at a 5% level of statistical significance was used (Zvárová 2004).

3. Results

The shovelling trait was most frequently observed on the lateral incisors in a total of 50% of evaluated individuals. On the contrary, the double shovelling trait occurred in 23.04% of first premolars. The incidence of the tuberculum dentale was relatively frequent on the central and lateral incisors (Fig. 16, 18), with 33.33% of cases. The medial interruption groove occurred most frequently on the central and lateral incisors (14.89%, 27,73%) (Fig. 2). If we leave aside the high frequency of the type three winging, which is considered to be the norm, then the other type with a higher frequency is the state whereby one or both central incisors are rotated distally (4.05%).

The distal accessory ridge was very frequently observed on canines, 62.07% of cases. A very rare trait on premolars is the tri-cusped premolar. The incidence of the metacone is again considered to be normal in these populations and this corresponds to the frequency observed, exceeding 90% on all molars. The incidence of the hypocone had a descending tendency from the first molars down to the third molars (53.75%) (Fig. 3, 4). This is similar to the metaconule, whose frequency is highest in the case of first molars 38.21% (Fig. 5). Tuberculum Carabelli occurred most frequently on the first molars (Fig. 15). There is nearly no incidence of parastyle on the molars. The incidence of the odontome trait (13.04%) on the second premolars is interesting (Fig. 6, 7). Double rooted upper second premolars (Fig. 17) have low frequencies in our sample (16,67%). Three-root premolars were also rarely observed (Fig. 8) as were single-root first molars. In the case of the teeth of the lower jaw, the following frequency of traits was observed. Shovelling on the central and lateral incisors did not exceed 7%. The Y groove pattern was typical on the first molar (81.01%), while the + groove pattern was typical on the second molar (72.64%) and a different shape than Y, X or + occurred on the third molars (65.57%). On the lower molars, the protostylid is an analogous trait to the parastyle, which is not as rare though, as it has been observed on the first molars in up to 37.57% of cases. Interesting is the high incidence of cusp five (Fig. 9, 10) on the first molars (93.71%) and on the third molars (47.83%) (Fig. 19, 21). The cusp six and cusp seven were rarely observed on all molars. The incidence of two or three root first premolars and of three root second premolars and molars was not been observed at all. A more detailed overview of the frequency of incidence of dental traits is presented in Tables 2-3.

Based on the observed frequencies, we tested the dependence of the incidence of dental nonmetric traits on sex (Tables 2-3). In our group, sex-dependent traits were found to include hypocone on the third upper molars, which was observed more frequently in females. Also more frequent in females were 1-root first upper premolars, while the 2-root premolars (Fig. 11) predominated in males. Traits involving the teeth of the lower jaw did not show any sexual dimorphism.

Fig. 13. Tri-cusped premolar U2P (Mikulčice grave No 969).

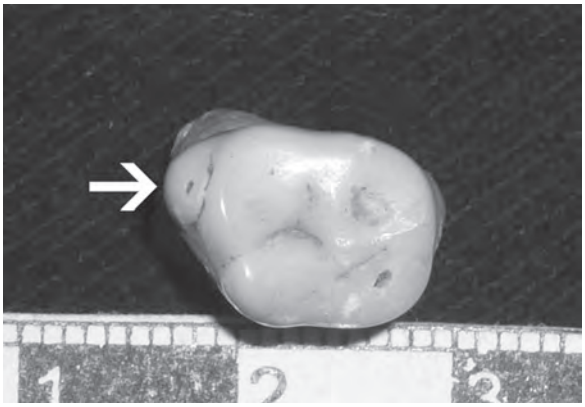

Fig. 14. Tuberculum Carabelli U2M (Mikulčice grave No 1030).

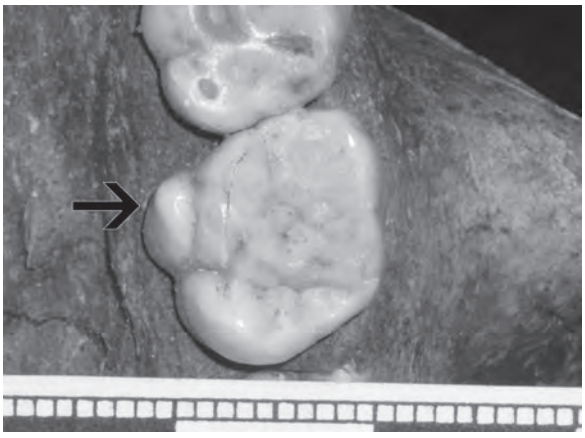

Fig. 15. Tuberculum Carabelli U1M (Mikulčice grave No 1253.)

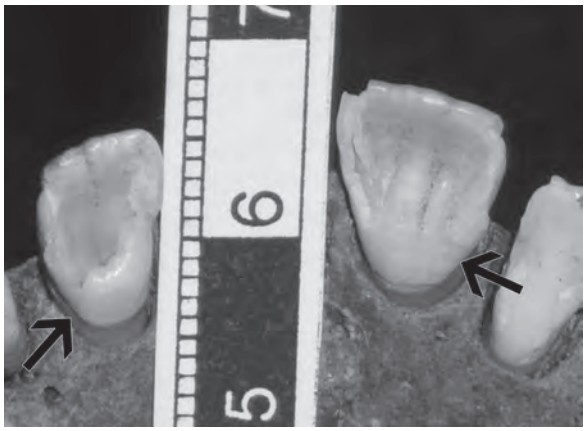

Fig. 16. Tuberculum dentale UI1 (Mikulčice grave No 1253).

Fig. 17. Double-rooted U2P (Mikulčice grave No 898).

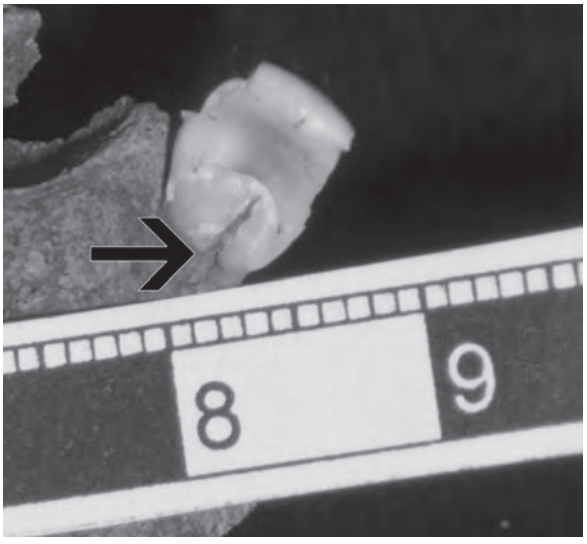

Fig. 18. Tuberculum dentale UI2 (Mikulčice grave No 1256).

We compared the population from Kostelisko and Klášteřisko with another five populations. We tried to select populations that would correspond either in date or geographically and in whose case the same method of evaluation of dental traits had been used. The first population used for comparison was a recent group from the then Czechoslovakia (Krchová/Velemínský/Peterka 2007). Both groups differed significantly in the incidence of the following traits: shovelling of the upper incisors and canines (Fig. 12), double shovelling and distal accessory ridge of the upper canines, metacone and cusp 5 on the first upper molars. According to the traits of the lower jaw teeth, these populations again differed most in the incidence of the distal accessory ridge on the lower canines, fovea anterior on the first molars, the incidence of a Y groove pattern on the second molar, the deflecting wrinkle and protostylid on the first molars. As to the other traits, the incidence of morphological traits on the teeth of both populations concurs (see Table 4). The Roman population and Mikulčice population again differed in the incidence of the following traits: shovelling of the upper incisors, tuberculum dentale on the upper canines, cusp 5 and parastylus on the first upper molars and the incidence of tuberculum Carrabelli on the upper three molars. As to the lower jaw, the situation was similar to the previous comparison with the recent population. Differences occurred in the case of the canine distal accessory ridge, fovea anterior, deflecting wrinkle on the first molars and the protostylid, which differed in the case of all molars (Table 5). The populations compared next originated from Scandinavia. The populations from the period of the settlement of Greenland (OG) and from Norway (NOR) differed most markedly, namely in the following cases: metacone on the first and second upper molars and cusp 7 on the lower second and third molars. A detailed list of the traits compared is found in Tables 6-7 On the contrary, the Greenland Middle Ages group (SvG) differed in only five traits, including cusp 5 on the second upper molars, 1-2 root second upper

molars. In the case of the teeth of the lower jaw, the groups differed in the incidence of the cusp 7 on the second and third molars and in the cusp 5 on the third molars (Table 8).

4. Discussion and conclusion

The aim of this work was to determine the frequency of the incidence of selected dental morphological traits in a population from Mikulčice and to compare our results with other population groups. For this comparison, we did not have at our disposal studies with a similarly dated (early Middle Ages) and geographically close (Central Europe) population group evaluated on the basis of the ASU DAS.

In the Great Moravian population, we did not observe the incidence of the following traits: winging – bilateral rotation above 20° and unilateral rotation of one of the central upper incisors, distosagittal ridge on the second upper premolars, odontome on the first upper premolars, double shovelling of the central lower incisors, premolar lingual accessory cusp type 8 and 9 (Fig. 20) on the first lower premolars, medial trigonid crest on the lower first and second molars and distal trigonid crest on the lower second molars, „cusp 7" on the lower second and third molars, 2- and 3-rooted lower first premolars and 3-rooted lower first molars. The following traits occurred with a lower frequency on the teeth of the upper jaw: double shovelling of the lateral incisors, 3-cusps on the first and second premolars (Fig. 13), tuberculum Carrabelli on the second and third molars (Fig. 14), parastylus on all molars, 3-rooted first premolars. The following traits occurred rarely on the teeth of the lower jaw: cusp 6 on the second molars and cusp 7 on the first molars. On the other hand, the following traits were represented most frequently: metacone all upper molars, 3-rooted the first and second upper molars, 2-rooted all lower molars.

As mentioned in the introduction, the association of the incidence of dental non-metric traits with sex may be considered population specific (e.g. Tsai et al. 1996; Irish 1997; Hsu et al. 1999; Scherer 2004; Ullinger et al. 2005; Khamis et al. 2006). In the Great Moravian population, sexual dimorphism was statistically proven in the case of the hypocone on the upper third

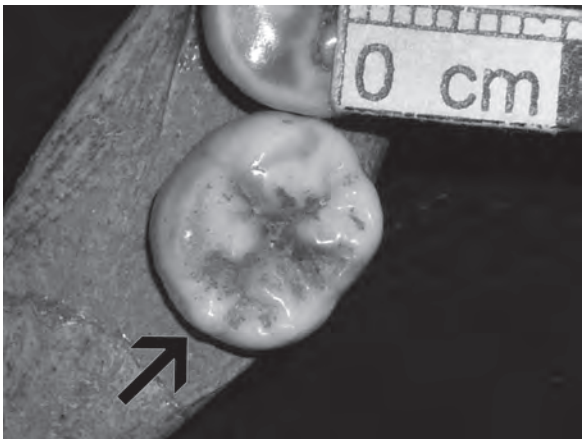

Fig. 19. Cusp 5 LM3 (Mikulčice grave No 1327).

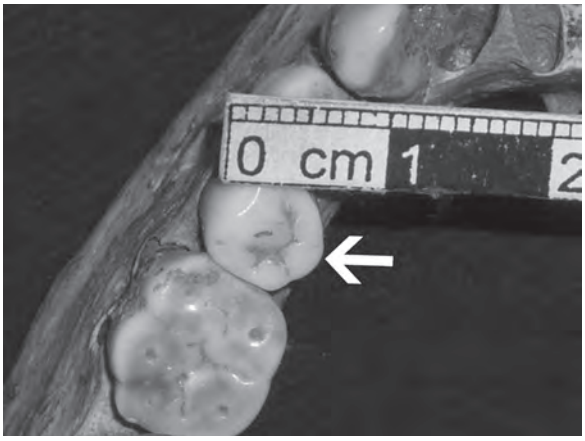

Fig. 20. Premolar lingual accessory cusps LP2 (Mikulčice grave No 1327).

Fig. 21. Cusp 5 L3M (Mikulčice grave No 1386).

molars – this trait was more frequent in females. In females, 1-rooted of the first upper premolars also predominated, while in males 2-rooted the first upper premolars were more frequent. On the contrary, in the Czech population from the 20th century, the incidence of the labial curve on upper incisors was sex-dependent, occurring more frequently in females (Krchová/Velemínský/Peterka 2007). For comparison, Edgar (2002) showed in the Modern Age population group from the Western European Von Luschan collection of the American Museum of Natural History a correlation with sex for the "peg shaped" upper incisors, the *fovea anterior*, deflecting wrinkle etc. For a number of traits tested, though, these studies did not involve sufficient frequencies of incidence, i.e. no general conclusions can be drawn from the results. This is where, unfortunately, the problem of unsatisfactory tooth preservation, namely preservation of occlusion surfaces, in adult individuals of determined sex comes into the fore.

We compared the Great Moravian population with another five populations. We tried to find studies involving similarly dated Central European skeletal groups on which the ASU DAS had also been applied. In view of the absence of such studies, we had to make a compromise and apply research from Scandinavia and Italy. An interesting point is the relatively high concordance of dental traits between the Great Moravian population from Mikulčice and the Middle Ages group from Greenland, where out of the 31 traits studied a similar incidence was noted in the case of 24 traits, i.e. a statistically significant difference in incidence was noted only in the case of 7 traits. A similar result was observed when comparing the Great Moravian population with the group dating from the settling of Greenland. In this case, both populations differed statistically in the incidence of 8 traits out of 31 studied. Based on the largest number of traits, we were able to compare the group from Mikulčice with the recent Czech population. Of the 57 traits studied, 14 traits had a statistically different incidence. The Roman population concurred with that of Mikulčice in 25 cases. The Roman population from the village of Lucus Feroniae and the city of Portus Romae (the Isola Sacra burial site), the Norwegian and the Czechoslovak population groups differed from the our group in the incidence of the cusp 5 on the first upper molars and in the prostostylid on the first molars. The Roman and Czechoslovak group differed from the one from Mikulčice in the shovelling traits on the upper first and second incisors, the tuberculum dentale on the upper canine, the canine distal accessory ridge on the lower canines, and the fovea anterior on the lower molar. All three Scandinavian groups- those from the period of the settlement of Greenland in the 10th century AD, the Middle Ages population of Greenland and Norway -also differed most markedly from the Slavic population in the incidence of cusp 7 on the lower first and second molars. According to Scott/Turner (1997), the incidence of the cusp 5 on the upper first molar in Western Europe is less frequent, while in Northern Europe its incidence is around 20-40 %. This trait is characteristic for the Sub-Saharan African population (up to 80 %). Scott/Turner (1997) in their work state that the Y groove pattern occurs in early European populations and in India, its incidence ranging from 19 to 27.8 %. The cusp 6 on the first lower molar is considered by Scott/Turner (1997) to be a common trait (more than 30 %). It occurs less frequently only in European populations and in New Guinea (5-15 %). In Northern Europe, the incidence of this trait increases to up to 25 %. Furthermore, Scott and Turner (1997) state that the cusp 7 on the first lower molar is rare worldwide. The only exceptions are the Sub-Saharan African populations, where its frequency is between 25 to 45%. According to the data of Scott and Turner, the Mikulčice population corresponds in the frequency of incidence of dental morphological traits to European groups.

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Table 1. Evaluated dental traits.

Trait	Teeth	Grades
Shoveling	UI1, UI2, UC, LI1, LI2, LC	0-2/3-7
Double shoveling	UI1, UI2, UC, UP1, LI1, LI2	0,1/2-6
Tuberculum dentale	UI1, UI2, UC	0, 1, 2, 3, 4, 5, 6
Interruption groove	UI1, UI2	0, 1, 2, 3, 4
Winging	UI1	1A, 1B, 2, 3, 4
Labial curve	UI1, UI2	0, 1, 2, 3, 4
Canine mesial ridge	UC	0, 1, 2, 3
Canine distal acc. ridge	UC, LC	0, 1, 2, 3, 4, 5
Premolar mesial acc. cusps	UP1, UP2	0, 1
Premolar distal acc. cusps	UP1, UP2	0, 1
Tri-cusped premolars	UP1, UP2	0, 1
Distosagittal ridge	UP1, UP2	0, 1
Metacone	UM1, UM2, UM3	0-2/3-5
Hypocone	UM1, UM2, UM3	0-2/3-5
Metaconule - cusp 5	UM1, UM2, UM3	0, 1, 2, 3, 4, 5
Carabelli's trait	UM1, UM2, UM3	0-3/4-7
Parastyle	UM1, UM2, UM3	0,1/2-6
Premolar lingual cusp	LP1, LP2	A, 0, 1, 2, 3, 4, 5, 6, 7, 8, 9
Fovea anterior	LM1	0, 1, 2, 3, 4
Groove pattern	LM1, LM2, LM3	Y, X, +, other
Cusp number	LM1, LM2, LM3	4, 5, 6
Deflecting wrinkle	LM1, LM2, LM3	0, 1, 2, 3
Medial trigonid crest	LM1, LM2, LM3	0, 1
Distal trigonid crest	LM1, LM2, LM3	0, 1
Protostylid	LM1, LM2, LM3	0/1/ 3-7
Cusp 5 – Hypoconulid	LM1, LM2, LM3	0, 1, 2, 3, 4, 5
Cusp 6 – Entoconulid	LM1, LM2, LM3	0, 1, 2, 3, 4, 5
Cusp 7 – Metaconulid	LM1, LM2, LM3	0, 1, 1A, 2, 3, 4
Peg shaped	UI2, UM3	0, 1
Odontome	UP1, UP2	0, 1
Macrodentes	all teeth	0, 1
Microdentes	all teeth	0, 1
1 – root	all P, M	0, 1
2 – roots	all P, M	0, 1
3 – roots	all P, M	0, 1

Table 2. Mikulčice - Klášteřisko and Kostelisko – incidence of traits and correlation of incidence with sex.
Explanatory notes: ΣN – total number of individuals with the evaluated trait, %- frequency of trait incidence, N – total number of males/females with the evaluated trait, N1 – incidence of trait in males, N2 – incidence of trait in females. Absence of a trait was coded in the protocol as „0“, presence of a trait as „1“, and if the trait could not be evaluated this was coded as „*“

Trait	Sample		Male		Female		χ^2 statistic	
	ΣN	%	N	N1	N	N2	χ2	p=0,05
Shoveling- U1I1	90	43,33	25	5	27	9	1,17	0,2788
Shoveling- U2I2	100	50	31	9	37	18	2,71	0,0996
Shoveling- UC	92	29,35	31	4	32	10	3,07	0,0799
Double shoveling- U1I1	72	8,33	26	1	21	-	0,83	0,3637
Double shoveling- U2I2	91	2,2	30	-	34	-	-	-
Double shoveling- UC	89	6,74	31	-	32	-	-	-
Double shoveling- U1P1	94	23,04	29	5	31	10	1,80	0,1795
Tuberculum dentale U1I1	111	28,83	36	2	37	5	1,33	0,2483
Tuberculum dentale U2I2	119	24,37	42	5	48	12	2,51	0,1133
Tuberculum dentale UC	132	33,33	55	16	45	12	0,07	0,7882
Interruption groove-U1I1-0	91	3,3	31	2	35	1	0,49	0,4841
Interruption groove-U1I1-1	95	6,32	33	1	35	2	0,29	0,5901
Interruption groove-U1I1-2	94	4,26	32	-	35	1	0,93	0,3353
Interruption groove-U1I1-3	95	8,42	32	-	35	1	0,93	0,3353
Interruption groove-U1I1-4	94	14,89	32	4	34	-	4,52	0,0334
Interruption groove-U2I2-0	106	-	-	-	-	-	-	-
Interruption groove-U2I2-1	111	18,02	39	7	44	9	0,08	0,7727
Interruption groove-U2I2-2	110	12,73	39	3	43	5	0,36	0,5486
Interruption groove-U2I2-3	109	5,5	37	1	42	1	0,01	0,9276
Interruption groove-U2I2-4	119	27,73	42	11	46	12	0,00	0,9912
Winging U1I1-11	75	-	31	1	29	1	0,00	0,9617
Winging U1I1-12	74	2,7	31	1	29	-	0,95	0,3294
Winging U1I1-2	74	-	-	-	-	-	-	-
Winging U1I1-3	130	95,38	49	46	54	52	0,33	0,5684
Winging U1I1-4	74	4,05	31	1	29	1	0,00	0,9617
Labial curve U1I1	48	79,17	-	-	-	-	-	-
Canine mesial ridge UC	43	20,93	11	1	12	2	0,29	0,5899
Canine distal acc. ridge UC	58	62,07	13	5	15	12	5,04	0,0248
Premolar mesial acc. cusps U1P1	72	5,56	21	1	21	1	-	-
Premolar mesial acc. cusps U2P2	46	6,52	14	-	16	2	1,88	0,1709
Premolar distal acc. cusps U1P1	75	16	21	3	22	4	0,12	0,7294
Premolar distal acc. cusps U2P2	47	10,64	14	1	16	3	0,87	0,3508
Tricusped premolars U1P1	74	1,35	20	-	23	1	0,89	0,3454
Tricusped premolars U2P2	53	3,77	15	1	21	1	0,06	0,8057
Distosagittal ridge U1P1	53	5,66	16	-	18	2	1,89	0,1693
Distosagittal ridge U2P2	64	-	-	-	-	-	-	-
Metacone U1M1	161	90,68	18	14	33	28	0,40	0,5267
Metacone U2M2	167	96,41	41	39	60	58	0,15	0,6959

Trait	Sample		Male		Female		χ^2 statistic	
	ΣN	%	N	N1	N	N2	χ2	p=0,05
Metacone U3M3	104	91,35	35	31	53	51	1,94	0,1632
Hypocone U1M1	207	98,55	33	33	62	61	0,54	0,4633
Hypocone U2M2	150	72,67	38	27	57	38	0,20	0,6523
Hypocone U3M3	80	53,75	29	12	38	25	3,96	0,0465
Metaconule - cusp 5 U1M1	123	38,21	13	1	26	7	1,97	0,1609
Metaconule - cusp 5 U2M2	103	19,42	24	2	36	4	0,12	0,7253
Metaconule - cusp 5 U3M3	64	17,19	24	5	30	6	0,01	0,9398
Carabelli's trait U1M1	137	34,31	23	4	30	5	0,00	0,9445
Carabelli's trait U2M2	118	1,69	39	1	42	-	1,09	0,2964
Carabelli's trait U3M3	75	2,67	29	1	34	1	0,01	0,9089
Parastyle U1M1	196	0,51	50	-	68	1	0,74	0,3892
Parastyle U2M2	159	2,52	53	3	63	1	1,43	0,2311
Parastyle U3M3	83	1,2	33	-	37	1	0,90	0,3415
Peg shaped U2I2	133	4,51	50	3	54	2	0,30	0,5844
Peg shaped U3M3	106	15,09	43	8	47	7	0,22	0,637
Odontome U1P1	36	0	-	-	-	-	-	-
Odontome U2P2	23	13,04	5	1	8	-	1,73	0,188
Macrodentes U1M1	225	1,57	69	1	93	2	0,11	0,7434
Macrodentes U2M2	189	0,53	63	1	75	-	1,20	0,2735
Macrodentes U3M3	94	2,13	38	-	41	2	1,90	0,1679
Microdentes U1I1	110	0	-	-	-	-	-	-
Macrodentes U1I1	114	7,89	43	2	41	1	0,30	0,585
Macrodentes U2I2	133	3,01	48	-	53	3	2,80	0,0943
Macrodentes UC	179	1,68	72	-	72	1	1,01	0,3156
Macrodentes U1P1	191	1,05	71	-	79	1	0,90	0,3415
Macrodentes U2P2	186	0,54	74	-	82	1	0,91	0,3406
Macrodentes U1M1	225	1,57	69	1	93	2	0,11	0,7434
Macrodentes U2M2	189	0,53	63	1	75	-	1,20	0,2735
Macrodentes U3M3	94	2,13	38	-	41	2	1,90	0,1679
Microdentes U1I1	110	0	-	-	-	-	-	-
Microdentes U2I2	129	1,55	48	2	51	-	2,17	0,1408
Microdentes UC	178	0	-	-	-	-	-	-
Microdentes U1P1	189	0,53	71	1	78	-	1,11	0,293
Microdentes U2P2	184	0,54	74	1	81	0	1,10	0,2939
Microdentes U1M1	252	0,4	68	-	93	1	0,74	0,391
Microdentes U2M2	186	0,54	62	1	74	-	1,20	0,2728
Microdentes U3M3	93	3,23	38	2	41	1	0,43	0,5117
1-Root U1P1	63	79,37	18	8	23	23	16,90	0
2-Root U1P1	50	64	18	16	18	9	6,41	0,0113
3-Root U1P1	30	3,33	11	1	9	-	0,86	0,3534
1-Root U2P2	63	100	-	-	-	-	-	-
2-Root U2P2	30	16,67	8	3	11	1	2,25	0,1337

Trait	Sample		Male		Female		χ^2 statistic	
	ΣN	%	N	N1	N	N2	χ2	p=0,05
3-Root U2P2	27	7,41	6	1	11	1	0,21	0,6432
1-Root U1M1	17	5,88	2	-	10	1	0,22	0,6404
2-Root U1M1	75	6,67	17	-	36	3	1,50	0,2204
3-Root U1M1	124	99,19	34	34	52	52	-	-
1-Root U2M2	43	11,63	13	1	16	-	1,27	0,2589
2-Root U2M2	49	26,53	13	1	21	7	2,93	0,0867
3-Root U2M2	82	95,12	29	29	36	34	1,66	0,1973
1-Root U3M3	33	84,85	11	10	18	15	0,33	0,566
2-Root U3M3	19	52,63	5	2	11	7	0,78	0,377
3-Root U3M3	23	65,22	7	5	11	7	0,12	0,7324

Table 3. Mikulčice - Klášteřisko and Kostelisko – incidence of traits and correlation of incidence with gender. Explanatory notes: ΣN – total number of individuals with the evaluated trait, %- frequency of trait incidence, N – total number of males/females with the evaluated trait, N1 – incidence of trait in males, N2 – incidence of trait in females. Absence of a trait was coded in the protocol as „0“, presence of a trait as „1“, and if the trait could not be evaluated this was coded as „*“

Trait	Sample		Male		Female		χ^2 statistic	
	ΣN	%	N	N1	N	N2	χ^2	p=0,05
Shoveling- L1I1	120	6,67	37	-	46	4	3,38	0,066
Shoveling- L2I2	149	6,71	53	1	63	5	2,15	0,1428
Double shoveling- L1I1	117	-	-	-	-	-	-	-
Canine distal acc. ridge LC	41	46,34	7	2	8	2	0,02	0,876
Premolar lingual acc. cusps L1P1-A	88	5,68	30	2	24	-	1,66	0,1974
Premolar lingual acc. cusps L1P1-0	106	71,7	35	24	35	29	1,94	0,1634
Premolar lingual acc. cusps L1P1-1	91	15,38	33	6	24	4	0,02	0,882
Premolar lingual acc. cusps L1P1-2	90	18,87	29	4	27	4	0,01	0,9131
Premolar lingual acc. cusps L1P1 -3	88	11,36	30	4	24	2	0,34	0,5613
Premolar lingual acc. cusps L1P1-4	85	2,35	29	1	24	-	0,84	0,3584
Premolar lingual acc. cusps L1P1-5	87	3,45	30	2	24	-	1,66	0,1974
Premolar lingual acc. cusps L1P1-6	86	4,65	29	1	24	-	0,84	0,3584
Premolar lingual acc. cusps L1P1-7	85	10,59	29	2	24	3	0,48	0,4873
Premolar lingual acc. cusps L1P1-8	85	-	-	-	-	-	-	-
Premolar lingual acc. cusps L1P1-9	85	-	-	-	-	-	-	-
Premolar lingual acc. cusps L2P2-A	52	3,85	12	-	16	-	-	-
Premolar lingual acc. cusps L2P2 -0	59	47,46	19	10	17	7	0,47	0,4919
Premolar lingual acc. cusps L2P2 -1	53	15,09	12	2	17	4	0,20	0,6532
Premolar lingual acc. cusps L2P2 -2	63	46,03	19	12	18	8	1,30	0,2536
Premolar lingual acc. cusps L2P2 -3	54	18,52	12	4	17	2	1,99	0,1579
Premolar lingual acc. cusps L2P2 -4	51	7,84	12	-	16	1	0,78	0,3778
Premolar lingual acc. cusps L2P2 -5	52	5,77	12	-	16	-	-	-
Premolar lingual acc. cusps L2P2 -6	52	3,85	12	-	17	1	0,73	0,3925
Premolar lingual acc. cusps L2P2 -7	52	1,92	12	-	16	-	-	-

Trait	Sample		Male		Female		χ^2 statistic	
	ΣN	%	N	N1	N	N2	χ^2	p=0,05
Premolar lingual acc. cusps L2P2 -8	52	1,92	12	-	17	1	0,73	0,3925
Premolar lingual acc. cusps L2P2 -9	51	-	-	-	-	-	-	-
Fovea anterior L1M1	55	41,82	1	1	5	1	2,40	0,1213
Groove pattern L1M1-Y	79	81,01	2	-	10	-		
Groove pattern L1M1-+	62	8,06	2	-	7	1	0,32	0,5708
Groove pattern L1M1-X	65	13,85	3	2	6	-	5,14	0,0233
Groove pattern L1M1-4	64	28,13	2	-	6	1	0,38	0,5371
Groove pattern L2M2-Y	85	34,12	20	9	26	7	1,63	0,2019
Groove pattern L2M2 -+	106	72,64	24	16	38	27	0,13	0,7152
Groove pattern L2M2-X	91	47,25	17	7	33	21	2,30	0,1296
Groove pattern L2M2-4	83	10,84	19	3	25	2	0,65	0,42
Groove pattern L3M3-Y	49	24,49	16	3	27	8	0,62	0,4293
Groove pattern L3M3-+	51	33,33	15	3	27	8	0,46	0,4964
Groove pattern L3M3-X	51	50,98	17	9	29	15	0,01	0,9364
Groove pattern L3M3-4	61	65,57	21	17	31	17	3,77	0,0521
Cusp number L1M1-4 cusps	124	14,52	24	7	27	3	2,63	0,105
Cusp number L1M1-5 cusps	156	93,59	31	27	37	34	0,42	0,5169
Cusp number L1M1-6 cusps	122	5,74	24	1	27	-	1,15	0,2841
Cusp number L2M2-4 cusps	181	96,13	54	52	71	71	2,67	0,1021
Cusp number L2M2-5 cusps	130	12,31	39	5	45	3	0,92	0,338
Cusp number L2M2-6 cusps	124	1,61	38	1	43	-	1,15	0,2844
Cusp number L3M3-4 cusps	82	80,49	29	25	42	32	1,09	0,2971
Cusp number L3M3-5 cusps	66	51,52	24	12	33	17	0,01	0,9101
Cusp number L3M3-6 cusps	55	9,09	20	2	29	3	0,00	0,9689
Deflecting wrinkle L1M1	42	40,48	1	-	3	1	0,44	0,505
Deflecting wrinkle L2M2	43	13,95	4	-	9	1	0,48	0,4878
Deflecting wrinkle L3M3	21	9,52	5	-	12	1	0,44	0,5058
Medial trigonid crest L1M1	29	-	4	-	14	1	0,30	0,2523
Medial trigonid crest L2M2	30	-	-	-	-	-	-	-
Medial trigonid crest L3M3	22	4,55	-	-	-	-	-	-
Distal trigonid crest L1M1	30	3,33	-	-	5	1	-	-
Distal trigonid crest L2M2	29	0	-	-	-	-	-	-
Distal trigonid crest L3M3	21	4,76	4	-	14	1	0,30	0,5823
Protostylid L1M1	189	37,57	47	10	55	9	0,40	0,5253
Protostylid L2M2	179	32,4	57	11	67	21	2,33	0,1266
Protostylid L3M3	84	17,86	37	9	38	3	3,77	0,0524
Cusp 5 L1M1	143	93,71	28	23	26	23	0,43	0,5137
Cusp 5 L2M2	109	13,76	29	4	36	3	0,50	0,4803
Cusp 5 L3M3	69	47,83	28	14	32	14	0,23	0,6283
Cusp 6 L1M1	110	4,55	20	-	19	1	1,08	0,2986
Cusp 6 L2M2	106	1,89	30	1	34	0	1,15	0,2833
Cusp 6 L3M3	58	8,62	23	2	29	3	0,04	0,8412

Trait	Sample		Male		Female		χ^2 statistic	
	ΣN	%	N	N1	N	N2	χ^2	p=0,05
Cusp 7 L1M1	109	1,83	21	1	19	-	0,93	0,3354
Cusp 7 L2M2	107	-	23	-	29	1	0,81	0,3685
Cusp 7 L3M3	58	-	-	-	-	-	-	-
Macrodentes L1I1	142	0,7	50	1	53	-	1,07	0,3009
Macrodentes L2I2	176	-	76	-	87	-	-	-
Macrodentes LC	217	-	-	-	-	-	-	-
Macrodentes L1P1	211	0,47	76	-	87	0	-	-
Macrodentes L2P2	168	0,6	56	-	78	0	-	-
Macrodentes L1M1	209	1,44	59	-	64	1	0,93	0,335
Macrodentes L2M2	196	0,51	70	-	72	1	0,98	0,3224
Macrodentes L3M3	93	-	-	-	-	-	-	-
Microdentes L1I1	142	2,82	50	1	53	2	0,29	0,5927
Microdentes L2I2	176	0,57	69	-	70	1	0,99	0,319
Microdentes LC	217	0	-	-	-	-	-	-
Microdentes L1P1	210	0	-	-	-	-	-	-
Microdentes L2P2	168	0	-	-	-	-	-	-
Microdentes L1M1	208	0,96	59	-	62	1	0,96	0,3273
Microdentes L2M2	196	1,02	71	-	71	2	2,03	0,1544
Microdentes L3M3	94	4,26	39	-	45	4	3,64	0,0564
1-Root L1P1	62	100	-	-	-	-	-	-
2-Root L1P1	31	-	-	-	-	-	-	-
3-Root L1P1	31	-	-	-	-	-	-	-
1-Root L2P2	64	100	-	-	-	-	-	-
2-Root L2P2	25	8	5	-	9	1	0,60	0,4392
3-Root L2P2	24	-	-	-	-	-	-	-
1-Root L1M1	54	3,7	12	-	17	-	-	-
2-Root L1M1	94	98,94	20	20	34	34	-	-
3-Root L1M1	54	-	-	-	-	-	-	-
1-Root L2M2	49	26,53	12	2	16	4	0,28	0,5949
2-Root L2M2	70	90	18	17	22	20	0,18	0,6428
3-Root L2M2	44	2,27	11	-	15	1	0,76	0,3825
1-Root L3M3	13	46,15	3	-	6	5	5,63	0,0177
2-Root L3M3	22	95,45	7	7	10	10	-	-
3-Root L3M3	12	25	5	2	3	1	0,04	0,8504

Table 4. Interpopulation comparison: Mikulčice (Klášteřisko and Kostelisko) – modern Czechoslovak population (Krchová et al. 2007).

Trait	Mikulčice		Czech rep.		χ^2 statistic		Yates' correction	
	N	%	N	%	χ^2	p-level	χ^2	p-level
Shoveling- U1I1	90	43,33	143	1,4	66,99	0,0000	64,13	0,0000
Shoveling- U2I2	100	50	130	-	83,06	0,0000	80,14	0,0000
Shoveling- UC	92	29,35	97	-	33,21	0,0000	30,86	0,0000

Trait	Mikulčice		Czech rep.		χ^2 statistic		Yates' correction	
	N	%	N	%	χ^2	p-level	χ^2	p-level
Double shoveling- U1I1	72	8,33	147	10,2	0,20	0,6587	0,04	0,8435
Double shoveling- U2I2	91	2,2	133	3,01	0,14	0,7124	0,00	0,9580
Double shoveling- UC	89	6,74	97	-	6,76	0,0093	4,77	0,0290
Double shoveling- U1P1	94	23,04	116	-0	30,33	0,0000	27,88	0,0000
Tuberculum dentale UC	132	33,33	98	63,27	20,28	0,0000	19,09	0,0000
Canine distal acc. ridge UC	58	62,07	95	84,21	9,63	0,0019	8,46	0,0036
Premolar mesial acc. cusps U2P2	46	6,52	84	5,95	0,02	0,8972	0,06	0,8007
Premolar distal acc. cusps U2P2	47	10,64	74	17,57	1,09	0,2965	0,61	0,4343
Premolar tricusps U2P2	53	3,77	90	2,22	0,30	0,5869	0,00	0,9854
Distosagittal ridge U2P2	64	-	88	-	-	-	-	-
Metacone U1M1	161	90,68	194	100	18,87	0,0000	16,64	0,0000
Metacone U2M2	167	96,41	82	98,78	1,13	0,2870	0,43	0,5113
Metacone U3M3	104	91,35	7	100	0,66	0,4168	0,01	0,9230
Hypocone U1M1	207	98,55	199	100	2,91	0,0883	1,27	0,2606
Hypocone U2M2	150	72,67	58	67,74	0,60	0,4386	0,36	0,5460
Cusp 5 - U1M1	123	38,21	139	50,36	3,90	0,0484	3,42	0,0644
Cusp 5 - U2M2	103	19,42	42	23,81	0,35	0,5537	0,13	0,7142
Cusp 5 U3M3	64	17,19	2	-	0,41	0,5207	0,10	0,7481
Carabelli's trait U1M1	137	34,31	176	38,07	0,47	0,4927	0,32	0,5702
Carabelli's trait U2M2	118	1,69	59	-	1,01	0,3146	0,06	0,8015
Carabelli's trait U3M3	75	2,67			-	-	-	-
Parastylus 1M1	196	0,51	164	0,61	0,02	0,8993	0,34	0,5583
Parastylus 2M2	159	2,52	65	1,54	0,20	0,6532	0,00	0,9610
Parastylus 3M3	83	1,2	2	-	0,02	0,8759	10,00	0,0016
Shoveling- L1I1-0	120	6,67	175	9,71	0,85	0,3559	0,5	0,4774
Shoveling- L2I2-0	149	6,71	152	10,53	1,39	0,2388	0,95	0,3307
Canine distal acc. ridge LC	41	46,34	84	17,86	11,29	0,0008	9,9	0,0017
Fovea anterior L1M1	55	41,82	107	75,7	18,15	-	16,7	-
Groove pattern L1M1-Y	79	81,01	65	72,31	1,53	0,2162	1,08	0,2995
Groove pattern L2M2-Y	85	34,12	19	5,26	6,3	0,0121	4,97	0,0258
Groove pattern L3M3-Y	49	24,49	1	100	2,9	0,0883	0,31	0,5805
Cusp number L1M1-4 cusps	124	14,52	140	12,86	0,15	0,695	0,05	0,8318
Cusp number L1M1-5 cusps	156	93,59	153	92,16	0,24	0,6243	0,07	0,7883
Cusp number L1M1-6 cusps	122	5,74	137	5,84	-	0,9721	0,05	0,8169
Cusp number L2M2-4 cusps	181	96,13	55	98,18	0,54	0,4621	0,1	0,7565
Cusp number L2M2-5 cusps	130	12,31	26	7,69	0,45	0,5013	0,11	0,7367
Cusp number L2M2-6 cusps	124	1,61	26	-	0,43	0,5144	0,08	0,7731
Cusp number L3M3-4 cusps	82	80,49	2	-	7,51	0,0061	3,49	0,0617
Cusp number L3M3-5 cusps	66	51,52	1	-	1,05	0,3065	-	0,9880
Cusp number L3M3-6 cusps	55	9,09	1	-	0,1	0,752	2,11	0,1461
Deflecting wrinkle L1M1	42	40,48	72	8,33	17,02	-	15,08	0,0001
Distal trigonid crest L1M1	30	3,33	82	-	2,69	0,1009	0,26	0,6082

Trait	Mikulčice		Czech rep.		χ^2 statistic		Yates' correction	
	N	%	N	%	χ^2	p-level	χ^2	p-level
Protostylid L1M1	189	37,57	161	27,33	4,13	0,0421	3,68	0,0551
Protostylid L2M2	179	32,4	65	20	3,56	0,0594	2,98	0,0843
Protostylid L3M3	84	17,86	3	-	0,65	0,4211	-	0,9786
Cusp 5 L1M1	143	93,71	159	93,71	-	0,9987	0,06	0,8136
Cusp 5 L2M2	109	13,76	35	11,43	0,13	0,7227	-	0,9460
Cusp 5 L3M3	69	47,83	-	-	-	-	-	-
Cusp 6 L1M1	110	4,55	91	8,79	1,48	0,2231	0,87	0,3523
Cusp 6 L2M2	106	1,89	33	-	0,63	0,4267	-	0,9664
Cusp 6 L3M3	58	8,62			-	-	-	-
Cusp 7 L1M1	109	1,83	132	6,82	3,4	0,0651	2,36	0,1248
Cusp 7 L2M2	107	-	39	-	-	-	-	-
Cusp 7 L3M3	58	-	2	-	-	-	-	-

Table 5. Interpopulation comparison: Mikulčice (Kláštěřisko and Kostelisko) – population from the period of Roman Empire (Manzi et al. 1997). Explanatory notes: Roman population from the village of Lucus Feroniae and the city of Portus Romae (the Isola Sacra burial site).

Trait	Mikulčice		Rome period		χ^2 statistic		Yates' correction	
	N	%	N	%	χ^2	p-level	χ^2	p-level
Shoveling- U1I1	90	43,33	28	10,71	9,91	0,0016	8,54	0,0035
Shoveling- U2I2	100	50	28	28,57	4,05	0,0442	3,23	0,0721
Double shoveling- U1I1	72	8,33	38	7,89	0,01	0,9203	0,08	0,7749
Double shoveling- U2I2	91	2,2	50	-	1,11	0,2921	0,10	0,7555
Tuberculum dentale UC	132	33,33	87	65,52	21,86	0,0000	20,58	0,0000
Canine distal acc. ridge UC	58	62,07	25	56	0,27	0,6033	0,08	0,7842
Hypocone U1M1	207	98,55	102	100	1,49	0,2222	0,37	0,5452
Hypocone U2M2	150	72,67	89	79,78	1,52	0,2176	1,16	0,2815
Cusp 5 - U1M1	123	38,21	69	4,35	26,32	0,0000	24,59	0,0000
Cusp 5 - U2M2	103	19,42	71	18,81	0,03	0,8625	0,00	0,9892
Cusp 5 U3M3	64	17,19	59	23,73	0,81	0,3681	0,46	0,4988
Carabelli's trait U1M1	137	34,31	64	25	1,76	0,1846	1,35	0,2453
Carabelli's trait U2M2	118	1,69	82	6,1	2,78	0,0954	1,63	0,2023
Carabelli's trait U3M3	75	2,67	68	13,24	5,61	0,0179	4,22	0,0399
Parastylus 1M1	196	0,51	74	6,76	9,65	0,0019	6,99	0,0082
Parastylus 2M2	159	2,52	104	-	2,66	0,1029	1,24	0,2650
Parastylus 3M3	83	1,2	73	1,37	0,01	0,9203	0,39	0,5341
Shoveling- L1I1-0	120	6,67	26	-	1,83	0,1761	0,77	0,3794
Shoveling- L2I2-0	149	6,71	53	3,77	0,6	0,4386	0,19	0,6608
Canine distal acc. ridge LC	41	46,34	47	10,64	14,07	0,0002	12,33	0,0004
Fovea anterior L1M1	55	41,82	13	76,92	5,19	0,0227	3,88	0,0489
Groove pattern L1M1-Y	79	81,01	65	80	0,02	0,8875	0,00	0,9531
Groove pattern L2M2-Y	85	34,12	110	23,64	2,6	0,1069	2,11	0,1464
Groove pattern L3M3-Y	49	24,49	82	14,63	1,99	0,1583	1,39	0,2389

Trait	Mikulčice		Rome period		χ^2 statistic		Yates' correction	
	N	%	N	%	χ^2	p-level	χ^2	p-level
Deflecting wrinkle L1M1	42	40,48	45	2,22	19,37	0,0000	17,11	0,0000
Distal trigonid crest L1M1	30	3,33	52	-	1,75	0,1859	0,08	0,7793
Protostylid L1M1	189	37,57	65	1,54	30,91	0,0000	29,16	0,0000
Protostylid L2M2	179	32,4	83	10,84	13,85	0,0002	12,74	0,0004
Protostylid L3M3	84	17,86	67	47,76	15,55	0,0001	14,18	0,0002
Cusp 5 L1M1	143	93,71	84	89,29	1,42	0,2334	0,88	0,3494
Cusp 5 L2M2	109	13,76	110	7,27	2,45	0,1175	1,81	0,1784
Cusp 5 L3M3	69	47,83	82	39,02	1,18	0,2774	0,85	0,3559
Cusp 6 L1M1	110	4,55	82	-	3,83	0,0503	2,24	0,1341
Cusp 6 L2M2	106	1,89	110	-	2,09	0,1483	0,54	0,4612
Cusp 6 L3M3	58	8,62	80	3,75	1,46	0,2269	0,70	0,4011
Cusp 7 L1M1	109	1,83	95	3,16	0,37	0,5430	0,02	0,8762
Cusp 7 L2M2	107	-	112	1,79	1,93	0,1648	0,46	0,4977
Cusp 7 L3M3	58	-	82	-	-	-	-	-

Table 6. Interpopulation comparison: Mikulčice (Klášteřisko and Kostelisko) – the population from the period of the settlement of Greenland (OG) (Scott et al. 1992).

Trait	Mikulčice		OG		χ^2 statistic		Yates' correction	
	N	%	N	%	χ^2	p-level	χ^2	p-level
Metacone U1M1	135	39,26	32	71,9	11,1	0,0009	9,82	0,0017
Metacone U2M2	145	54,48	45	77,8	7,77	0,0053	6,82	0,0090
Metacone U3M3	74	25,68	47	25,5	-	1,0000	0,04	0,8446
Hypocone U1M1	202	93,07	43	93	-	1,0000	0,10	0,7492
Hypocone U2M2	150	72,67	42	88,1	4,29	0,0383	3,48	0,0620
Cusp 5 - U1M1	123	38,21	19	21,1	2,11	0,1463	1,43	0,2325
Cusp 5 - U2M2	103	19,42	33	36,4	3,99	0,0458	3,10	0,0782
Cusp 5 U3M3	64	17,19	36	36,1	4,52	0,0335	3,55	0,0597
Parastylus 1M1	196	0,51	15	6,7	5,62	0,0178	0,98	0,3225
Parastylus 2M2	159	2,52	23	8,7	2,41	0,1206	0,86	0,3540
Parastylus 3M3	83	1,2	21	9,5	4,14	0,0419	1,70	0,1919
Peg shaped 3M3	106	15,09	20	-	3,46	0,0629	2,23	0,1353
1-2 root 2M2	51	35,29	30	43,3	0,52	0,4708	0,23	0,6297
Groove pattern Y L1M1	79	81,01	48	92,3	2,66	0,1029	1,89	0,1689
Groove pattern Y L2M2	85	34,12	48	33,3	0,01	0,9203	0,01	0,9212
Groove pattern Y L3M3	49	24,49	49	24,5	-	1,0000	0,06	0,8143
Deflecting wrinkle 1M1	42	40,48	7	42,9	0,01	0,9203	0,09	0,7667
Protostylid L1M1	189	37,57	18	16,7	3,13	0,0769	2,28	0,1309
Protostylid L2M2	179	32,4	26	15,4	3,12	0,0773	2,36	0,1243
Protostylid L3M3	84	17,86	27	40,7	5,97	0,0146	4,76	0,0292
Cusp 5 L1M1	143	93,71	24	83,3	3,08	0,0793	1,80	0,1791
Cusp 5 L2M2	109	13,76	44	15,9	0,12	0,7290	0,01	0,9297
Cusp 5 L3M3	69	47,83	51	49	0,02	0,8875	0,00	0,9558

Trait	Mikulčice		OG		χ^2 statistic		Yates' correction	
	N	%	N	%	χ^2	p-level	χ^2	p-level
Cusp 6 L1M1	110	4,55	19	26,3	10,74	0,0010	7,91	0,0049
Cusp 6 L2M2	106	1,89	40	2,5	0,05	0,8231	0,18	0,6737
Cusp 6 L3M3	58	8,62	47	19,2	2,49	0,1146	1,66	0,1973
Cusp 7 L1M1	109	1,83	29	17,2	11,29	0,0008	8,32	0,0039
Cusp 7 L2M2	107	-	40	20	22,63	0,0000	18,91	0,0000
Cusp 7 L3M3	58	-	31	25,8	-	-	-	-
3- roots 1M1	54	-	12	-	-	-	-	-
1-root 2M2	49	26,53	27	29,6	0,08	0,7773	0,00	0,9831

Table 7. Interpopulation comparison: Mikulčice- Klášteřisko and Kostelisko – the Middle Ages population of Norway (NOR) (Scott et al. 1992).

Trait	Mikulčice		NOR		χ^2 statistic		Yates' correction	
	N	%	N	%	χ^2	p-level	χ^2	p-level
Metacone U1M1	135	39,26	67	59,7	7,53	0,0061	6,73	0,0095
Metacone U2M2	145	54,48	83	69,9	5,22	0,0223	4,60	0,0321
Metacone U3M3	74	25,68	64	31,3	0,53	0,4666	0,29	0,5922
Hypocone U1M1	202	93,07	75	96	0,82	0,3652	0,39	0,5344
Hypocone U2M2	150	72,67	83	85,5	5,04	0,0248	4,33	0,0373
Hypocone U3M3	80	53,75	59	49,2	0,29	0,5902	0,13	0,7155
Cusp 5 - U1M1	123	38,21	49	20,4	5,01	0,0252	4,24	0,0395
Cusp 5 - U2M2	103	19,42	55	25,5	0,77	0,3802	0,46	0,4988
Cusp 5 U3M3	64	17,19	44	22,7	0,51	0,4751	0,22	0,6403
Parastylus 1M1	196	0,51	81	-	0,41	0,5220	0,21	0,6475
Parastylus 2M2	159	2,52	78	2,6	0,00	1,0000	0,17	0,6761
Parastylus 3M3	83	1,2	54	1,9	0,10	0,7518	0,18	0,6743
Peg shaped 3M3	106	15,09	71	2,8	7,02	0,0081	5,74	0,0166
2-roots 1P1	50	64	64	43,8	4,62	0,0316	3,84	0,0500
1-2 root 2M2	51	35,29	78	35,9	0,00	1,0000	0,01	0,9060
Groove pattern Y L1M1	79	81,01	52	94,2	4,62	0,0316	3,57	0,0587
Groove pattern Y L2M2	85	34,12	72	19,4	4,22	0,0399	3,51	0,0608
Groove pattern Y L3M3	49	24,49	56	14,3	1,76	0,1840	1,16	0,2804
Deflecting wrinkle 1M1	42	40,48	26	19,2	3,31	0,0688	2,41	0,1204
Protostylid L1M1	189	37,57	34	2,9	15,80	0,0001	14,26	0,0002
Protostylid L2M2	179	32,4	44	2,3	16,48	0,0000	14,97	0,0001
Protostylid L3M3	84	17,86	34	20,6	0,12	0,7301	0,01	0,9330
Cusp 5 L1M1	143	93,71	50	90	0,76	0,3845	0,31	0,5803
Cusp 5 L2M2	109	13,76	67	9	0,91	0,3395	0,51	0,4742
Cusp 5 L3M3	69	47,83	55	45,5	0,07	0,7926	0,01	0,9348
Cusp 6 L1M1	110	4,55	38	10,5	1,77	0,1835	0,88	0,3491
Cusp 6 L2M2	106	1,89	80	-	1,53	0,2167	0,27	0,6050
Cusp 6 L3M3	58	8,62	44	4,6	0,65	0,4201	0,17	0,6812

Trait	Mikulčice		NOR		χ^2 statistic		Yates' correction	
	N	%	N	%	χ^2	p-level	χ^2	p-level
Cusp 7 L1M1	109	1,83	52	13,5	9,02	0,0027	6,95	0,0084
Cusp 7 L2M2	107	-	63	11,1	12,40	0,0004	9,74	0,0018
Cusp 7 L3M3	58	-	44	18,2	-	-	-	-
3- roots 1M1	54	-	44	-	-	-	-	-
1-root 2M2	49	26,53	86	23,3	0,18	0,6703	0,05	0,8278

Table 8. Interpopulation comparison: Mikulčice- Klášteřisko and Kostelisko – Middle Ages population of Greenland (SvG) (Scott et al. 1992).

Trait	Mikulčice		SvG		χ^2 statistic		Yates' correction	
	N	%	N	%	χ^2	p-level	χ^2	p-level
Metacone U1M1	135	39,26	15	53,3	1,11	0,2921	0,60	0,4379
Metacone U2M2	145	54,48	28	71,4	2,75	0,0973	2,10	0,1469
Metacone U3M3	74	25,68	22	13,6	1,39	0,2384	0,79	0,3731
Hypocone U1M1	202	93,07	21	100	1,55	0,2131	0,60	0,4392
Hypocone U2M2	150	72,67	30	76,7	0,2	0,6547	0,05	0,8211
Cusp 5 - U1M1	123	38,21	11	54,6	1,13	0,2878	0,55	0,4595
Cusp 5 - U2M2	103	19,42	24	41,7	5,34	0,0208	4,18	0,0409
Cusp 5 U3M3	64	17,19	19	36,8	3,33	0,0680	2,28	0,1314
Parastylus 1M1	196	0,51	15	-	0,08	0,7773	2,80	0,0943
Parastylus 2M2	159	2,52	20	10	3,07	0,0797	1,20	0,2742
Parastylus 3M3	83	1,2	16	6,3	1,72	0,1897	0,12	0,7316
Peg shaped 3M3	106	15,09	10	-	1,75	0,1859	0,71	0,3989
1-2 root 2M2	51	35,29	20	65	5,15	0,0232	4,02	0,0450
Groove pattern Y L1M1	79	81,01	15	73,3	0,46	0,4976	0,11	0,7427
Groove pattern Y L2M2	85	34,12	33	30,3	0,16	0,6892	0,03	0,8592
Groove pattern Y L3M3	49	24,49	26	26,9	0,05	0,8231	0,00	0,9614
Deflecting wrinkle 1M1	42	40,48	10	30	0,37	0,5430	0,06	0,8023
Protostylid L1M1	189	37,57	11	9,1	3,66	0,0557	2,53	0,1119
Protostylid L2M2	179	32,4	17	11,8	3,11	0,0778	2,22	0,1365
Protostylid L3M3	84	17,86	18	5,6	1,7	0,1923	0,89	0,3445
Cusp 5 L1M1	143	93,71	16	100	1,07	0,3009	0,21	0,6435
Cusp 5 L2M2	109	13,76	23	32	3,8	0,0513	2,70	0,1006
Cusp 5 L3M3	69	47,83	26	53,9	10,71	0,0011	9,01	0,0027
Cusp 6 L1M1	110	4,55	13	23,1	6,57	0,0104	3,87	0,0491
Cusp 6 L2M2	106	1,89	24	8,3	2,73	0,0985	0,99	0,3188
Cusp 6 L3M3	58	8,62	24	16,7	1,12	0,2899	0,45	0,5014
Cusp 7 L1M1	109	1,83	18	38,9	32,21	0,0000	26,83	0,0000
Cusp 7 L2M2	107	-	22	4,6	22,63	0,0000	18,91	0,0000
Cusp 7 L3M3	58	-	21	9,5	-	-	-	-
3- roots 1M1	54	-	21	-	-	-	-	-
1-root 2M2	49	26,53	30	26,7	-	1,0000	0,06	0,8033