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Cranial and Dental Traits of the Nakazuma Jomon People from Ibaraki, Japan

By

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Abstract Metric and nonmetic traits data were obtained from the cranial and dental series of the Nakazuma Jomon people and compared with those of other Jomon samples. Significant differences were not found in most of the metric and nonmetric traits, suggesting that the cranial and dental morphology of the Nakazuma Jomon people are similar to those normally found in the other Jomon samples. Some of the differences observed in a few traits were considered to be caused by the genetic drift within this population unit probably consisting of close kinship groups.

Introduction

Approximately one hundred human skeletons dating to the Jomon period were found from one small burial pit at the Nakazuma shell mound site, located in Toride City, Ibaraki Prefecture. The cultural remains suggest that these human skeletons were collectively reburied at the same time during the Horinouchi 2 stage in the early phase of the Late Jomon period. Cranial preservations, morphological descriptions and identifications of sex and age were recorded elsewhere (MATSUMURA, 1995a).

In the present study, data of metric and nonmetric traits were obtained from the cranial and tooth series of the Nakazuma Jomon people and compared with those of other Jomon samples. In respect to the cranial and dental morphology, little geographical variations have been discerned in the shell mound people of the later half of the Jomon period (DODO, 1982; YAMAGUCHI, 1982, 1992; MATSUMURA, 1995b). For comparisons of both the cranial and dental traits, therefore, the average data of pooled Jomon samples from various districts in Japan were used.

The Nakazuma human skeletal remains examined are housed at the Department of Archaeology, National Museum of Japanese History.

Metric Cranial Traits

The cranial measurements were taken by the first and third authors, according to the method of MARTIN & SALLER (1957). Table 1 gives 37 cranial measurements and indices obtained from the Nakazuma Jomon series.

For comparison with the Nakazuma Jomon sample, the 23 cranial measurements and indices from the pooled Jomon sample (OGATA, 1981) are shown in the right column of same table. Compared between the two samples, significant differences are not found in most of the measurements and indices in both the sexes. The differences are found only in the sagittal arc and orbital breadth between the males. The former is longer and the latter is shorter in the Nakazuma sample than in the pooled Jomon sample compared.

Nonmetric Cranial Traits

The second author alone scored all the 22 nonmetric cranial traits used in this study as present or absent for all crania, following the criteria of DODO (1974, 1986). Table 2 shows the incidences of the 22 nonmetric cranial traits of the Nakazuma Jomon series (both the sexes are combined).

The data from the pooled Jomon sample in eastern Japan, which were scored by Dodo (DODO & ISHIDA, 1990), are given in the same table. The Nakazuma sample shows the tendency of the low frequencies of the bridging traits, for example, the incidence of the medial palatine canal in the Nakazuma Jomon sample is significantly lower than that in the compared Jomon sample. The Nakazuma Jomon sample also has lower incidences of the hypoglossal canal bridging and the mylohyoid bridging, although those are not significantly different. The condylar canal and tympanic dehiscence also in the Nakazuma Jomon sample are found to be significantly different from the Jomon sample in eastern Japan. The Nakazuma sample shows a lower frequency of the condylar canal, while the incidence of the tympanic dehiscence is higher.

Metric Dental Traits

The permanent dentition of the Nakazuma Jomon series were measured on the mesiodistal and buccolingual crown diameters by the first and third authors, in accordance with the standard method of FUJITA (1949). The measurements were taken on the right side teeth. When the right side tooth was missing or heavily worn, the left side dentition was measured as a substitute. The basic statistics of thus measured crown diameters are shown in Table 3.

The data from other pooled Jomon series (MATSUMURA ,1995b) are given in the same table. In both the sexes, differences in most of the crown diameters

Table 1. Means of cranial measurements (mm) and indicies of the Nakazuma Jomon and comparative Jomon samples.

		Males							Females						
		Nakazuma Jomon			Jomon (OGATA, 1981)				Nakazuma Jomon			Jomon (OGATA, 1981)			
		n	M	SD	n	M	SD	*t*-value	n	M	SD	n	M	SD	*t*-value
1	Maximum cranial length	36	185.0	6.2	40	182.8	6.5	1.50	17	174.1	6.7	33	176.6	5.4	1.39
5	Basion-nasion length	13	103.4	7.2					7	100.4	3.7				
8	Maximum cranial breadth	32	143.7	4.8	40	145.1	5.1	1.18	16	140.9	3.8	35	140.6	5.6	0.21
8: 1	Length-breadth index	32	77.9	3.6	40	79.5	3.4	1.90	15	80.5	2.3	33	79.5	3.8	0.90
9	Minimum frontal breadth	37	96.4	5.2	36	98.0	6.1	1.23	19	95.9	3.8	34	96.6	4.6	0.56
9: 8	Transv. front-pariet. index	32	66.7	3.5	35	67.4	4.9	0.62	15	67.6	2.7	32	69.0	4.1	1.18
10	Maximum frontal breadth	32	120.2	5.6	36	122.2	4.7	1.57	18	116.3	5.0	35	118.5	4.4	1.64
12	Maximum occipital breadth	29	110.1	5.1					16	105.9	3.6				
12: 8	Transv. pariet-occip. index	28	77.0	3.3					16	75.2	2.7				
17	Basion-bregma height	13	139.2	7.2	22	138.4	7.1	0.32	7	136.7	6.5	19	137.4	7.3	0.21
17: 1	Length-height index	13	76.5	3.3	22	75.5	3.1	0.88	6	76.7	3.6	19	78.0	3.3	0.80
17: 8	Breadth-height index	12	96.6	4.8	22	95.6	3.9	0.66	6	96.8	4.4	19	97.7	5.9	0.34
25	Sagittal arc	13	383.9	12.3	20	371.9	13.1	2.54*	5	374.2	14.0	25	362.6	11.5	1.92
26	Frontal arc	32	127.9	7.7					17	122.1	6.8				
27	Parietal arc	35	135.1	6.9					17	129.4	5.9				
27: 26	Sagitt. front-pariet. index	31	106.2	10.1					15	106.0	8.6				
28	Occipital arc	14	122.0	7.2					5	118.4	6.1				
29	Frontal chord	32	111.0	5.9					17	106.4	4.8				
29: 26	Frontal curvature index	32	86.9	2.9					17	87.3	2.5				
30	Parietal chord	35	117.5	5.2					17	111.4	9.6				
30: 27	Parietal curvature index	35	87.1	2.6					17	86.0	5.6				
31	Occipital chord	13	102.3	5.2					7	103.6	5.3				
31: 28	Occipital curvature index	13	84.1	3.9					5	86.0	1.6				
40	Basion-prosthion length	8	100.3	7.9	17	102.0	8.0	0.49	5	101.0	8.5	17	100.1	8.1	0.21
43	Upper facial breadth	36	108.1	5.9	34	110.4	7.0	1.48	18	107.4	3.9	32	106.7	5.2	0.48
45	Bizygomatic breadth	20	140.4	4.9	31	140.4	8.4	0.00	10	134.6	7.4	25	134.2	7.4	0.14
46	Bimaxillary breadth	23	102.1	10.8	29	102.2	7.0	0.03	13	100.3	6.6	26	97.9	4.1	1.36
48	Upper facial height	20	66.9	7.2	27	68.5	7.1	0.74	10	64.1	4.5	24	64.0	3.2	0.07
48: 45	Upper facial index	16	47.7	5.9	25	49.4	4.4	1.04	7	47.5	4.0	22	47.6	2.9	0.05
48: 46	Ditto	19	66.5	10.3	24	67.3	6.2	0.30	10	63.0	4.4	24	65.5	4.4	1.49
51	Orbital breadth	26	40.0	2.3	26	41.9	3.1	2.41*	13	39.9	2.3	27	39.3	2.2	0.81
52	Orbital height	27	31.8	2.6	28	33.0	2.2	1.84	12	32.5	2.1	26	33.1	2.6	0.68
54	Nasal breadth	23	26.7	2.3	26	26.0	2.0	1.02	10	26.3	1.3	26	25.3	1.7	1.65
55	Nasal height	21	48.4	4.1	25	48.8	4.2	0.33	11	47.5	3.4	24	46.4	3.9	0.82
57	Minimum breadth of nasalia	17	10.4	2.4					8	10.6	1.4				
60	Upper alveolar length	15	56.2	4.3	17	54.4	3.8	1.21	8	52.6	3.5	18	51.1	1.9	1.36
61	Upper alveolar breadth	21	63.4	4.2	17	65.6	4.1	1.59	9	61.1	2.0	18	61.4	4.0	0.20

Significance level; *5%.

Table 2. Incidences of the 22 nonmetric cranial traits of the Nakazuma Jomon and comparative Jomon samples.

Nonmetric Cranial Trait	Nakazuma Jomon		Jomon (DODO & ISHIDA, 1990)	
	n	p	n	p
1. Metopism	52	0.115	159	0.151
2. Supraorbital nerve groove	94	0.170	234	0.111
3. Supraorbital foramen	90	0.144	248	0.109
4. Ossicle at the lambda	48	0.042	156	0.045
5. Biasterionic suture	97	0.196	276	0.228
6. Asterionic bone	84	0.036	226	0.088
7. Occipito-mastoid wormians	47	0.085	132	0.106
8. Parietal notch bone	73	0.110	176	0.125
9. Condylar canal patent	34	0.647**	84	0.917
10. Precondylar tubercle	62	0.016	160	0.075
11. Paracondylar process	2	0.000	30	0.067
12. Hypoglossal canal bridging	60	0.100	168	0.196
13. Tympanic dehiscence	94	0.521***	254	0.256
14. Ovale-spinosum confluence	55	0.000	88	0.034
15. Foramen of Vesalius	55	0.309	110	0.391
16. Pterygo-spinous foramen	51	0.020	130	0.023
17. Medial palatine canal	46	0.000*	160	0.113
18. Transv. zyg. suture vestige	49	0.327	136	0.338
19. Clinoid bridging	3	0.000	20	0.000
20. Mylohyoid bridging	51	0.059	224	0.134
21. Jugular foramen bridging	19	0.000	68	0.015
22. Sagittal sinus groove flexes left	46	0.130	127	0.118

Significance level; *5%, **1%, ***0.1%.

between the Nakazuma and comparative Jomon samples are not significant.

Nonmetric Dental Traits

Twenty one nonmetric tooth traits were scored by the first author in conformity to the criteria and classification given elsewhere (MATSUMURA, 1995c). The sampled teeth were from one side of jaw as in taking the metric data. Table 4 presents frequencies of presence of the 21 nonmetric tooth traits (both the sexes are combined).

The right column of Table 4 shows the data of the pooled Jomon sample given by MATSUMURA (1995c) and results of the chi-square tests. Four of the 21 traits show highly significant differences in those frequencies between the two Jomon samples. The Nakazuma Jomon dentition is characterised by higher frequencies of the hypocone reduction (UM2), the six cusps (LM1) and the X type of fissure pattern (LM2), and lower occurrence of the hypoconulid reduction (LM2), compared with the other Jomon sample.

Table 3. Means of mesiodistal and buccolingual crown diameters of the Nakazuma Jomon and comparative Jomon samples.

	Males							Females						
	Nakazuma Jomon			Jomon (MATSUMURA, 1995b)				Nakazuma Jomon			Jomon (MATSUMURA, 1995b)			
	n	M	SD	n	M	SD	*t*-value	n	M	SD	n	M	SD	*t*-value
Mesiodistal diameters (mm)														
UI1	16	8.58	0.66	108	8.51	0.40	0.59	5	8.98	0.37	74	8.28	0.42	3.63*
UI2	23	7.24	0.63	106	7.10	0.47	1.21	5	6.65	0.31	78	6.84	0.51	0.82
UC	23	7.65	0.43	68	7.55	0.42	0.98	8	7.18	0.65	54	7.33	0.52	0.74
UP1	37	7.01	0.40	153	6.90	0.38	1.56	8	7.01	0.44	127	6.65	0.48	2.07
UP2	33	6.40	0.34	183	6.46	0.40	0.81	8	6.46	0.23	164	6.30	0.44	1.02
UM1	35	10.33	0.36	190	10.28	0.47	0.60	12	9.98	0.50	174	9.90	0.49	0.55
UM2	25	8.89	0.50	172	9.12	0.60	1.83	10	8.74	0.49	150	8.81	0.54	0.40
LI1	10	5.40	0.23	61	5.27	0.36	1.11	4	5.28	0.24	49	5.23	0.41	0.24
LI2	16	5.86	0.26	91	5.72	0.37	1.45	5	5.57	0.33	62	5.70	0.36	0.78
LC	23	6.66	0.28	112	6.73	0.45	0.72	9	6.52	0.41	85	6.50	0.37	0.15
LP1	26	6.95	0.38	172	6.91	0.37	0.51	11	6.74	0.50	165	6.61	0.47	0.88
LP2	29	7.04	0.43	190	6.94	0.45	1.12	11	6.86	0.61	187	6.68	0.52	1.10
LM1	34	11.72	0.49	210	11.61	0.45	1.31	15	11.36	0.62	209	11.15	0.49	1.57
LM2	32	10.85	0.66	201	10.80	0.63	0.41	10	10.57	0.71	200	10.44	0.58	0.68
Buccolingual diameters (mm)														
UI1	24	7.07	0.32	125	7.29	0.34	2.93*	6	7.28	0.25	93	7.00	0.34	1.98
UI2	21	6.69	0.34	118	6.69	0.42	0.00	5	6.56	0.48	95	6.38	0.38	1.02
UC	27	7.82	0.45	71	7.96	0.49	1.29	8	7.18	0.50	58	7.71	0.51	2.76*
UP1	36	9.26	0.46	153	9.27	0.49	0.11	8	9.32	0.37	124	8.96	0.55	1.82
UP2	35	9.06	0.45	184	9.00	0.58	0.58	8	8.96	0.29	165	8.75	0.52	1.13
UM1	35	11.86	0.39	189	11.78	0.51	0.88	12	11.34	0.53	176	11.37	0.48	0.21
UM2	25	11.42	0.46	175	11.45	0.62	0.23	10	10.82	0.46	151	10.97	0.58	0.80
LI1	11	5.97	0.33	79	5.93	0.36	0.35	4	5.79	0.16	59	5.68	0.34	0.64
LI2	16	6.15	0.28	108	6.20	0.37	0.52	5	6.10	0.36	78	6.10	0.43	0.00
LC	23	7.31	0.39	115	7.44	0.51	1.16	9	7.26	0.30	88	7.11	0.40	1.09
LP1	26	7.66	0.38	173	7.79	0.48	1.32	11	7.38	0.74	167	7.50	0.51	0.73
LP2	30	8.26	0.45	193	8.33	0.48	0.75	11	8.05	0.62	190	8.02	0.52	0.18
LM1	35	11.20	0.48	218	11.23	0.43	0.38	15	10.92	0.44	210	10.83	0.48	0.71
LM2	32	10.40	0.50	207	10.47	0.51	0.72	10	10.19	0.60	197	10.06	0.51	0.78

Significance level; *5%.

Discussion and Conclusion

Above comparisons of the cranial and dental traits show that the Nakazuma Jomon people are basically similar to the average Jomon people in both the metric and nonmetric characteristics. As far as the nonmetric traits are concerned, however, a few traits of the Nakazuma sample showed the highly significant differences from those of the average Jomon sample. The differences under the

Table 4. Frequencies of the 21 nonmetric tooth traits in the Nakazuma Jomon and comparative Jomon samples.

Trait	Tooth	Nakazuma Jomon		Jomon (MATSUMURA, 1995c)		
		Freq.	n	Freq.	n	Chi-square
Shovelling	UI1	48.0%	25	70.6%	68	4.07*
Shovelling	UI2	30.8%	26	40.6%	204	0.95
Double shovelling	UI1	0.0%	27	0.5%	207	0.13
Double shovelling	UI2	0.0%	32	0.0%	198	0.00
Tuberculum dentale	UI1	9.7%	31	7.8%	220	0.14
Tuberculum dentale	UI2	27.3%	33	22.2%	217	0.43
Spine	UI1	22.2%	27	26.5%	170	0.22
Interruption groove	UI2	51.7%	29	60.0%	185	0.71
Winging (bilateral)	UI1	9.5%	21	9.1%	197	0.00
De Terra's tuberculm	UP1	27.6%	29	11.5%	199	5.53*
Double rooted	UP1	44.7%	38	43.8%	176	0.01
Double rooted	UP2	10.3%	29	2.0%	150	5.22*
Carabelli's trait	UM1	0.0%	49	5.6%	341	2.87
Hypocone reduction	UM2	27.8%	36	7.7%	209	13.11***
Sixth cusp	LM1	49.0%	51	25.3%	360	12.43***
Seventh cusp	LM1	12.0%	50	9.0%	366	0.46
Protostylid	LM1	5.8%	52	4.9%	423	0.06
Deflecting wrinkle	LM1	5.6%	36	14.1%	99	1.86
Groove pattern Y	LM1	75.0%	48	68.9%	402	0.75
Groove pattern X	LM2	38.5%	39	13.5%	399	16.23***
Hypoconulid reduction	LM2	20.5%	39	45.3%	192	8.23***

Significance level; *5%, ***0.5%.

1% level of significance were found in two of the 22 cranial nonmetric traits and four of the 21 dental nonmetric traits. Some of the significant differences between the two samples were probably caused by the interobserver errors. Among those nonmetric traits showing significant differences, particularly, the tympanic dehiscence is not considered to be reliable for comparisons between data given by different observers (ISHIDA & DODO, 1990).

In terms of the cranial and dental morphology, the Jomon people from shell mounds in the Honshu Island are regarded to be generally homogeneous (DODO, 1982; YAMAGUCHI, 1982, 1992; MATSUMURA, 1995b). Focused on the small population units from the respective local sites, however, some peculiarities in part of their cranial morphology were found by several studies. For example, the Tsukumo sample in Okayama shows the relatively low cranial height compared with the other Jomon samples (YAMAGUCHI, 1982; HANIHARA & UCHIDA, 1985; KONDO, 1993, 1994). A few cranial nonmetric differences were also found in the Tsukumo sample by MOURI (1988). The metric and nonmetric studies by KONDO (1993, 1994) showed that the skulls from the Ubayama site in Chiba possess some characteristics distinct from the other Jomon samples compared.

DODO (1981, 1988) demonstrated the peculiarities of nonmetric traits in the cranial samples from the Satohama site in Miyagi and the Sanganji site in Fukushima. In these two Jomon samples, the metopism were observed more frequently than in the average Jomon people.

The causes of such inter-site variations or the site peculiarities of the cranial morphology still have not been elucidated. Except the interobserver errors as mentioned above, some environmental differences between the sites may be considered as one of the causes. Concerning the Nakazuma Jomon people, the present authors can suggest another factor causing the nonmetric peculiarity observed in this study.

MIYAUCHI and NISHIMOTO (eds. 1995), who are archaeologists in charge of excavation of the Nakazuma site, supposed that the reburied people in this site belonged to one community consisting of several families. In order to prove this assumption, MATSUMURA and NISHIMOTO (1996) analysed their kinship relations using the tooth crown measurements. Figure 1 is the dendrogram drawn in that kinship analysis using the maxillary tooth crown diameters of 92 Jomon individuals from the various sites in the Kanto district. Two major clusters of the Nakazuma individuals (Nos. ① & ④) were regarded to be close kinship respectively in that study. As shown in the same figure, another close kinship within a site was deduced in the people from the Ubayama shell mound in Chiba.

Focusing on certain nonmetric tooth traits of the Nakazuma individuals, there is a remarkable tendency in support of the existence of the kinship deduced in above study. The kinship analysis was based on the metrics of the maxillary premolars and first molars. Thereby, a tendency of the occurrence of the De Terra's tuberculum in the upper first premolar can be compared with the kinship clusters induced by the tooth measurements. Figure 2 presents the presence (scores "1" & "2")/absence (score "0") of this trait in the dendrogram of the Nakazuma individuals drawn in the previous kinship analysis. The plotting is restricted to the samples of two groups (① & ④) which were regarded to be close kinship respectively. It is quite interesting that the most of the samples belonging to the cluster ① possess the De Terra's tuberculum, while this trait can not be observed in the samples of the cluster ④ except one. The De Terra's tuberculum is not so frequently found in the Jomon people. As shown in Table 4, the incidence of this trait is only 11.5% in the average Jomon sample. The extremely high frequency in the cluster ① of the Nakazuma people suggests the close genetic relationship between thus clustered individuals. Table 4 shows that the incidence in the Nakazuma sample is significantly higher than in the average Jomon sample. After all such genetic connection within the Nakazuma Jomon people resulted in the accidentally high frequency of this tuberculum.

Taking this case into the consideration of the inter-site variations of the Jomon people, there is possibility that the genetic drift within the local inhabitants

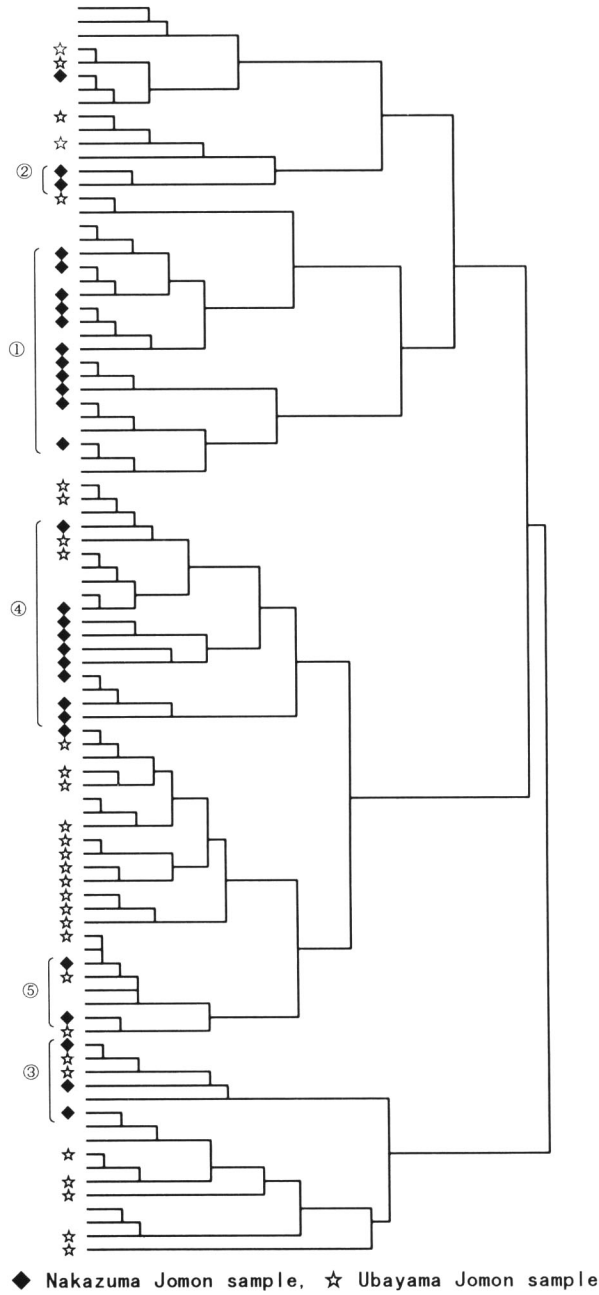

Fig. 1. Dendrogram between the 92 Jomon individuals from various sites in the Kanto district based on the kinship analysis using tooth crown measurements (MATSUMURA & NISHIMOTO, 1996).

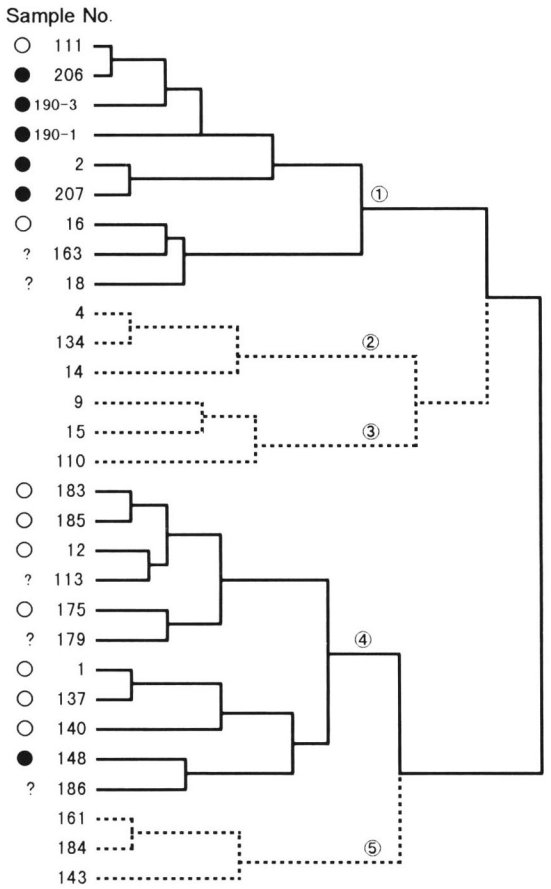

Fig. 2. The presence of the De Terra's tuberculum (UP1) in the two major clusters (① & ④) of the Nakazuma Jomon individuals based on the kinship analysis using tooth crown measurements (MATSUMURA & NISHIMOTO, 1996).

consisting of some kin-folks caused the metric or nonmetric traits peculiarities observed in several population units.

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Appendix 1. Cranial measurements (mm) and indicies of the Nakazuma Jomon males.

No.	3	4	9	11	12	13	14	15	17	18	111	113	119	134
Sex	Male	Male	Male	Male	Male	Male	Male	Male	Male	Male	Male	Male	Male	Male
1 Maximum cranial length	182	193	182	178	192	179	200	193	182	181		172	186	173
5 Basion-nasion length			101	100	105	101								102
8 Maximum cranial breadth	146	142	146	140	145		136	139	137	145		142	138	142
8:1 Length-breadth index	80.2	73.6	80.2	78.7	75.5		68.0	72.0	75.3	80.1		82.6	74.2	82.1
9 Minimum frontal breadth	92	99	97	91	98	97	95	95	98	99		93	99	100
9:8 Transv. front-pariet. index	63.0	69.7	66.4	65.0	67.6		69.9	68.3	71.5	68.3		65.5	71.7	70.4
10 Maximum frontal breadth	120	123	123	120	119	117		120	114	119		120		116
12 Maximum occipital breadth		113	112	107	104		107	112	110	107		116		112
12:8 Transv. pariet-occip. index		79.6	76.7	76.4	71.7		78.7	80.6	80.3	73.8		81.7		78.9
17 Basion-bregma height			141	129	149	143								133
17:1 Length-height index			77.5	72.5	77.6	79.9								76.9
17:8 Breadth-height index			96.6	92.1	102.8									93.7
25 Sagittal arc	400	386	390		400	366	378					364		
26 Frontal arc	133	130	130	120	132	132	125	136	125	131		129		133
27 Parietal arc	142	138	140	130	145	120	133	127	129	136		132	134	126
27:26 Sagitt. front-pariet. index	106.8	106.2	107.7	108.3	109.8	90.9	106.4	93.4	103.2	103.8		102.3		94.7
28 Occipital arc	125	118	120		123	114	120					103		
29 Frontal chord	113	117	109	101	119	111	114	122	113	114		112		111
29:26 Frontal curvature index	85.0	90.0	83.8	84.2	90.2	84.1	91.2	89.7	90.4	87.0		86.8		83.5
30 Parietal chord	117	124	124	113	127	104	118	116	114	115		116	125	110
30:27 Parietal curvature index	82.4	89.9	88.6	86.9	87.6	86.7	88.7	91.3	88.4	84.6		87.9	93.3	87.3
31 Occipital chord	104	102	99		103	103	109					87		
31:28 Occipital curvature index	83.2	86.4	82.5		83.7	90.4	90.8					84.5		
40 Basion-prosthion length			97		98	113								103
43 Upper facial breadth	100	116	106	103	110	113		111	109	113		91	112	98
45 Bizygomatic breadth	130	150	140			147		140	144	136		143		138
46 Bimaxillary breadth	100	110	106		106	116		100	114	102		100		113
48 Upper facial height	60	67	67		72	66		72	68	68	62			68
48:45 Upper facial index	46.2	44.7	47.9			44.9		51.4	47.2	50.0				49.3
48:46 Ditto	60.0	60.9	63.2		67.9	56.9		72.0	59.6	66.7				60.2
51 Orbital breadth	37	43	38		42	43	41	45	41	40		42		37
52 Orbital height	29	34	32		36	33	36	30	34	32		34		36
54 Nasal breadth	23	29	24		25	26		30	28	26	26			26
55 Nasal height	43	51	49		51	43		55	49	48	43	49		52
57 Minimum breadth of nasalia	9	10			11	7	8	16	11	10		9		
60 Upper alveolar length			58						52					53
61 Upper alveolar breadth			63		63	67			60		60			59

Appendix 1. (continued)

No.	136	137	139	141	143	150	154	156	158	161	163	170.2	175	176
Sex	Male	Male	Male	Male	Male	Male	Male	Male	Male	Male	Male	Male	Male	Male
1 Maximum cranial length	181	188	197	185	190	184	184	183	189	192	191	186	185	185
5 Basion-nasion length	105						120	105				105		
8 Maximum cranial breadth	141	152		141	156	150	142	147	139		140	145	151	
8:1 Length-breadth index	77.9	80.9		76.2	82.1	81.5	77.2	80.3	73.5		73.3	78.0	81.6	
9 Minimum frontal breadth	104	100	100	94	100	102	100	98	95	94	81	88	98	106
9:8 Transv. front-pariet. index	73.8	65.8		66.7	64.1	68.0	70.4	66.7	68.3		57.9	60.7	64.9	
10 Maximum frontal breadth	123	126		120	127	126		124	127		120	128	126	120
12 Maximum occipital breadth	115			105	113	114	111	117	110	101	97		120	
12:8 Transv. pariet-occip. index	81.6			74.5	72.4	76.0	78.2	79.6	79.1		69.3		79.5	
17 Basion-bregma height	138						142	146				135		
17:1 Length-height index	76.2						77.2	79.8				72.6		
17:8 Breadth-height index	97.9						100.0	99.3				93.1		
25 Sagittal arc								397				388		
26 Frontal arc	140	142	130		125		132	142		124	123	125	132	123
27 Parietal arc	135	132	132	130	147	130	128	135		140	127	133	135	144
27:26 Sagitt. front-pariet. index	96.4	93.0	101.5		117.6		97.0	95.1		112.9	103.3	106.4	102.3	117.1
28 Occipital arc								125	122			130		
29 Frontal chord	119	118	117		110		114	114		108	101	104	114	106
29:26 Frontal curvature index	85.0	83.1	90.0		88.0		86.4	80.3		87.1	82.1	83.2	86.4	86.2
30 Parietal chord	117	118	119	115	127	116	113	116		124	114	114	118	120
30:27 Parietal curvature index	86.7	89.4	90.2	88.5	86.4	89.2	88.3	85.9		88.6	89.8	85.7	87.4	83.3
31 Occipital chord								104	104			103		
31:28 Occipital curvature index								83.2	85.2			79.2		
40 Basion-prosthion length	100													
43 Upper facial breadth	113	116	109	111	118	110	116	109	104	111	106	96	111	108
45 Bizygomatic breadth	147								139				139	
46 Bimaxillary breadth	63	112			103				101				110	
48 Upper facial height	61				69								79	
48:45 Upper facial index	41.5												56.8	
48:46 Ditto	96.8				67.0								71.8	
51 Orbital breadth	40	38			44				37	40			41	
52 Orbital height	33	28			29		27		29	29			33	
54 Nasal breadth	26	30			29					27			28	
55 Nasal height	42				51								54	
57 Minimum breadth of nasalia			10		10		11							
60 Upper alveolar length	56				64	56				58			61	
61 Upper alveolar breadth	61	62		61	63	62				62			74	

Appendix 1. (continued)

No.	179	182	183	185	186	199	200	205	206	6
Sex	Male	Male	Male	Male	Male	Male	Male	Male	Male	Male
1 Maximum cranial length	176	182	187	178	180	184	184	191		186
5 Basion-nasion length	93	108				91				108
8 Maximum cranial breadth	142	142	150	144	137	146	148	140		147
8:1 Length-breadth index	80.7	78.0	80.2	80.9	76.1	79.3	80.4	73.3		79.0
9 Minimum frontal breadth	97	91	107	92	86	91	97	95	101	95
9:8 Transv. front-pariet. index	68.3	64.1	71.3	63.9	62.8	62.3	65.5	67.9		64.6
10 Maximum frontal breadth	115	121	125	114	112	100	117	116	125	123
12 Maximum occipital breadth	116	111	109	113	104	113	107	105		112
12:8 Transv. pariet-occip. index	81.7	78.2	72.7	78.5	75.9	77.4	72.3	75.0		76.2
17 Basion-bregma height	132	147				128				147
17:1 Length-height index	75.0	80.8				69.6				79.0
17:8 Breadth-height index	93.0	103.5				87.7				100.0
25 Sagittal arc	370	392				376				383
26 Frontal arc	115	122	141	117	115	128	113		127	122
27 Parietal arc	132	146	130	146	134	133	150	142		135
27:26 Sagitt. front-pariet. index	114.8	119.7	92.2	124.8	116.5	103.9	132.7			110.7
28 Occipital arc	133	124				125				126
29 Frontal chord	104	105	120	106	102	111	101		113	110
29:26 Frontal curvature index	90.4	86.1	85.1	90.6	88.7	86.7	89.4		89.0	90.2
30 Parietal chord	114	126	114	120	111	113	122	121		118
30:27 Parietal curvature index	86.4	86.3	87.7	82.2	82.8	85.0	81.3	85.2		87.4
31 Occipital chord	101	104								107
31:28 Occipital curvature index	75.9	83.9								84.9
40 Basion-prosthion length	87	96								108
43 Upper facial breadth	107	110	100	103	103	107	111	108	109	113
45 Bizygomatic breadth	144	134	140	140	135	139		138		145
46 Bimaxillary breadth	96	100	101	94	109	95			92	106
48 Upper facial height	48	66	83	66	61				64	71
48:45 Upper facial index	33.3	49.3	59.3	47.1	45.2					49.0
48:46 Ditto	50.0	66.0	82.2	70.2	56.0				69.6	67.0
51 Orbital breadth	40	39	39	35	39	41	40		39	40
52 Orbital height	30	30	35	28	33	32	32		33	31
54 Nasal breadth	24	27	32	24	24		27		24	28
55 Nasal height	44	51	55	45	44				48	49
57 Minimum breadth of nasalia	9		13		8				15	9
60 Upper alveolar length	60	51	57	61	48				55	53
61 Upper alveolar breadth	61	67	70	62	64		57		62	71

Appendix 2. Cranial measurements (mm) and indicies of the Nakazuma Jomon females.

No.	1	2	19	101	110	112	138	146	148	151	155	157	159	167
Sex	Female	Female	Female	Female	Female	Female	Female	Female	Female	Female	Female	Female	Female	Female
1 Maximum cranial length	177		171	180		171	180	182	171		157	172	166	179
5 Basion-nasion length	103				101		105	102						97
8 Maximum cranial breadth	144		135	146		141	141	142	140	139		140	138	140
8:1 Length-breadth index	81.4		78.9	81.1		82.5	78.3	78.0	81.9			81.4	83.1	78.2
9 Minimum frontal breadth	99	98	95	99	97	96	93	94	94		102	91	87	97
9:8 Transv. front-pariet. index	68.8		70.4	67.8		68.1	66.0	66.2	67.1			65.0	63.0	69.3
10 Maximum frontal breadth	123	116	113	124		117	113	113	110	114		117	106	118
12 Maximum occipital breadth	103		102	111		101	107	110	106	114		105	104	103
12:8 Transv. pariet-occip. index	71.5		75.6	76.0		71.6	75.9	77.5	75.7	82.0		75.0	75.4	73.6
17 Basion-bregma height	145				129		135	146						136
17:1 Length-height index	81.9						75.0	80.2						76.0
17:8 Breadth-height index	100.7						95.7	102.8						97.1
25 Sagittal arc				367			369	396					360	
26 Frontal arc	122	118	117	120	103	121	116	132	123			130	120	125
27 Parietal arc			131	133	132	131	130	140	133	128		123	127	132
27:26 Sagitt. front-pariet. index			112.0	110.8	128.2	108.3	112.1	106.1	108.1			94.6	105.8	105.6
28 Occipital arc				114			123	124					110	
29 Frontal chord	112	107	101	108	93	104	105	115	106			110	103	107
29:26 Frontal curvature index	91.8	90.7	86.3	90.0	90.3	86.0	90.5	87.1	86.2			84.6	85.8	85.6
30 Parietal chord			115	119	119	113	110	126	111	84		107	110	114
30:27 Parietal curvature index			87.8	89.5	90.2	86.3	84.6	90.0	83.5	65.6		87.0	86.6	86.4
31 Occipital chord				101	105		106	106		111			94	
31:28 Occipital curvature index				88.6			86.2	85.5					85.5	
40 Basion-prosthion length	97				104		113							
43 Upper facial breadth	108	110	109	100	110	108	113		105		113	105	107	107
45 Bizygomatic breadth	139		144			142	138				131	126		125
46 Bimaxillary breadth	108	102	97	99	100	98	101				109	84		104
48 Upper facial height	67	70		63	57	58	68				67			
48:45 Upper facial index	48.2					40.8	49.3				51.1			
48:46 Ditto	62.0	68.6		63.6	57.0	59.2	67.3				61.5			
51 Orbital breadth	41	40	38	40	40	37	46				40	37		41
52 Orbital height	36	34	32	31	32	31	31				34			28
54 Nasal breadth	29	28		26	25	27	25				26			
55 Nasal height	48	46		46	43	43	46				50	54		
57 Minimum breadth of nasalia	11	12	12	10	8		12							
60 Upper alveolar length	54	55			52	50	58		46					
61 Upper alveolar breadth	60	64			60	62	64		60					

Appendix 2. (continued)

	170-1	184	188	189	201	203
	Female	Female	Female	Female	Female	Female
1 Maximum cranial length	178	172	170	178	172	184
5 Basion-nasion length				94		101
8 Maximum cranial breadth	140	134	146	141		148
8:1 Length-breadth index	78.7	77.9	85.9	79.2		80.4
9 Minimum frontal breadth	100	95	91	97	95	102
9:8 Transv. front-pariet. index	71.4	70.9	62.3	68.8		68.9
10 Maximum frontal breadth	119	110	124	121	116	119
12 Maximum occipital breadth	106	104	110	104		105
12:8 Transv. pariet-occip. index	75.7	77.6	75.3	73.8		70.9
17 Basion-bregma height				131		135
17:1 Length-height index				73.6		73.4
17:8 Breadth-height index				92.9		91.2
25 Sagittal arc						379
26 Frontal arc	126	119	127	128		128
27 Parietal arc	135	118	116	128	133	130
27:26 Sagitt. front-pariet. index	107.1	99.2	91.3	100.0		101.6
28 Occipital arc						121
29 Frontal chord	110	104	108	108		108
29:26 Frontal curvature index	87.3	87.4	85.0	84.4		84.4
30 Parietal chord	120	101	100	114	116	114
30:27 Parietal curvature index	88.9	85.6	86.2	89.1	87.2	87.7
31 Occipital chord						102
31:28 Occipital curvature index						84.3
40 Basion-prosthion length				90		101
43 Upper facial breadth	108	108	97	107	110	108
45 Bizygomatic breadth		128		130		143
46 Bimaxillary breadth		104		105		93
48 Upper facial height		67		60		64
48:45 Upper facial index		52.3		46.2		44.8
48:46 Ditto		64.4		57.1		68.8
51 Orbital breadth		40		40		39
52 Orbital height		33		34		34
54 Nasal breadth		26		26		25
55 Nasal height		52		47		48
57 Minimum breadth of nasalia		10		10		
60 Upper alveolar length		53		53		
61 Upper alveolar breadth		61		61		58

Appendix 3. Metric and nonmetric traits in maxillary teeth of the Nakazuma Jomon series.

		3	4	9	11	12	13	14	15	17	18	110	111	113
		Male	Male	Male	Male	Male	Male	Male	Male	Male	Male	Male	Male	Male
Mesiodistal diameters (mm)														
	UI1	8.35				8.31			8.96		8.09	7.44		
	UI2		6.64			6.88			6.99			6.51		7.62
	UC					8.27			7.22		7.92	7.20		7.59
	UP1	6.69	7.08	6.83	6.60	7.36	7.01	6.80	7.12	6.31	6.88	6.68	6.44	7.36
	UP2		6.91	6.27		6.41		6.63	6.86		6.09	6.31	5.66	6.50
	UM1	10.25	10.59	10.00		10.43	10.93	10.79	10.75	10.00	10.40	9.76	10.28	10.31
	UM2	9.00				9.12	8.93		8.67	9.26		8.70		10.26
Buccolingual diameters (mm)														
	UI1	7.01				7.32			7.56	6.81	6.65	6.52		
	UI2		6.99			6.83			6.91			6.19		6.96
	UC					8.33			8.44	7.26	7.28	6.96		7.22
	UP1	8.95	9.07	8.68	8.76	9.32	9.65	9.33	9.08	8.97	9.62	8.32	8.64	9.43
	UP2		9.68	8.59		8.83		9.44	9.18	9.00	8.88	8.23	8.15	9.17
	UM1	11.33	12.58	11.49		11.85	12.34	12.45	12.27	11.87	11.88	10.91	11.55	11.80
	UM2	11.24				11.49	11.98		11.69	11.05		10.87		11.82
Nonmetric tooth trait														
shovelling	UI1	0.08				0.47			0.53		0.22	0.24		
shovelling	UI2		0.21			0.32			0.34			0.26		0.67
double shovelling	UI1	0				0			0		0	0		
double shovelling	UI2		0			0			0			0		0
tuberculum dentale	UI1	0				0			0	0	0	1		
tuberculum dentale	UI2		1			1			0			1		2
spine	UI1	0				0			1		0	0		
interruption groove	UI2		0			1			0			0		1
winging (bilateral)	UI1	0				4			0	1	4	0		
De Terra's tuberculum	UP1	0		0		0	0	0				0	0	
double rooted	UP1	1	1	1	1		1	1	1	1	2		1	
double rooted	UP2	1		1	1		1	1		1	1		1	
Carabelli's trait	UM1	0		0		0	0	0	0	0	0	0	0	0
hypocone reduction	UM2	2				0	2		2	0		0		2

Appendix 3. (continued)

		134	136	137	140	141	143	154	158	161	163	170.2	175	179
		Male	Male	Male	Male	Male	Male	Male	Male	Male	Male	Male	Male	Male
Mesiodistal diameters (mm)														
	UI1				9.06		8.65			7.97	9.14			8.86
	UI2			7.00	7.28	6.98			8.29	6.25	7.08	8.46		7.28
	UC	7.04		7.91	8.15					7.43	7.32		7.25	7.90
	UP1	6.45	6.75	7.50	7.30		7.78		7.67	7.15	6.71		7.56	7.19
	UP2	6.55	6.43	6.66	6.81		6.99		6.65	6.54	6.09	6.38	6.66	6.28
	UM1	9.86		10.74	10.48		10.28	10.67		9.58	10.24		10.51	9.86
	UM2	8.71			9.76			8.74		7.82	8.82	8.35	9.20	8.81
Buccolingual diameters (mm)														
	UI1		7.04		6.91		7.41			7.10	7.53	7.27	6.88	7.45
	UI2			6.57	6.37	6.31			7.19	6.66	6.88			7.33
	UC	8.11		8.51	8.12	7.81	8.02			7.70	8.00		7.77	8.01
	UP1	8.61	9.07	10.05	9.84		9.69		9.84	9.16	9.59		9.45	9.29
	UP2	9.17	8.85	9.50	9.20		9.46		9.64	9.66	9.45	8.68	9.45	8.96
	UM1	11.83		12.14	12.11		12.01	11.77		11.64	12.05		12.27	11.84
	UM2	11.32			12.23			11.88		10.86	11.77	11.65	11.69	10.80
Nonmetric tooth trait														
shovelling	UI1				0.41		0.44			0.07	0.60			
shovelling	UI2				0.02				0.57	0.02	0.39	0		
double shovelling	UI1				0		0			0	0		0	0
double shovelling	UI2			0	0	0			0	0	0	0		0
tuberculum dentale	UI1		0		0		0			0	1		1	1
tuberculum dentale	UI2			0	1	0			1	3	1	1		1
spine	UI1		0		0		0			0	0		0	
interruption groove	UI2			0	0	0			0	3	3	1		
winging (bilateral)	UI1		0		0		0			0	0		2	1
De Terra's tuberculum	UP1	0		0	0					0			0	
double rooted	UP1		2			2	2			1	1		2	2
double rooted	UP2		1			1				1	1		1	2
Carabelli's trait	UM1	0		0	0		0	0		0	0		0	0
hypocone reduction	UM2	2			1			0			0	2	2	2

Appendix 3. (continued)

		182	183	185	186	190.1	206	1	2	112	138	148	150	151
		Male	Male	Male	Male	Male	Male	Female	Female	Female	Female	Female	Female	Female
Mesiodistal diameters (mm)														
	UI1			8.64		9.53		8.94				8.87		
	UI2	7.97		7.83	6.76	7.57	6.78				6.99	6.57	6.91	6.21
	UC	7.89		7.74	7.37	8.47	7.76		7.40			7.31		7.00
	UP1	6.88	7.20	6.88	7.32	7.50	6.80	7.23	6.88			6.75		6.66
	UP2		6.18	6.03	6.25	6.84	6.06	6.57	6.67		6.38	6.23	6.42	6.59
	UM1	10.77	10.42	9.99	10.09	10.99	10.28	10.34	10.47		10.18	9.78	10.23	
	UM2	9.41	8.93	8.48	8.44				8.69		9.33	8.88		8.60
Buccolingual diameters (mm)														
	UI1			7.13		7.21	7.08	7.35			7.23	7.08		
	UI2	6.36		6.31	6.50	7.01	6.44				7.02	6.30	7.13	6.33
	UC	8.48		8.16	7.72	8.02	8.11		7.12			7.47		6.96
	UP1		9.26	8.92	9.54	9.91	9.16	9.70	9.21		9.40	9.40		8.95
	UP2		8.96	8.76	9.38	9.48	8.69	9.14	8.71		9.15	8.91	9.39	9.12
	UM1	12.11	11.74	11.34	11.48	12.27	11.85	11.86	12.02		11.75	11.10	12.26	
	UM2	11.88	11.75	10.60	10.93				11.02		11.05	11.07		11.28
Nonmetric tooth trait														
shovelling	UI1			0.24		1.09		0.19				0.32		
shovelling	UI2	0.25		0.16	0.55	0.40						0.63	0.24	0.44
double shovelling	UI1			0		0	0	0				0		
double shovelling	UI2	0		0	0	0	0				0	0	0	0
tuberculum dentale	UI1			0		1	0	0			0	0		
tuberculum dentale	UI2	0		0	2	2	0				0	1	1	0
spine	UI1			0		0		0				0		
interruption groove	UI2	3		0	1	1	1					0	0	0
winging (bilateral)	UI1			1		0	1	1				0		
De Terra's tuberculum	UP1	0	0	0		2		0	1			1		1
double rooted	UP1		2	2	2			2	1	2	2	1	1	1
double rooted	UP2		1	1	2			1		1	1			1
Carabelli's trait	UM1	0	0	0	0	0		0	0		0	0		
hypocone reduction	UM2	3	2	0	0				0		2	2		1

Appendix 3. (continued)

		155	157	167	184	189	203	5	6	12.2	16	21	22	114
		Female	Female	Female	Female	Female	Female	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
Mesiodistal diameters (mm)														
	UI1				8.43		9.33	8.77	8.84		8.88	8.59	8.23	
	UI2				6.56				7.47		6.63		7.03	
	UC	6.33			7.01		8.01	7.50			7.47			
	UP1			7.60	6.38	6.95		7.20		6.86	6.97			
	UP2				6.09	6.75					6.59	6.41		
	UM1	10.46	9.17	9.69	9.05	10.19		10.67	10.80	10.16	10.52	9.74	9.98	
	UM2			8.35	7.79	9.41	8.99	8.90	9.95		9.69	8.66		
Buccolingual diameters (mm)														
	UI1				6.94		7.55	7.17	7.61		7.19	7.70	6.44	
	UI2				6.04				6.37		6.28		5.85	
	UC	6.52			7.22		7.80	7.76			7.27			
	UP1			9.64	8.64			9.23		9.33	9.66			
	UP2				8.59	8.66					9.28	9.03		
	UM1	11.34	11.20	10.68	11.02	10.81		11.53	12.15	11.83	12.11	11.50	11.00	
	UM2			10.35	9.93	10.75	11.19	10.50	12.34		12.03	11.34		
Nonmetric tooth trait														
shovelling	UI1				0.20		0.12	0.65	0.58		0.72	0.87	0.67	
shovelling	UI2				0.26						0.22		0.52	
double shovelling	UI1				0		0	0	0		1	0	0	
double shovelling	UI2				0				0		0		0	
tuberculum dentale	UI1				0		0	2	1		0	2	0	
tuberculum dentale	UI2				2				0		0		0	
spine	UI1				0		0	2	0		0	2	2	
interruption groove	UI2				3				0		2		3	
winging (bilateral)	UI1				1						2	0		
De Terra's tuberculum	UP1				0			2		0	0			
double rooted	UP1	1		2	2	1	2			1		1		
double rooted	UP2	1		1			1			1		1		
Carabelli's trait	UM1	0	0		1	0		0	0	0	0	0	0	0
hypocone reduction	UM2			0	1	3	2	1	2		2	1		

Appendix 3. (continued)

		152.2	153	160	190.2	190.3	192	197	204	207	320
		Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
Mesiodistal diameters (mm)											
	UI1				9.47	9.48	8.19				9.28
	UI2			6.88	7.42	7.90	6.66			7.61	8.07
	UC				7.33	8.68	7.63			8.57	8.48
	UP1	6.94			7.33	7.29	6.15			7.44	7.69
	UP2					6.71				7.05	
	UM1	9.69	10.75	10.35	11.19	11.80	10.09	10.31	10.29	10.99	11.21
	UM2	8.78	8.79		9.16				8.86	9.58	9.93
Buccolingual diameters (mm)											
	UI1				6.96	7.91	6.91				7.67
	UI2				6.43	6.74	6.15			6.89	7.12
	UC				8.35	9.03	7.10			8.87	8.75
	UP1	9.30			9.42	9.44	8.43			9.94	10.30
	UP2					8.81				9.26	
	UM1	11.71	11.71	10.81	12.07	12.98	11.60	11.91	12.06	12.82	11.73
	UM2	11.41	12.14		11.73					12.10	11.87
Nonmetric tooth trait											
shovelling	UI1			0.55	1.19	0.68	1.02				0.40
shovelling	UI2			0.46	0.51	0.17	0.86			0.78	0.29
double shovelling	UI1				0	0	1				1
double shovelling	UI2			0	0	0	0			0	0
tuberculum dentale	UI1			0	0	1	0				1
tuberculum dentale	UI2			0	0	1	0			2	2
spine	UI1			2	0	0	0				1
interruption groove	UI2				3	0	0			1	1
winging (bilateral)	UI1										
De Terra's tuberculum	UP1	0			2	1				2	0
double rooted	UP1	1	2							1	2
double rooted	UP2		1							1	2
Carabelli's trait	UM1	0	0	0	2	0	0		2	0	0
hypocone reduction	UM2	1	0		0				1	1	1

Appendix 4. Metric and nonmetric traits in mandibular teeth of the Nakazuma Jomon series.

		3	17	18	110	111	163	170.2	175	186	187	190.1	205	329
		Male	Male	Male	Male	Male	Male	Male	Male	Male	Male	Male	Male	Male
Mesiodistal diameters (mm)														
	LI1	5.45					5.56						5.49	4.78
	LI2	5.97		5.78			5.80					6.04		6.12
	LC	6.93	6.57	6.53	6.20	6.69	6.72					6.76		6.56
	LP1	7.10		6.80	6.57	6.33	7.06		7.58			6.85	7.63	6.53
	LP2	7.39		6.48	6.70	6.13	7.21		7.76		6.91	7.30	7.04	6.53
	LM1	12.29		11.47	11.16	11.72	11.58	12.53	12.70	11.28	11.78	10.95	11.73	11.38
	LM2	11.68	10.51	10.97		9.70	11.01		10.83	10.23	11.65	11.08	10.95	9.98
Buccolingual diameters (mm)														
	LI1	5.97					6.49						5.83	5.96
	LI2	6.37		5.92			6.17					6.58		6.35
	LC	7.15	7.58	7.11	6.59	7.19	7.43					7.65		7.71
	LP1	7.75	8.05		6.92	7.03	7.74		7.56			7.67	7.77	7.28
	LP2	8.38		8.23	7.61	7.36	8.46		8.29		8.64	8.80	8.41	8.10
	LM1	11.05		11.45	10.18	10.77	11.48	11.77	11.85	11.02	10.84	10.87	10.87	10.48
	LM2	10.66	9.98	10.35		9.44	10.73		11.13	10.28	10.25	10.31	10.20	9.85
Nonmetric tooth trait														
sixth cusp	LM1	0		0	0	2	0	1	2	2		1	1	0
seventh cusp	LM1	0		0	0	0	0	0	0	0		0	0	0
protostylid	LM1	2		0	0	0	0	0	0	0		2	0	0
deflecting wrinkle	LM1				1	0	0	0				0		0
groove pattern Y	LM1	1			1	2	1	1				2	1	1
groove pattern X	LM2	2	2	2		2	2		3	2		3	1	3
hypoconulid reduction	LM2	5	5	6		4	4		5	5		5	5	4

Appendix 4. (continued)

		335	336	338	341	342	343	344	346	351	356	358	359	370
		Male	Male	Male	Male	Male	Male	Male	Male	Male	Male	Male	Male	Male
Mesiodistal diameters (mm)														
	LI1		5.37							5.42	5.32			5.56
	LI2		5.57	5.76	6.22				5.41	6.05	6.05			6.09
	LC	6.19	6.72	7.08					7.05	6.95	6.67		6.74	6.17
	LP1	6.96	7.02	6.94				6.95	6.88	6.44	7.13	7.02	7.35	
	LP2	6.83	7.37	7.28				6.96	7.24	7.35	7.41	7.71	7.05	6.88
	LM1	11.64	11.51	11.75	12.12	11.00		11.78		11.80	11.91	12.31	11.40	11.27
	LM2	11.14	10.67	11.32	11.34			11.53		10.11	11.42	11.96		10.89
Buccolingual diameters (mm)														
	LI1		5.92						5.87	5.47	5.58			6.28
	LI2		6.21	5.52	6.22				6.19	5.90	6.12			6.29
	LC	6.94	7.89	7.33					7.05	7.36	6.94		7.46	7.01
	LP1	7.84	7.69	7.65				7.82	7.76	7.88	8.15	7.49	7.93	
	LP2	7.37	7.76	8.38				8.09	8.53	7.92	8.72	8.44	8.59	8.59
	LM1	11.24	11.27	11.91	10.64	11.00		11.08	11.98	11.44	11.58	11.11	11.52	11.51
	LM2	11.01	10.37	10.99	10.47			10.76		10.48	10.65	10.60		10.74
Nonmetric tooth trait														
sixth cusp	LM1	1	0	2	2	2	1	0		0	0	0		0
seventh cusp	LM1	2	0	2	2	2	0	0		0	0	0		0
protostylid	LM1	0	0	0	0	0	1	0		0	0	0		1
deflecting wrinkle	LM1	0	0		0	0		0		0		1		
groove pattern Y	LM1	2	1	1	2	1	1	2		1	2	1		1
groove pattern X	LM2	3	2	3	3		3	2		3	2	2		2
hypoconulid reduction	LM2	6	5	5	5		6	5		5	5	5		5

Appendix 4. (continued)

		391	394	396	1	112	129	155	167	188	203	337	345	357
		Male	Male	Male	Female	Female	Female	Female	Female	Female	Female	Female	Female	Female
Mesiodistal diameters (mm)														
	LI1					5.07					5.49			
	LI2	5.31						5.22			5.86			
	LC	7.17			6.61			6.23		6.66	6.89	6.82		
	LP1	6.83				6.49		6.21	7.27	7.32		7.01	6.37	
	LP2	7.02			7.34	6.77		6.15		7.28		7.83	6.09	6.36
	LM1	12.50			11.40	12.00	11.19	10.44		11.72	12.05		11.25	10.15
	LM2	11.46	10.71	9.20	10.54		11.76			10.47			9.87	9.51
Buccolingual diameters (mm)														
	LI1					5.65					5.93			
	LI2	5.82						5.86			6.04			
	LC	8.19			7.33			7.13		7.45	7.29	7.65		
	LP1	8.54				7.12		6.79	8.74	7.52		7.45	6.74	
	LP2	9.12	8.32		8.95	7.97		7.21		8.26		8.99	7.50	7.67
	LM1	11.88			11.23	11.05	11.42	10.48		10.81	11.49		10.39	10.09
	LM2	11.28	10.53	9.00	10.53		10.76			9.86			9.56	9.10
Nonmetric tooth trait														
sixth cusp	LM1	2			2	0		2		0	0		0	0
seventh cusp	LM1	0			0	0		0		0	0		0	0
protostylid	LM1	1			0	0		0		0	0		0	0
deflecting wrinkle	LM1	1			0			0		0				0
groove pattern Y	LM1	1			1	1		1		1			1	1
groove pattern X	LM2	3	2	2	2		2			2			3	3
hypoconulid reduction	LM2	5	5	4	5		5			4			5	4

Appendix 4. (continued)

		364	368	369	392	395	5	21	114	164	181	190.2	190.3	320
		Female	Female	Female	Female	Female	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
Mesiodistal diameters (mm)														
	LI1													
	LI2				5.70		5.79	5.60			6.39		6.23	
	LC			5.65			6.54	5.97			7.21			
	LP1			6.14				6.36			7.10		7.66	
	LP2				7.41		7.52	6.42			7.20			
	LM1	11.10			11.66		12.19	11.56		12.41	12.52		12.06	12.31
	LM2	10.56	10.30			10.46					11.48			10.81
Buccolingual diameters (mm)														
	LI1													
	LI2				6.72		5.84	6.41			6.21			
	LC			6.60			6.60	6.93			7.81			
	LP1			6.63				7.90			7.54			
	LP2				8.54		8.24	7.60			8.38			
	LM1	10.67			10.94		11.08	11.21		11.57	11.40		11.32	11.32
	LM2	9.96	10.78			10.70					10.47			10.61
Nonmetric tooth trait														
sixth cusp	LM1	2			2		1	0	0	1	0	1	0	0
seventh cusp	LM1	0			1		0	0	0	0	0	0	0	0
protostylid	LM1	0			0		1	0	0	0	0	0	0	0
deflecting wrinkle	LM1	0			0		0		0	0	0	0	0	0
groove pattern Y	LM1	2			1		1	1	1	1	1	1	2	1
groove pattern X	LM2	3				2					3			3
hypoconulid reduction	LM2	5				4	6					5		

Appendix 4. (continued)

		333	347	350	352	354	355	365	371	379	393
		Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
Mesiodistal diameters (mm)											
	LI1										
	LI2		5.24								5.66
	LC		6.67								
	LP1					7.21		7.12			
	LP2					7.17		7.03		6.75	
	LM1		11.58	10.75	11.87	11.40	11.97	12.30	11.13	12.42	11.97
	LM2			10.28	11.45	11.23		11.38	10.51	11.26	11.67
Buccolingual diameters (mm)											
	LI1										
	LI2		6.03								6.56
	LC		6.60								
	LP1					8.14		7.83			
	LP2					8.44		8.20		8.11	
	LM1		11.09	10.12	11.19	11.88	11.26	11.30	10.69	11.40	11.80
	LM2			10.63	11.17	11.41		10.50	10.54	10.36	11.01
Nonmetric tooth trait											
sixth cusp	LM1	0	2		1	1	0	0	1	0	0
seventh cusp	LM1	0	1		0	0	0	0	0	0	2
protostylid	LM1	0	0		0	0	0	0	0	0	0
deflecting wrinkle	LM1	0	3		0	0	0	0	1		0
groove pattern Y	LM1	1	1		1	2	1	1	1	1	1
groove pattern X	LM2			1	3	2		2	2	2	2
hypoconulid reduction	LM2	6		4	5	5		5	5	5	