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A Human Skeletal Remain of Yayoi Period from Shakameyama Site, Ehime Prefecture, Shikoku

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It has been demonstrated by analyses of a considerable amount of human skeletal material collected in Kyūshū and Chūgoku districts that the population of Yayoi period in the westernmost part of Japan was composed of short-statured groups with low face and taller groups with rather high face (*e.g.* KANASEKI, 1966; NAITO, 1971). According to the leading hypothesis proposed by KANASEKI (1966, 1976), the former groups were basically the descendants of the indigenous Jōmon population while the latter included the immigrant stocks from the Asiatic continent who brought such primary elements of Yayoi culture as rice cultivation and metallurgy with them into Japanese islands.

On the other hand, only a small number of human skeletal remains of Yayoi period have been found in other districts of Japan (*e.g.* SUZUKI, 1969). As a matter of fact, the Shakameyama material, to be described here, is the one and only remain of Yayoi people as yet in Shikoku district. Comparative analyses of this material with Yayoi contemporaries and Jōmon forerunners will contribute to throwing light on the post-Jōmon population history in the island of Shikoku.

Materials and Methods

Provenance

A group of dwelling houses and five square moated graves (*Hōkeishūko-bo*) of late Middle Yayoi period (around A.D. 100) were excavated at Shakameyama site, Shimoharamachi, Tobe-chō, Iyo-gun, Ehime Prefecture, Shikoku, in 1974 by Prof. S. NISHIDA of Ehime University and his project team. Only one of the graves (Grave 5) preserved a human skeletal remain in an adequate condition. The graveyard of about 9 m in diameter was enclosed by some 1 m wide square furrows. A rectangular stone cist (about 160 cm long, 40 cm wide, and 30 cm deep in the clear), covered by a mound of clay, was placed in its center. The body was found lying on the pebbly bottom of the cist in an extended supine position, with the head directed to the east (Fig. 1). Some amount of cinnabar had been sprinkled all over the body. No grave goods but for some Middle Yayoi potsherds placed in the enclosing furrows were found with the body.

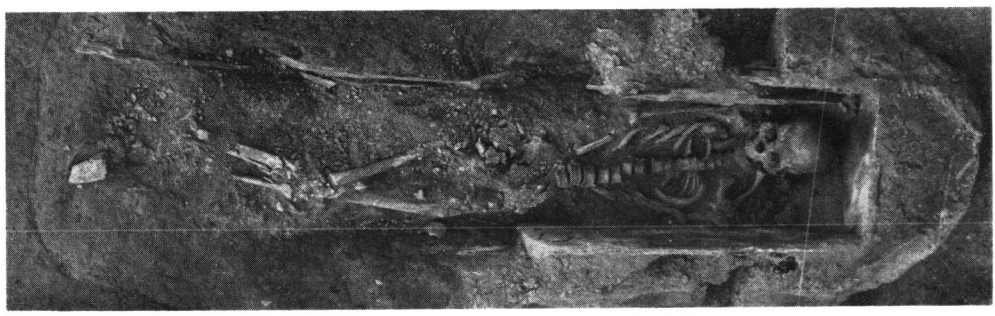

Fig. 1. The Shakameyama skeleton found in the stone cist of the Grave 5. (Courtesy Mr. Y. YONEKURA.)

The skeletal material was prepared and investigated in the National Science Museum, Tokyo, and has subsequently been deposited in the Prefectural Museum of Ehime in Matsuyama.

Preservation

The axial skeleton is preserved in good condition, whereas the extremity bones are damaged to a considerable extent. Hand and foot bones are virtually missing.

The frontal, zygomatic and some other bones show numerous small areas of destruction, 1 to 5 mm in diameter, on their surface. In view of the fact that the erosion is confined to the bone surfaces which were not covered by soil but exposed to the air in the cist, it seems more likely that the destruction was caused by physico-chemical action rather than by some pathological process.

Sex and Age

Morphological sexing of this skeleton is rather difficult, because not only the innominate bones are missing, but the cranial morphology is ambiguous, showing masculine characters in the mastoid region and feminine features in the facial region. Metrically, however, the dimensions of the skull are slightly closer to the means of the male than to those of the female of the most representative Yayoi series from Doigahama site (KANASEKI, NAGAI, & SANO, 1960). It is also confirmed by the craniometric discriminant functions of HANIHARA (1959). All of the eight functions based on different combinations of cranial measurements assign the skull to the male.

The principal cranial sutures are still open outside, excepting a small section of the sagittal suture, but extensively closed inside. Dental attrition reaches the 2nd or 3rd grade except in the molar region, where many teeth were lost ante-mortem owing to pathological cause.

Thus, a male of late adult or early mature phase seems to be a reasonable estimation of the sex and age.

Methods of Measurements and Descriptions

Basically, the metric definitions and descriptive criteria of R. MARTIN (MARTIN &

SALLER, 1957) are followed unless otherwise noted.

Measurements and Descriptions

Measurements and indices of the skull are given in Table 1. Those of postcranial bones are inserted in the respective sections of the following descriptions.

Table 1. Measurements and indices of the Shakameyama skull.

1.	Grösste Hirnschädellänge	(178)	32.	Stirnprofil-Winkel	85°
3.	Glabello-Lambdalänge	174	32(5)	Krümmungswinkel des Stirnbeins	137°
3a.	Nasion-Lambdalänge	175	37(2)	Schädelbasis-Winkel	27°
5.	Schädelbasislänge	103	40.	Gesichtslänge	103
7.	Länge des Foramen magnum	—		40: 1	(57.9)
8.	Grösste Hirnschädelbreite	136		40: 5	100.0
	8: 1	(76.4)	41.	Seitliche Gesichtslänge	73
9.	Kleinste Stirnbreite	98	42.	Untere Gesichtslänge	115
	9: 8	72.1	43.	Obergesichtsbreite	108
10.	Grösste Stirnbreite	113		9: 43	90.7
	9: 10	86.7	44.	Biorbitalbreite	101
11.	Biauricularbreite	126	45.	Jochbogenbreite	134
12.	Grösste Hinterhauptsbreite	108		45: 8	98.5
	12: 8	79.4		9: 45	73.1
13.	Mastoidealbreite	—		10: 45	84.3
16.	Breite des Foramen magnum	—		40: 45	76.9
17.	Basion-Bregma-Höhe	138	46.	Mittelgesichtsbreite	95
	17: 1	(77.5)		46: 45	70.9
	17: 8	101.5	47.	Gesichtshöhe	104
	(1+8+17)/3	(150.7)		47: 45	77.6
18.	Ganze Schädelhöhe	138		47: 46	109.5
20.	Ohr-Bregma-Höhe	116		(40+45+47)/3	113.7
	20: 1	(65.2)	48.	Obergesichtshöhe	64
	20: 8	85.3		48: 18	46.4
21.	Ganze Ohrhöhe	115		48: 45	47.8
23.	Horizontalumfang über Glabella	503		48: 46	67.4
	17: 23	27.4		(40+45+48)/3	100.3
24.	Transversalbogen	309	49.	Hintere Interorbitalbreite	—
	11: 24	40.8	49a.	Zwischenaugenbreite	23
25.	Mediansagittal-Bogen	—	50.	Vordere Interorbitalbreite	22
26.	Mediansagittaler Frontalbogen	117		50: 44	21.8
27.	Mediansagittaler Parietalbogen	130	51.	Orbitalbreite (mf)	41
	27: 26	111.1		51: 45	30.6
28.	Mediansagittaler Occipitalbogen	—	51a.	Orbitalbreite (d)	39
29.	Mediansagittale Frontalsehne	106	52.	Orbitalhöhe	35
	29: 26	90.6		52: 48	54.7
30.	Mediansagittale Parietalsehne	119		52: 51	85.4
	30: 27	91.5		52: 51a	89.7
31.	Mediansagittale Occipitalsehne	—			

54.	Nasenbreite	27
	54: 45	20.1
55.	Nasenhöhe (ns)	46
	54: 55	58.7
	Nasenhöhe (nariale)	46
56.	Länge der Nasenbeine	21
57.	Kleinste Breite der Nasenbeine	(8)
	57: 56	(38.1)
57(1)	Grösste Breite der Nasenbeine	18
	57: 57(1)	(44.4)
57(2)	Obere Breite der Nasenbeine	—
60.	Maxilloalveolarlänge	53
	60: 40	51.5
61.	Maxilloalveolarbreite	(62)
	61: 45	(46.3)
	61: 60	(117.0)
62.	Gaumenlänge (sta)	45
63.	Gaumenbreite	—
64.	Gaumenhöhe	—
65.	Kondylenbreite des Unterkiefers	(127)
66.	Winkelbreite des Unterkiefers	106
	66: 45	79.1
	66: 65	(83.5)
67.	Vordere Unterkieferbreite	53
68.	Länge des Unterkiefers	80
	68: 65	(63.0)
68(1)	Länge des Unterkiefers	107
69.	Kinnhöhe	27
69(1)	Höhe des Corpus mandibulae	—
69(2)	Höhe des Corpus mandibulae (M_2)	—
69(3)	Dicke des Corpus mandibulae	13
70.	Asthöhe	58
70a.	Asthöhe (vertikal)	59
70(1)	Koronoidhöhe	58
71.	Astbreite	37
	71: 70	63.8
71a.	Kleinste Astbreite	37
72.	Ganzprofilwinkel	81°
73.	Nasaler Profilwinkel	(85°)
74.	Alveolarer Profilwinkel	69°
75.	Profilwinkel des Nasendaches	66°
77.	Querprofilwinkel des Obergesichtes	142°
79.	Astwinkel des Unterkiefers	121°
Measurements of facial flatness (See YAMAGUCHI, 1973.)		
	Frontal chord (fmo-fmo)	99.2
	Frontal subtense from nasion	17.1
	Frontal index of flatness	17.2
	Simotic chord	8.8
	Simotic subtense	0.9
	Simotic index of flatness	10.2
	Zygomaxillary chord (zma-zma)	95.4
	Zygomaxillary subtense from ss	18.2
	Zygomaxillary index of flatness	19.1
	Horizontal zygomatic arc	r. 62
	Vertical zygomatic arc	r. 46
	Horizontal zygomatic chord	r. 56.0
	Zygomatic subtense	r. 11.7
	Zygomatic index of flatness	r. 20.9

Neurocranium (Figs. 2–4)

Almost complete except for partial damages in the sphenoid and occipital bones. More than thirty small perforations of the outer compact layer, probably due to natural erosion, are scattered on the surface of the right parietal, frontal, and zygomatic bones.

The closure of the coronal, sagittal, and lambdoid sutures are in grade 0, 1, and 0 outside, and 4, 3, and 2 inside respectively. The metopic suture is entirely closed.

The vault is ovoid in *norma verticalis* and relatively high. Length-breadth index is mesocranic (76.4). Length-height and breadth-height indices are hypsi- and acrocranic respectively. Frontal and parietal tubera are moderately developed. The complexity of the vault sutures is rather slight. A medium-sized left lambdoid suture bone is the only wormian bone throughout the course of the principal vault sutures. Foramen parietale is present on the right side only. No sign of sagittal keeling is observed in the parietals.

The vault is house-form in *norma occipitalis*. The external occipital protuberance

is small. There is no trace of the transverse occipital suture.

In *norma lateralis*, the glabella is rather indistinct, reaching only the grade 2 in prominence. The frontal and occipital profiles are curved moderately. Mid-sagittal parietal arc is much longer than the frontal. The temporal lines are generally obscure, but posteriorly they end in a salient supramastoid crest. Articulation type at the pterion is sphenoparietal on either side. The squamosal suture takes a low and flat course, being interposed by a small parietal notch bone on the left side. The mastoid

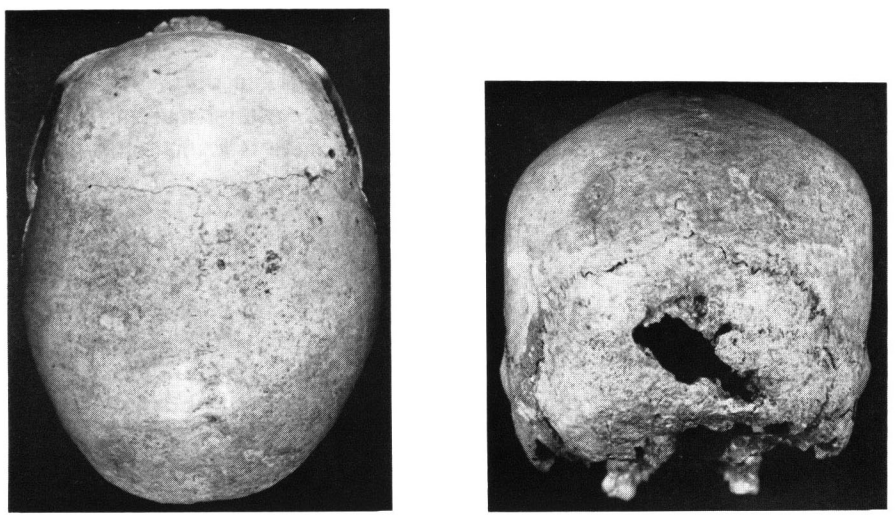

Fig. 2. Norma verticalis and norma occipitalis of the Shakameyama skull.

Fig. 3. Norma lateralis of the Shakameyama skull.

process is medium-sized. The external acoustic meatus is slightly narrowed by low exostoses on its anterior and posterior walls bilaterally. Tympanic dehiscence is found on neither side.

Limited portions are preserved intact in the base of the skull. A spinule is formed in the middle of the anterior margin of the foramen magnum. No other anomalies, such as the precondylar tubercle or the ossified apical ligament, are discerned in this region. The lateral lamina of the pterygoid process is well developed, but the pterygospinous foramen is not formed at its base.

In *norma frontalis*, the supra-orbital region of the frontal bone is rather even with very low relief of the glabella and the superciliary arches. Only at the lateral end of the supra-orbital margin, a distinct bony tubercle stands out on the outer surface of the zygomatic process of the frontal bone. The supra-orbital margin has a frontal notch and a supra-orbital foramen on either side. There is a small area of cribrous formation in the roof of the left orbit.

Facial Skeleton (Figs. 3–5)

The facial skeleton as a whole is low and relatively wide. The upper facial index is euryenic.

The shape of the margins of the orbit is transversely long oval, with somewhat tilted axis. The orbital index is hypsiconchic.

The nasion region is not deeply engraved. The smooth profile of the glabella continues into the concave profile of the nasal bridge without sharp inflection. Horizontal contour of the nasal bones is low and flat. The direction of the facial surface of the frontal process of the maxilla is nearer to the frontal plane than to the sagittal.

Fig. 4. Norma basalis and norma frontalis of the Shakameyama skull.

The piriform aperture is low and wide. The nasal index is hyperchamaerrhinic. The lower margin of the piriform aperture is clear-cut and the anterior nasal spine protrudes sharply.

The body of the maxilla is generally reduced in size, and a large concavity, instead of a trim canine fossa, is observed at the anterior surface of the mid-face. There are multiple infra-orbital foramina and infra-orbital suture in both maxillae. The alveolar process of the maxilla is extremely low, and its anterior portion is markedly prognathous.

The zygomatic bone is small, low, and considerably flared. The zygomaxillary tuberosity, inframaxillary fossa, and a short posterior vestige of the transverse suture are observed bilaterally.

None of the palatine torus, bony bridging of palatine grooves, and incisive suture are found in the bony palate.

In the symphyseal region of the mandible, mental protuberance is pronounced and the mental tubercles are indistinct. The mandibular body is extremely low. The mental foramen is single and positioned between P_2 and M_1 on either side. The base of the body is flat and the mandible does not belong among so-called rocker jaws. The ramus is oblique and broad. The angle is everted on the right side but not on the left. The lingula is small and the mylohyoid arch is not seen on both sides. There is no sign of the mandibular torus.

Fig. 5. Occlusal view of the Shakameyama mandible.

Of the hyoid bone, the body and a fragment of the greater horn are preserved.

Dentition (Figs. 4–6)

The state of preservation is as follows.

														A		
					C									C		
(×/*)	/	M	P	P	C	I	I	I	I	C	P	P	M	M	M	
×	×	×	P	P	C	I	I	I	I	C	P	P	×	×	×	
			A													

(/: tooth missing but socket present; ×: tooth lost ante-mortem; *: congenital absence; C: caries; A: abscess at the root.)

In addition to the normal dentition shown above, a small supernumerary tooth,

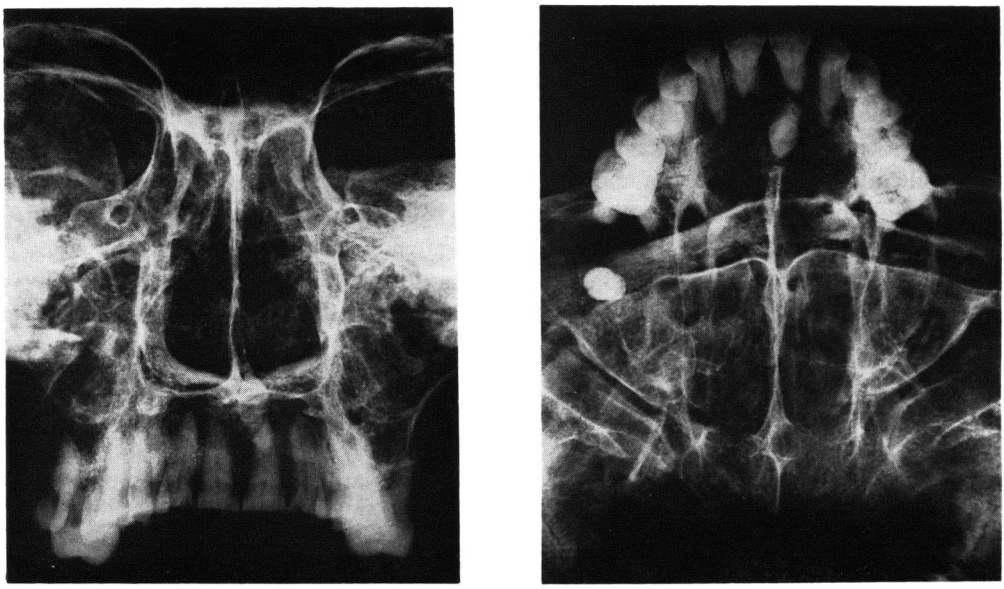

Fig. 6. Postero-anterior (left) and supero-inferior (right) radiographs of the maxillae showing an unerupted supernumerary tooth behind the right I^1.

which may be called a mesiodens, is embedded behind the root of the right I^1, with its conical crown pointed toward the nasal cavity (Fig. 6).

Left M^3 is of reduced type, measuring only 6.0 mm in crown diameter. It is difficult to know whether the right M^3 was lost ante-mortem or had been congenitally absent. Left M^2 is largely destroyed by caries, leaving only a small fragment of root. Its alveolus is enlarged, presumably by the formation of an abscess. The roots of the M^1s are hypercementotic. All lower molars are missing, with their alveoli entirely resorbed. They were lost ante-mortem, probably in consequence of caries and abscess.

Attrition of the incisor, canine, and premolar teeth is generally flat and well advanced. This suggests an edge-to-edge mode of occlusion. The dentine is exposed to more or less extent in these teeth, but not in the surviving maxillary molars. This means that the lower molars were lost long before the death of this individual.

Owing to advanced attrition, it is difficult to learn the degree of shovelling in the maxillary incisors. Distinct CARABELLI groove is observed in M^1 of either side.

Vertebrae, Sternum, and Ribs

The atlas and the coccyx are missing. The sacrum is fragmentary. Body height measurements of some representative presacral vertebrae are given in Table 3. Some of the thoracic and lumbar vertebrae exhibit osteophytosis of the body and osteoarthritic degeneration of the intervertebral joint facets. Imprints of SCHMORL's node (herniation of the nucleus pulposus) are observed in the lower surface of the body of the 8th thoracic and the 2nd and the 3rd lumbar vertebrae.

Only a fragment of the body is preserved of the sternum.

Large or small fragments of eleven right ribs and twelve left ribs are preserved.

Clavicles and Scapulae

The shaft alone is preserved of the clavicle on either side. The circumference of the mid-shaft is 31 mm in the right clavicle and 29 mm in the left.

Both scapulae are incomplete. The lateral border is fluted by the sulcus axillaris subscapularis. Arthritic bony lipping is seen around the glenoid cavity. A small shallow pit is found at the center of the cavity on either side. The acromioglenoid distance of HASEBE (1921) (see YAMAGUCHI, 1967) is 19 mm in the left scapula.

Humeri

The right humerus is almost completely preserved, but the left lacks the distal one-third. The bone as a whole is very slender, but muscle attachment areas are well developed. Incipient lipping is seen on the left caput. The septal aperture is absent in the right humerus.

Measurements and indices after MARTIN		Right
1.	Grösste Länge	(296)
2.	Ganze Länge	293
5.	Grösster Durchmesser der Mitte	20
6.	Kleinster Durchmesser der Mitte	14
7.	Kleinster Umfang der Diaphyse	54
7a.	Umfang der Mitte	58
6:5	Diaphysenquerschnitt-Index	70.0
7:1	Längendicken-Index	(18.2)

Radii

Only the proximal half of the right radius and a short diaphysial fragment of the left are preserved. The shaft is slender, with moderately developed interosseous border. Slight signs of osteoarthritis can be seen on the proximal surface of the head.

Measurements and index after MARTIN		Right
4.	Transversaler Durchmesser des Schaftes	16
5.	Sagittaler Durchmesser des Schaftes	10.5
5:4	Diaphysenquerschnitts-Index	65.6

Ulnae, Hand Skeletons, and Innominate Bones

Missing.

Femora

Again, the diaphysis alone is preserved of either femur. The subtrochanteric portion of the shaft is considerably platymeric, though the lateral crest is not pronounced. The linea aspera is distinctly developed, but the pilaster formation on the

dorsal surface of the mid-shaft is very weak. The curvature of the shaft is moderate.

Measurements and indices after MARTIN and KOGANEI		Right	Left
6.	Sagittaler Durchmesser der Diaphysenmitte	25.5	25.0
7.	Transversaler Durchmesser der Diaphysenmitte	25.0	28.5
8.	Umfang der Diaphysenmitte	79	83
9.	Oberer transversaler Diaphysendurchmesser	—	34.5
10.	Oberer sagittaler Diaphysendurchmesser	—	20.5
6: 7	Index pilastricus	102.0	87.7
10: 9	Index platymericus	—	59.4
A	Grösster Durchmesser 3 cm unterhalb des Trochanter minor*	—	35.0
B	Kleinster Durchmesser 3 cm unterhalb des Trochanter minor*	—	20.0
B: A	Index*	—	57.1

* Defined by KOGAMEI (1893).

Tibiae

The proximal two-thirds of the diaphysis are preserved on either side. The shaft is not flattened transversely. The shaft indices are eurycnemic rather than platycnemic. The cross section of the right mid-shaft corresponds to HRDLIČKA's type 5 and that of the left to the type 4 (STEWART, 1947). The vertical rough line in the middle of the posterior surface is clear and long in the left tibia, but obscure and short in the right.

Measurements and indices after MARTIN		Right	Left
8.	Grösster Durchmesser der Mitte	27.0	26.5
8a.	Gleiches Mass im Niveau des For. nutricium	30.5	31.0
9.	Transversaler Durchmesser der Mitte	19.0	19.0
9a.	Gleiches Mass in der Höhe des For. nutricium	22.0	22.0
10.	Umfang der Diaphyse	74	71
10a.	Gleiches Mass im Niveau des For. nutricium	82	83
9: 8	Index des Querschnitts der Mitte	70.4	71.7
9a: 8a	Index cnemicus	72.1	71.0

Fibulae

Only the middle one-third of the left diaphysis is preserved.

Measurements and indices after MARTIN		Left
2.	Grösster Durchmesser der Mitte	13.5
3.	Kleinster Durchmesser der Mitte	9.5
4.	Umfang der Mitte	38
3: 2	Index des Diaphysenquerschnittes der Mitte	70.4

Foot Skeletons

The sustentaculum tali of the right calcaneus and the proximal half of the right fifth metatarsal bone are all of the material preserved of the entire foot skeletons. The anterior and middle facets for talus of the calcaneus are united into a single articular surface.

Comparative Analyses

The view of KANASEKI (1966, 1976) that the Yayoi population in western Japan was composed of direct descendants of aboriginal Jōmon people and immigrants from the Asiatic mainland is generally accepted as a valid hypothesis. According to him, the immigrant element is represented by large skeletal series from Doigahama site in Yamaguchi Prefecture and Mitsu site in Saga Prefecture. The native element, however, is represented only by sporadic skeletal remains from various burial sites of smaller scale than the above-mentioned.

In the following analyses, the Shakameyama material is compared with the skeletal series from Doigahama and Mitsu sites as representatives of the immigrant element of the Yayoi population, the Late to Latest Jōmon skeletal series from Tsukumo shellmound in Okayama Prefecture and from Yoshiko shellmound in Aichi Prefecture as substitutes for the native element in the Yayoi population, and with the skeletal material of the recent southwestern Japanese as a control.

Craniometric Distances

PENROSE's distances (CONSTANDSE-WESTERMANN, 1972) of the Shakameyama skull from the male cranial series of Doigahama (KANASEKI, NAGAI, & SANO, 1960), Mitsu (USHIJIMA, 1954), Tsukumo (KIYONO & MIYAMOTO, 1926), Yoshiko (KINTAKA, 1928), and recent southwestern Japanese (HARADA, 1954) were calculated on the bases of the following 32 linear measurements: MARTIN's nos. 1, 5, 8, 9, 12, 17, 20, 23, 24, 26, 27, 29, 30, 40, 43, 45, 46, 47, 48, 51, 52, 54, 55, 57, 60, 61, 66, 67, 68, 69, 70, and 71 (cf. Table 1). Results are shown in Table 2. The shape distance (C_z^2) from the Jōmon series of Yoshiko is the closest, followed by that from another Jōmon series of Tsu-

Table 2. PENROSE's distances of the Shakameyama skull from the Jōmon, Yayoi, and recent cranial series.

	C_H^2	C_Q^2	C_Z^2
Jōmon period:			
Yoshiko	0.966	0.170	0.822
Tsukumo	1.117	0.183	0.964
Yayoi period:			
Doigahama	1.416	0.240	1.213
Mitsu	1.947	0.538	1.455
Recent:			
southwestern Japanese	1.808	0.024	1.841

kumo. The Yayoi series from Doigahama and Mitsu are farther, and the recent Japanese series is the farthest.

Cranial Indices and Angles

Of the cranial indices and angles, those which exhibit clear difference between the Jōmon and Yayoi series were picked out. The broken lines in Fig. 7 show relative deviations of the combined Yayoi series (Doigahama and Mitsu), the combined Jōmon series (Tsukumo and Yoshiko), and the Shakameyama skull in nine indices and two angles from the averages of the recent southwestern Japanese measured by the standard deviations of the recent series as the unit.

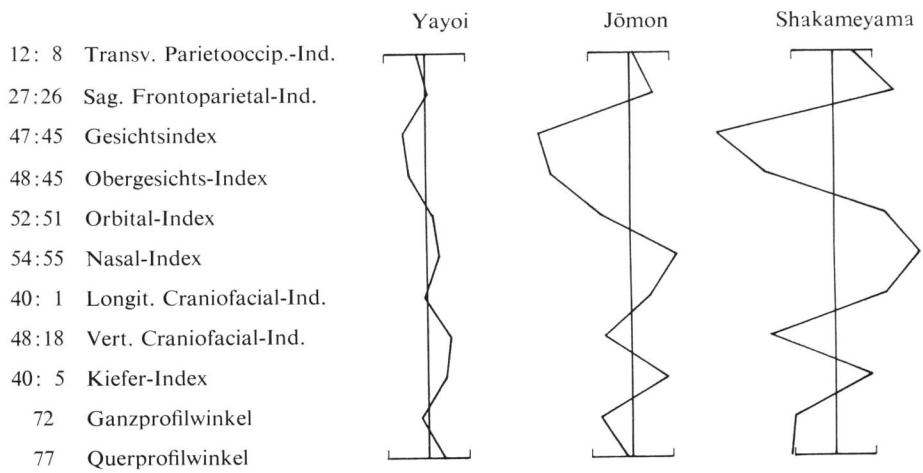

Fig. 7. Standardized deviations of the Yayoi and Jōmon series and the Shakameyama skull from the recent southwestern Japanese series in the cranial indices and angles. The vertical base lines represent the averages of the recent series. The horizontal lines indicate the range of +1 S.D. to the right and −1 S.D. to the left.

The figure manifests that the Yayoi averages are much less deviated from those of the recent Japanese series than the Jōmon averages, and that the deviation pattern of the Shakameyama skull closely resembles that of the Jōmon series. The Shakameyama and the Jōmon are characterized by relatively larger transverse occipital diameter, relatively longer sagittal parietal arc and basion-prosthion diameter, relatively broader face and nose, more prognathous facial profile, and smaller nasomalar angle than in the Yayoi and the recent Japanese cranial series.

Body Height of Vertebrae

Table 3 gives the comparison of the middle height of the vertebral body at different levels of presacral vertebrae between the Shakameyama skeleton and the Jōmon, Yayoi, and recent Japanese materials. The broken lines in Fig. 8 show standardized deviations of the Doigahama, Tsukumo, and Shakameyama materials from the

averages of the recent Japanese series. It is evident that the Yayoi series from Doigahama is very close to the recent Japanese series. On the other hand, the Shakameyama resembles the Jōmon series from Tsukumo in that the body of the 22nd vertebra is higher and those of the rest are lower than in the recent Japanese.

Table 3. Comparison of the middle height of the vertebral body at different levels of presacral vertebrae.

	6th V.	10th V.	15th V.	22nd V.
Shakameyama	10.0	14.0	15.0	24.5
Male averages of:				
Jōmon (Tsukumo)[1]	9.2	15.1	16.5	23.0
Yayoi (Doigahama)[2]	10.66	15.21	17.42	22.50
Recent (Kyūshū)[3]	10.4	15.3	17.3	22.6
(S.D. in recent series)	(0.97)	(1.05)	(1.22)	(1.73)

1) KINTAKA, MIYAKE, & MAOKA, 1938. 2) TABATA, 1958. 3) TSUNEMATSU, 1957.

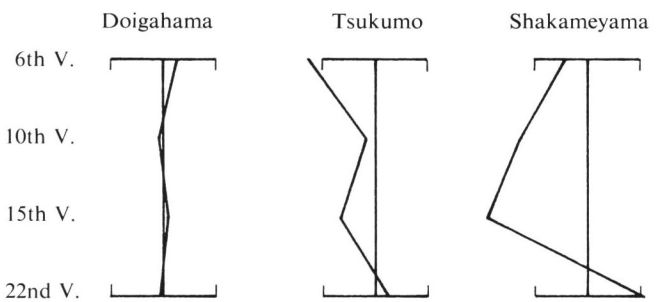

Fig. 8. Standardized deviations of the Doigahama and Tsukumo series and the Shakameyama skeleton from the recent Japanese series in the middle height of the vertebral body (cf. Table 3.).

Reconstructed Stature

In spite of a slight breakage at the medial end of the trochlea, the maximum length of the right humerus could be estimated to be 296 mm. That of the left femur, lacking both epiphyses, was roughly estimated to be about 406 mm, by averaging those of three recent Japanese femora whose diaphyses were of nearly equal length to that of the Shakameyama left femur.

The regression equations of PEARSON (1899) based on the maximum length of humerus and femur gave stature estimates of 156.30 cm and 157.63 cm. Another set of equations of FUJII (1960) based on the total length of the humerus (293 mm) and the maximum length of the femur gave 156.19 cm and 155.06 cm. Simple average of these four estimates is 156 cm. These estimates are apparently lower than the average male stature estimates of 162.81 cm and 161.98 cm for the Yayoi series from Doigahama and Mitsu (ZAITSU, 1956; USHIJIMA, 1954), and rather close to those of 158.05 cm and 158.79 cm for the Jōmon series from Tsukumo (KANASEKI & TABATA, 1930) and

the alleged Jōmon descendants in Yayoi period from various sites in northwestern Kyūshū (NAITO, 1971).

Cross Section Indices of Limb Bone Mid-Shaft

It is well known that the Jōmon postcranial skeletons are characterized by pronounced pilaster formation on the dorsal surface of the femur and flatness of the shaft of all other long limb bones. These characteristics can be numerically expressed by higher value of cross section index of the femoral mid-shaft and lower values of those of other limb bone mid-shafts than in the recent Japanese materials. As shown in Table 4, the average mid-shaft indices of the Yayoi postcranial long bones from Doigahama and Mitsu are intermediate between those of the Jōmon and the recent Japanese series. Such a general trend toward more nearly round cross section of limb bone mid-shaft as seen in post-Jōmon period may be regarded as reflecting a decreasing tendency in the muscular and kinetic stresses imposed upon the bones.

Of the Shakameyama postcranial materials the humerus and the radius are as flat as those of the average Jōmon materials, whereas the tibia is less flat than the Jōmon, approaching the average of the Yayoi tibiae, and the pilaster formation of the femur is extremely weak. The cross section index of the femoral mid-shaft is even less than the average in the recent Japanese series (Table 4, Fig. 9). This implies that the

Table 4. Comparison of the cross section indices of limb bone mid-shaft.

	Humerus	Radius	Femur	Tibia
Shakameyama	70.0	65.6	102.0	70.4
Male right averages of:				
Jōmon (Tsukumo[1] & Yoshiko[2])	73.0	66.9	116.2	66.1
Yayoi (Doigahama[3] & Mitsu[4])	76.2	70.7	109.1	70.7
Recent (Kyūshū[5])	78.11	71.51	105.78	77.1
(S.D. in recent series)	(5.10)	(5.12)	(7.78)	(8.94)

1) KIYONO & HIRAI, 1928. 2) ISHISAWA, 1931; OHBA, 1935. 3) ZAITSU, 1956. 4) USHIJIMA, 1954. 5) SENDO, 1957; MIZOGUCHI, 1957; ABE, 1955; INABE, 1955.

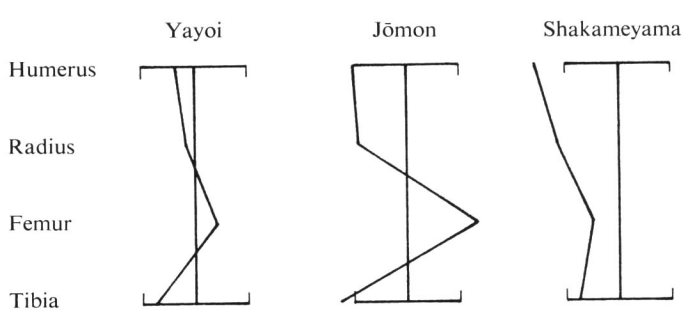

Fig. 9. Standardized deviations of the Yayoi and Jōmon series and the Shakameyama skeleton from the recent Japanese series in the cross section indices of the limb bone mid-shaft (cf. Table 4.).

secular trend to gracilization was already under way at least in the lower limb bones of the Shakameyama skeleton.

Miscellaneous

Besides those characters hitherto mentioned, the large acromioglenoid distance in the scapula and the edge-to-edge bite may be enumerated among the Jōmon-like features of the Shakameyama skeleton. On the other hand, however, it has also some other characters which are not Jōmon-like but rather common among the materials of later periods, such as flatness of the regions of glabella and nasal bridge, reduction of the maxillary body, contraction of extensive dental disease, and slenderness of the limb bone as shown by the low robustness index of the humerus. The evidence of the latter group of characters tells that secular changes in physical characters, similar to those revealed in the Yayoi skeletal materials from Kantō district by SUZUKI (1963, 1969), were also taking place in Shikoku district.

Summary and Conclusion

An adult male skeletal remain of Middle Yayoi period found in a stone cist at Shakameyama site, Tobe-chō, Ehime Prefecture, Shikoku, was measured and described. The Shakameyama skeleton is characterized, among others, by high mesocranic vault, low face with alveolar prognathism, edge-to-edge bite, and short stature. It is generally closer in cranial measurements and indices, pattern of the height of vertebral bodies, and reconstructed stature to the Late to Latest Jōmon skeletal series from Tsukumo and Yoshiko shellmounds than to those of the Yayoi skeletal series from Doigahama and Mitsu sites. If the hypothesis of KANASEKI (1966, 1976) that the Yayoi population in western Japan was composed of the immigrant element as represented by the skeletal series from Doigahama and Mitsu and of the aboriginal element as represented by smaller series from various sites in Kyūshū is valid, as it is widely regarded, the Shakameyama skeleton can definitely be allocated to the latter component. Although the skeleton is basically of Jōmon type, it is already under way of gracilization, as witnessed by relatively even glabello-nasal region, reduced maxillary body, non-pilastric femur, and eurycnemic tibia.

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摘　　要

愛媛県伊予郡砥部町，釈迦面山遺跡の第5号方形周溝墓で，昭和 49 年に愛媛大学の西田栄教授らによって発掘された，弥生時代中期と推定される1人骨は，保存のよい弥生時代人骨として四国では初めての出土例とされている．人骨は，粘土でおおわれた組合せ式箱形石棺内に，東枕仰臥伸展位で埋葬され（図1），副葬品は伴なわなかったが，顔面をはじめほぼ全身にわたって辰砂が振りまかれ，周溝内に弥生中期の土器片が発見されたという．四肢骨の一部は失われているが，軀幹骨は比較的よく保存されている．寛骨が全く保存されていないことと，大臼歯の多くが病的原因によって脱落していることから，この個体の性・年齢の推定には充分の精度を期しがたいが，ほぼ成年の終りないし熟年のはじめに相当する男性と推測される．頭蓋前部の骨表面には，多数の小さな穿孔が認められるが，これらは病的破壊よりは，石棺内での物理化学的な自然の要因による侵蝕であろうと考えられる．

頭蓋の計測値は表1に，その他の骨の計測値は本文の記載の中に分散して掲げた．脳頭蓋は長幅示数 76.4 の中頭蓋型に属する．長高示数，幅高示数はともに高型に入る．左右の外耳道に軽度の骨瘤がみられる．顔面頭蓋は幅に比して高さがかなり低く，上顔示数，鼻示数はともに広型に属するが，眼窩は比較的高い．上顎骨には歯槽性突顎の傾向がみられるが，咬合の形式は鉗子状であったと思われる．下顎の大臼歯はすべて生前に脱落し，歯槽も吸収されている．残存歯の一部には齲蝕のあとが認められる．また，上顎右中切歯の後には，逆生過剰歯が埋伏している（図 2～6）．

頭蓋計測値について，PENROSE の距離あるいは偏差折線の方法を用いて，現代日本人，弥生時代人（土井ケ浜遺跡，三津遺跡），および縄文時代後・晩期人（津雲貝塚，吉胡貝塚）との比較を行うと，釈迦面山頭蓋は土井ケ浜や三津の弥生時代人よりは，むしろ縄文時代人に類似している（表2，図7）．脊柱の各高さにおける椎体中央高の比較においても，本人骨は現代人や弥生時代人よりも縄文時代人に近い（表 3，図 8）．右上腕骨および左大腿骨の最大長を推定し，PEARSON および藤井の方法によって身長を求めると，約 156 cm という値がえられる．これは土井ケ浜および三津の男性の平均推定身長 162.81，161.98 よりかなり低く，津雲貝塚人の 158.05 や，北西九州の弥生時代人平均の 158.79 の方にやや近い．

金関（1966, 1976），内藤（1971）などによって，中国・九州地方の弥生時代人には，土井ケ浜・三津に代表されるような，渡来者を含む高身高顔の集団と，その他の比較的小規模な遺跡の資料群で代表される，縄文時代以来の土着の低身低顔の集団の存在することがほぼ明らかにされているが，釈迦面山人骨の場合は，縄文時代人の特徴を多分に保有しており，明らかに土着集団の範疇に属すると考えられる．

しかし本人骨には，眉間から鼻根部にかけての平坦さ，上顎体の退縮，齲蝕の痕跡，四肢骨の細さ，大腿骨の非柱状性，脛骨の非扁平性（表 4，図 9）などのように，縄文時代人的でなく，むしろ後の時代の資料に共通するような特徴もいくつか認められる．このことは，南関東の弥生時代人について鈴木（1963, 1969）が明らかにしたのとほぼ同様な，繊細化へと向かう時代的変化が，この地方においても生起しつつあったことを示すものであろう．

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