

# Dual Structure Model for the Population History of the Japanese

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This paper proposes a 'dual structure model' to explain the population history of Japanese, including the Okinawa islanders (Ryukyus) and Ainu under a single hypothesis. The model assumes that the first occupants of the Japanese Archipelago came from somewhere in Southeast Asia in the Upper Palaeolithic age and they gave rise to the people in the Neolithic Jomon age, or Jomonese; then the second wave of migration from northeast Asia took place in and after the Aeneolithic Yayoi age; and the populations of both lineages gradually mixed with each other. The 'dual structure model' also assumes that the population intermixture is still going on and the dual structure of the Japanese population is maintained even today. Thus, several regional differences such as those between east and west Japan in physical as well as cultural characteristics can be explained by the varying rates of intermixture from region to region. In general, this model agrees well not only with physical and cultural evidence but also with non-human evidence as revealed by Japanese dogs, mice, etc. At the same time, the model provides a reasonable way of explanation in regard to the relationships among the Japanese main islanders, Ryukyus, and Ainu.

*Keywords:* JAPANESE, AINU, RYUKYU, POPULATION HISTORY, DUAL STRUCTURE MODEL, ANTHROPOLOGY.

## HISTORICAL BACKGROUND

Several different theories have been proposed in regard to the population history of Japanese since the early 19th century. Philipp Franz von Siebold, who came to Japan in 1823 as a physician of the Dutch settlement at Nagasaki, made extensive studies on Japanese people and culture. He stated that the Japanese were close to Mongolians, and the Japanese Neolithic population gave rise to the present-day Ainu (1854, see Siebold, 1897). This theory was reinforced by his son, Heinrich P. von Siebold, who stayed in Japan as an Austrian diplomat in the late 19th century.

After the Meiji Restoration (1868), a large number of scholars from Europe and the United States were invited by the Japanese government to help with Japan's modernization. Among them were some natural scientists who paid attention to the

anthropology of the Japanese population. Erwin von Baelz, a pathologist from Germany, found that Japanese could be classified into two different physical types on the basis of somatometry. He called them *Satsuma* and *Choshu* types (Baelz, 1883, 1885, 1901; dual physique theory). *Satsuma* and *Choshu* are, respectively, the old names of Kagoshima and Yamaguchi Prefectures of today. Von Baelz described the *Satsuma* type as being characterized by a broad and low face, large eye openings, double eyelids, wider nose, thick lips and ear lobes, and short stature. The *Choshu* type showed a longer face, narrower eye openings and nose, single eyelids, thin lips and ear lobes, slender body build, and taller stature. He also pointed out that the *Satsuma* type was common in Japanese and the *Choshu* type was predominant in aristocratic families, though small in number. Von Baelz also emphasized the common origin of Ainu and Ryukyus (Okinawa islanders) on the basis of somatological evidence (1911; Ainu-Ryukyu common origin theory).

Edward S. Morse, a zoologist from Boston, discovered in 1877 a shell mound at Omori, Tokyo, and carried out an excavation the same year. This was the first scientific excavation of an archaeological site in Japan. Cultural as well as human skeletal remains unearthed there are now stored at the University of Tokyo as nationally important cultural properties. In his paper on the Omori Shell Mound, the first scientific report published in Japan, Morse (1879) stated, on the basis of comparisons with Amerindian sites, that the Neolithic people had been replaced by the Ainu and the latter were replaced again, in regions other than Hokkaido, by the ancestral population of the modern Japanese who migrated from somewhere on the Asian Mainland (pre-Ainu theory).

John Milne, a geologist from London, made several important contributions to archaeology from a geological point of view. He estimated the age of the Omori Shell Mound to be around 3,000 years old, close to the dates obtained with the latest chronometric techniques. As regards the peopling of Japan, he criticized Morse's pre-Ainu theory, assuming that Honshu was occupied by Ainu, and Hokkaido by the people called *Koropokguru* (see below) in the Neolithic age (Milne, 1880, 1882).

The first generation of Japanese students, who studied abroad, returned home in the late 19th century and started investigations on the Japanese population and culture. Shogoro Tsuboi paid special attention to anthropology, archaeology, and folklore. In 1884 he founded the Anthropological Society of Tokyo, the predecessor of the present Anthropological Society of Nippon. After returning from Europe, he proposed the *Koropokguru* theory (Tsuboi, 1887) which was basically the same view stressed by Milne. *Koropokguru* are the pygmoid pit-dwellers who appear in Ainu legends; Tsuboi emphasized that the Jomonese, the people of the Neolithic Jomon age, must have been *Koropokguru* because the Jomonese were relatively short in stature, and lived in pit dwellings.

Yoshikiyo Koganei, an anatomist, carried out anthropological surveys in Hokkaido, excavating more than 100 Ainu skeletons in 1888-89. Koganei's conclusion obtained through osteological studies was entirely different from that of Milne and Tsuboi; namely, Jomonese had been the ancestral form of Ainu and they were replaced by the population who gave rise to the modern Japanese in the main islands

such as Honshu, Kyushu and Shikoku (Jomon-Ainu theory, Koganei, 1983). This theory is similar to that of Morse in proposing population replacement, but differs in recognizing a direct lineage from the Jomonese to present-day Ainu.

The heated debate between Tsuboi and Koganei in the late 19th century was the first scientific discussion of Japanese population history. However, since Koganei's theory was based on a number of skeletal remains and scientific methodology, the *Koropokguru* theory was criticized and abandoned after Tsuboi's death in 1913. On the other hand, Koganei was unable to demonstrate the affinities and origins of the Ainu-Jomonese lineage and wrote that the Ainu were 'Rasseninsel', or a racially isolated island (Koganei, 1894).

After the 1930s, new theories were proposed by Kotondo Hasebe and Kenji Kiyono. The difference between the new and old theories lays in whether racial replacement took place after the Jomon age. Kiyono, a pathologist, and his colleagues excavated a number of Jomon shell mounds and obtained human skeletal remains of more than 1,000 individuals. Applying statistical methods on the osteological data, he concluded that the Jomonese were the direct ancestral population of modern Japanese but morphologically altered through intermixture with the surrounding populations (hybridization theory, Kiyono, 1943, 1949). He emphasized that intermixture between Jomonese and south Asian populations gave rise to the majority of modern Japanese, and admixture between Jomonese and north Asians gave rise to the Ainu.

On the other hand, Hasebe (1940) did not assume any racial mixture; rather he argued for continuous microevolutionary changes from the Jomonese to modern Japanese (continuity theory). After World War II, Hisashi Suzuki obtained a large number of human skeletal remains belonging to almost every period from Jomon to recent times. On the basis of his periodized skeletal collection, Suzuki (1969) found gradual changes in morphology from Jomon times to Yayoi, proto-historic (3rd-6th centuries), medieval (14th century), Muromachi (16th century), and early modern ages (17-19th centuries). This evidence gave strong support to Hasebe's continuity theory, and was accepted by a majority of scientists in all related fields.

More recently, Howells (1966) analyzed cranial data from Ainu, non-Ainu Japanese, and Jomonese with the discriminant function method. He concluded that these groups belonged to different lineages, although Jomonese and Ainu resembled each other. He further suggested racial replacement took place as a result of Jomonese population decline. However, he did not recognize secular changes within population and assumed stableness of physical traits throughout the periods from the Neolithic to modern ages. This view is basically the replacement theory. It seems to ignore evidence of geographic variation and secular change in the Japanese, cultural changes, and the role of migration in Japan's history.

As regards Japanese somatology, Akira Matsumura (1925) analyzed cephalic index and stature data derived from many local populations in the early 1920s. He found statistically significant geographic variation. For instance, cephalic index and stature were generally larger in western Japan than in eastern Japan. Geographic variation in somatometric data was also analyzed by Seiho Nishi (1944) in the early 1940s, and

in much more detail by Jokichi Ueda and Mototsugu Kohama in the 1950s. Ueda and Kohama organized a large somatometric study group, collecting extensive data from more than 100 local populations. On the basis of statistical analyses, Kohama (1960) emphasized that there was a large genetic impact by Koreans on the people in the Japanese main islands. Kohama's theory is similar to Kiyono's hybridization theory, but differs in the view about the Ainu. Kohama and his colleagues said nothing about the racial origin of the Ainu, but only that the Ainu were the native people of Hokkaido.

During the 1950s and 1960s, Takeo Kanaseki and colleagues excavated about 100 human skeletal remains from the Yayoi site at Doigahama, Yamaguchi Prefecture, on the western end of Honshu (Kanaseki *et al.*, 1960). Kanaseki found that they represented unique characteristics which were largely different from other contemporary Yayoi populations. The Doigahama population had higher and flatter faces, higher and rounder cranial vaults, narrower nasal apertures, taller stature, etc., compared with other Yayoi series. Shortly before the excavation at Doigahama, the Mitsu Yayoi site, Saga Prefecture, was excavated, and numerous skeletal remains were obtained. Comparisons of the osteological data from Doigahama and Mitsu by Kanaseki and his colleagues revealed certain characteristics to be shared in both series (Ushijima, 1954).

Based on comparative studies, Kanaseki emphasized that the Yayoi populations with unique characteristics were likely migrants from the Korean Peninsula, who were gradually absorbed into the native Japanese population that was derived from the Jomonese. In subsequent years Masafumi Nagai and Yoshiatsu Naito found a large number of the same kind of skeletal characteristics in north Kyushu. They recognized that the migration to this region in the Yayoi age was not an exceptional case, rather it took place on a larger scale than previously supposed. Naito (1971) classified Yayoi skeletons into two types, the north Kyushu and northwest Kyushu types. The former is distributed mainly in Fukuoka Prefecture, north Oita Prefecture, and north Saga Prefecture. The latter are found in west Fukuoka Prefecture and Nagasaki Prefecture. Morphologically, the north Kyushu type is like the Doigahama and Mitsu groups, while the northwest Kyushu type retained Jomonese characteristics.

As discoveries of skeletal remains belonging to the north Kyushu type increased, H. Suzuki, who stressed the continuity theory, accepted Kanaseki's view, but emphasized, at the same time, that the number of migrants was probably so small that they had almost nothing to do with the genetic structure of the subsequent Japanese population. However, Suzuki seems to have overlooked an important point, namely, the geographic variation in Japanese physical characteristics, and recent findings in archaeology, history, and related fields. The skeletal remains collected and studied by Suzuki were largely from the Kanto district of eastern Japan which was densely populated by the Jomonese. The influence of migrants was small compared with western Japan. Thus, the results obtained by Suzuki are not applicable to the populations in western Japan.

As briefly described above, several different theories about Japanese origins and

variations have been proposed during the last one and a half centuries. As anthropological data accumulated, and research techniques were refined, it has become evident that the population history of Japan is much more complicated than previously recognized. Each theory explains part of the existing evidence but none does so in a general manner. In particular, it is difficult to consider the population history of Japanese together with Ainu and Ryukyus who have always been discussed separately from the main islanders. It seems possible, however, to find a way to explain the origins and variation issues as a whole through a re-examination of different theories, and through the application of refined research techniques to the extensive data which have accumulated for more than 100 years.

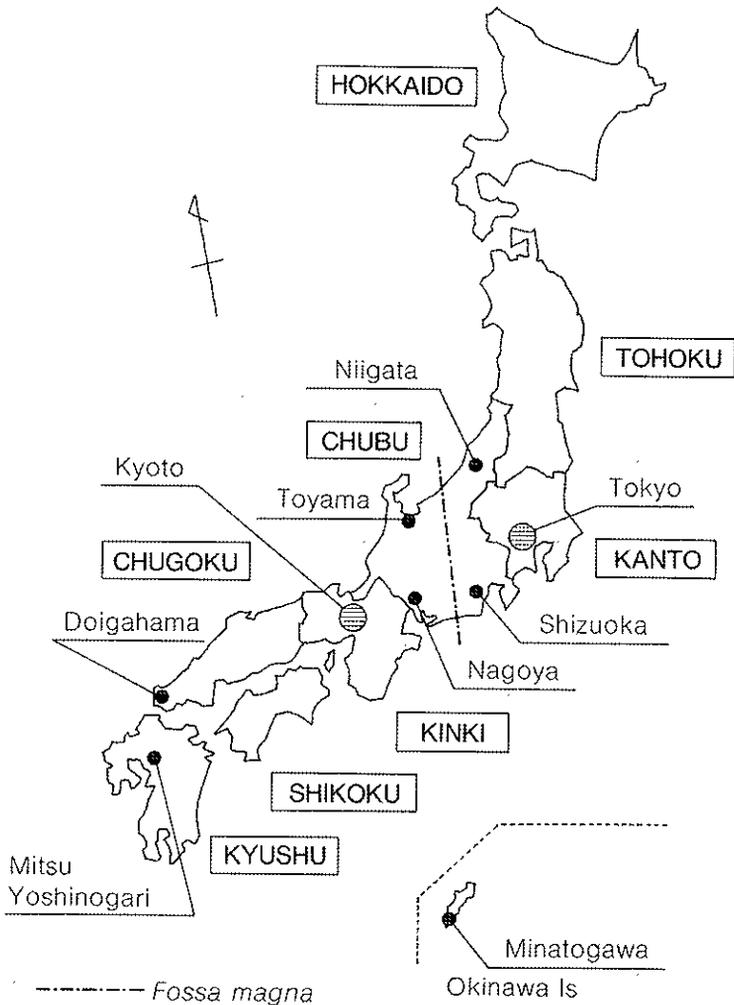


Fig.1. Map of Japan with place names which appear in the text. District names are in squares.

## PALAEOLITHIC AND NEOLITHIC JOMON AGES

Archaeological evidence shows that the Japanese Archipelago has been occupied by humans since the Middle Palaeolithic age, or more than 50,000 years ago. However, the oldest skeletal remains thought to represent an ancestral form of Japanese are those from the Upper Palaeolithic age, or about 18,000 years B.P.

Minatogawa Man, who was unearthed in Okinawa, is one of the representatives of the Palaeolithic population in Japan. The Minatogawa site was found by Oyama, an

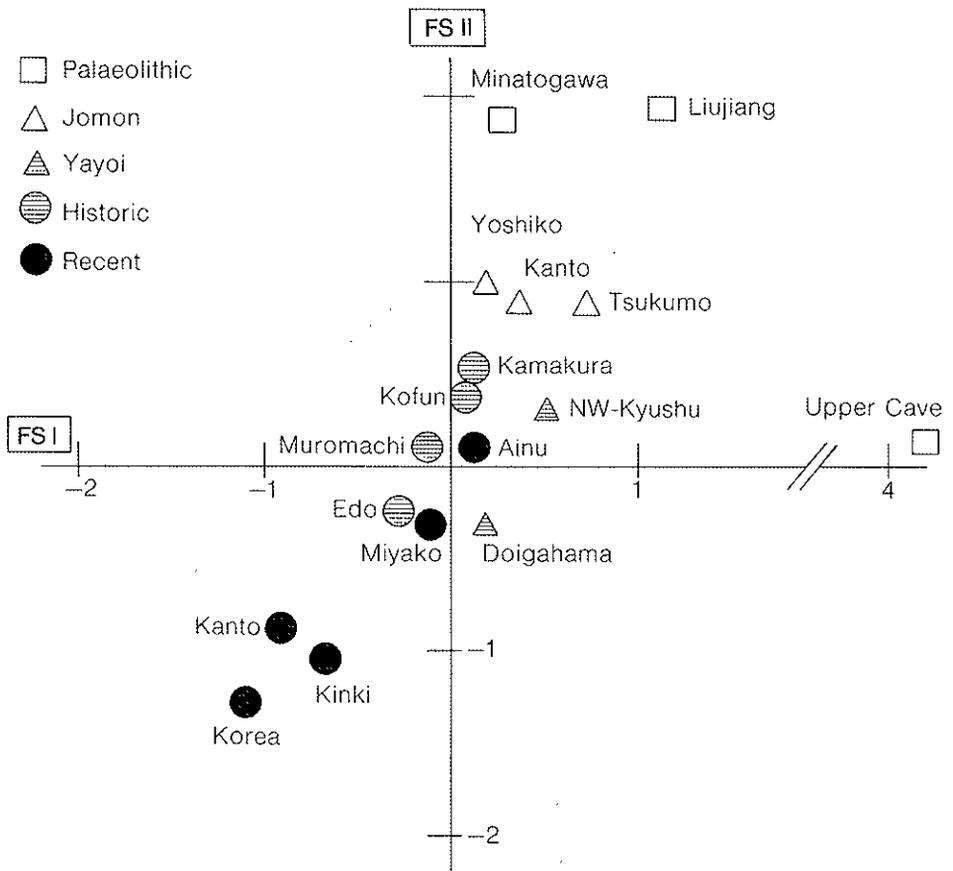


Fig.2. Two-dimensional scattergram of populations based on the 1st and 2nd factor scores after varimax rotation. The data used are 9 cranial measurements. Note microevolutionary changes from the Upper Palaeolithic Minatogawa Man to modern Japanese, and the relative positions of NW-Kyushu Yayoi (natives), Doigahama Yayoi (migrants), modern Ainu and Miyako (Ryukyus) (modified from Suzuki, 1981).

archaeologist, and excavated by a University of Tokyo team headed by H. Suzuki in 1971. The Minatogawa I male skull shows “archaic” characteristics common in Palaeolithic crania. Minatogawa I had relatively short stature, estimated to have been about 155 cm. On the basis of statistical comparisons, Suzuki (1982) pointed out that the Minatogawa Man was morphologically closer to the Liujiang Man from Guangxi Province, south China, than to the Upper Cave Man of north China. At the same time, the Minatogawa crania resemble those of the Neolithic Jomonese. Eickstedt (1934) pointed out the similarity between Japanese and southeast Asians, sometimes called Palaemongoloids. A statistical analysis of the Minatogawa Man and the subsequent Japanese populations strongly supports this view.

The Neolithic Jomon age lasted about 10,000 years from the final stage of the last ice age to around 2,300 years ago. The Jomonese inherited several morphological characteristics from the Minatogawa Man. This suggests that the Jomonese were part of the lineage of ‘Palaemongoloids’ of Southeast Asia through Minatogawa Man (Fig. 2).

The Jomonese were distributed widely in the Japanese Archipelago, from Hokkaido in the north to Okinawa in the south. Microevolutionary changes took place during the Jomon age. They include a fairly wide range of chronological as well as geographic differences. The range of variability in the Jomonese skeletal morphology is, however, narrower in comparison with modern Japanese. The Jomon age was contemporary with the postglacial age, with the Japanese Archipelago isolated from the Asian mainland by the rise in sea level. This aquatic barrier seems to have limited

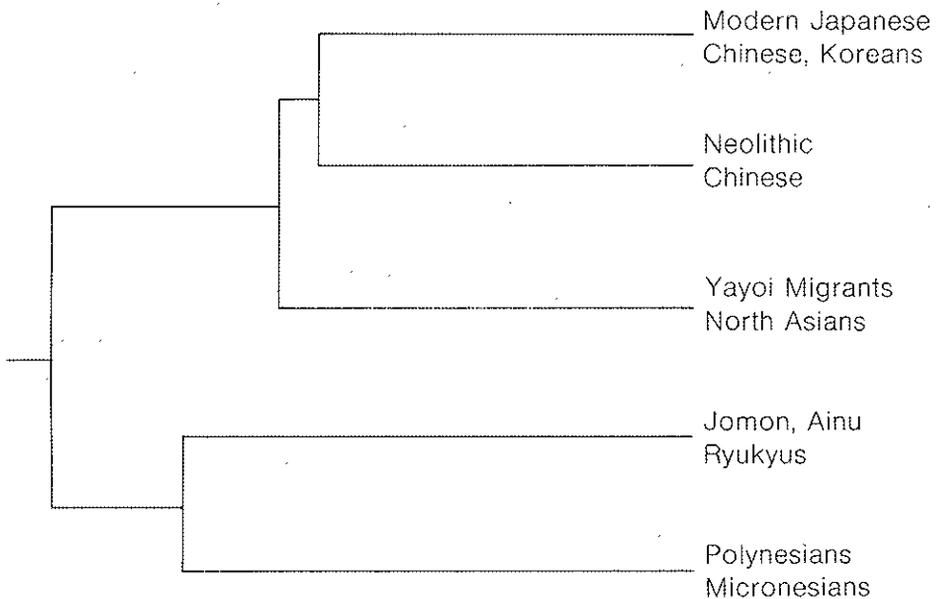


Fig.3. Dendrogram showing affinities of population groups based on Q-mode correlation matrix from 9 cranial measurements and 21 populations (modified from Hanihara, K., 1984).

migration from the mainland, allowing for the evolution of the Jomon culture solely within the Japanese Archipelago.

In fact, the physical characteristics of the Jomonese differ largely from those of the contemporary Chinese populations. The former retain a larger amount of "archaic" characteristics which are shared by the Minatogawa Man, Liujiang Man, and Palaeolithic populations in southeast Asia (Fig. 3). This fact again seems to show that practically no genetic interchange took place between Jomonese and the surrounding populations. The former took a unique course of microevolution within a different ecosystem, population size, food resources, etc., from those of the latter.

Using a DNA amplification technique, Horai and his colleagues (1989) analyzed the mitochondrial DNA sequence in a Jomonese skeleton whose  $^{14}\text{C}$  age was estimated to be  $5,790 \pm 120$  years B.P. Comparing the sequence from this individual with those from 107 other individuals, they found complete identity in two Southeast Asians from Malay and Indonesia out of 16 non-Japanese Asians. Although this is a single example, the result is not inconsistent with the view that ancestral Jomonese may have originated in Southeast Asia.

### AENEOLITHIC YAYOI AGE

The Yayoi age lasted from the 3rd century B.C. to the 3rd century A.D. The events which took place during this period are quite controversial with respect to the history of Japanese people and culture. The most essential cultural changes in the Yayoi age were the introduction of paddy-field rice cultivation and metal tools. In addition, it is likely that the political system introduced from the mainland was of special importance for nation-building in the later ages.

The inhabitants of the Japanese Archipelago lived in relatively small communities throughout the Palaeolithic to Neolithic Jomon times. Population size of the Yayoi communities was larger, on average, more than twice that of the Jomon age. Koyama (1978) estimated population size during the Jomon through proto-historic ages, finding an average community size of 24 individuals for Jomon sites and 57 for Yayoi sites in eastern Japan. In western Japan, particularly in northern Kyushu, however, the scale of occupation sites was much larger than in the other regions. The Yoshinogari site in Saga Prefecture, a typical Yayoi site, is accompanied by one or more ditches, fences, gates, storehouses, watchtowers, burial mounds, etc. Archaeologists have confirmed that the site was planned by external migrants (Saga Prefectural Board of Education, 1990). The skills of politics and defensive warfare were introduced first into north Kyushu, later expanding to the Kinki district in central Honshu during the proto-historic Kofun age (3rd–6th centuries).

Archaeological evidence shows that the migration from the Asian mainland to Japan apparently took place first during the final stage of the Jomon age, with the number of migrants increasing rapidly in the Yayoi age. This migratory period corresponds with cooling climatic and wide spread civil disturbance in central and north China and Korea. It is probable, therefore, that the migration to Japan was

stimulated by chaos in neighboring countries associated with climatic change. According to the historian Ueda (1965), Yayoi age metal tools show typical northeast Asian patterns, indicating that they were likely brought along with the mainland migrants. As is well-known, *Sanguozhi*, China's Jin Dynasty record, describes a tribute sent from Japan in 57 A.D. This act strongly suggests that a fairly large number of migrants settled in Japan, establishing small political states by the middle of the Yayoi age. Ueda believes that the migratory flow from the mainland lasted about 1,000 years—from the Yayoi age to the 7th century. The migrants were not only "power holders" and their affiliated clans, but also were common people in large numbers. If so, the migrants may well have included political refugees similar to the Southeast Asian boat people of today.

As described previously, Kanaseki and his colleagues excavated a large number of skeletal remains from Yayoi sites in north Kyushu and Yamaguchi Prefecture (Ushijima, 1954; Kanaseki *et al.*, 1960). On the basis of comparative studies of the skeletons Kanaseki pointed out their unique characteristics which were similar to north Asians and suggested that they had originated from somewhere in north Korea. He supposed also that the people settling these sites had probably interbred with the native Jomon people.

More recently, Hanihara (1984) compared the Yayoi osteological data with that of several populations from the Neolithic to modern ages in north China, Mongolia, east Siberia, and elsewhere, using multivariate statistical methods (Fig. 3). The results support Kanaseki's view and provide new findings. The cranial morphology of the Yayoi migrants shows close affinities to that of populations in Mongolia, northeast China, and east Siberia, all of whom are thought to be adapted to extremely cold climates. This finding suggests that the homeland of the migrants was likely in northeast Asia. The migrants probably followed routes, though not yet certain, from their original places through the Korean Peninsula and north China to west Japan. Another route, via central China, may have been also possible. This suggestion is consistent with the descriptions of Japan's political situation and customs which appeared in China's historical records of the Qin (221–206 B.C.) and Han (206 B.C.–220 A.D.) Dynasties that were contemporaneous with the Yayoi age.

Applying C. A. B. Smith's divergence coefficients (Mean Measure of Divergence) using frequencies of nonmetric cranial traits, Ossenberg (1986) found a morphological cline from Siberia to Kinki, Kanto, Hokkaido (Ainu), and then to the Jomonese. She suggested that the Siberian genetic influence was greater in west Japan than in east Japan. The same trend was reported by Dodo (1986, 1987) and Dodo & Ishida (1988) who analyzed more than a dozen nonmetric cranial traits in combination. They emphasized that the migrant groups in the Yayoi age were grouped into a cluster together with northeast Asians and recent Japanese, while Ainu and Jomonese formed a separate cluster. Based on their results, they concluded that the continuity theory was hardly acceptable and that a large migratory influence of northeast Asians should be admitted.

On the other hand, Kanaseki's view that the skeletal populations of the Doigahama and Mitsu sites may have been intermixed between the native population and

migrants cannot be accepted without some reservation. Kanaseki supposed that the migrants had to espouse native females because they must have consisted mainly of males. However, the female crania from the Doigahama site closely resemble those found at the Yean-ri site in south Korea (Kim *et al.*, 1985; Ogata *et al.*, 1988). This fact suggests that the migrant groups consisted of both males and females. Nevertheless, it is quite possible that matings between the Yayoi migrants and Jomon natives took place in individual cases.

The Yayoi populations in eastern and western Japan are morphologically quite different. Statistical analysis of cranial measurements shows that the Yayoi populations in northwestern Kyushu and the Kanto district still maintain a large amount of Jomonese characteristics. They are separated sharply from those of the northern Kyushu or Doigahama type as shown by a cluster analysis dendrogram based on Q-mode correlation coefficients (Fig. 4). However, the influence of the Yayoi migrants seems to have extended to the Kanto district unexpectedly early, because some individuals in this region show evident characteristics of the Yayoi migrants.

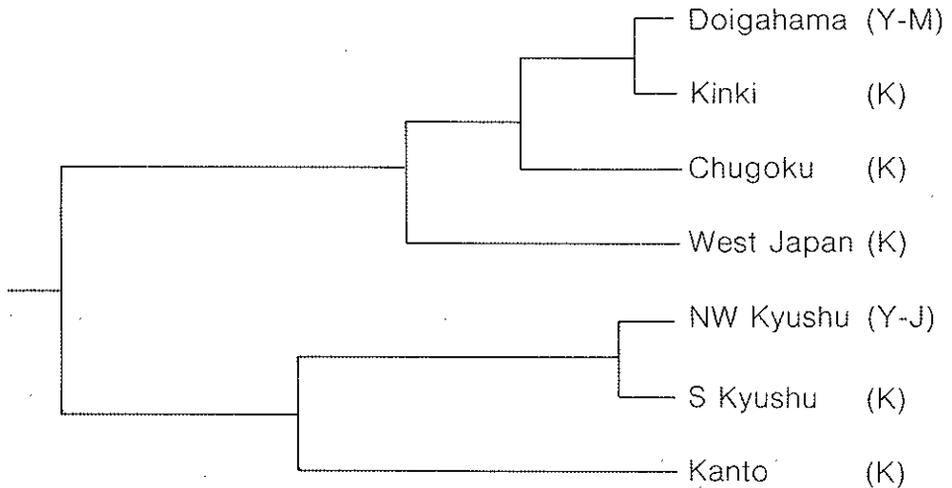


Fig.4. Dendrogram showing affinities of Yayoi and Kofun populations based on Q-mode correlation matrix computed from 7 cranial measurements. Note close affinities between the Yayoi migrants (Y-M) and Kofun populations (K) in west Japan, and between the Yayoi natives (Y-J) and Kofun populations (K) in east Japan/south Kyushu (after Hanihara, K., 1987).

On the whole, the Yayoi age can be characterized in terms of skeletal morphology as a period of genetic influence of northeast Asians in western Japan, particularly in northern Kyushu, and genetic continuity in native Jomonese in eastern Japan. This means that the bipolarization of the Japanese population, as evident in skeletal morphology, began in the Yayoi age.

### PROTO-HISTORIC KOFUN AGE

The Kofun (ancient burial mounds) age lasted from the late 3rd to 6th centuries. It was characterized by unification of small political units which ultimately gave rise to the Imperial Court in the Kinki district, central Honshu. Another important trend in this age was the increased number of migrants because of Imperial Court policy, which was enthusiastic in importing higher culture and techniques from China and Korea. Chinese written characters are said to have been introduced into Japan in the 5th century. Confucianism and Buddhism were introduced in the early or middle 6th century.

Osteological data reveal that a majority of the mainland migrants in the Kofun age were of north Asian ancestors, and the morphological difference between eastern and western Japan became even more evident than in the Yayoi age (Jo, 1938a, b; Hanihara *et al.*, 1984; Hanihara, 1987a, b; Fig. 4). Generally, the Kofun populations in eastern Japan still retained characteristics inherited from the Jomonese, but those in western Japan predominantly carried characteristics of the migrants. At the same time, the populations in western Japan included individuals who represented the cranial morphology intermediate between Jomonese and the migrants. This fact suggests that intermixture of the two primary populations proceeded during the Kofun age, particularly in western Japan.

On the basis of frequency distributions of nonmetric cranial traits, Yamaguchi (1985) concluded that the Kofun population was, on a whole, more like modern Japanese and Koreans than like the Jomonese. This finding supports the view that the Japanese population was affected largely by the north Asians after the Yayoi age. Analyzing craniometric data of the Kofun populations in eastern Japan, Yamaguchi (1987) further demonstrated that they were much closer to the Doigahama Yayoi population than to Jomonese, and concluded that the characteristics of the former had spread into the eastern part of Honshu by around the 8th century.

The chronological ages of crania used by Yamaguchi extended from the 4th to 8th centuries which were contemporaneous with the proto-historic and early historic ages. According to early Japanese historical records, the Imperial Court came to power at the latest in the middle 6th century. Japan's first constitution was established by Prince Shotoku in 604 A.D. The Empress Genmyo moved the capital to Nara in 710 A.D. The first official historical record of Japan (*Nihon-Shoki*) was compiled in 720 A.D., which recorded that some of the Kinki district migrants moved to eastern Japan in the early 8th century on the order of the Imperial Court. It is natural, therefore, that the so-called 'Kofun series' crania of eastern Japan possess characteristics like the Yayoi populations of the north Asian lineage because their genes diffused to the Kanto and neighboring regions by the early 8th century.

The general trends characterizing the Kofun age show a rapid increase of the number of the migrants in comparison with the Yayoi age. Hanihara (1987a) carried out a computer simulation on the population increase during 1,000 years from the 3rd century B.C., the beginning of the Yayoi age, to the 7th century A.D., the early historic age. The simulation was based on Koyama's population size estimates

(Koyama, 1978), rates of population increase and secular changes in cranial morphology which took place during the period under consideration. The results clearly suggest that the proportion of people belonging to the north Asian lineage increased roughly 70% to 90% of the entire Japanese population by the end of the 7th century. The proportion in the Kinki district was likely much higher than in eastern Japan.

Despite his own finding of close affinity between the Kofun population and the Yayoi migrants, Yamaguchi (1987) criticized the results obtained by Hanihara and argued for a much lower number of migrants by quoting the annual rate of population increase of 0.5% for colonizing people during the age of colonialism. The rate of increase adopted by Yamaguchi is, however, hardly acceptable because the ways of life, living standards, and ecosystems were likely much different between the colonial people after the 16th century and Japanese before the 7th century. On the other hand, the annual rates of population increase are estimated to be less than 0.2% for the early agriculturists (McEvedy & Jones, 1978), and about 0.1% for the Japanese during the 8th-16th centuries (Okazaki, 1986). Therefore, the rate adopted by Yamaguchi seems to be greater than the actual case.

## POPULATIONS IN THE PERIPHERAL AREAS

The term 'peripheral' refers to the regions away from the Kinki district where the ancient capitals were located following the establishment of the Imperial Court sometime in the 6th century. At this time, the Imperial Court had little or no effect on the people inhabiting the peripheral regions.

Early historical records (*Nihon-Shoki*, *Shoku-Nihongi*, etc.) describe people who occupied these regions by different names such as *Emishi*, *Ezo*, *Ebisu*, *Kumaso*, *Hayato*, *Tsuchigumo*, etc. They opposed the Imperial Court until the early historic or medieval ages. Who these people were, and where they came from, are long-standing issues among historians, archaeologists, anthropologists, folklorists, and other related scientists. To date, there is no satisfactory explanation about their origins and affinities. Hanihara (1990) analyzed geographic variation in cranial data, suggesting that the *Emishi* or *Ezo* in the Tohoku district, the northeastern part of Honshu, might have been the populations who represented intermediate morphology between the present-day Ainu and non-Ainu Japanese. In other words, they were influenced little, or none at all, by the migrants. They maintained a larger amount of Jomonese characteristics than did those groups in other regions.

Hokkaido Ainu are likely one of the extreme cases. Hokkaido was occupied by Jomonese since the earliest Jomon age. They were basically the same in skeletal and dental morphology as Honshu Jomonese. The Jomonese physical and cultural characteristics were retained through the Hokkaido epi-Jomon age, which was contemporary with the Honshu Yayoi and Kofun ages, and the Satsumon age which was roughly parallel with Honshu's early historic and medieval ages, or the 9th-13th centuries (Fujimoto, 1988). The Hokkaido cranial data show that the Jomonese changed gradually into the present-day Ainu during epi-Jomon and Satsumon times

(Hanihara, 1984). On the other hand, the Honshu populations underwent a different course of microevolution due to the influence of the migrants. This has been demonstrated repeatedly by statistical analyses of both dental and cranial data (Hanihara, 1984, 1986, 1990; Hanihara *et al.*, 1984).

This view is supported by Omoto and his colleagues (Omoto, 1972; Misawa & Hayashida, 1968) who studied blood groups, marker genes, and several other genetic traits in the Ainu. The gene frequencies show the close affinities of Ainu to non-Ainu Japanese and the other Asiatic populations. Later, Omoto (1984) analyzed genetic polymorphisms in blood collected from Philippine Negritos, finding significant similarities between Ainu and Negritos. On the basis of these findings he suggested that Japan's native population could be traced back to early populations, sometimes called 'Proto-Mongoloids'. The same findings were obtained through studies on dental morphology (Fig. 5; T. Hanihara, 1989c, 1990; Hanihara & Hanihara, 1990).

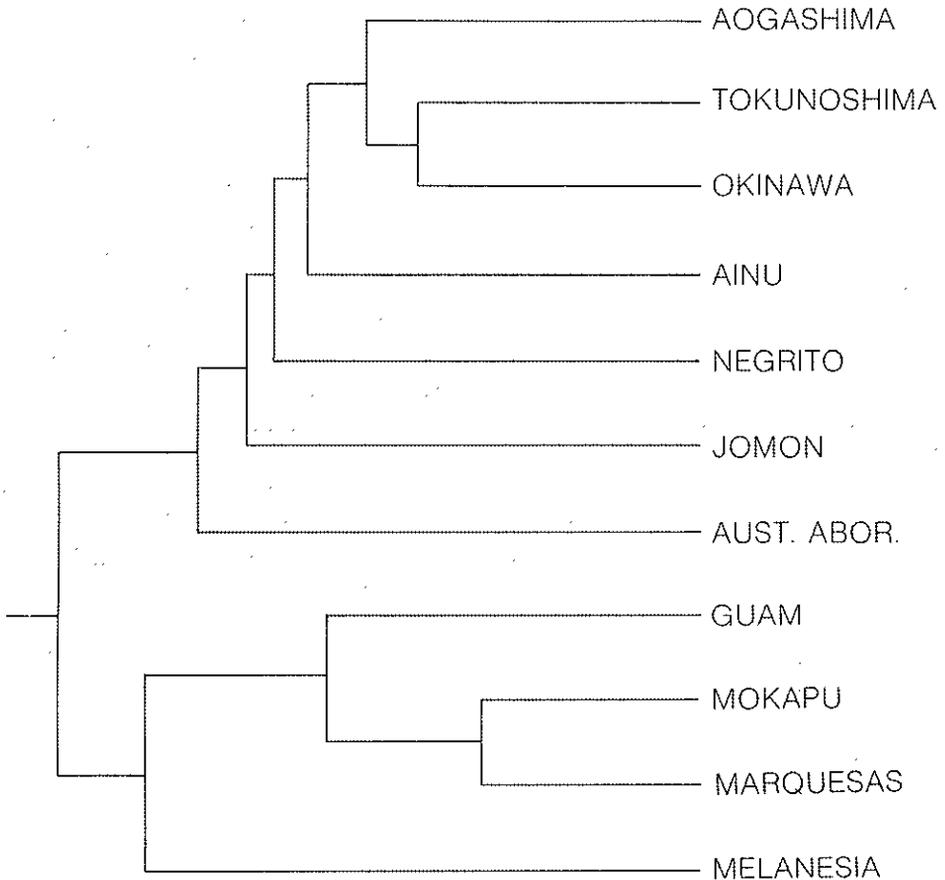


Fig.5. Dendrogram showing affinities of the Japanese and Oceanic populations based on Q-mode correlation matrix computed from mesiodistal tooth crown diameters (after Hanihara, T., 1990).

As is well-known, the study of Ainu origins and affinities has a long and controversial history. According to Kodama (1970), the earliest anthropological study of Ainu was done by Busk, an English anatomist, who described an Ainu skull in 1868. Since then, many different views about Ainu origins have been proposed. Dönitz (1874) found little difference between Ainu and non-Ainu Japanese. He emphasized that the former could be included in the Mongoloid race. This view was accepted by Dobrotworski (1875). On the other hand, a Caucasoid origin for Ainu was advocated by Busk (1868), Bickmore (1868), Davis (1870) and many other authors. More recently, Kodama (1970) supported this view on the basis of craniology, osteology, somatology, and cultural evidence. Another authority who supported a Caucasoid origin for the Ainu was Furuhata (1935, 1962). He was one of the finders of the ABO blood group inheritance pattern, and with his colleagues carried out extensive surveys of the ABO gene distribution in Japan and other countries. Based on these data, Furuhata classified modern human populations into 7 major races and 17 subraces using the method of 'triangle expression of serological position'. He found that the Ainu could not be closely grouped with any major race. Nevertheless, he stated "I believe that Ainu are Caucasians" (Furuhata, 1962).

The theory of the Oceanic origin of Ainu was first proposed by de Saint-Martin (1872), and supported by Anutschin (1876), Tarenetzky (1890), and several Russian scholars. Schrenck (1881) proposed that the Ainu did not belong to any major race of today; instead he suggested they should be called a 'Palaeasiatic' race.

Most of the recent studies on Ainu demonstrate close similarities between Ainu, Jomonese, Ryukyus, and non-Ainu Japanese in both morphology and genetics, as mentioned above. These results reveal that the Ainu are derived from the Jomonese who in turn can be traced back to the earlier population that inhabited southern Asia, or a group referred to as the Palaeasiatic race by Schrenck. Turner and Hanihara (1977) demonstrated that the dentition of the Ainu are more like that of Polynesians and Micronesians than like that of Caucasians, rejecting the view that the Ainu were of European origin. This view has support in the fact that both Polynesians and Micronesians are considered to have been derived from the early populations in Southern Asia. The difference between Ainu and non-Ainu Japanese has resulted from the north Asian migratory influence after the Yayoi age (Hanihara, 1984, 1990).

The same cause seems to explain the differences between present-day Ryukyus and main islanders. Baelz (1883, 1885, 1911) long ago pointed out the close similarities between Ryukyus and Ainu, emphasizing the common origin of the two populations. Until recently, no one re-examined his findings, and both Ainu and Ryukyus were studied separately from main islanders.

Suda's (1950) re-examination of extensive data on Ryukyus and main islanders determined that the former were one of the Japanese local varieties. Later, Hanihara and colleagues (Hanihara *et al.*, 1975b) compared dental traits in Ryukyus and found a close similarity with Ainu teeth. Ikeda (1974) compared the cranial measurements of Miyako islanders, one of the Okinawa Islands, with those from the other regional populations, noting considerable similarity between the former and

Ainu, Jomonese, and southern Asians. Using Ikeda's data Hanihara (1985) carried out further statistical analysis, finding that Ryukyus were grouped into a single cluster with Jomonese and Ainu. Ikeda (1982) compared frontal sinus measurements, and found that Ainu, Ryukyus, and Jomonese were grouped into one cluster, while modern Japanese, Chinese and Koreans joined together in another cluster. Here again, the results obtained from morphological investigations are consistent with those obtained by Omoto and colleagues (1973) through genetic studies.

The Ryukyu populations were isolated from the main islanders, not only geographically but also politically, until the early 17th century when the Shimazu Clan in south Kyushu attacked the Ryukyu Kingdom. In addition, the Okinawa islands are similar to the Hokkaido island in having been occupied by Jomonese since the early Jomon age, and affected little or almost not at all by the Imperial Court until the end of the medieval age. These circumstances were probably responsible for the similarity between Ryukyus and Ainu, at least as far as physical characteristics are concerned. In other words, the Ryukyus seem to have inherited a large amount of Jomonese characteristics as did the Ainu.

Common elements in the Ryukyu and Ainu cultures have recently been pointed out by cultural scientists. For instance, part of the elementary vocabularies, basic language structures, world views, ideas of faith, etc., are said to be similar in both groups, and likely due to a common origin in the Jomon age (Fujimoto, 1988; Umehara & Fujimura, 1990). Although these views should be tested and evaluated by other sorts of evidence, the elements which are common in the Ainu and Ryukyu cultures may be key factors for the analysis of Japanese traditional culture.

### MODERN JAPANESE

Differences between eastern and western Japan are recognized by the majority of the Japanese people. For instance, dialects, traditional customs, taste in foods, ways of thinking, etc., are different in the two areas. Differences also occur in several archaeological materials such as pottery patterns, cultural assemblages, and subsistence. While the pattern of hearth and fireplace was the same throughout Japan in the Jomon age, it became different in eastern and western Japan in the Yayoi times. Head orientation of burials shows the same kind of inter-regional difference (Tsude, 1990, personal communication). Differences in dialects have arisen by the process of 'east-west bipolarization' (Tokugawa, 1983; Kobayashi, 1989).

The east-west differences are evident not only in cultural evidence but also in physical traits such as stature, cephalic as well as facial morphology, finger and palm print patterns (Kimura, 1962), distribution of the ABO and other blood types (Furuhata, 1935; Tanaka, 1959), serum protein and red cell enzyme types (Omoto *et al.*, 1973; Omoto, 1978) and other features (Figs. 6-8).

Special attention should be paid to the fact that the boundaries between these differences tend to lie in the Chubu district, or the region between the lines running through Niigata and Shizuoka cities in the east and Toyama and Nagoya cities in the

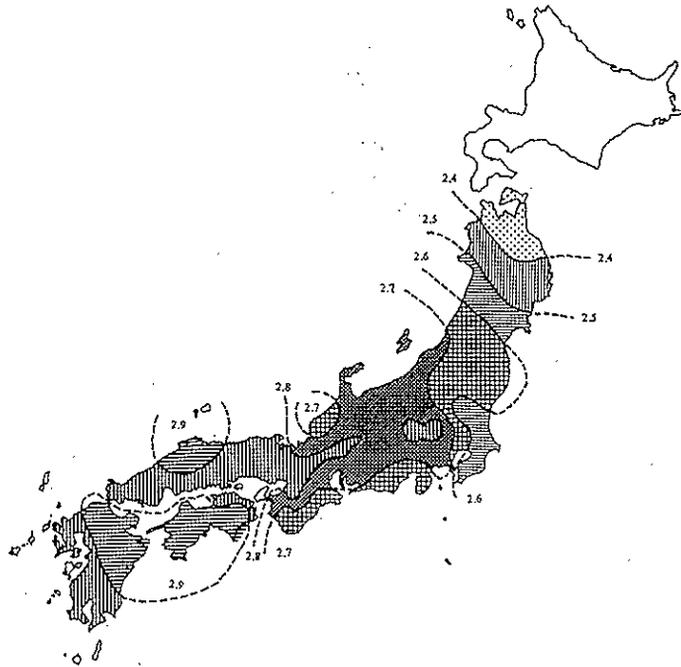


Fig.6. Distribution of blood group gene A (p) in Japanese (after Tanaka, 1959).

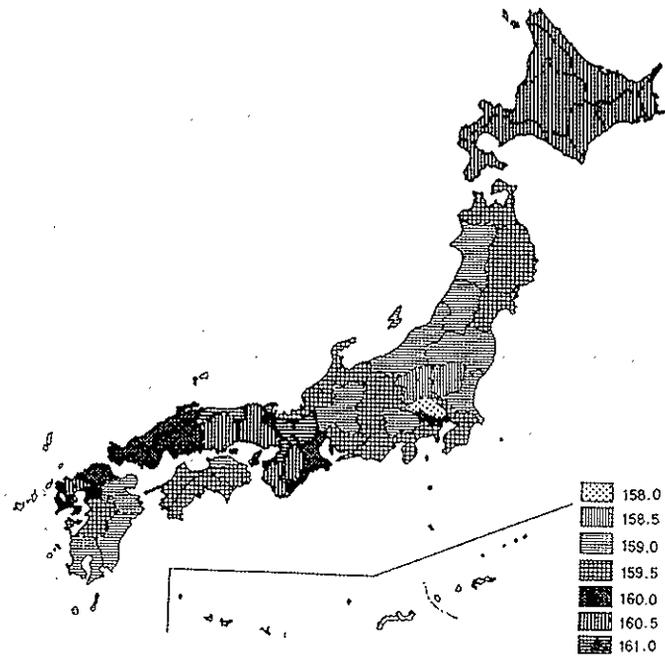


Fig.7. Stature in male Japanese according to prefecture, 1928--31 (after Hasebe, 1935).

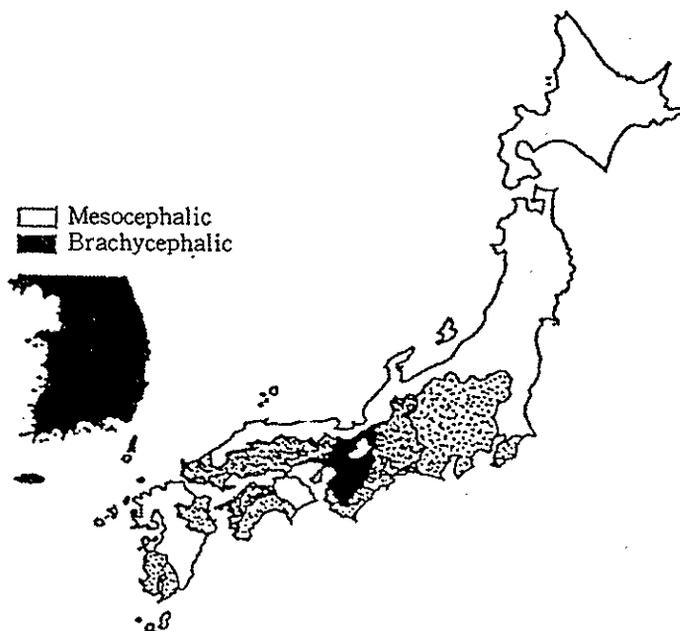


Fig.8. Cephalic index in modern Japanese and Koreans (modified from Kohama, 1960).

west; and that most of the physical characteristics show clines from west to northeast.

It also attracts our attention that the boundaries between east and west Japan roughly overlap with the so-called *Fossa magna* which is a large dislocation running from Itoigawa in Niigata Prefecture to Lake Hamana (Hamanako) in Shizuoka Prefecture. The natural environment and ecological niches have been largely different between the two regions defined by this line since the Jomon age. Koyama (1978) pointed out that the number of Jomon sites and population density were different in the two regions. East Japan was much more densely populated than west Japan in the Jomon age. However, the population in west Japan increased rapidly in the early Yayoi age and exceeded that of east Japan by the final Yayoi stage, or the 3rd century, at the latest (Koyama, 1978). This shift suggests a rapid change in culture including food production techniques in west Japan caused by migrants from the mainland. The differences today between east and west Japan likely originated in the Jomon and Yayoi ages.

One of the important considerations ignored in the theories reviewed earlier, concerns geographic variation in the Japanese population. In spite of several osteological and somatological reports on this issue published since the 1920s, practically none of them have been taken into consideration in regard to the Japanese population history. Perhaps the only example in which geographic variation was positively analyzed in relation to this problem were the somatometric studies by Kohama (1960). He discussed, however, the issue exclusively from the somatometric

point of view and did not recognize the microevolutionary changes in skeletal morphology which has taken place since the Jomon age.

Attributing special importance to geographic variations, K. Hanihara organized a study group for the re-examination of skeletal morphology of modern Japanese. The group, consisting of more than 30 anthropologists and anatomists, started its activity in 1979. It gathered metric and nonmetric data from crania whose origins were reliably recorded. The cranial samples used were university collections obtained from 13 local regions, from Hokkaido (Ainu) in the north to Kyushu in the south, and the total sample included 711 males and 537 females (Commission of Anthropological Investigation of Modern Japanese Crania, 1981, 1983).

On the basis of statistical analysis of these data, Hanihara (1985) found clines

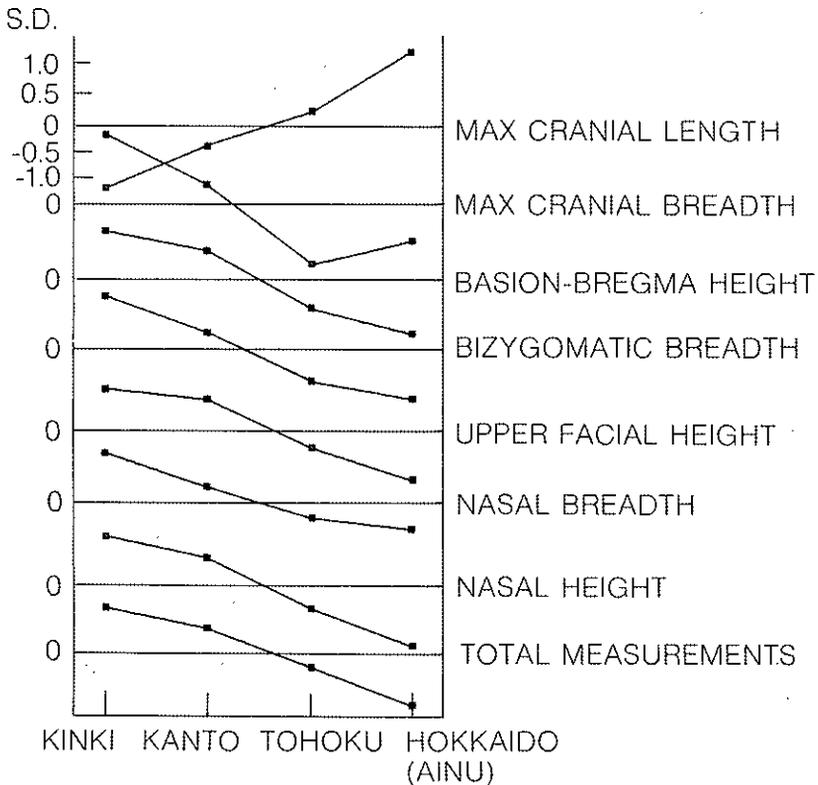


Fig.9. Deviation curves for cranial measurements in the modern Japanese male from 4 districts. Black squares show deviations from grand means of the populations compared. Deviations are shown in standard deviation unit and the signs for maximum cranial length are reversed in computing those for total measurements (after Hanihara, K., 1990).

evident in cranial measurements which decreased or increased from west to northeast Japan (Fig. 9). He also noted that the north Asian characteristics were predominant in north Kyushu and west Honshu, while those of Jomonese were maintained in

Hokkaido, northeast Honshu, Shikoku and south Kyushu. Amami and Okinawa Islands are included in the latter group as revealed by other data. It is of interest to note that the regions where the Jomonese heritage is predominant are those little affected by the Imperial Court in the early historic ages. In other words, the people in these regions were assimilated by the Imperial Government later on.

Almost the same clines were reported by Omoto (1978) on the basis of molecular genetics. He proved that the frequencies of marker genes such as glutamic-pyruvic transaminase (GPT), haptoglobin (Hp), and Gc subtype showed clines from west to east in Honshu, and all the gene frequencies in east Honshu were closer to those in Ainu. At the same time, the populations in Aomori, Iwate and Akita Prefectures which are located at the northern end of Honshu show the closest affinity to Ainu in gene frequencies of the ABO blood groups (Misawa & Hayashida, 1968).

With respect to Japanese somatometry, Kouchi (1983) compared the data collected by Matsumura (1925), Nishi (1944) and the National Somatometric Research Group (1950-52). These data were obtained from almost every location of Japan, providing a very reliable basis for analyzing geographic variation in modern Japanese. In addition, the birth years of the subjects were from the 1880s to 1890s for the Matsumura series, from 1916 to 1926 for the Nishi series and the 1890s to 1930s for the NSRG series. Analyzing geographic variation and secular changes, Kouchi found that the characteristics of west Honshu diffused gradually to northeast Honshu. In particular, the secular changes in local types are quite evident between the Matsumura and Nishi series of which the interval of the average birth years is about 30 years. This finding suggests that intermixture between the groups of the two regions is still on going, that is to say, the physical traits derived from the Jomonese and those introduced by migrants in and after the Yayoi age, are responsible for the regional differences of today. Japanese are sometimes said to be homogeneous in both culture and biology, but such is not the case.

As regards dental morphology, Turner (1976, 1979, 1986, 1987) and Turner & Hanihara (1977) carried out comparative studies of Japanese and the neighboring populations, and Brace and colleagues (1982, 1989) studied tooth size and craniofacial dimensions. They pointed out a close relationship between Jomonese and Ainu and a large difference between the two populations and modern Japanese. Both Turner and Brace emphasize that Jomonese are classified into what can be termed the 'Jomon-Pacific cluster' together with Micronesians and Polynesians, and that Ainu derived directly from Jomonese. Brace further stresses a close relationship between non-Ainu Japanese and the Mainland-Asians and a large difference between the 'Jomon-Pacific cluster' and 'Mainland-Asian cluster'. Brace's idea is, therefore, basically the same as the replacement theory proposed by earlier authors, which is hardly acceptable because the theory is inconsistent with secular changes and geographic variations within the Japanese population. On the contrary, Turner who used almost the same samples studied by Brace, expresses a different view that Jomonese were not replaced by the ancestral group of modern Japanese but left their traces in the latter. It is particularly important that Turner (1976) recognizes two fundamental elements in the Japanese tooth morphology, 'sundadont' and 'sinodont'

patterns, which coexist even today. In any case, the close affinities of Jomonese and Ainu to the southeast Asian and Pacific populations which were pointed out by Turner and Brace are consistent with what has been found through craniological and genetic investigations.

On the basis of morphological similarity between Ainu and the medieval population in the Kanto district, Brace and colleagues (1989) further go to stress that the *Samurai* are derived from Ainu. Although Brace gave no definition of *Samurai*, the findings in archaeology, history, folklore, physical anthropology, etc., do not support Brace's view. *Samurai*, or "warriors" in Japan, emerged in the 10th century through arming of local clans who held power and high social positions. Therefore, *Samurai* could not have been Ainu. On the other hand, *Ashigaru*, the lowest class of *Samurai*, emerged through the class strife which took place during the 14th-15th centuries. They were mostly farmers and Buddhists in local regions. At the same time, the rise of *Ashigaru* was not limited to the Kanto district but took place in different regions all over Japan. It is likely, therefore, that a majority of the *Ashigaru* class consisted of the native people but not Ainu as they are today (see K. Hanihara, 1990). If Brace's view were correct, in any case, a large number of Ainu must have been distributed throughout Japan as farmers and Buddhists in the medieval age. Brace's '*Samurai* theory' has, therefore, no grounds whatsoever in actual fact.

Using metric and nonmetric dental traits, T. Hanihara (1989a, b) found that

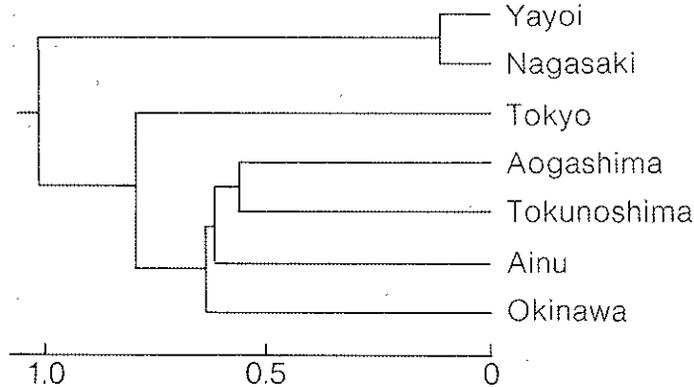


Fig. 10. Dendrogram drawn from Q-mode correlation matrix of mesiodistal tooth crown diameters (after Hanihara, T., 1989b).

geographically isolated populations were similar to Ainu, Ryukyus, and Jomonese in dental morphology but different from a majority of modern Japanese (Fig. 10). At the same time, T. Hanihara (1989c) and Hanihara & Hanihara (1990) pointed out a close similarity between Jomonese-Ainu-Ryukyus group and Philippine Negritos in dental characteristics (Fig. 5). Howells (1976), Kennedy (1979) and Omoto (1984) suggested close cultural as well as physical affinities between Negritos and the so-called Proto-Mongoloids. On the basis of genetic surveys in the Philippines, Omoto (1984, 1986) goes on to suggest that Negritos probably had something to do

with the origin of the Mongoloid populations. Taking these various findings into account, it is likely that Negritos maintain several characteristics which were derived from the ancestral form of east Asians, or the groups having the 'sundadont' dental pattern, in Turner's (1979, 1986) terminology. This means, in turn, that the Japanese populations possessing Jomonese characteristics may have derived originally from early southeast Asians.

Putting all of the evidence together, the populations in the southwestern part of Honshu and Kyushu are similar to north Asians and those in northeast Honshu to south Asians in physical characteristics. This trend can, therefore, be expressed by a term 'north-south inversion' of characters in Japanese. It is also evident that the bipolarization of Japan has been present since the Yayoi age, and is still maintained in the present-day Japanese population.

### NON-HUMAN EVIDENCE

On the basis of genetic studies of Japanese dogs, Tanabe (1985, 1989, 1990) found that the dogs distributed in northeast Japan carry genes derived from south Asian breeds of dog. Those in southwest Japan carry north Asian genes. The former group consists of dogs in Hokkaido and the northeastern part of Honshu. The latter includes those distributed in west Honshu, Kyushu, and Shikoku. In addition, Tanabe paid special attention to secular changes in the dog cranial morphology. For instance, the 'stop' in the frontal bone has developed gradually since the Jomon age. This trend is particularly evident in the northeast Japan group. In other words, the dogs in northeast Japan seem to be derived from 'Jomon dogs', who originated in south Asia, which were kept by the Jomon people. Dog skeletons found from Jomon sites were usually buried carefully, sometimes together with human remains.

Moriwaki and colleagues (Moriwaki, 1983; Yonekawa *et al.*, 1988) studied mitochondrial DNA of Japanese mice. They found almost the same trend; namely the mtDNA sequence in the mice distributed in northeast Honshu and Hokkaido is the same as those in south Asia. Those in southwest Japan share the common sequence patterns with north Asian mice. On the basis of the distribution pattern of mice, Moriwaki thinks that the south Asian type may have migrated to Japan first, probably in the Palaeolithic age when land bridges connected the Japanese Archipelago with the Asian Mainland. The north Asian type arrived later with the migrants from north Asia.

Both dogs and mice are symbiotic with humans. They tend to accompany human migrations. The trend of a 'north-south inversion' in distribution pattern which is parallel to human populations is, therefore, likely related to the population history of the Japanese.

Another line of evidence is the distribution pattern of viruses which cause adult T-cell leukemia (ATL). Hinuma and colleagues (Hinuma, 1985, 1986) found that ATL-virus carriers in Japan are distributed to limited local areas, such as isolated small islands, and places which are rather inaccessible. Carriers are also relatively

frequent in the Ainu. Interestingly, these places correspond to those which were far from the ancient capitals, and supposedly occupied by the people of the Jomonese lineage. Virologically, the ATL-virus is one of retro-viruses and transmitted from mothers to children in a manner similar to sex-linked genes. Hinuma suggests that the ATL-virus may have been carried by Jomonese and survived through their descendants to the present-day. It is of interest to note that the distribution of ATL-virus carriers overlaps roughly that of the dentition of the Jomonese or 'sundadont' pattern as revealed by T. Hanihara (1989a, b).

## DISCUSSION

The view stressing that Jomonese were replaced by the ancestral population of modern Japanese has been firmly emphasized since the late 19th century. In fact it is the easiest way to explain the differences between Jomonese and modern Japanese as well as those between Ainu and non-Ainu Japanese.

As data have accumulated, however, anthropologists began to realize that many findings were inconsistent with this replacement theory. For instance, clines from west to northeast Japan, localization of particular characters in limited regions, cultural differences between east and west Japan, and so forth, are hardly explainable by a simple replacement theory. It seems to be natural that this theory was proposed when data were still limited, but strangely this view is supported by some anthropologists even today. The only reason may be nothing but ignorance about new findings in east Asian and Japanese anthropology and related sciences. After World War II, in particular, an extensive amount of new data and findings were assembled through a variety of investigations, not only in anthropology but also in several other related fields. They cannot be ignored for analyzing the population history of Japanese.

The hybrid theory proposed by Kiyono and Kohama seems to be more reasonable, but it does not explain the origins and affinities of Ainu and Ryukyus. As a result, the close similarity between the two populations remained unexplained. The view of Kiyono that the intermixture between Jomonese and north Asians gave rise to the present-day Ainu is not acceptable because Ainu show almost none of the north Asian characteristics found in the people of the extremely cold north. Kohama simply assumed a different origin for the Ainu from that of non-Ainu Japanese and did not discuss this issue.

The continuity theory proved the direct line from the late Palaeolithic Minatogawa Man, or at least from the Neolithic Jomonese, to the present-day Japanese. This theory has the advantage of recognizing microevolution within populations, and consequently it succeeds in explaining the secular changes which took place in the populations of the Jomonese lineage. However, Suzuki did not consider inter-regional geographic variation. The samples he used were mainly from east Japan, particularly from the Kanto district. He believed that his samples represented the entire Japanese population throughout the periods from the Jomon to modern ages. As a result, the theory was inconsistent with the findings of the Yayoi skeletal remains in north

Kyushu. In addition, the problems concerned with the Ainu and Ryukyus were hardly explained by this theory.

The migration theory stressed by Kanaseki is supported by the new findings on the Yayoi skeletal remains from north Kyushu and the western end of Honshu. A large difference between the two Yayoi groups, 'north Kyushu type' and 'northwest Kyushu type' in Naito's terminology, cannot be explained by the continuity theory. It is of special importance that the migration theory is consistent not only with physical evidence but also with historical records compiled in Japan, China, and Korea. On the other hand, this theory has its limits in proving the uniqueness of the Yayoi populations in question, and in assuming the places to where they emerged. In his discussion Kanaseki (1976) stated that the migration from the Korean Peninsula took place within a limited time and the migrants were small in number so that they did not produce a large impact on the native Japanese population, or that of the Jomon lineage, and the migrants were absorbed into the native populations by the Kofun age. However, subsequent findings strongly suggest that the migrants were unexpectedly large in number and had a great impact on the native Jomonese and their descendants, both physically and culturally (Hanihara, 1987a). In fact, the influence of the migrants spread over wide areas of Japan.

The other issues to be re-examined are the common origin of Ainu and Ryukyus and the dual physique theory. Although both views were expressed by Siebold and Baelz as early as in the 19th century, they were ignored by subsequent investigators for a long time. If a large impact of the migrants on the native Jomonese is taken into account, the idea of a common origin of Ainu and Ryukyus is supported by the view that both populations were almost free from the influence of the migrants in physical, cultural, and political aspects because they inhabited the regions far from the ancient capitals. In other words, a close similarity between Ainu and Ryukyus is due to a common origin from the Jomonese and, on the contrary, the populations in the Japanese main islands gradually changed physically and culturally under the influence of the migrants from north Asia. Several findings suggest that the separation between the Ainu-Ryukyu group and main islanders progressed during a period of more than a millennium from the Yayoi to medieval ages (K. Hanihara, 1990).

The dual physique theory may also be supported by the view of coexistence of the two lineages derived from the Jomonese and the migrants. The so-called *Satsuma* type is represented by characteristics closer to the south Asians. The *Choshu* type is more similar to north Asians. The former corresponds to the Jomonese lineage, and the latter to the migrants. It is of interest to note that the bipolarization of the two types likely suggests heterogeneity of the Japanese in physical as well as cultural elements. The trend of bipolarization of Japanese emerged in the Yayoi age and is maintained even today as represented by the previously discussed geographic variations. This means that intermixture between the two lineages is still going on as shown by Kouchi (1983).

As described, the important events which took place in the course of the population history of Japanese can be explained by assuming the coexistence of the two lineages, one from the Jomonese and the other from the migrants from north Asia.

The former may have inhabited the Japanese Archipelago since the Upper Palaeolithic age and the latter since the Yayoi age. Intermixture between both lineages is still in progress. Geographically, the groups of the Jomon lineage are distributed mainly in Hokkaido (Ainu), Okinawa (Ryukyus), east Honshu, south Kyushu and Shikoku. Those of the north Asian lineage are found in west Honshu and north Kyushu. The migrants brought new cultural elements such as the cultivation technique of paddy-rice fields, metal tools, and political power to Japan. They established small states in west Japan, probably in north Kyushu, for the first time. These states were gradually integrated into a larger power structure which gave rise to the Imperial Court, established in the Kinki district by the 6th century. The assimilation of local groups such as *Emishi*, *Ezo*, *Hayato*, etc., continued for a long period from the beginning of the Imperial Court to the medieval age. This event seems to symbolize the bipolarization or dual structure of Japanese.

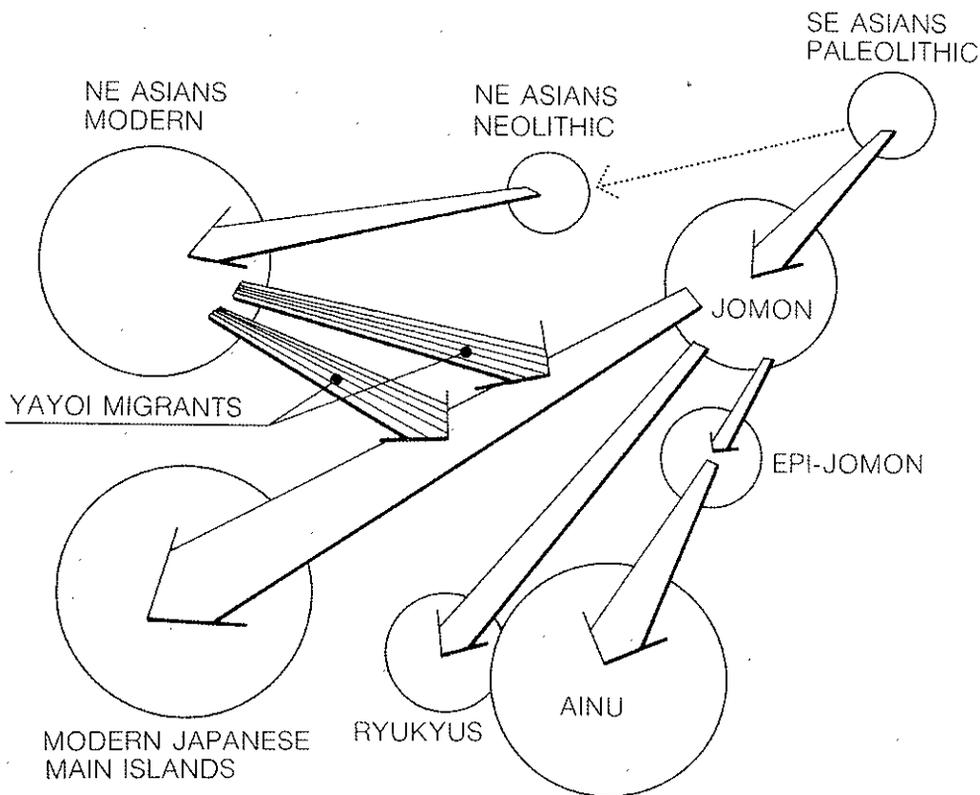


Fig.11. Schematic expression of the formation history of Japanese. Population groups are scattered according to the 1st and 2nd principal component scores obtained from 9 cranial measurements in males. Note the difference in microevolutionary courses between Ainu-Ryukyus and main islanders. Microevolution of some isolated populations may also have taken place along the similar courses to those of the Ainu-Ryukyu group.

Putting all of these findings together, the view described here in regard to the population history of Japanese may be expressed by the term 'dual structure model' (Fig. 11). This model is consistent not only with physical evidence but also with cultural phenomena in Japan. In particular, the issues such as geographic variation in physical traits which are recognized throughout the periods from the Neolithic Jomon to modern ages; phyletic relationships among the main islanders, Ainu, and Ryukyus; those between Japanese and neighboring populations; the so-called 'north-south inversion' of physical characteristics in Japanese, Japanese dogs and mice, and so forth, are consistent with the dual structure model as a whole.

This model is basically the same as the pattern which was recognized by Turner (1976), stressing the coexistence of 'sundadont' and 'sinodont' patterns in Japanese. Although his study concerns dental morphology, the results obtained on the basis of a number of populations in the Pacific basin provide this model with strong support.

In recent years a number of studies have been carried out in different fields of cultural sciences in relation to the basic structure of Japanese culture, and several problems in question can be answered by applying the dual structure model. In this respect, it may be worthwhile, by applying this model, to re-examine the problems which still remain today.

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## 二重構造モデル：日本人集団の形成に関わる一仮説

植原和郎

**要旨：**日本人集団の形成史については古くからさまざまな学説が提唱された。その多くは一面の真理を語ると思われるが、石器時代から現代に至る種々のデータを全体として説明するには説得力に欠ける面もある。同時に、現在のデータや研究方法で再検討されるべき問題も少なくない。例えば Baelz が記載した、いわゆる薩摩タイプ・長州タイプの問題や、アイヌ・琉球人の系統関係などは、当時とは異なる視点から再検討する必要がある。

また、一方では、きわめて限られたデータから、日本の文化や歴史を無視した短絡的発言が行われることもあり、しかもそれが国際的に通用するという危険性をはらんでいることは無視できない問題である。

本論文で提出する日本人集団の二重構造モデルは、従来の諸説を比較検討し、また最近の研究成果に基づく統計学的分析によって得られた一つの仮説である。このモデルは次の点を骨子とする。

(1) 現代日本人の祖先集団は南東アジア系で、おそらく後期旧石器時代から日本列島に住み、縄文人を生じた。(2) 弥生時代から7世紀ころにかけて北東アジア系の集団が日本列島に渡来し、大陸の高度な文化をもたらすとともに、在来の南東アジア系(縄文系)集団に強い遺伝的影響を与えた。(3) 南東・北東アジア系の2集団は日本列島内で徐々に混血したが、その過程は現在も進行中で、日本人は今も heterogeneity、つまり二重構造を保っている。

以上の観点から、さらに次のことが導かれる。(1) 日本人集団の二重構造性は、弥生時代以降とくに顕著になった。(2) 弥生時代から現代に至るまでの日本人集団の地域性は、上記2系統間の混血の割合、ならびに文化的影響の程度が地域によって異なることによって生じた。身体形質や文化にみられる東・西日本の差、遺伝的勾配なども北東アジア系(渡来系)集団の影響の大小によるところが大きいであろう。(3) アイヌと琉球人の身体形質にみられる強い類似性は、両者とも南東アジア系集団を祖先とし、しかも北東アジア系集団の影響が本土人に比べてきわめて少なかったという共通の要因による。換言すれば、弥生時代以降大きい変化を示したのは本土の集団である。

以上の諸点は単に日本人集団のみならず、ヒト以外の動物、例えば日本犬や日本の野生マウスの分布にも当てはまる。また文化現象についても二重構造モデルで説明しうる場合が多く、さらに歴史との整合性も高い。

言うまでもなく、種々の研究領域のデータの中にはこのモデルに適合しないものもあり、

また日本人集団の形成過程において、上記以外の複雑な要素が関与したことも十分に考えられる。またこのモデルそのものも検討すべき多くの課題を含んでいる。しかし一方では、二重構造モデルに基づいて身体と文化に関わる諸現象を合理的に説明し得ることから、さらに多くの点についてこのモデル自体の適合性を検討し、修正を加え、理論の精密化を計ることは無意味ではないと思われる。