

Notes on the Human Skeleton of the Early Jomon Phase from the Meotoiwa Rock Shelter Site in Ogose, Saitama Prefecture

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Abstract A mature male skeleton of the Early phase of the Jomon Period excavated at the Meotoiwa rock shelter site in Ogose was measured and described. It showed such characteristic features as the low and wide facial skeleton, extremely advanced tooth wear, thin limb bones, and highly pilastric femur that are common to most of the Jomon skeletal remains from the Early and Earliest phases.

Introduction

A human skeleton was found, without any grave goods, from the Meotoiwa rock shelter in Ogose, Saitama Prefecture, in 1987. The shelter was inhabited intermittently from the Earliest phase of the prehistoric Jomon Period to the early historic Heian Period. Archaeological circumstances suggested an association with two intact potteries of the Yayoi Period, but the skeletal morphology implied an earlier date. Thus, in order to ascertain the chronological position of this skeleton, a bone fragment was submitted to radiocarbon analysis, and it was confirmed to go back to the Early phase of the Jomon Period. The scarcity of human skeletal materials from the earlier phases of the Jomon Period enhances the importance of this material.

Material

The Meotoiwa rock shelter is a small site, covering an area of about 30 square meters, located along the rivulet of Tsukune in Ogose-cho, Saitama Prefecture. It was excavated by the Board of Education of Ogose-cho, under the direction of Mr. Naotake HASHIGUCHI, in 1987. Artifacts of the Heian Period, the Yayoi Period, and the Late through the Earliest phases of the Jomon Period were found successively. There was found one and only burial, yielding a partial skeleton in a contracted supine position, with the elbow, hip, and knee joints fully flexed and the head directed to the south (HASHIGUCHI and ISHIKAWA, 1988).

The skeleton, estimated to be of a mature male, was dated at 6510 ± 200 yr B. P. (NUTA-2055; half life=5570 years, 0 yr B. P.=A. D. 1950), or the Early phase of the Jomon Period, by accelerator mass spectrometric measurement of ^{14}C of a piece of the left fibula (Matsu'ura *et al.*, 1992).

The braincase, the mandible, and the left femur are well preserved, but the mid-facial skeleton and most of the postcranial bones are in more or less fragmentary conditions.

Description

Cranial measurements, incidence of nonmetric cranial traits, and postcranial measurements are given in Tables 1 to 3.

Braincase

The calvarial part is nearly complete, but the anterior part of the cranial base is largely missing. The size is moderate, but the superciliary arches are prominent and the mastoid processes are fairly large. The major calvarial sutures are at the first or second stage of closure. The score of vault suture closure of MEINDL and LOVEJOY (1985) is 9, corresponding to the mean age of 39.4.

The outline in vertical view is ovoid and mesocranic, with the length-breadth index of 77.7. The frontal and parietal tubera are not prominent. The complexity of the major suture lines is moderate. The antero-medial corners of the parietals are slightly thickened with porous surface. No sutural anomaly is seen in and around the occipital. The external occipital protuberance is small but distinct.

In the lateral view, the glabella is well developed, reaching BROCA's stage 5, a

Table 1. Cranial measurements.

1. Maximum cranial length	179	27. Parietal sagittal arc	130
5. Nasion-basion length	105	27: 26	107.4
8. Maximum cranial breadth	139	29. Frontal sagittal chord	106
8: 1	77.7	29: 26	87.6
9. Least frontal breadth	100	30. Parietal sagittal chord	112
9: 8	71.9	30: 27	86.2
10. Maximum frontal breadth	118	38. Cranial capacity (Lee-Pearson)	1451
9: 10	84.7	43. Outer biorbital breadth (fmt)	111
11. Biauricular breadth	125	43(1). Inner biorbital breadth (fmo)	104
12. Biasterionic breadth	105	43c. Nasion-biorbital subtense	15.5
12: 8	75.5	43c: 43(1)	14.9
17. Basion-bregma-height	140	45. Bizygomatic breadth	(140?)
17: 1	78.2	48(1). Nasospinale-prosthion height	(22.5)
17: 8	100.7	51. Orbital breadth (l)	(42)
20. Auriculo-bregmatic height	114	67. Bimental breadth	49
20: 1	63.7	69. Height of symphysis	(31)
20: 8	82.0	69(1). Height of Corpus mandibulae (>28)	
23. Horizontal circumference	515	69(3). Thickness of Corpus mandibulae	13
24. Transverse arc	312	69(3): 69(1)	(<46.4)
26. Frontal sagittal arc	121	71. Breadth of ramus (r)	35

Measurements are numbered in conformity with MARTIN's system (BRÄUER, 1988).

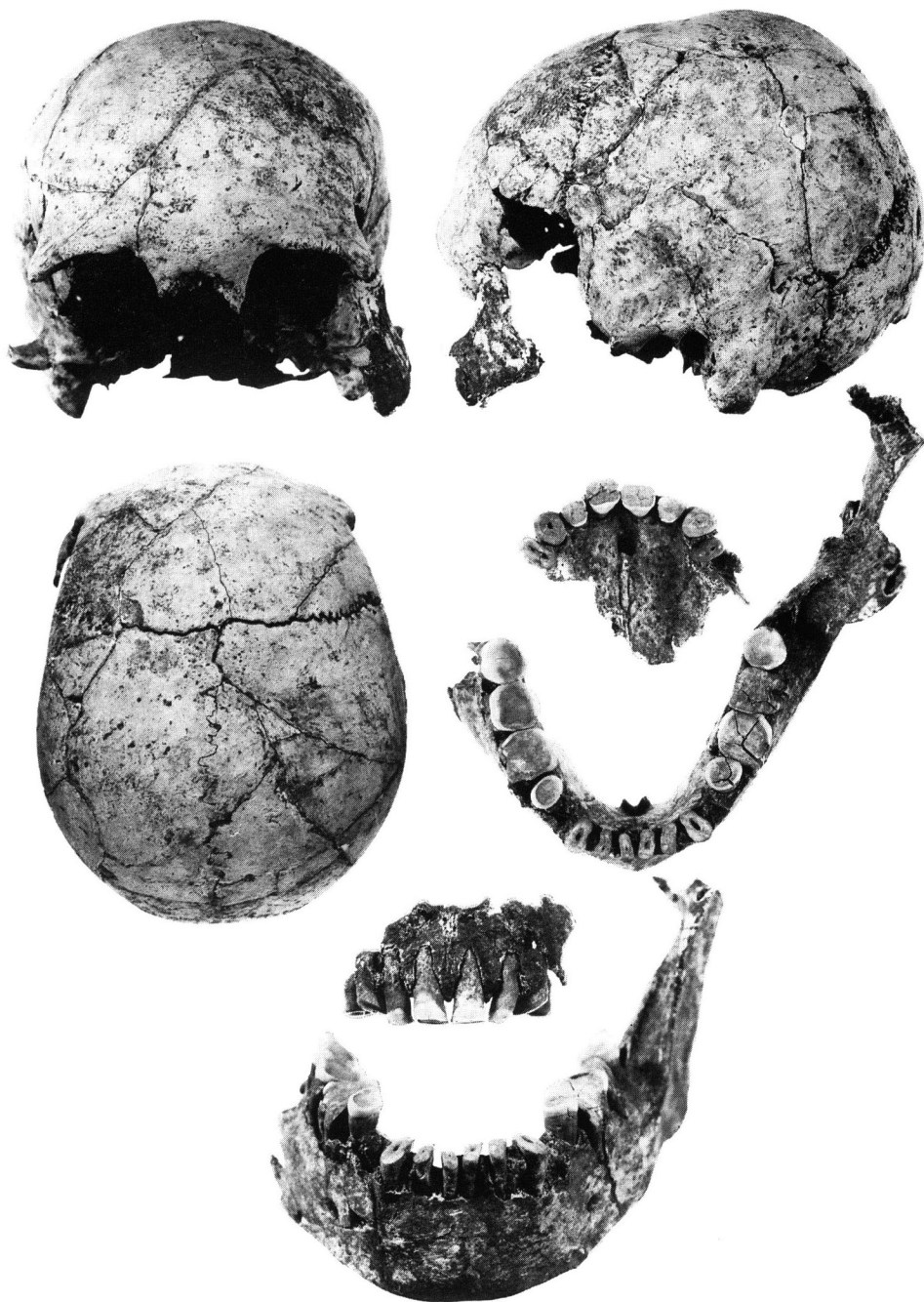


Fig. 1. The skull and dentition of the Meotoiwa human skeleton.

shallow depression is formed behind the bregma, and curvature of the upper occipital squama is slight. The temporal lines are rather weak, but the supramastoid crests are prominent.

The hypoglossal canals are not bipartite, but the right canal shows a slight tendency toward bipartition. A small perforation is recognized in the right tympanic plate. Slight arthritic pitting is seen on the posterior surface of the right mandibular tubercle.

A faint sagittal keeling is seen in the frontal view. The frontal squama is broad, with the temporal lines diverging superiorly. The brow ridges are even more developed than the glabella. The zygomatic processes of the frontal project laterally, making the frontal index of flatness considerably lower than the average of the Jomon crania (YAMAGUCHI, 1980).

Facial skeleton

Only the antero-inferior portion of the maxillae, the left zygomatic bone, and the mandible are preserved in more less incomplete conditions.

The nasion is deep-set under the strongly developed glabella. The small fragment of the frontal process of the left maxilla attached to the frontal indicates that the outer surface of the process faced laterally rather than anteriorly. There is no neural foramen along the superior orbital margins. Camaeconchic orbital margins and a euryene facial skeleton are suggested by the position of the zygomatic and the form of the anterior portion of the maxillae. The anterior alveolar portion seems to be slightly prognathic.

The mandible is incomplete with the right ramus separated from the rest. The mental protuberance is prominent, but the mental tubercles are indistinct. The mandibular body is rather low, and does not rock with flat basal margins and slightly projecting and everted angles. The ramus is broad and the pterygoid tuberosities are rugged. The mandibular torus is absent on both sides. The mental spines for the genioglossus and geniohyoid muscles are well developed.

A large body of the hyoid is preserved. The junction with the greater horn is not yet ossified.

Dentition

Condition of preservation is as follows:

= = = = P C I I	I I C P = = = =
M M M P ○ C I I	I I C ○ P M M M

(= : missing area, ○ : missing tooth.)

BROCA's degree of wear and the form or the inclination of the occlusal surface of each tooth are listed below.

Upper I1: 3, almost horizontal

Table 2. Incidence of nonmetric cranial variants.

Inca bone	—	Hypoglossal canal divided (l)	—
Lambda ossicle	—	The third condyle	—
Sutura mendosa (>10 mm) (r)	—	Tympanic dehiscence (>1 mm) (r)	+?
(l)	—	Palatine torus	—
Asterion ossicle (r)	—	Metopism	—
(l)	—	Supraorbital nerve groove (r)	—
Occipitomastoid ossicle (r)	—	(l)	—
(l)	—	Supraorbital foramen (r)	—
Parietal notch bone (>5 mm) (r)	+	(l)	—
(l)	—	Transverse zygomatic suture (>5 mm) (l)	—
Pterion (r)	H	Multiple mental foramina (r)	—
Auditory exostosis (r)	—	(l)	+
(l)	—	Mylohyoid bridge (r)	—
Transverse sinus dominance	R	(l)	—
Condylar canal patent (l)	+	Mandibular torus (r)	—
Hypoglossal canal divided (r)	—	(l)	—

Upper I2: 3, distal (close to the neck)

Upper C: 4, convex and buccally advanced (pulp cavity exposed)

Upper right P1: 4, horizontal (pulp cavity exposed)

Upper left P1: 4, convex both mesiodistally and buccolingually (pulp cavity exposed)

Lower I and C: 4, convex labiolingually (pulp cavity exposed except in the left I2)

Lower right P2: 3, nearly horizontal

Lower left P2: 2, nearly horizontal

Lower M1: 3/4, mesiobuccal (to the root)

Lower right M2: 3, nearly horizontal

Lower left M2: 4, convex buccolingually, especially advanced buccally

Lower M3: 2, lingual

The occlusal surface of the maxillary tooth row does not fit that of the mandibular tooth row. The wears of the upper canines, lower incisors, canines, and the first molars seem to be caused by the use of teeth for some purpose other than mastication, such as skin tanning or fiber working.

Postcranial bones

The axial skeleton is preserved in a poor condition. Most of the thoracic bones and vertebrae are fragmented and only a small number of pieces are preserved, with the exceptions of the first and the second cervical vertebrae. The superior articular surfaces of the atlas are divided into two parts by the transverse crease. The articular surface of the fovea dentis shows some marginal lipping. Costal fragments are generally thin.

Both of the right and left clavicles lack the epiphyses. The shaft is moderately

Table 3. Postcranial measurements.

	Right	Left
Clavicle		
4. Vertical diameter of midshaft	10	—
5. Sagittal diameter of midshaft	12.5	—
4: 5	80.0	—
6. Circumference of midshaft	38	—
Humerus		
4. Bi-epicondylar width	—	53
5. Maximum diameter of midshaft	20	19
6. Minimum diameter of midshaft	15	15.5
6: 5	75.0	81.6
7. Least circumference	55	55
Ulna		
3. Least circumference	31	30
11. Dorso-ventral shaft diameter	—	11.5
12. Transverse shaft diameter	—	14
11: 12	—	82.1
Radius		
3. Minimal circumference	34	34
4. Maximum transverse shaft diameter	—	15
5. Sagittal shaft diameter	—	10
5: 4	—	66.7
Femur		
1. Maximum length	—	420
2. Oblique length	—	417
6. Antero-posterior diameter of midshaft	28	27
7. Medio-lateral diameter of midshaft	23.5	22
6: 7	119.1	122.7
8. Circumference of midshaft	81	77
9* Maximum subtrochanteric diameter	—	26.5
10* Minimum subtrochanteric diameter	—	21.5
10*: 9*	—	81.1
Tibia		
8. Sagittal diameter of midshaft	28	27.5
9* Transverse diameter of mid-shaft (after Vallois)	19	18
9*: 8	67.9	65.5
Fibula		
2. Maximum diameter of midshaft	—	12.5
3. Minimum diameter of midshaft	—	10
3: 2	—	80.0
4. Circumference of midshaft	—	38

Measurements with asterisked numbers are slightly different from Martin's system.

thick and flat. The scapulae of both sides are fragmented and only the glenoid cavities and the axillary borders are preserved in good condition. A small depression is recognized in the center of the glenoid cavity of each side. The predominant groove on the axillary border is that for the subscapularis muscle. Marginal arthritic lipping

of the glenoid cavity is seen only in the right scapula.

The humeri of both sides lack either one or two epiphyses. The left humerus, better preserved than the right, is definitely slenderer and less flat in the shaft than average Jomon humeri. The fossa oleclani is perforated but it is difficult to determine whether the perforation is postmortem or antemortem, since the margin of the foramen is broken. No arthritic changes are recognized in the preserved parts of the proximal and distal articular surfaces. Muscle markings are developed moderately. The shaft of the right humerus shows a laterally convex curvature.

The right ulna is eroded and lacks both ends. The shaft is thin with the interosseous margin developed weakly, but the pronator crest on the anterior surface is well developed. The left ulna lacks the distal part. The shaft is slender and the midshaft cross section does not show the typical flatness of the Jomon ulnae. The radii of both sides also lack the epiphyses. The shaft is thin and flat. Most of the hand bones of both sides are preserved but are more or less broken. The carpal bones are smaller than Jomon averages, and the metacarpals seem to be generally slender.

Of the innominate bones, only a fragment of the left ilium including the lower part of the iliac fossa and the upper part of the acetabulum is preserved. No arthritic changes are recognized on the lunate surface. The sex indicating outline of the greater sciatic notch is not observable.

The right femur is eroded and broken into several pieces. The left femur is better preserved, though it lacks the greater and lesser trochanters and the medial epicondyle. This is the only long bone of which the maximum length can be measured. The stature is estimated to be 158.6 cm by the equation of FUJII (1960) and 160.2 by that of PEARSON (1899). These estimates are fairly close to the average stature estimate of the Jomon males (HIRAMOTO, 1972). The shaft is slender with the thin and elevated *linea aspera* on the posterior surface. The pilastric index is definitely higher than the Jomon average. The subtrochanteric part of the shaft is platymeric with moderately developed lateral crest and the cross section index is close to the Jomon average. The *empreinte iliaque* is present on the anterior surface of the neck. The intercondylar fossa is narrow (19.5 mm).

The vastus notch is not present in the left patella. The right patella is broken.

The tibia of each side preserves only the proximal half of the shaft. The shape of the cross section of the midshaft is close to the type 5 of HRDLÍČKA (STEWART, 1947), and the index value is mesocnemic, being close to the Jomon average. The soleal line is marked rather weakly.

The right fibula is missing. The left fibula is broken and lacks the proximal epiphysis. The shaft is very thin, with the midshaft circumference close to the minimum of the range of variation in the Jomon fibulae, and less flat than the Jomon average, but the lateral surface is fluted as seen in many Jomon fibulae.

The metatarsal I and the proximal phalanx I of the right foot and the talus, calcaneus, navicular, medial and intermediate cuneiforms, and the metatarsal I of the left foot are preserved in more or less incomplete conditions. Because of surface

erosion, it is difficult to judge whether the squatting facet is present or absent on the neck of the left talus. Both the talus and the calcaneus are small, with lengths of about 45 mm and about 73 mm respectively. The proximal phalanx I, 30 mm long and 13 mm wide at the midshaft, is slenderer than the Jomon average (YAMAGUCHI, 1991).

Discussion

The Meotoiwa skeleton shares the prominent glabella and brow ridges, laterally projecting zygoma, low and wide forms of the orbital margin and of the facial skeleton, elevated nasal root, pilastric femur, and mesocnemic tibia with the average skeletal remains of the Jomon Period (YAMAGUCHI, 1982).

Among the Jomon remains, it is closer to those from the earlier phases than to those from the later phases in that the mandibular body is fairly low, the dental wear is extremely advanced indicating the influence of the use of teeth for some purpose other than normal chewing activities, all the long limb bones are slender, and the pilastric index of the femur is very high (DODO, 1976; MORIMOTO & TAKAHASHI, 1986; OGATA, 1981; SUZUKI, 1950).

Summary and Conclusion

A mature male skeleton of the Early Jomon phase excavated from a small rock shelter site at Meotoiwa in Ogose was measured and described. In addition to common Jomon characters, it showed the features that were characteristic of many of the remains of the earlier phases of the Jomon Period, such as the very low facial skeleton, non-masticatory attrition of the teeth, slender limb bones, and the strong pilastric structure of the femur.

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