

## ANALYSIS OF THE SOCIAL STATUS DIFFERENCES AMONG THE QIDAN BASED ON DENTAL HEALTH

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**ABSTRACT.** *The Qidan were considered a powerful nomadic confederacy of the eastern Xianbei. In 344 A.D., the Qidan were separated from Xianbei and disappeared as an independent people since they were overwhelmed by the Nuzhen in 1124A.D.*

*Tooth wear was observed and compared on the remains from several archeological sites in western Liaoning, east and central southern Inner Mongolia. Based on artifact assemblages and tomb writings, three sites were determined to be the burials of Qidan nobility, and three sites were determined to be the cemeteries of commoners.*

*The process of tooth-wear is continual from tooth eruption to death. Age is one of the most important factors affecting tooth-wear. In addition, the diet, food preparation, occlusive relations, and health conditions of the teeth affect the tooth-wear of archaeological populations. Comparing the tooth-wear between the elite and commoners of Qidan of the same age, we see that the average tooth-wear rate is lower in the elites than in the commoners. The dental diseases in the elite are also less common than those detected in Qidan commoners. Based on the analyses we conclude that the customs of using teeth and the food ingredient in the diet are different between the commoners and elite.*

### INTRODUCTION

The Qidan were a nomadic group from the northeastern portion of modern day China. Based on Chinese historical documents the Qidan are first mentioned as a distinct group around the 4<sup>th</sup> century CE. Their original homeland is thought to have been in the area of the Huangshui and Tu rivers. The Qidan were originally many loosely affiliated tribes, but by 600 CE, they had become one large confederation. After the formation of the Qidan state they established diplomatic relations with the neighboring Chinese during the Tang Dynasty. Their relationship with the Tang alternated between paying tribute to them, and open warfare with them. In 916 CE, the Qidan established a country in present day Mongolia and northeastern China. In 947 CE the Qidan founded the Liao Dynasty. By 1125 CE, the neighboring Nuzhen had conquered the Qidan, thus ending the Liao Dynasty. The Nuzhen incorporated the Qidan lands into their empire. Afterwards, some Qidan remained with the Nuzhen, and some migrated to Central Asia (Chen 1986).

Teeth are one of the most enduring artifacts from archaeological context. An individual's life history is often evident from the patterns of disease and wear on their dentition. In turn, the population history of a particular people can be read from the combined information recorded in their dentitions. This study will use degree of dental wear, and frequency of caries, abscesses, ante mortem tooth loss, and periodontal disease to distinguish social status differences in the Qidan people of northeastern China.

Dental wear is defined by the gradual attrition of the tooth crown through abrasion of the tooth surfaces. This action can be severe enough to wear away the enamel, dentin, and even the roots of teeth, eventually leading to ante mortem tooth loss. There are two modes of dental attrition, the action of teeth against teeth, or the action of foreign objects against the teeth. Dental wear can occur on the occlusal, labial, lingual, buccal, or interproximal surfaces of the tooth through daily contact between teeth and between the jaws. Additionally food or cultural objects introduced into the mouth can also contribute specific patterns of dental wear (Scott and Turner 1988).

The process of dental wear begins as soon as a tooth erupts, and continues until the tooth is lost, or the death of the individual. In this respect dental wear is a very fluid process constantly recording the life of the individual in their dentition. Patterns of dental wear are often population specific. Within a single archaeological site, individuals can be relatively aged based on the degree of their dental wear. If the individuals from within a site are subject to the same environmental conditions, diet, food processing methods, and cultural practices, then their rate and degree of tooth wear should be the same for individuals of the same age. Any deviations from this pattern can indicate the presence of more than one ethnicity, social group, or gender differences in lifeways (Bermudez de Castro et al. 1993).

When observing tooth wear within or between populations several factors can affect the pattern and rate of attrition. Environmental factors include the quality and quantity of the water supply, the amount of windblown dust present to contaminate food, and the presence of minerals or chemicals in the soil. Biological factors include the genetic quality of a population's enamel, the timing of weaning, and the overall stress load of the population. Cultural factors include a population's diet, food processing methods, hygiene practices, social divisions (gender, age, status), cultural modification, and tool use. It is the interaction of all these factors which produce a population specific pattern of tooth wear. Differences in the patterning of dental wear within or between populations can usually be attributed to a difference in environment, biology, or cultural practices (Molnar 1971; 1972).

This type of research can benefit archaeological and historical investigations by giving an independent line of evidence for a population's subsistence economy, social differentiation, and cultural practices. On a local level this type of research can give a clearer picture of a population's diet and health status.

## **MATERIALS AND METHODS**

### **Samples**

Thirty-five individuals were scored with a total of 235 observable permanent teeth (Table 1). The samples were taken from 6 archaeological sites located in eastern and southern Inner Mongolia, and western Liaoning Province (Figure 1). Based on artifact assemblages and tomb writings, three sites were determined to be the burials of Qidan nobility, and three sites were determined to be the cemeteries of commoners. The samples were then combined into two groups, one of elite burials, and one of commoners. The purpose of this study is to explore whether there are significantly different patterns in dental wear between Qidan nobles and commoners, and to assess a possible link between specific wear patterns and dental health, and thus gain some insight into the oral health status of these populations.



*Figure 1. The sites mentioned in this study.*

1. Yemaotai site, No.1- Faku city, Liaoning Province. The burials are believed to be individuals related to a Qidan queen. There are five individuals, four males and one female (Gu et al. 2005).
2. Guanshanzhongxuchang site- Fuxin city, Liaoning Province. The burials are believed to be individuals related to a Qidan queen (Gu et al.2005).
3. Yeluyuzhi site- Alukeerqinqi, Inner Mongolia. The burials are believed to be individuals related to a Qidan king. There are eight individuals in total, five male and three female (Zhou 2004).
4. Shanzuizi site-Ningcheng city, Inner Mongolia. The burials are believed to be of the common Qidan people. There are twelve individuals total, nine male and three female (Zhu 1991).

5. Qianhaizi site-Shangdu xian, Inner Mongolia. The burials are of the common Qidan people.
6. Woniushi site-Zhenglanqi, Inner Mongolia. The burials are of the common Qidan people.

### Methods

Three different methods for scoring dental wear were originally evaluated for this study. Molnar's (1971) method scores tooth wear based on the severity, wear plane direction, and overall shape of the wear. This methodology was determined to be too detailed for the research proposed. The second methodology evaluated was Scott's (1979) system for scoring molars. This method was also too detailed for the purposes of the current research. In the end Smith's (1984) method for scoring dental wear was chosen, as the scoring procedures were clear and easy to follow, and this method had been previously tested on archaeological populations with different subsistence strategies.

**Table 1.** The dental specimens scored in the present study

Samples	I1	I2	C	P1	P2	M1	M2	M3	Total
Maxillary teeth									
Yemaotai No.1	0	0	2	5	3	6	3	0	19
Guanshanzhongxuchang	2	2	2	4	3	7	5	0	25
Yeluyuzhi	0	3	3	5	5	6	8	1	31
Shanzuizi	0	1	7	9	7	8	9	5	46
Qianhaizi	0	0	0	0	0	4	4	1	9
Woniushi	0	0	0	1	1	2	1	0	5
Mandibular teeth									
Yemaotai No.1	2	2	1	3	2	4	4	2	20
Guanshanzhongxuchang	3	2	4	4	4	6	5	0	28
Yeluyuzhi	0	0	0	0	0	0	0	0	0
Shanzuizi	1	3	5	7	4	7	8	4	39
Qianhaizi	0	0	0	1	2	4	3	2	12
Woniushi	0	0	0	0	0	1	0	0	1

Besides scoring tooth wear, dental disease was also recorded. This can reflect differences in diet and the diversity of eating customs between the different social classes of the Qidan. The dental diseases observed included ante mortem tooth loss, abscessing, periodontal disease, and caries rate (Figures 2-5). The samples were divided two different ways for analysis. First the individuals were pooled into elite and commoner samples. Secondly, the elite and commoner samples were also separated into age categories. Since the severity of dental wear is correlated with the advancing age of an individual, the second set of tests should provide a more accurate comparison of the differences between the social classes. The weighted averages method was used to compare different types of teeth (incisors, canines, premolars, molars) between the elite and commoner samples.

The average attrition score =  $\sum$  (the percentage of each score of attrition  $\times$  relative score) (Liu 2005).

### RESULTS

Table 2 shows the average dental wear status of each age group for nobles and commoners. The distribution and frequency of tooth wear is different between nobles and

commoners. Whether observing tooth wear by the same age groups or in the pooled samples, the commoners consistently show more severe dental wear than the nobles (Table 3). For example, in the age group of 50 year-olds, the dental wear of commoners averaged a score of 5, whereas the nobles averaged a score of 3.3. Overall among the samples the average dental attrition of commoners is more severe than in the nobles.

The frequency of dental disease in commoners is also higher than in the nobles. Forty one out of 108 individual teeth of commoners were diagnosed with dental diseases (caries, abscesses or periodontal disease), whereas only 13 out of 154 individual teeth of nobles show any sign of dental diseases. The frequency of dental disease in commoners is 37.96% and in nobles is 8.44% respectively.

**Table 2.** The average dental wear status of each age group for nobles and commoners.

Samples	I1	I2	C	P1	P2	M1	M2	M3	
Maxillary teeth									
Elite	20-30	0	1	3.5	2	1.7	2.8	1.3	1
	30-40	0	2	2	2	2	4.5	4	0
	40-50	0	0	0	4.5	3.5	7	3	0
	>50	5	6	5	4.7	3.5	6.7	6	0
Commoner	20-30	0	0	3.3	6	2.5	2.7	3	1
	30-40	0	0	4	3	5	4	3	5
	40-50	0	0	0	0	0	0	0	0
	>50	0	5	5	7	7	7.5	5.3	7
Mandibular teeth									
Elite	20-30	0	0	0	2.5	2	4	2	1
	30-40	0	0	0	0	0	3	3	1
	40-50	0	0	0	0	0	0	0	0
	>50	3.3	4	4.3	4.7	4.3	6.7	6.3	4
Commoner	20-30	0	5	2.3	2	1	3	1.8	1
	30-40	0	4	0	2	2	4.5	3.5	1.5
	40-50	0	0	0	0	0	0	0	0
	>50	5	6	7	6.5	6.5	7	6	0



*Fig. 2. Periodontal disease and caries*



*Fig. 3. Caries on the first molar. on the third molar.*



**Fig. 3.** Abscess of the right incisors, canine and first premolar.



**Fig. 5.** Severe ante mortem tooth loss and alveolar resorption.

**Table 3.** The average dental wear score for nobles and commoners (pooled samples).

Samples	I1	I2	C	P1	P2	M1	M2	M3
Maxillary teeth								
Elite	5	4	3.5	2.8	2.1	4.8	2.5	1
Commoner	0	5	4	6.3	5.4	4.4	3.8	3.5
Mandibular teeth								
Elite	3.3	4	4.3	2.8	3.4	5.2	4.3	1.8
Commoner	5	5	3.5	3.5	4	4.9	2.9	1.3

## CONCLUSIONS

On average, the tooth wear scores for the Qidan common people were higher than that of the elite. The Qidan elite had better overall oral health than the common people. A possible reason for the difference in social status may be that the Qidan elite practiced better hygiene such as washing their hands and food before eating, more thorough food preparation techniques removing contaminants, better oral health through tooth brushing (Kradin and Ivliev 2008; Qian Rehe Sheng Bowuguan 1956), and better medical treatment for dental diseases.

The comparison of the samples demonstrates that there is a significant social status difference in terms of dental health between the Qidan elite and commoners. This paper focuses on the Qidan people, thus the subsistence mode and the living environment should be the same, leaving social status as the only factor accounting for the difference. Within one society, the elite possesses more food options and thus enjoys an advantage in food choice and food processing. Compared to the food eaten by the elite, the products available for commoners is usually less processed, contains more contaminants, and are less various (Zhang 2004).

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## ХУРААНГУЙ

Жан Линху, Вей Дун

### КИДАНЫ НИЙГМИЙН ЯНЗ БҮРИЙН ДАВХРААНЫ ХҮМҮҮСИЙН ШҮДНИЙ ӨВЧЛӨЛИЙН СУДАЛГАА

Киданчууд нь МЭ 344 онд Сяньбигаас тусгаарлан Дорнод Сяньбигийн нүүдэлчдийн хүчирхэг холбоог байгуулсан бөгөөд 1124 онд Nuzhen-д эзлэгдэн мөхсөн.

Энэхүү өгүүлэлд баруун Лианонинг, Өвөр монголын баруун, зүүн, төвийн болон урд нутагт явуулсан Киданы археологийн малтлагаар илрүүлсэн эртний хүмүүсийн шүдний судалгааны үр дүнгээс танилцуулж байна. Археологийн эд өлгө болон булшны бусад хэрэглэгдхүүнээс харахад 3 булш нь Киданы язгууртны оршуулга, мөн 3 нь жирийн иргэдийн оршуулга болох нь тодорхойлогдсон.

Шүдний элэгдэл нь төрөхөөс эхлээд нас бартал тасралтгүй үргэлжлэх үйл явц бөгөөд нас бол шүдний элэгдлийн шалтгааныг тогтоох чухал хүчин зүйл юм.

Мөн хоолны нэр төрөл, хоолыг бэлтгэх арга хэлбэр, ажлалт болон шүдний эрүүл мэндийн байдал зэрэг нь хүмүүсийн шүдний элэгдэлд нөлөөлдөг. Киданы нийгмийн янз бүрийн давхраанд хамрах адил насны хүмүүсийн шүдний өвчлөлийг харьцуулахад шүдний элэгдлийн дундаж язгууртнуудын дунд жирийн иргэдийнхээс бага байгаа ба шүдний өвчлөл ч гэсэн Киданы жирийн иргэдэд язгууртнуудынхаас их байна. Шүдний өвчлөлийн судалгааны дүнгээс харахад шүдийг өдөр тутмын ахуйд хэрэглэх зан үйл болон хоолны хольц, нэр төрөл Киданы язгууртан болон жирийн иргэдэд ялгаатай байжээ гэсэн дүгнэлтэнд хүрч байна.