PEOPLE OF THE *SAMURAI* CLASS KEPT THEIR ANTEMORTEM LOST TEETH

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ABSTRACT Three hundred and fifty-seven skeletons were excavated from the old site of the Sougenji temple in Kitakyushu City, Fuknoka Prefecture, Japan, in 1992. These skeletons were remains of the *samurai* class and had been buried during the seventeenth or eighteenth century (Edo period). To clarify *samurai* dental habits, we examined their teeth and alveolar condition. Alveoli could be detected at least partly in 141 skeletons. Detailed examination revealed that 22 bodies had been buried with their own antemortem lost teeth. As most of the Sougenji people were buried in vessels, the likelihood that the belongings of one person would mix with those of another was small. The roots of three teeth were artificially shaved, indicating that those teeth were likely used as artificial teeth. However, most of the antemortem lost teeth lacked artificial shaved tracks. Although the meaning behind the preservation of antemortem lost teeth remains obscure, the present data indicate that oral health care appears to have been a part of the Sougenji *samurai* culture. This is the first such report.

INTRODUCTION

Dyeing teeth (blackening teeth), tooth brushing, and false teeth were all customary practice during early modern times (Edo period) in Japan (Hasegawa, 1993). Tooth dyeing is thought to have been practiced in Japan since before recorded history. In the Edo period tooth dyeing signified marriage status among women. Tooth brushing with a tufted toothpick was recorded as early as the Edo period, during which time many types of tooth powder were sold (Hasegawa, 1993). Furthermore, technicians made false teeth during that period (Hasegawa, 1993). These findings suggest that during the Edo period people took care of their teeth and oral condition.

The *samurai* were originally warriors and they came into existence during the Middle Ages. They belonged to the highest class during tile Edo period. However, because large-scale excavation of *samurai* skeletons from one site has not yet been performed, overall *samurai* dental care has not been clarified. Three hundred and fifty-seven skeletons of the *samurai* class were excavated in 1992. We examined their teeth and alveolar condition to establish *samurai* dental habits.

MATERIALS AND METHODS

The old Sougenji temple site in Kitakyushu City, Fukuoka Prefecture, Japan, includes burials. Sougenji temple was initially erected at Shinshu Matsumoto in the Chubu District by Ogasawara Hidemasa, who was lord of Shinshu Matsumoto. When the Ogasawara family moved to Kokura in Kyushu in 1632, the Sougenji temple was moved as well. The Sougenji temple burned down in 1866, but was rebuilt in 1869 and moved to its present location in 1975. However, the burials did not move. The bodies at this site were Ogasawara retainers and belonged to the *samurai* class.

The site was excavated in 1992, revealing over six hundred graves. Three hundred fifty-seven skeletons were excavated. Based on the archaeological remains, such as the form and design of the vessels, archaeologists determined that the bodies were buried during the 17th or 18th century (Ogata, 1995). Matsushita (1995) examined the skeletons buried at the Sougenji site and estimated their age and sex based on bone morphology. He classified adult skeletons as young age (20-39 years old), middle age (40-59 years old), and old age (over 60 years old). Alveoli could be detected at least partly in 141 adult skeletons. The senior author visually observed their teeth and alveolar condition and determined that a tooth fell out antemortem if the alveolar socket was completely closed.

RESULTS OF THE OBSERVATIONS

Twenty-two of the 141 skeletons were buried with some teeth (Table 1). The alveolar sockets of these teeth were completely closed. As filth and calculus adhered to all roots of those teeth as far as near their apex, those teeth were thought to have been lost to periodontal disease. Among the skeletons buried at Sougenji site, approximately 66% were in vessels and 19% were in wooden tubs. The height of the vessels ranged from 70-90 cm and the interior diameter was approximately 50 cm. Each vessel had a stone lid. Although the wooden tubs had decayed and disappeared, archaeologists established that they had been in wooden tubs based on the condition of the graves (Ogata, 1995).

Twenty-one out of 22 skeletons were buried in a vessel, indicating that the belongings of others did not mix. The shape and color of the teeth remaining in each vessel were similar. The lack of excess teeth indicated that these

antemortem lost teeth belonged to the skeleton in the vessel. Therefore, we believe that these bodies were buried with their own antemortem lost teeth.

The condition of the alveoli and the antemortem lost teeth in each vessel are listed in Table 1. Figures 1-26 show the alveolar condition and antemortem lost teeth in vessels No. 113, 139, 154, 301, 337, 327, and 391.

Only two of the skeletons had artificially shaved teeth. One was No.113 (Fig. 3), which contained the remains of an elderly female. Thirteen upper teeth and 14 lower teeth remained in the vessel. The alveoli of the mandible were entirely closed, suggesting that fourteen lower teeth were antemortem lost teeth and were buried with the woman. However, the alveolar part of the maxilla is missing. Consequently, we could not determine whether the 13 upper teeth had been lost antemortem. Bilateral upper central incisors were observed. Their the appearance differed considerably, as the root of the left incisor was shortened and the crown was polished (Fig. 3). Based on these findings, we considered the left incisor to be an antemortem lost tooth, which was buried with the woman.

The vessel with skeleton No.154 contained the remains of an elderly male. The upper alveoli between the right second premolar and left canine were entirely closed (Fig. 9), and the maxillary upper central and lateral incisors remained in the vessel (Fig. 10). These incisors lacked roots and had pinholes on the proximal surface. None of the other teeth among the 22 skeletons with their own antemortem lost teeth had artificial marks.

DISCUSSION

Skeletons of the early modern age have been excavated from various parts of Japan (Morita and Kawagowe, 1960; Suzuki *et al.*, 1962; Suzuki, 1967; Tateshi, 1970; Waki, 1970; Morimoto et al., 1976; Watanabe et al., 1982; Nakahashi, 1987; Matsushita and Wakebe, 1990; Matsushita et al., 1990; Saiki et al., 1991). However, none of these studies or other studies of excavated skeletons in Japan reported the presence of antemortem lost teeth with skeletons. One reason for this is that the alveolar bone is relatively fragile, and consequently is not always found among the excavated bones. Furthermore, distinct skeletons could not always be identified, and thus researchers could not establish whether the teeth were antemortem lost teeth from that skeleton. In the present study, because approximately 66% of the Sougenji burial containers were in vessels, including 21 with antemortem lost teeth, we could clearly distinguish individual skeletons. Thus, identification of antemortem lost teeth was possible.

Initially, we believed that these *samurai* preserved their own antemortem lost teeth to make their own false teeth. This appears to have been the case with the maxillary central and lateral incisors of No.154 (Fig. 10). The incisors appear to have been tied to the remaining teeth by thread or wire or used for artificial teeth in a wooden denture.

Artificial stone teeth, which appear to have been tied to the remaining teeth, were also excavated from the Sougenji site. Wooden dentures incorporating human teeth have been reported previously by Iida (1962). The maxillary left central incisor in No.113 (Fig. 3) was also thought to have been used in making false teeth. However, none of the other teeth from the twenty-two skeletons had artificial marks. Thus, due to the small number of teeth apparently used for false teeth and because molars were seldom used for false teeth, we must assume that the other antemortem lost teeth were preserved for other purposes. Wooden upper and lower full dentures and two stone upper partial dentures were excavated from the Sougenji grave. Approximately 33 % of the males had slick polished labial and buccal tooth surfaces, though lingual surfaces of those teeth were stained. Furthermore, as the polished surfaces were restricted areas which could be touched by a tufted toothpick, we presumed that the polished surfaces were caused by tooth brushing. These findings all indicate that the *samurai* class buried at Sougenji must have taken care of their teeth and oral condition as part of body health control.

Matsushita (1995), who also examined skeletons buried at the Sougenji site, reported that 34 skeletons were thought to be old age and 43 skeletons to be middle age, indicating that the life expectancy of the *samurai* class at Sougenji was relatively long. However, if the purpose was maintenance of oral health, preservation of the antemortem lost teeth would have been unnecessary. The preservation of antemortem lost teeth and burying them with the bodies indicates a level of interest in the teeth that exceeds simple health care. There may have been psychological reasons or, relatively more likely, religious significance.

In order to better understand this habit, we should determine how widespread the preservation of antemortem lost teeth was among the *samurai* class by examining other populations from that era. Such large-scale excavations of *samurai* skeletons have not yet been performed, preventing such comparisons. Although skeletons of common people during early modern times have been excavated, they have generally been buried in wooden tubs or interments. Consequently, the condition of the skeletons has been generally poor and the skeletons cannot be

clearly distinguished from one another. Therefore, judging whether the loose teeth were antemortem lost teeth of the accompanying skeleton has been difficult. We hope that larger scale excavations of *samurai* skeletons can be performed to allow further assessment of dental care among this population.

SUMMARY AND CONCLUSIONS

To evaluate *samurai* dental care, we examined the teeth and alveolar condition. Twenty-two skeletons were buried with some teeth and the alveolar sockets were completely closed. These 22 bodies were thought to have been buried with their own antemortem lost teeth. Previous thought held that members of this population preserved their own antemortem lost teeth for use as their own false teeth. However, only two skeletons among the 22 skeletons had artificial marks on their teeth.

Other findings indicated that the Sougenji *samurai* people brushed their teeth and used artificial teeth, indicating these people practiced good dental care. This is the first large-scale study to demonstrate good dental care. Although the reason that the Sougenji *samurai* people preserved their own antemortem lost teeth is not clear, the practice appears to have served a more personal than practical purpose. Perhaps, the Sougenji *samurai* people may have preserved these teeth for some psychological reasons. Further study is required to better understand the dental habits of the *samurai*.

ACKNOWLEDGEMENT

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LITERATURE CITED

Hasegawa M. 1993. Ha-no-fuuzokushi. Tokyo: Jikuu-shupan (In Japanese).

Lida S. 1962. Medizinalgeschichtlishe forschung über den holzplatte-kunstzahn. J Osaka Odontological Soc 25:415-483 (In Japanese with German summary).

Matsushita T. Wakebe T. 1990. Human skeletal remains excavated from Ishibotoke site, Higashihiroshima city, Hiroshima prefecture. Report on excavation in Hiroshima prefecture 84:292-296 (In Japanese with English summary).

Matsushita T. Wakebe T. Saiki K, Oyamada J. 1990. Human skeletal remains of the pre-modern period excavated from Gusukuma site, Urasoe city, Okinawa prefecture. Report on excavation in Urasoe city in 1990:75-112 (In Japanese with English summary).

Matsushita T. 1995. Human skeletal remains of the pre-modern period excavated from the old site of the Sougenji temple in Kitakyushu city, Fuknoka prefecture. Report on excavation in Kitakyushu city 172:502-542 (In Japanese).

Morimoto I, Ogata T. Hiramoto K. Yoshida S. 1976. Skeletal remains of the townsmen of Edo from the campus of Hitotsubashi high scoot, Tokyo. J Anthrop So Nippon 84:62 (In Japanese with English title).

Morita S. Kawagowe T. 1960. Anthropological studies on the skulls of Edo-era excavated at Yushima-Muenzaka, Tokyo. J Anthrop Soc Nippon 67: 278-295 (In Japanese with English summary).

Nakahashi T. 1987. Huinan skeletal remains of the Edo period excavated from the Tenpukuji site, Fukuoka. J Anthrop Soc Nippon 95:89-106 (In Japanese with English summary).

Ogata Y. 1995. Sougenji-ato: Kitakyusyuusi-maizoubunkazaityosahoukokusyo 172. Kitakyushu: Shunpou-sha (in Japanese).

Saiki K, Matsushita T. Oyamada J. Wakebe T. Orihara Y. 1991. A human skeletal remain excavated from the Tabaru site, Matshuura city, Nagasaki prefecture. Report on excavation in Matsuura city 10:37-49 (In Japanese with English summary).

Suzuki H. Sakura H. Hayashi T. Tanabe G. Imai Y. 1962. Craniometry of the Japanese skulls of the final Edo era. J Anthrop Soc Nippon 70: 105-120 (In Japanese with English summary).

Suzuki H. 1967. Studies on the graves, coffin contents and skeletal remains of Tokugawa Shoguns and their families at the Zojoji temple. In: Suzuki H. Yazima K, Yamabe T. editors. Zojoji-Tokugawa-Shogunbo-to-sono-ihinn, ital. Tokyo: University of Tokyo press. p 121-274. (In Japanese).

Tateshi G. 1970. Anthropological study on the lower extremities of the Edo period people, excavated from Kuwashima island in Ushibuka city, Southern Amakusa district, Kumamoto prefecture. J Kumamoto Med Soc 44: 1092-1115 (In Japanese with English summary).

Waki T. 1970 Anthropological study on the skulls of the Edo period people, excavated from Kuwashima island in Ushibuka city, Southern Amakusa district, Kumamoto prefecture. J Kumamoto Med Soc 44:1031-1091 (In Japanese with English summary).

Watanabe T, Wada Y, Kanda S. 1982. A report on the excavated skulls of the Edo-period from the Tsubue site of Kurashiki city in Okayama prefecture. J Anthrop Soc Nippon 90:61-72. (In Japanese with English summary).

TABLE 1. Condition of the alveoli and antemortem lost teeth in vessels of 22 skeletons

				Teeth in alveoli and condition of alveoli																Antemortem Lost Teeth in Vessel													
				Right								Left								Right								Left							
ID	Sex	Age	Jaw	M3	M2	M1	P2	P1	C	I2	I1	I1	I2	C	P1	P2	M	M	M	M	M	M	P2	P1	C	I2	I1	I1	I2	C	P1	P2	M1	M2
12	M	40-59	Upper	×	×	×	●	×	○	×	×	○	×	×	×	○	○	○	○	M^3				P^1					I^2	C	P^1			
			Lower	○	○	○	○	●	○	●	×	×	●	○	●	●	×	×	×								I^1							M^2
78	F	40-59	Upper	—	—	●	●	●	●	×	×	×	×	×	×	×	/	×	×									I^1	I^2	C	P^1			
			Lower	×	×	×	×	×	×	×	×	Δ	Δ	○	○	×	×	○	○		M_2	M_1	P_2	P_1		I_2								M_1	
95	F	60-	Upper	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—															
			Lower	●	×	×	×	●	○	×	×	×	×	×	×	×	×	×	×		M_2	M_1				I_2			I_2	C	P_1	P_2	M_1	M_2
103	M	40-59	Upper	○	●	○	○	○	○	○	○	—	—	—	—	—	●	○	○															
			Lower	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○									I_1						
109-2	F	20-39	Upper	○	○	/	×	×	○	○	×	○	×	×	×	×	○	○	○				P^2	P^1			I^1		I^2	C	P^1	P^2		
			Lower	○	○	○	○	○	○	○	○	○	○	○	○	×	○	○	○													P_2		
113	F	60-	Upper	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—									I^1						
			Lower	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	M_3	M_2		P_2	P_1	C	I_2	I_1	I_1	I_2	C	P_1	P_2	M_1	
139	F	60-	Upper	/	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×		M^2	M^1	P^2	P^1		I^2	I^1	I^1	I^2	C		P^2	M^1	M^2
			Lower	×	×	×	×	×	×	×	×	×	×	×	×	×	×	—	—	M_3	M_2	M_1		P_1	C	I_2	I_1	I_1	I_2	C	P_1	P_2	M_1	
154	M	60-	Upper	—	—	—	×	×	×	×	×	×	×	×	—	—	—	—	—							I^2	I^1							
			Lower	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×			M_1	P_2	P_1	C									
169	F	40-59	Upper	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—															
			Lower	×	×	○	○	○	○	×	×	×	○	○	○	○	○	×	×							I_2	I_1	I_1						
179	M	40-59	Upper	×	×	○	Δ	×	Δ	×	×	Δ	×	○	×	○	●	○	○	M^3			P^2	P^1	C	I^2	I^1	I^1	I^2		P^1			
			Lower	○	○	○	○	○	○	○	○	○	○	○	○	○	○	×	○															M_2
301	M	40-59	Upper	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—															
			Lower	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×		M_2			P_1	C	I_2	I_1			I_2	C	P_1			M_2
327	M	60-	Upper	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×		M^2	M^1	P^2	P^1	C	I^2	I^1	I^1	I^2	C		P^2	M^1	M^2
			Lower	○	×	Δ	Δ	×	×	×	×	×	×	×	×	×	Δ	Δ	×			M_1	P_2	P_1	C	I_2			I_1	I_2	C	P_1	P_2	M_1	
337	M	40-59	Upper	×	×	×	×	×	○	×	×	×	×	×	×	×	×	×	×	M^3		M^1									C			M^1	
			Lower	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×		M_2	M_1	P_2	P_1					I_1	I_2			P_2	M_1	
338	F	40-59	Upper	×	×	×	/	○	○	×	×	×	×	×	×	—	—	Δ	Δ			M^1									C			
			Lower	×	●	○	×	×	○	Δ	×	×	Δ	○	×	○	×	○	●							I_2	1	I_1	I_2		P_1			
346	F	60-	Upper	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—															
			Lower	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×			M_1	P_2	P_1		I_2	I_1	I_1	I_2	C	P_1	P_2	M_1	
358	F	40-59	Upper	×	×	×	×	×	×	×	×	×	×	○	×	×	×	×	×	M^3	M^2	M^1	P^2	P^1	C	I^2	I^1	I^1	I^2			P^2	M^1	M^2
			Lower	○	○	×	○	○	○	○	×	×	○	○	○	×	×	○	○			M_1					I_1		I_1			P_2		
364	M	60-	Upper	×	/	×	×	×	○	○	×	×	×	○	○	○	×	×	×										I^1					
			Lower	×	×	○	/	○	○	○	×	×	○	○	○	○	○	×	×		M_2													
391	F	60-	Upper	/	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×		M^2	M^1			C	I^2	I^1			C		P^2	M^1	M^2
			Lower	×	×	×	×	×	×	×	×	×	×	○	×	○	×	×	×		M_2	M_1	P_2		C								M_1	
443	M	40-59	Upper	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—															
			Lower	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	M_3			P_2							C		P_2	M_1	M_2
462	M	40-59	Upper	—	×	×	○	Δ	○	×	○	○	○	○	×	×	—	—	—		M^2	M^1		P^1							P^1	P^2		
			Lower	◆	○	○	○	○	○	○	○	○	○	○	○	○	○	○	◆															
475	F	40-59	Upper	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—															
			Lower	—	—	×	×	×	×	×	×	×	×	×	×	×	×	—	—					P_1						C				
477	M	60-	Upper	—	—	—	—	×	×	×	×	×	×	×	×	×	×	—	—					P^1	C	I^2	I^1	I^1	I^2	C	P^1	P^2	M^1	
			Lower	—	×	×	×	×	×	×	×	×	×	×	×	×	—	×	Δ		M_2	M_1	P_2	P_1	C	I_2				I_2	C	P_1	P_2		M_2

○ remaining tooth, ● postmortem lost tooth, × closed alveolus, Δ closing alveolus, / unclear alveolus, \uninterrupted tooth, ◆ congenital missing tooth, — damaged alveolus. I is incisor. P is premolar. M is molar. Superscript indicates position in the maxilla. Subscript indicates position in the mandible.

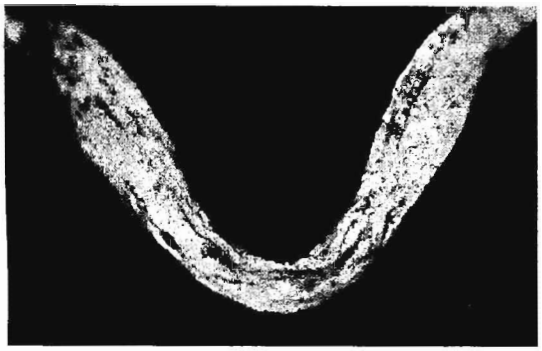

Fig. 1. Aveolar surface of mandible of Skeleton 113.

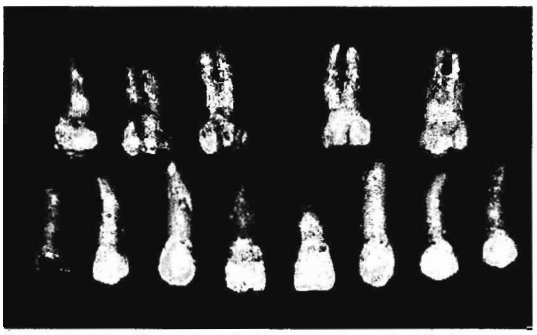

Fig. 2. Maxilary teeth in vessel with Skeleton 113.

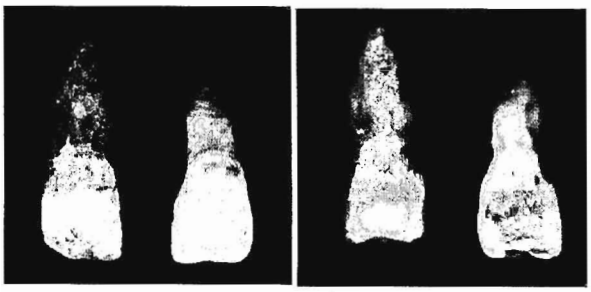

Fig. 3. Maxillary central incisors of skeleton 113. The root of the left incisor had an artificially cut plane and a polished crown.

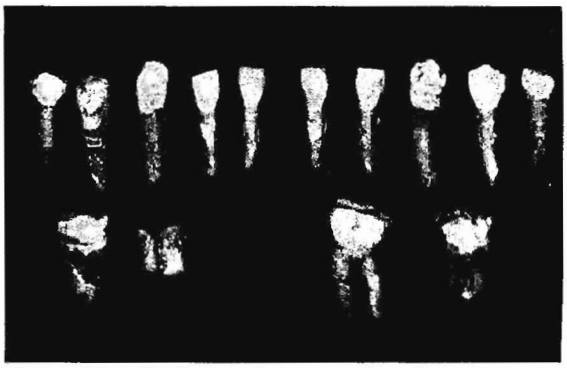

Fig. 4. Mandibular teeth in vessel with skeleton 113.

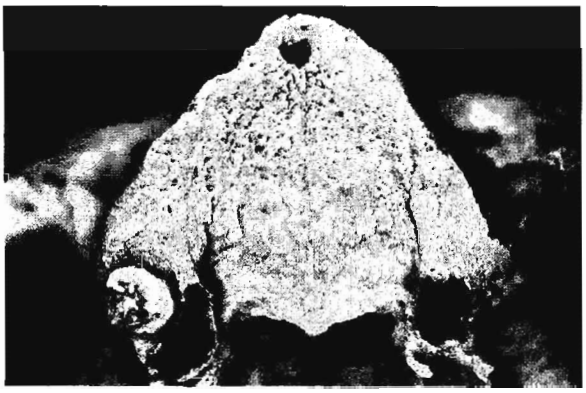

Fig. 5. Maxillary alveoli of Skeleton 139.

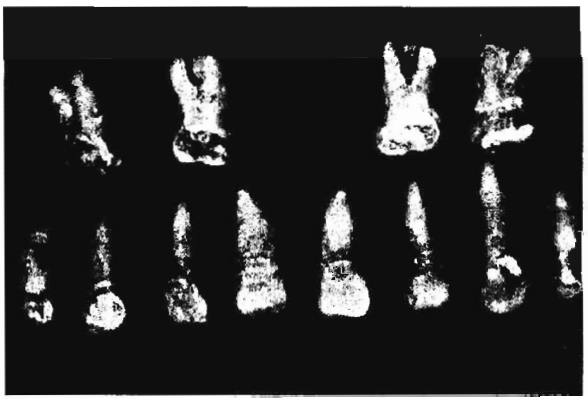

Fig.6. Maxillary teeth in vessel with skeleton 139.

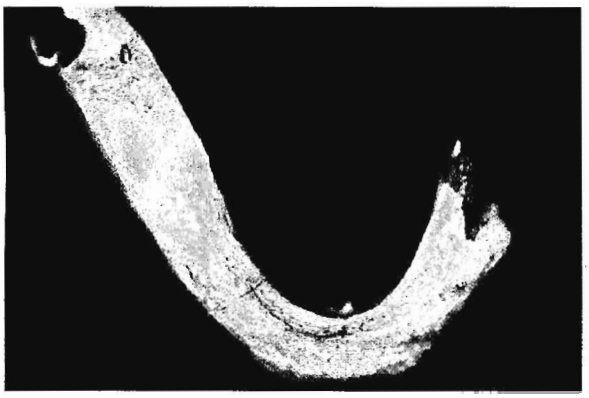

Fig. 7. Alveolar aspect of mandible of Skeleton 139.

Fig. 8. Mandibular teeth in vessel with Skeleton 139.

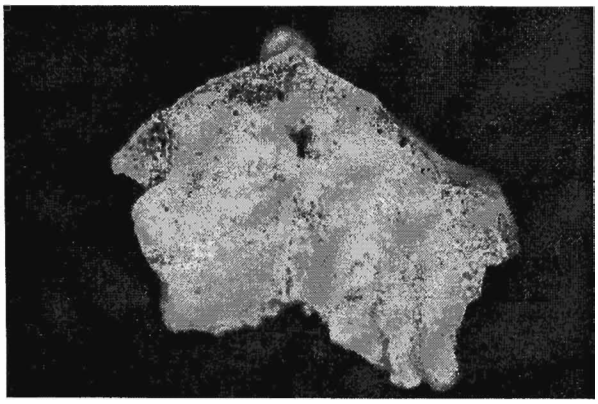

Fig. 9. Alveolar aspect of maxilla of Skeleton 154.

Fig. 10. Teeth remaining with Skeleton 154.

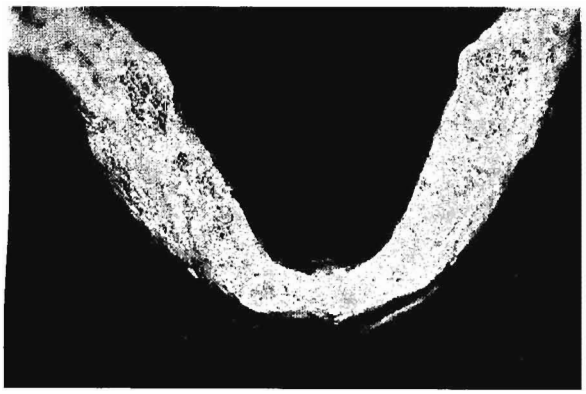

Fig. 11. Alveolar aspect of mandible of Skeleton 154.

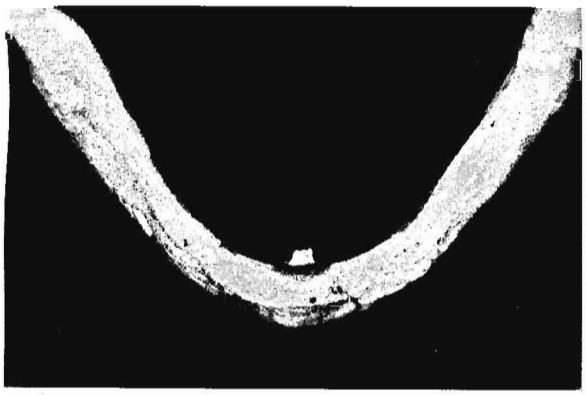

Fig 12. Alveolar aspect of mandible of Skeleton 301.

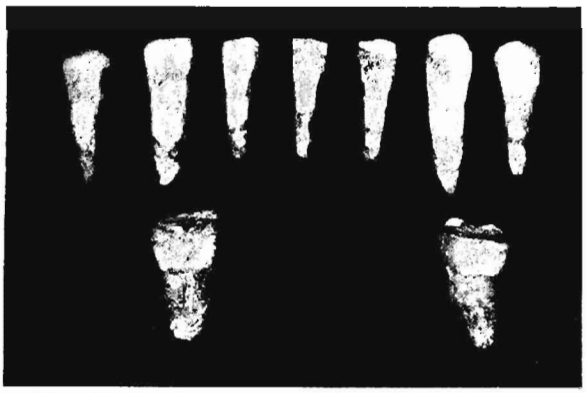

Fig. 13. Teeth in vessel with Skeleton 301.

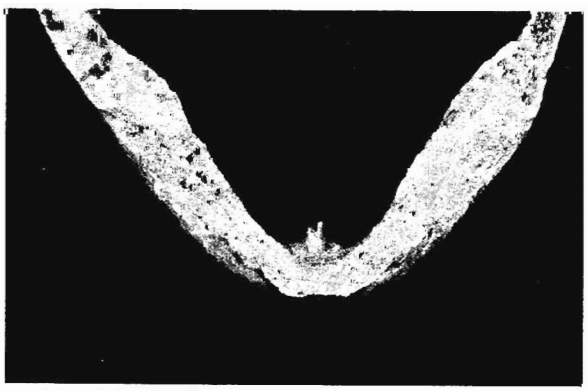

Fig. 14. Alveolar aspect of mandible of Skeleton 346.

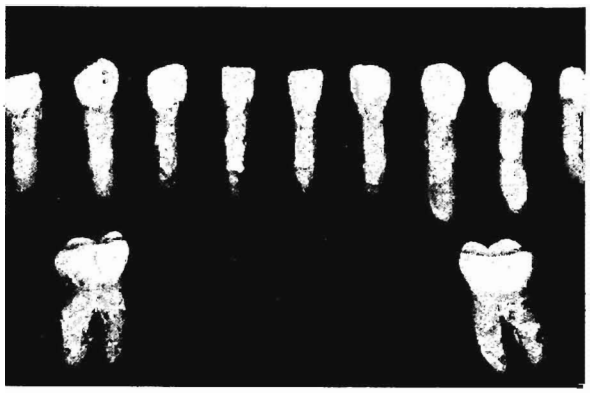

Fig. 15. Teeth in vessel with Skeleton 346.

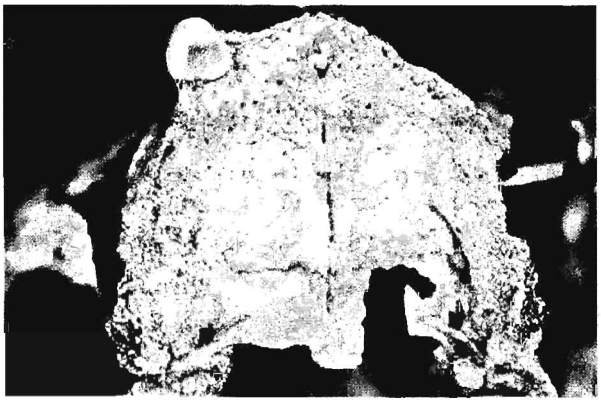

Fig. 16. Alveolar aspect of maxilla of Skeleton 337.

Fig. 17. Teeth in vessel with Skeleton 337.

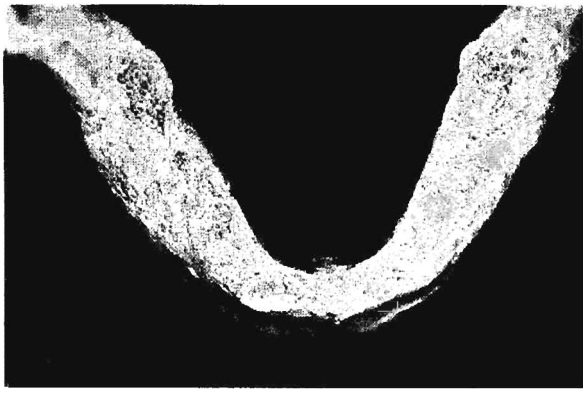

Fig. 18. Alveolar aspect of mandible of Skeleton 337.

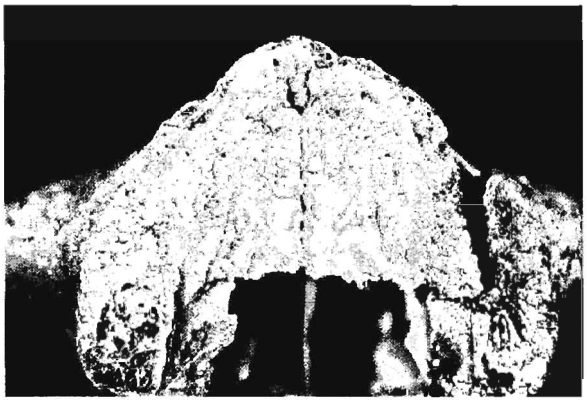

Fig 19. Alveolar aspect of maxilla of Skeleton 327.

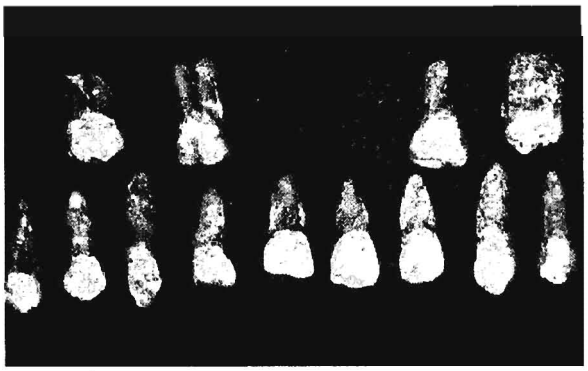

Fig. 20. Maxillary teeth with Skeleton 327.

Fig. 21. Alveolar aspect of mandible of Skeleton 327.

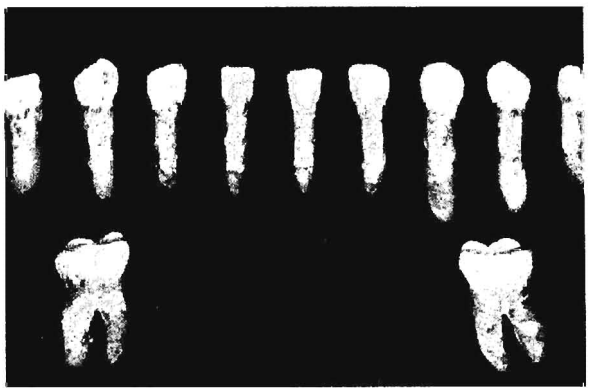

Fig. 22. Mandibular teeth with Skeleton 327.

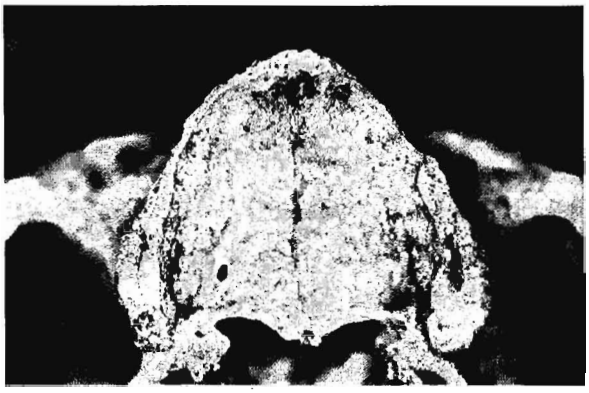

Fig. 23. Alveolar aspect of maxilla of Skeleton 391.

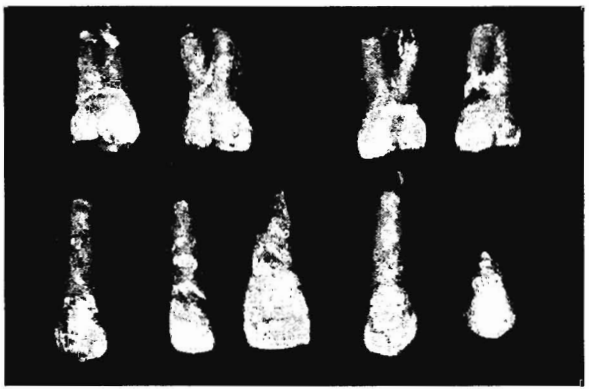

Fig. 24. Maxillary teeth with Skeleton 391.

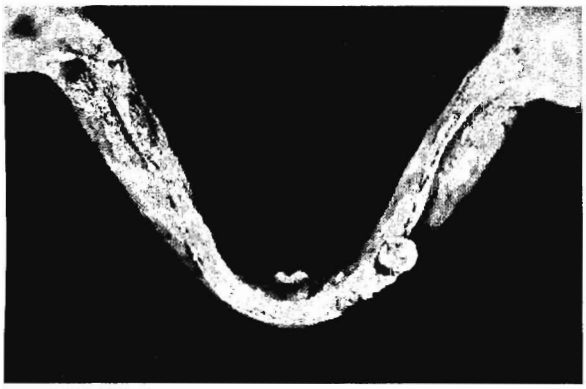

Fig. 25. Alveolar aspect of mandible of Skeleton 391.

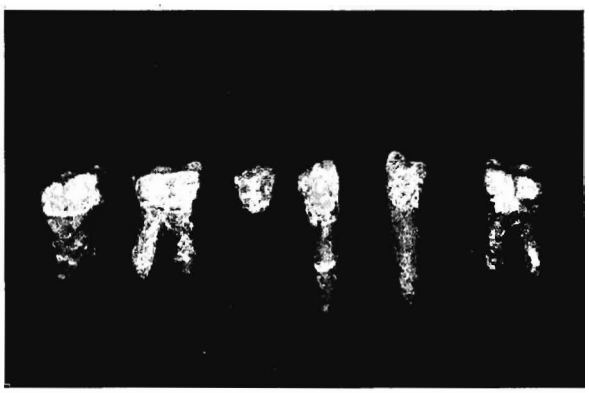

Fig. 26. Mandibular teeth with Skeleton 391.

DENTAL ANTHROPOLOGISTS' SECTION

VISITING RESEARCH SCHOLARS - PRESENT & PAST - DEPARTMENT OF ANTHROPOLOGY, ARIZONA STATE UNIVERSITY

Yoshitaka Manabe is working at Arizona State during the 1999-2000 academic year. Impressed by Prof. Turner's article, "Late Pleistocene and Holocene Population History of East Asia Based on Dental Variation," his research has been based on the ASU Dental Anthropology System. At present, Manabe is investigating the temporal and regional variation of tooth morphology in China and Japan, in order to search for the homelands of the migrant Yayoi populations which caused the quick and large-scale change (Sundadonty to Sinodonty) at the time of the shift from the Jomon to the Yayoi periods in the Japanese Islands. Research of the size and shape of the cervix of the teeth, the alveolar arch, and the palate is also in progress. In fact, Manabe is interested in microevolution of every masticatory organ. In Japan Manabe is Associate Professor in the Department of Oral Anatomy, Nagasaki University School of Dentistry in Nagasaki. He is also a coauthor of the paper on *samurai* antemortem lost teeth in this issue of *Dental Anthropology*.

Liu Wu spent the academic year 1990-1991 at Arizona State. During that time Liu was an editor of *Dental Anthropology* (then, the *Dental Anthropology Newsletter*) and developed the plaque for the mesial trigonid crest, which is now part of the ASU Dental Anthropology System. After a hiatus of eight years he has returned to the United States, this time to Penn State University. Liu is analyzing the mandibular molars from a large sample of miocene hominoids from Yuanmou County, Yunnan Provence in southwestern China, using EDMA (Euclidian Distance Matrix Analysis). Liu, DAA member L. Hlusko, and L. Deng will present their work at the Annual meeting of the American Association of Physical Anthropologists in April.

LITERATURE CITED

Turner CG II. 1987. Late Pleistocene and Holocene population history of East Asia based on dental variation. Am J Phys Anthropol 73:305-321.