

ANCIENT HUMAN BONES WITH MERCURIC COSMETICS EXCAVATED FROM THE BURIAL MOUND OF KANZO-YAMA IN TOKUSHIMA

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Abstract: A complete human skeleton was excavated from a burial mound built in the 6th Century (Kofun period of Japan) at the top of Kanzo-yama hill of Itano-cho, Tokushima. Most of the cranio-facial bones, neck and upper thoracic bones appeared reddish painted with mercuric cosmetics (mercuric sulfide). Bones were mostly laid ventral-up in the anatomical arrangement; the cranium was dolico-cephalic (73.0 in cranial index), the midface low (54.7 in Kollmann index), and the nose middle (47.1 in nasal index). This is one of the most well-preserved excavations of human remains of the Kofun period of Tokushima, an adult male estimated to be 162 cm in height.

Index Terms

ancient bones, bone excavation, ancient burial, mercuric cosmetics, Kofun period, paleoanthropology

INTRODUCTION

Blue stone (green-schist) coffins were well-known from the early Kofun period of Awa (an old name of Tokushima). There were, however, few findings on the details of complete burial of human bones, especially of those decorated with reddish cosmetics. The first report on the details was the excavation from Tsurushima burial mound by the present authors¹⁾. This is the second case of a complete skeleton painted with cosmetics. The burial mound (No. 1) at the top flat of Kanzo-yama hill was known for long years in Itano-cho, and excavated first in 1927 and found to be a single burial of the middle Kofun period²⁾, then it was carefully preserved by people with government. It is auspicious not to disturb the original position of bones. So, this is a rare case of the original excavation of complete bones painted with cosmetics.

MATERIALS AND METHODS

LOCATION

The bones were well-preserved in a coffin (No. 1 burial mound) set in a box of stone plates

of green-schist(the blue stone coffin of Awa). They were excavated by Yuji Kawano and his fellows in cooperation with us on Dec. 27, 1994. Before the excavation the coffin was once opened by Ryohei Aki²⁾ and he found an iron straight sword, edge-in-up along the left side of the loins bone. There were also 2 swords ; one was found about 25 m from the southern point of the coffin and another about 90 m south from the coffin. Those(without the bones)were carried by him to the Imperial Museum of Tokyo according to the indication of the Ministry, because the burial was said to be related to royalty.

In the history of Kanzo-yama, Aki believed the name derived from characters signifying "Godplace". There were more than 10 burials surrounding the top. The present excavation was organized by Bunkichi Toyota, Director of the Board of Education in Itano-cho. The No. 1 burial mound at the top flat of Kanzo-yama hill is located in Itanishi-cho, north of the new town in Itano-cho and, after this excavation, the hill is to be flattened for expansion of the new town.

The coffin was laid on the line of east-west, the head to east and the feet to west. The east and west walls consist of one stone plate, each 33 cm of the inner size and the side walls of 3 stone plates each, left 171.5 cm right 173 cm of the inner size, on which several stone plates are transversally laid to close the coffin. Sand had not much penetrated into the lumen, because the stone plates were well fitted together to prevent sand-inflow. Surface of the bones was considerably dried and the cranial half of bones appeared reddish in color. The red cosmetics were spread to the upper third of the coffin floor throughout bones painted. There were no rudimental goods which had been removed already at the previous opening²⁾.

TREATMENTS OF BONE SPECIMENS

Bones are photographed as they are(Fig. 1 a). All the bones look to be set in ventral-up in the normal anatomical order. The cranial half of vertebrae with the skull are faced to the left, but the thorax and upper extremities are ventral-up(Fig. 1 b), and the pelvis seems to be in the ventral position, but the right femur is half sunk in the sand and some bones of the right hand remain near the right os ischii(Fig. 1 c).

The peculiar finding is a spreading of red cosmetics around the area of the upper half of the coffin(Fig. 1 b). The bones are removed from the surface layer to the deeper, and photographed layer by layer. There are no anatomical disorders of normal positions of bones. After identification of half-broken bones, they are removed carefully, bound with soft tissue and preserved with fragments with the same numbering in the same box. In this way, most of the bones are excavated and identified to preserve for further study. Most of the bones are covered with minute rootlets. After they are removed, the surfaces are hardened by spray of plastics. Some important bones are reconstructed by fusing with wax and resin used for dentistry. Thus, the pelvis is reconstructed to show main size and sex(Fig. 5).

Both the color adhesives on the bone and its surroundings are examined by an inductively coupled plasma atomic emission spectrometer(ICPS-1000 III, Shimadzu)³⁾ to show their metal elements.

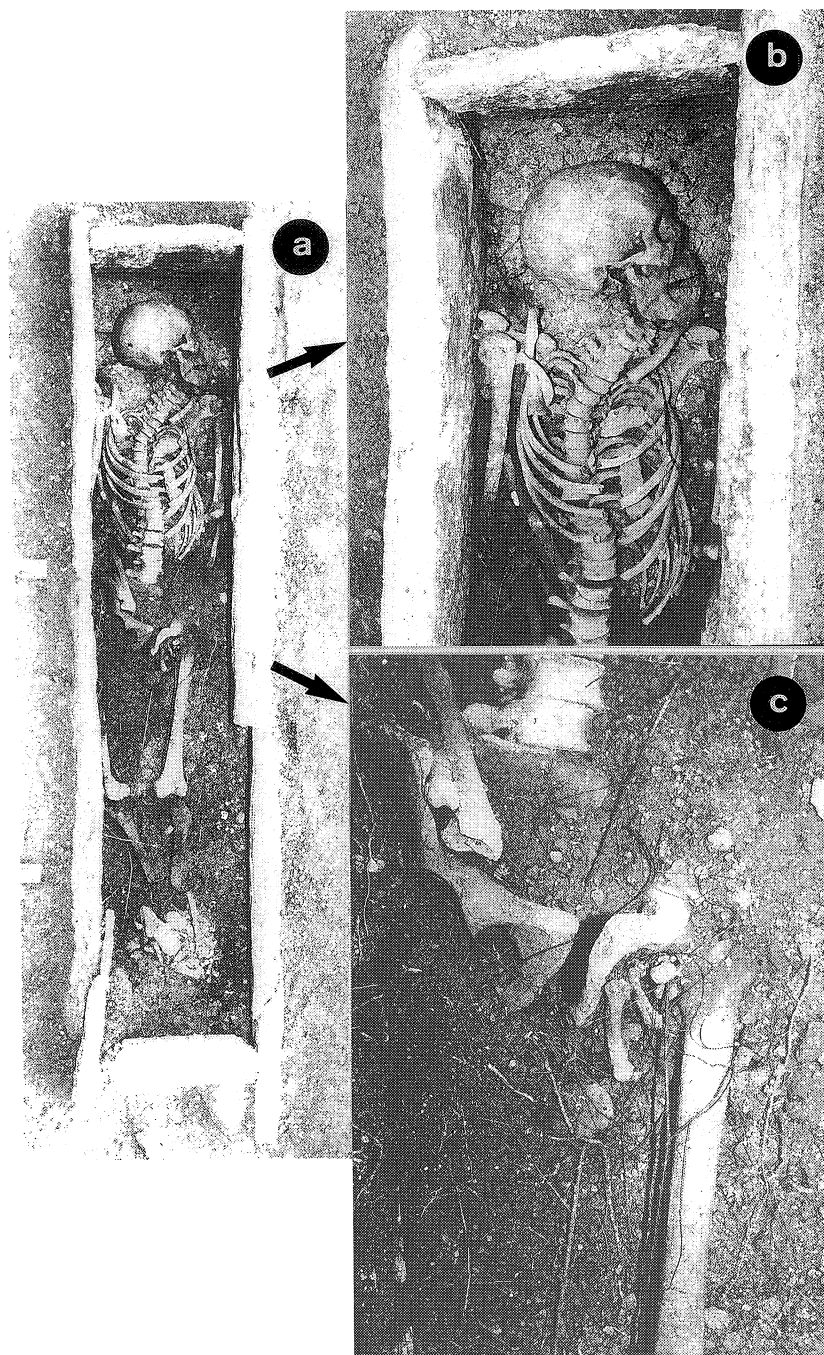


Fig. 1. The green schist coffin was opened to show bones (a). Red color spread over the cranial half of bones (b). The right caudal half was covered with sand infiltrated (c).

OBSERVATIONS

GENERAL FINDINGS ON BONES

Most of the bones were well grown without any dystrophia and anomaly. The trunk bones were arranged anatomically in the normal order. All the vertebrae were twisted to the left at

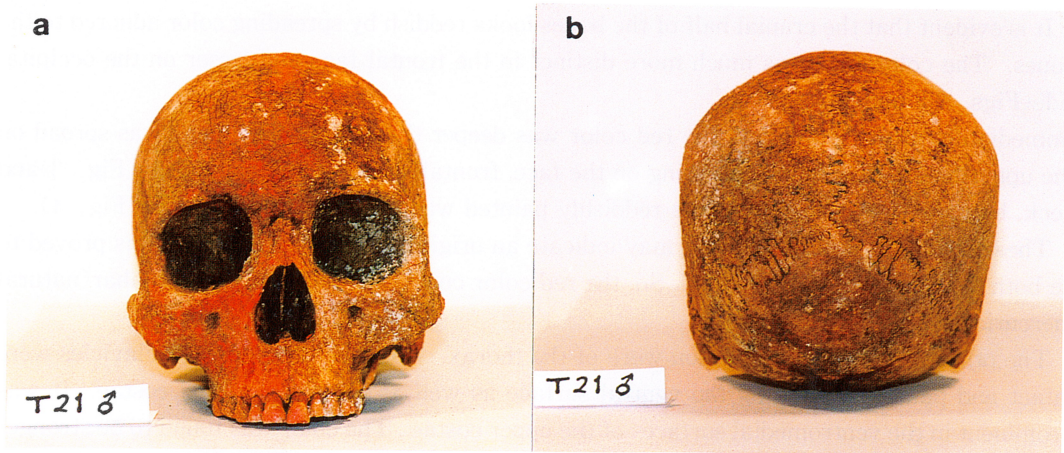


Fig. 2. The cranium on the front view (a) was strongly painted with red cosmetics. On the occipital view several lateral Inca bones are shown (b).

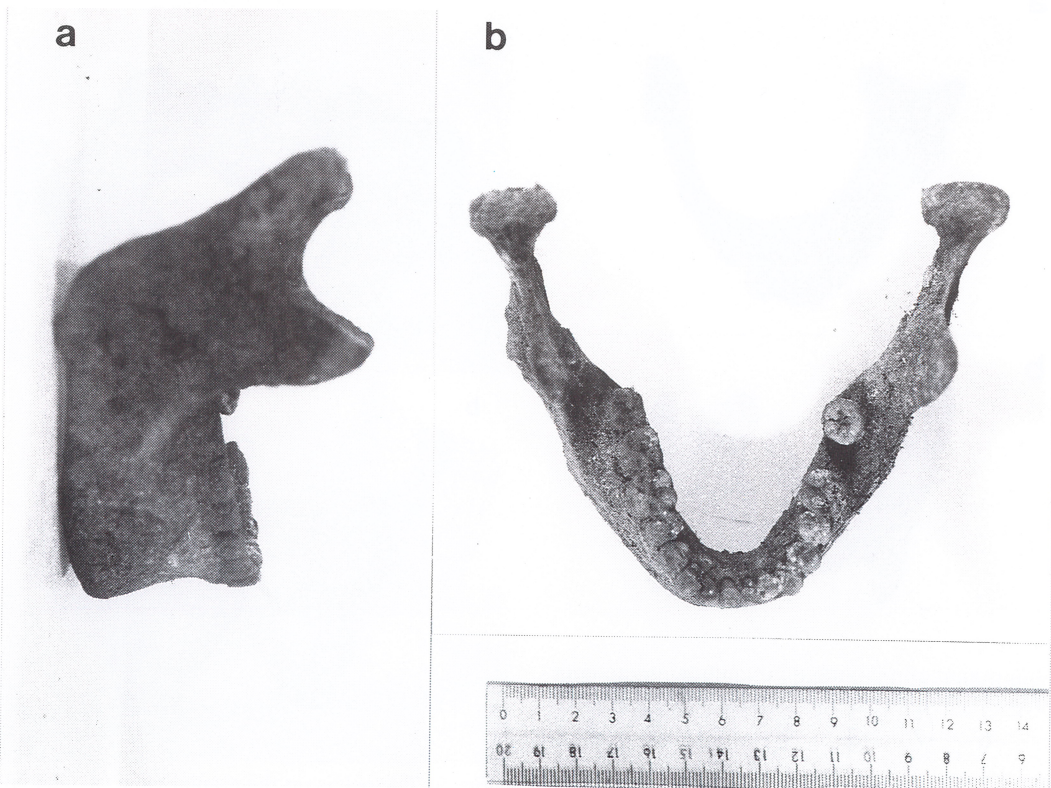


Fig. 3. The mandible on the side view (a) and on the cranial view (b) showing Vm of the alveolar arch type.

about 90 degrees, while adhered costae were placed just to ventral, not to the left. The vertebral axis for rotation was changed from ventral to dorsal at the 12th thoracic vertebra. This change did not relate to the twisting of thoracic vertebrae (Fig. 1 b), because the lower lumbar vertebrae were also twisted as seen in Fig. 1 c. Twisting of the back bones may depend on the original site of the body at the burial. So, that the head faces to the left is agreeable with the twist of the column. Thus, the bone arrangement was not peculiar.

It is evident that the cranial half of the bones looks reddish by spreading color adhered to the bones. The coloration was much more distinct in the frontal face and lesser on the occipital side (Figs. 2 a and 2 b).

Immediately after excavation, the red color was deeper than later. The color was spread on the upper half of the coffin, centering on the face, frontal side of mandibular body (Fig. 3) and neck, because the thyroid cartilage reddishly painted was well preserved in form (Fig. 4).

These grades of color spreading may indicate an original site of painting which is proved to be both Hg and S at a high level⁹⁾. So, the red color contains a high level of cinnabar (natural mercuric sulfide).

The other findings for coloration were of the thorax. Both the left and right clavicles were intact and painted mainly on the ventral surface as well as the sternum and costae. It was prominent in the ventromedial surfaces of the upper costae. The color was found to be stronger on the ventral and lesser on the dorsal surface of ribs. This indicates clearly a local difference

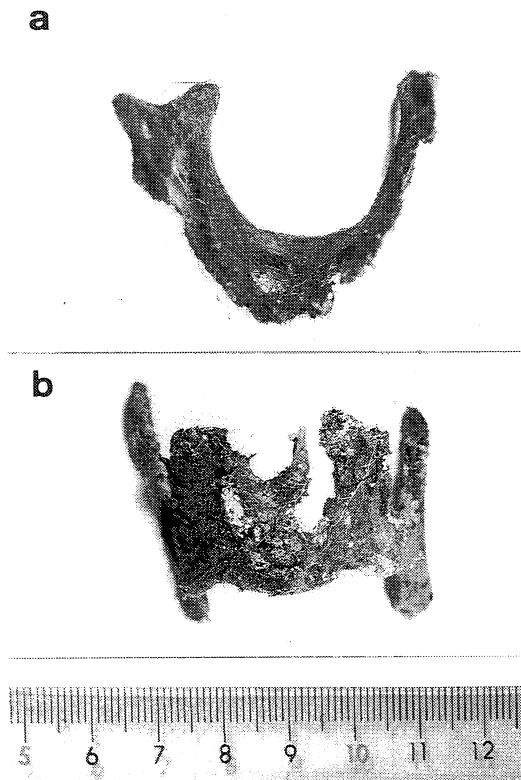


Fig. 4. The thyroid cartilage on the cranial view (a) and on the ventral view (b).

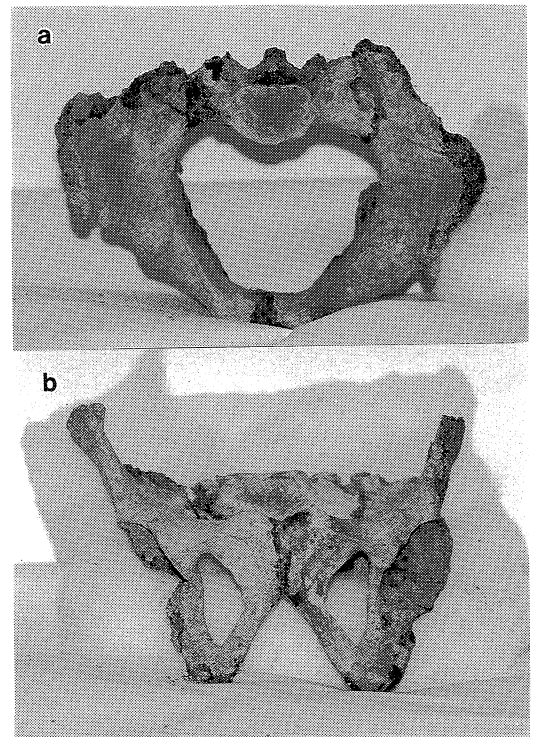


Fig. 5. The pelvis on the cranial view (a) and on the ventral view (b).

of the cosmetics painted on the body part, that is denser from the frontal head and face, mandibular front and neck to the ventral breast. The lower half of the body was not so dense as the upper, but a little only on the ventral side. Thus, a gradient of painting cosmetics was found on the whole body. In addition, both the extremities were found not intact on the humerus, ulna, and radius with lack of edges, but both the femurs were almost intact, 41.0 cm

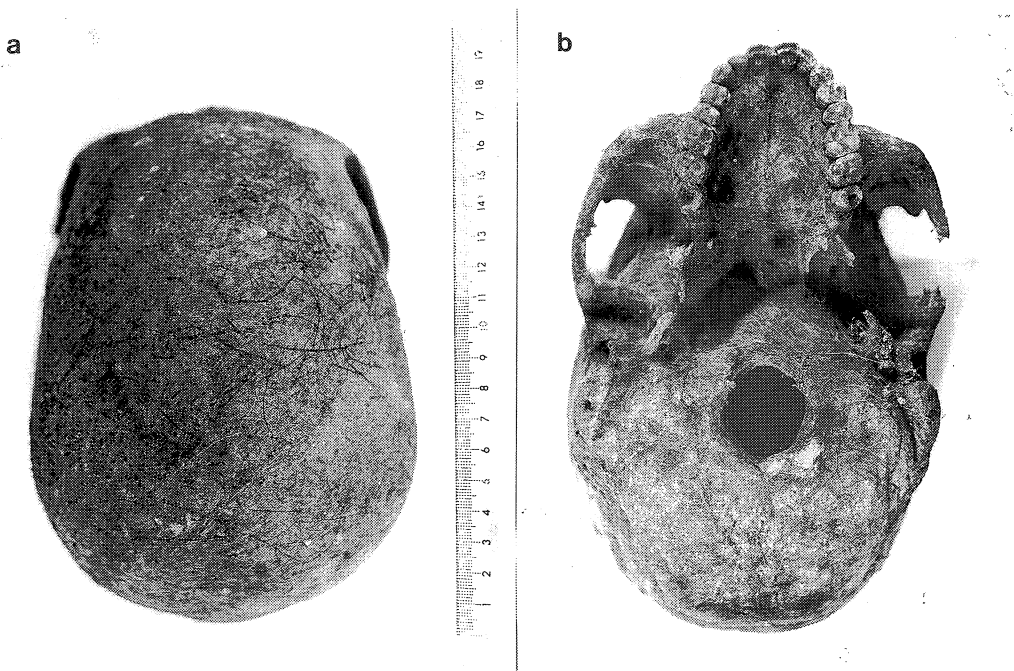


Fig. 6. The calvaria over head view (a) and the cranium on the basilar view (b) on which Va of the alveolar arch type is seen.

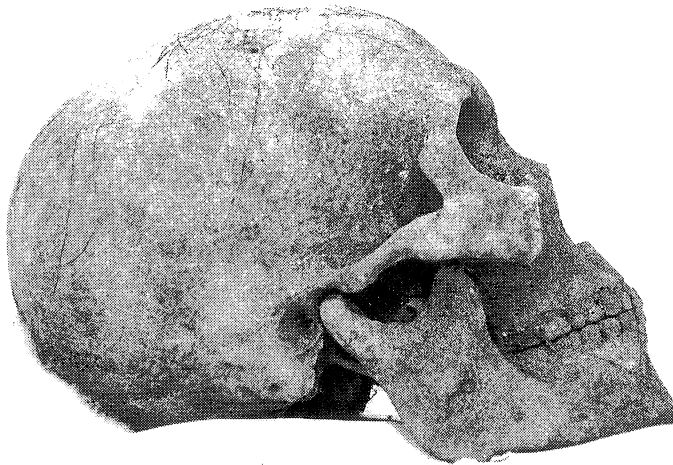


Fig. 7. The skull on the side view shows the forceps type of attrition.

in length for the right and 42.3 cm for the left, respectively. From these measurements, the body height was estimated to be about 162 cm.

The pelvis was reconstructed to the original form and some measurements were done as shown in Table 1. These measurements indicate that the individual was an adult and the shape of foramen obturatum looked sharply triangular, the acetabulum somewhat deeper and most prominently sharper in the pubic angle with a phallic process. Those findings are enough to conclude he was a male (Fig. 5).

FINDINGS OF THE SKULL AND CRANIOMETRY

Estimations were made on choice by general craniometry based on the routine method of Martin. Data are shown in Table 2. Most values obtained were not peculiar. The most prominent data are 73.0 of the cranial index which is dolico-cephalic (Fig. 6 a), and 54.7 of the upper facial index of Kollmann which is considerably low height and 47.1 of the nasal index which is lower middle (Fig. 2 a). These are typical in the humans of Kofun period of Awa. These estimations were directly made on the skull, complete without any crushes. On the cranial sutures, most of them are well preserved and there are no rudiments of fontanelles. The sagittal suture is partly fused (Fig. 6 a), but the lambda is distinct to form sharp edges including 2 small inlays each in the lateral sutures to form 4 lateral Inca bones (Fig. 2 b).

OBSERVATIONS ON TEETH

All of the teeth are grown including 4 of No. 8 (Table 3 a). The No. 7 of left mandible is lacking, but its repaired alveolus remains. The attrition grade is observed according to the indication by Tochihara⁴). Most of the teeth are equally macerated to the moderate value of

Table 1. Measurements of the pelvis

Measurement	Length in mm
outer bi-ischiadic width	*220
inner transverse width	117
inner longitudinal width	91
width between both of the tuber ischiadicum	85

*Value estimated by doubling of the value of one side.

Table 2. Craniometry of the skull excavated from Kanzo-yama burial mound

Measurements	Length in mm	Index in %
bizygomatic breadth	137	
max. bimaxillary breadth	63	
midfacial breadth	109	
upper facial height	75	
max. width of piriform aperture	24	
nasal height	51	
length of piriform aperture	31	
breadth of nasal radix	25	
Bregma height	137	
auricular head height	117	
max. cranial length	189	
max. cranial breadth	138	
cranial index		73.0
upper facial index (Kollmann)		54.7
upper facial index (Virchow)		68.8
nasal index		47.1
mastoideal width	116	
width between apices of process styloideus	67	
length of foramen magnum	32	
width of foramen magnum	29	
index of foramen magnum		90.6

Table 3. The formula of teeth (a) and their maceration grades (b)

a)	8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8
	8	7	6	5	4	3	2	1	1	2	3	4	5	6	-	8
b)	4	4	4	4	5	4	5	5	5	5	4	4	4	4	4	4
	c	c														c
	4	4	4	4	4	4	5	5	5	5	4	4	4	4	e	4

Numbers referred from the maceration grade of Tochiwara.

c : caries, e : wound repaired after extraction

4 or 5 (Table 3 b). There are found caries of the No. 6 and 8 on the right maxilla and of the No. 5 on the left maxilla. The mesial and labial sides of the teeth look painted with red cosmetics (Fig. 2 a).

From these considerations on the teeth and others relating to the age diagnosis, the age is supposed to be more than 40 years old.

The occlusion is considered to be "edge by edge" as the forceps type (Fig. 7). According to Miyai and Yamada⁵⁾, the alveolar arch type is diagnosed as Va on the maxilla (Fig. 6 b) and Vm on the mandible (Fig. 3 b).

DISCUSSION

Many excavations, more than 500 cases, have been reported in Shikoku alone⁶⁾. There were, however, few achievements on human bones. Especially, complete reports of humans decorated with red cosmetics have been quite rare, despite two reports written by us. One was excavated from Tsurushima¹⁾ of Tokushima-shi and another from Inokubo⁷⁾ of Iyo-shi. Both the examples were decorated with red paintings in the Kofun period of Shikoku. The stone coffin of Inokubo held two males found intact with red colored skulls, while that of Tsurushima contained a single male with an iron sword at the top of Tsurushima hill buried in the 6th Century. Accordingly, the latter case of burial is in good agreement with the present excavation. The red color was analysed to show a higher content of Hg with other metals such as Fe, Mn, Cu and Zn from Tsurushima. These results are agreeable to the present analysis and disagree with those of Inokubo. So, this mercuric compound is considered to be derived from the same source of the mine product (possibly from an ancient mine of Katsuura, near Tokushima). Some other findings were reported on the bones contaminated with red color⁸⁾⁹⁾. Those bones were mostly crushed into pieces and could not be reconstructed, and the color was shown to be some mercuric compound, and suggested to be mixed with FeO₃, especially from the bones excavated in Matsuyama⁹⁾.

The burial mound of Tsurushima was a compound gravings of the central burial at the top of a hill surrounded with several burials. The bones of the center were laid with the head in nearly northern direction. While the present burial mound was also a compound gravings of the central burial at the top of Kanzo-yama hill with many burials downwards, the present bones were laid from head to foot just in the western direction.

The other similarities may concern the physical characteristics of both the men. The Tsurushima man shows 69.9 of the cranial index, 53.5 of the upper facial index of Kollmann, 65.5 of that of Virchow, and 50.0 of the nasal index, while the present indices of Kanzo-yama show 73.0 of the cranial index, 54.7 of Kollmann, 68.8 of Virchow and 47.1 of the nasal index,

which are closer to those of the former.

On geographical comparison between Tsurushima and Kanzo-yama, Tsurushima was an islet less than 100 m high in the small bay near Komatsujima, and Kanzo-yama was a cape hill about 100 m high facing to the sea in the Kofun period. The distance is about 15 km between them, and they are separated by the out-flow of the Yoshino River.

Nevertheless, cultural exchanges must have been done over natural barriers even in the ancient period. The relationship should be further studied not only on the history of burial modes, but also on modern analyses of human remains. In the present report the authors describe only details of the burial in relation to the remains of red cosmetics.

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