

# RECONSTRUCTING FINAL JOMON POST-MARITAL RESIDENTIAL PATTERNS IN WESTERN JAPAN

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## ABSTRACT

*Human skeletal remains from the Ikawazu and Tsukumo sites were examined to obtain an insight into post-marital residential patterns in the Final Jomon period. Using tooth crown measurements, Q-mode correlation coefficients were calculated to determine the biological affinity among skeletal remains, and to test Harunari's hypothesis on Jomon kinship structure. Non-metric cranial variants were also used to address the same issue. The results suggest that both the male and female populations of a Jomon village consisted of a significant number of kin, and that both male and female individuals could remain residential members of their community of origin after marriage. It is highly likely that this pattern was produced as a result of the operation of a bilateral principle. Although the results obtained in this paper refuted Harunari's hypothesis, they support an important implication of the hypothesis that the dominant post-marital residential pattern in the Jomon period was bilocal.*

The study of post-marital residential patterns in the Jomon period of Japan has been conducted mainly by the examination of tooth-extraction patterns and mortuary practices (e.g., Harunari 1979, 1986). Nevertheless, many of the interpretations proposed so far remain speculative and do not involve coherent testable models. The author and Naomi Doi of University of the Ryukyus have previously attempted to devise a means by which the models with test implications can be verified or falsified (e.g., Tanaka *et al.* 1985; Doi *et al.* 1986). We have found that tooth-crown measurements are a genetically inherited attribute particularly suitable for testing models concerning kinship structures and post-marital residential patterns in prehistory. We have applied a procedure, which will be fully illustrated

below, to data from the Kofun period of Japan, and have obtained some successful results (Tanaka 1990).

In this paper, the author will attempt to apply the procedure to data from two prominent Jomon sites, Ikawazu in Aichi Prefecture and Tsukumo in Okayama Prefecture. Harunari's (1979) hypothesis, which states that particular types of tooth-extraction indicate the social position of the individual, has been highly influential in the study of Jomon social organization. This hypothesis is based on the assumption that specific types of tooth-extraction, namely Harunari's type 2C and type 4I, indicate that individuals with these types of tooth-extraction married into the community from the outside (Harunari 1979). In this paper, this hypothesis will be tested, and doing so, the author hopes to obtain some preliminary insights into the kinship structure and the characteristics of the social systems of the Jomon period. The author also hopes to gain an insight into the nature of the society which accepted migrants from the Korean Peninsula who brought with them wet rice agriculture in the final phase of the Final Jomon.

## MATERIAL AND METHODS

The pioneering work of Hanihara *et al.* (1983) has shown that tooth-crown measurements – in their study the mesiodistal diameter – can be used as a reliable indicator of biological kin-relations between individual skeletons. The author and Doi then modified this method by adding another measurement, the buccolingual diameter. In addition, we applied our modified procedure to randomly chosen family groups and individuals from the contemporary Japanese population, and have managed to specify the combinations of teeth which are the most sensitive indicators of biological kin-relations with respect to tooth-crown measurements. We first calculated the Q-mode correlation coefficient scores of the family group and non-family group populations. These results were then compared. The combinations of particular

teeth in which the Q-mode correlation coefficient showed a value of more than 0.500 were deleted, and most statistically significant combinations were selected by examining the frequency of their occurrence (Doi *et al.* 1986).

The skeletal samples examined were from the Ikawazu shell mound (Atsumi Town Board of Education 1988) and the Tsukumo shell mound (Kiyono *et al.* 1920). The sample from the former site consists of skeletons from individual graves and disarticulated bones collected and re-buried in a pit in a cemetery (Figures 1 and 2). The sample from the latter site consists of individual articulated skeletons buried in individual graves in a cemetery (Kiyono *et al.* 1920) (Figure 3). The investigative procedure applied was as follows:

1. Kin-relations among the male and female populations, as well as between individual skeletons, were examined in terms of the Q-mode correlation coefficient scores.
2. It was inferred that the post-marital residential pattern of a society was patrilocal if the Q-mode correlation coefficient scores of the male population were higher than that of the female population, as this suggests that biologically related individuals were represented to a greater extent in the male population than in the female population. In the same way, it was assumed that the post-marital residential pattern of a society was matrilocal if the Q-mode correlation coefficient scores of the female population were higher than that of the male population. The post-marital residential pattern was assumed to have been bilocal if the Q-mode scores between the female and male populations showed no significant statistical differences.

The results from the skeletal sample were then examined with reference to the Q-mode scores obtained from the study of the modern population (Doi *et al.* 1986) and Spence's (1974) work using non-metric cranial traits to address the same issue.

## RESULTS

### *Ikawazu*

Ikawazu site is a shell mound located on the coast of Aichi Prefecture. The site has been excavated on a number of occasions, but the skeletal sample examined in this paper was excavated in 1984 (Atsumi Town Board of Education 1988). Forty-four individual skeletons were recovered in that year. The burials were divided into three chronological sub-phases. Grave No. 6 is of particular interest in that it contained the disarticulated bones of 13 individuals. Some sort of specific social ties are envisaged to have existed among these individuals. Harunari (1979) proposed that all but individual No. 19 from this grave married into the community from other communities based on the fact that they all had type 2C tooth-extraction. Harunari assumed that those 12 individuals underwent type 2C tooth-extraction after they were married into the community to indicate their social position within that community.

The preservation of teeth in the skeletal sample was not of a sufficient level to obtain many of the desirable combinations of teeth with which biological kin-relations could be convincingly determined. In addition, only two female individuals shared any of the favourable teeth-combinations, preventing the Q-mode scores of female individuals from being fully examined. Only the combination UP1/P2/M1 could be found in sufficient numbers in the male population. Despite the fact that the number of male skeletons from Phases 1 and 2 totaled only three, and came to only five when those from Phase 3 were added, it was still very interesting to note that the ten paired Q-mode scores obtained from six male individuals in Phases 1, 2 and 3 were higher than 0.500. High scores were also obtained among male and female individuals. An average score of 0.815 was obtained from the population of three male individuals (three

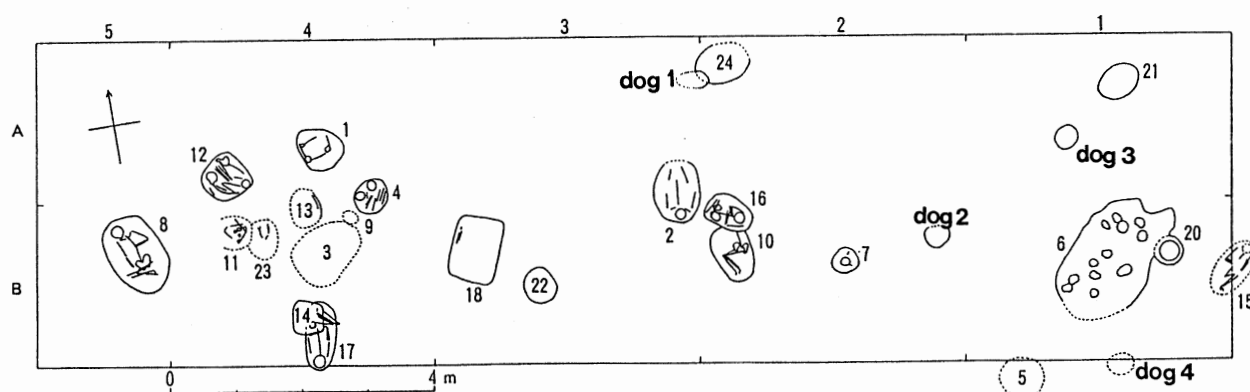


Figure 1: Plan of the Ikawazu site cemetery (Atsumi Town Board of Education, 1988).

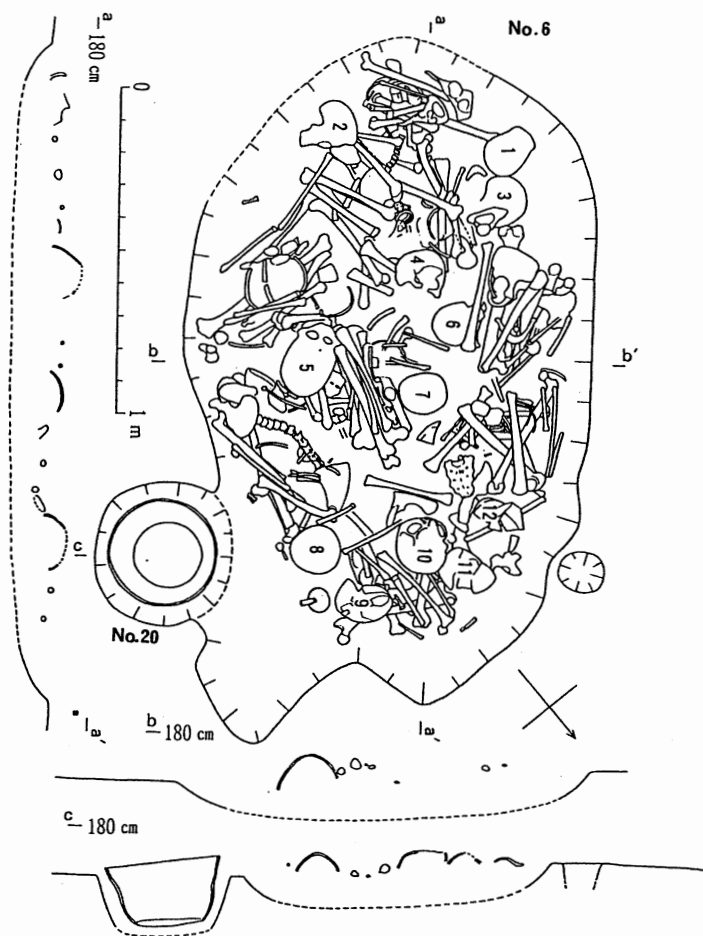


Figure 2: Detail of Grave No. 6 at the Ikawazu site (Atsumi Town Board of Education, 1988).

paired scores) from Phases 1 and 2 and 0.513 from the population of five male individuals (ten paired scores) from Phases 1, 2 and 3. Application of the same procedure to the modern Japanese sample-group produced an average score of only 0.019 among the non-kin individual population. Therefore the value of 0.513 was statistically significant (Table 1).

Following this, Q-mode scores for the combination UP2/M1 and LP2/M1/M2, which although it was not an ideal combination with regard to sensitivity in indicating biological kin-relations, was examined in order to increase the sample size which could be investigated. Using this combination, the number of male individuals increased from three to six (14 paired scores) in the Phase 1 and 2 populations and had an average Q-mode score of 0.434. If individuals from Phase 3 are included, the number increases from five to eight individuals (28 paired scores) and the average becomes

0.401. The average of the non-kin individual population of the modern Japanese sample group was 0.074.

It was shown that the Q-mode scores among the male population of the skeletal sample were all significantly higher than those obtained from the non-kin individual population of the modern Japanese sample-group. This suggests that the male population of the skeletal sample included a significant number of biologically related individuals. Bearing this in mind, an examination of non-metric cranial variants was carried out. Twenty-nine non-metric cranial variants, among which 19 variants have been confirmed as being free from possible sex-based differences, were selected for examination and their cumulative affinity values calculated according to Spence (1974). The results showed no significant differences between the male and female populations. It is of particular interest to note that the cumulative affinity value of ten male and female individuals with Harunari's 2C type tooth-extraction was 14.0% for the 29 variants and 7.0% for the 19 non-sex related variants. The values for the male and female individuals buried in Grave No. 6 were 23.5% and 17.4% respectively.

The data from Ikawazu site suggest the following interpretation of kin-relations at that site. Firstly, it must be noted that the Q-mode scores obtained among the male individuals are statistically very high. If this result can be assumed to reflect the kin/non-kin relations within the male population included in the data, it suggests that the population included a reasonable number of kin. Harunari inferred that individuals with type 2C tooth-extraction married

into the community from the outside, and were thus non-kin, but the above results do not support Harunari's hypothesis. However, due to the small sample-size, these results should not be accepted without caution.

The cumulative affinity value, calculated according to Spence (1974), shows that there is no significant difference between the male and female populations. This suggests that the post-marital residential pattern of the Ikawazu community is likely to have been a bilocal one, with a strong possibility of both male and female members of the community being able to remain in their community after marriage. This result coincides well with the results of the tooth-measurement examination.

What should be noted here is that the cumulative affinity value obtained for the male and female individuals with Harunari's type 2C tooth-extraction is 7.0%. This is a relatively low value, and one could argue from this that

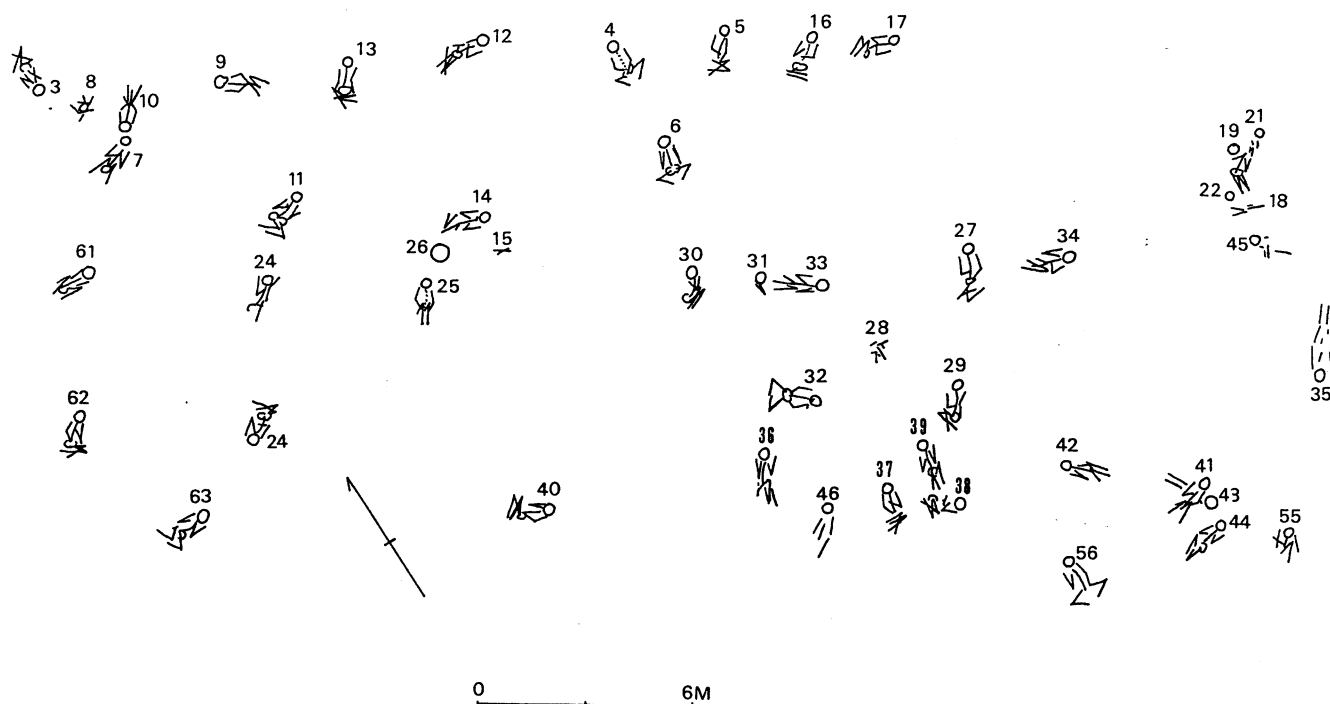


Figure 3: Plan of the Tsukumo site cemetery (Kyono et al. 1920).

Table 1. Q-mode scores of the Ikawazu and modern non-kin populations. (\*\*\*) denotes significance at the 0.001 level)

Tooth combination	Population	Pairs	Mean values
P <sup>1</sup> P <sup>2</sup> M <sup>1</sup>	Males (Phases 1-2)	3	0.815
	Males (Phases 1-3)	10	0.513***
	Modern Non-kin	200	0.019
P <sup>2</sup> M <sup>1</sup> P <sub>2</sub> M <sub>1</sub> M <sub>2</sub>	Males (Phases 1-2)	14	0.434***
	Males (Phases 1-3)	28	0.401***
	Modern Non-kin	200	0.074

Table 2. Q-mode scores of the Tsukumo and modern non-kin populations. (level of significance: \*\*\* 0.001; \*\* 0.01; \* 0.05)

Tooth combination	Population	Pairs	Mean values
P <sup>1</sup> P <sup>2</sup> M <sup>1</sup>	Males	35	0.345***
	Females	10	0.320*
	Modern Non-kin	200	0.019
P <sup>1</sup> P <sup>2</sup> M <sup>1</sup> P <sub>1</sub> P <sub>2</sub> M <sub>1</sub>	Males	20	0.426**
	Females	13	0.407***
	Modern Non-kin	200	0.074
M <sup>1</sup> M <sup>2</sup> M <sub>1</sub> M <sub>2</sub>	2C type	15	0.498*
	4I type	20	0.486***
	Modern Non-kin	200	0.189

Harunari's hypothesis that these individuals married into the community could still hold. Nevertheless, the population from which the value was obtained did not include the individuals from Grave No. 6 who, although they had type 2C tooth-extraction, were not included on the grounds that the disarticulated upper and lower jaws from the grave could not be matched. The value obtained among the individuals from Grave No. 6 was, as already mentioned, very high. Harunari's hypothesis cannot be verified on these grounds.

#### Tsukumo

The Tsukumo site is a shell-mound located in Okayama Prefecture on the coast of the Inland Sea. A number of excavations of various scales have been conducted at this site in the past. The skeletal sample used in this study was obtained in the excavation conducted by Kyoto University in 1919-1920 (Kiyono *et al.* 1920). The skeletal sample is thought to be contemporary with, or to be from a slightly earlier time-period than that of the Ikawazu site.

The results of the examination employing the same procedure as applied to the Ikawazu data are presented in Table 2. The sample size was, again, not entirely

satisfactory. Nevertheless, the Q-mode scores obtained were significant and worthy of careful interpretation.

# CONCLUDING REMARKS

The results of the examination of the Ikawazu and Tsukumo data suggest that the data-populations included a significant number of kin. It has also been suggested that both the male and female populations of the data sets consisted of a significant number of kin. This suggests that both male and female individuals could remain residential members of their community of origin after marriage. It is highly likely that this pattern was produced as a result of the operation of a bilateral principle in their post-marital residential choice.

Harunari's hypothesis that particular tooth-extraction types indicate the social positions of individuals has been highly influential in the study of Jomon social organization. In this paper, the author has specifically attempted to test his hypothesis that tooth-extraction types 2C and 4I indicate individuals who married into the community from outside. Although the results obtained refute Harunari's hypothesis as a whole, they support an important implication of Harunari's hypothesis that the dominant post-marital residential pattern in the Jomon period was bilocal.

This outcome is particularly important in that the characteristics of the bilocal residential pattern would have affected the way in which migrants, carrying wet-rice agricultural technology and related socio-economic and ideological elements, were accepted into the Final Jomon communities in western Japan. Brace and Nagai (1982) and Hanihara (1987) have argued that, in the Yayoi period, numerous people immigrated to western Japan displacing the Jomon people. Nevertheless, a large amount of archaeological evidence suggests that the number of immigrants was not as high as first believed, and this evidence strongly suggests that male and female immigrants and Jomon people lived together peacefully (Tanaka 1986; Shimojo 1989). As Kanaseki (1969) had speculated, the bilateral society, which the present author has assumed to have been present in the Jomon period, can be considered the most suitable for the acceptance of immigrants. This also suggests that membership of Jomon communities was not highly restricted.

The work presented here is still in its preliminary stages. Nevertheless, the enormous potential of the procedure used has, the author believes, been made clear. The author hopes to make contributions to a wide range of issues, covering not only Jomon post-marital residential patterns, but also relationships between post-marital residential patterns and social structures, by elaborating the procedure in the near future.

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