

Nissology, Island Archaeology, and the Archaeology of Ryukyus (1)

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Abstract

Nissology, or the science of islands, aims to study islands holistically. Thus, nissology-related journals, such as *South Pacific Studies*, cover islands' natural, economic, social, and cultural aspects. These themes are also presented and discussed at annual meetings of nissology, such as at the Japan Society of Island Studies meetings. While the objective of nissology is proclaimed to be a holistic approach to island studies, the prehistoric aspect seems to be missing. Prehistory attempts to elucidate the human past before any written records. A prehistoric approach to nissology is essential to understand contemporary people and culture as in many cases more than 90% of islands' history is prehistoric.

On the other hand, island archeology has been dominated by islands in the Mediterranean, Oceania, the Channel (California), and the Caribbean. The archeology of these regions has been the source of clarifying cultural histories. Furthermore, comparison and contrast of archeological data from these islands extracted general tendencies of human-island environmental relationships. Some of these have been proposed as theories - however, there is a lack of archeological data from the Ryukyu Archipelago islands. For the last 100 years, a considerable amount of archeological data, comparable to the four major regions of island archeology, has been accumulated. Therefore, archeological data from the Ryukyu Archipelago compensate and/or provide new aspects to the world of island archeology.

The present paper outlines archeological data from the Ryukyu Archipelago, mainly focusing on the Central Ryukyus, in order to demonstrate how the data from the Central Ryukyus contribute to nissology and island archeology.

Key words: Central Ryukyus, island archaeology, nissology, Paleolithic, prehistory, Ryukyu Archipelago

Received: 28 October, 2021

Accepted: 16 November, 2021

Introduction

Nissology, or the science of islands, was inaugurated during the International Small Islands Studies Association Conference in 1994 in Okinawa, Japan, and the purpose of this newly born discipline is “the study of islands on their own term” proposed by Grant McCall of the New South Wales University (KAKAZU 2019: 14). This is an epoch-turning point in the study of islands. While scholars had studied islands before 1994, the commencement of nissology set the stage to conduct multi-disciplinary island studies for the first time. For the last three decades, nissology has been conducted in many areas of study, such as economy, society, tourism, biology, fishery, and agriculture, and have successfully produced valuable scientific data (KAWAI et al. 2013).

However, while nissology has successfully obtained important scientific data from islands, almost all of them have dealt with present or at least a shallow history. For example, although the *South Pacific Studies*, published by the International Center for Island Studies, Kagoshima University, has been published since 1980, almost all articles focus on modern economy, cultures, and industries. Less than five deals with prehistory.

All islands have a long history. In terms of history, many islands were occupied by people without writing systems. The islands in the Caribbean (KEEGAN and HOFFMAN 2015) and Oceania (KIRCH 1984) were inhabited by non-literate people before the Europeans “discovered” these islands. Of course, many islands in the world are occupied by people with writing systems. However, these islands also have a history without writing, that is, their prehistory. To establish a complete nissology, human history, especially prehistoric or archeological data, must be considered.

Archeology of islands, on the other hand, has been extensively studied in the Mediterranean (BROODBANK 2000, CHERRY 1981, KNAPP 2013), Oceania (KIRCH 1984, STEADMAN 2006), California Channel Islands (KENNETT 2005, RICK and EARLANDSON 2008), and Caribbean islands (FITZPATRICK 2013, KEEGAN and HOFFMAN 2017). Archeology has greatly contributed to the reconstruction of the cultural histories of these regions. Furthermore, comparisons of archeological data among these islands have provided valuable insights into human-island environmental relationships. It is probably not exaggerated to state that some of these insights have been promoted as a larger theory comprising of principles or rules.

What is lacking in the world of island archaeology is data from the Ryukyu Archipelago. The history of archeological research goes back as early as the late nineteenth century. For example, KANDA, as early as 1884, published a report on surface-collected stone adzes from the Amami Oshima Island. In 1904, TORII conducted the first excavation on Ishigakijima Island (ASATO 2012). While archeological research during the first three-quarters of the twentieth century was sporadic, it established the foundation of the chronology of this region. Archeological works have increased exponentially since the 1970s, as in the mainland of Japan, due to development projects. As a result of large-scale buildings, roads, and other large-scale constructions (ASATO 2012), the number of excavations surged, as well as the areas of excavation. Intensive and extensive excavations

conducted over the last five decades have successfully produced details on the prehistory of this region. Thus, archeological data from the Ryukyu Archipelago are comparable to those of the Mediterranean, Oceania, California Channel Islands, and Caribbean islands. In other words, the archeological data from the Amami and Okinawa Archipelago offer valuable insights into island archeology and anthropology in general.

This paper will demonstrate how the prehistory of the Central Ryukyus can contribute to nissology and island archeology. At least Japanese nissology appeared to have, superficially, if not at all, touched deep history. It is difficult to determine how modern people and cultures have evolved and matured since the written history of Central Ryukyus only began from the fifteenth to sixteenth centuries AD. Archaeology and prehistory are the only approaches which can reveal deep history.

On the other hand, the archeology of islands has been mainly centered around the Mediterranean, Oceania, California Channel Islands, and Caribbean islands. Archeological data from the Central Ryukyus provide complementary or brand-new data to island archeology. Among these data, this paper deals with the colonization processes of *Homo sapiens* to the Central Ryukyus. This paper will contribute to island archeology by bringing about a new aspect of island archeology and the nissology of the Central Ryukyus by presenting the time-depth of peopling of the islands. The remainder of this paper is organized as follows. First, it provides background information such as geography and chronology. Second, it discusses the first appearance of *Homo sapiens* in this region. Third, it investigates the origin of the modern Central Ryukyu population. Finally, in summary and conclusion, this paper highlights the contribution of this research to island archeology and nissology. In the future, I would like to provide several other unique aspects of the prehistory of this region, such as hunter-gatherer-fisher adaptation to an island environment.

Background

Geography

The Central Ryukyus Islands are located at the center of the Ryukyu Archipelago, stretching between the Kyushu and Taiwan Islands, approximately 1200 km. Geographically, the Ryukyu Archipelago is subdivided into Northern, Central, and Southern Ryukyus. Northern Ryukyu comprises Tanegashima Island, Yakushima Island, and its surrounding islands. The Central Ryukyus consists of the Amami and Okinawa archipelagos. The Miyako and Yaeyama Archipelago formed the Southern Ryukyus (Fig. 1). The present paper mainly focuses on the prehistory of the Central Ryukyus.

Chronology

The Amam and Okinawa Archipelago chronology consist of Paleolithic, Shellmidden, and Gusuku periods (Table 1, modified from SHINZATO 2014). The Paleolithic period began with the appearance of *Homo sapiens* ca. 36,000 years ago and ended approximately 10,000 years ago. The Early and Late Shellmidden periods are featured by the appearance of pottery culture and covers between, generally and traditionally, ca. 6,500 years ago and 1,000

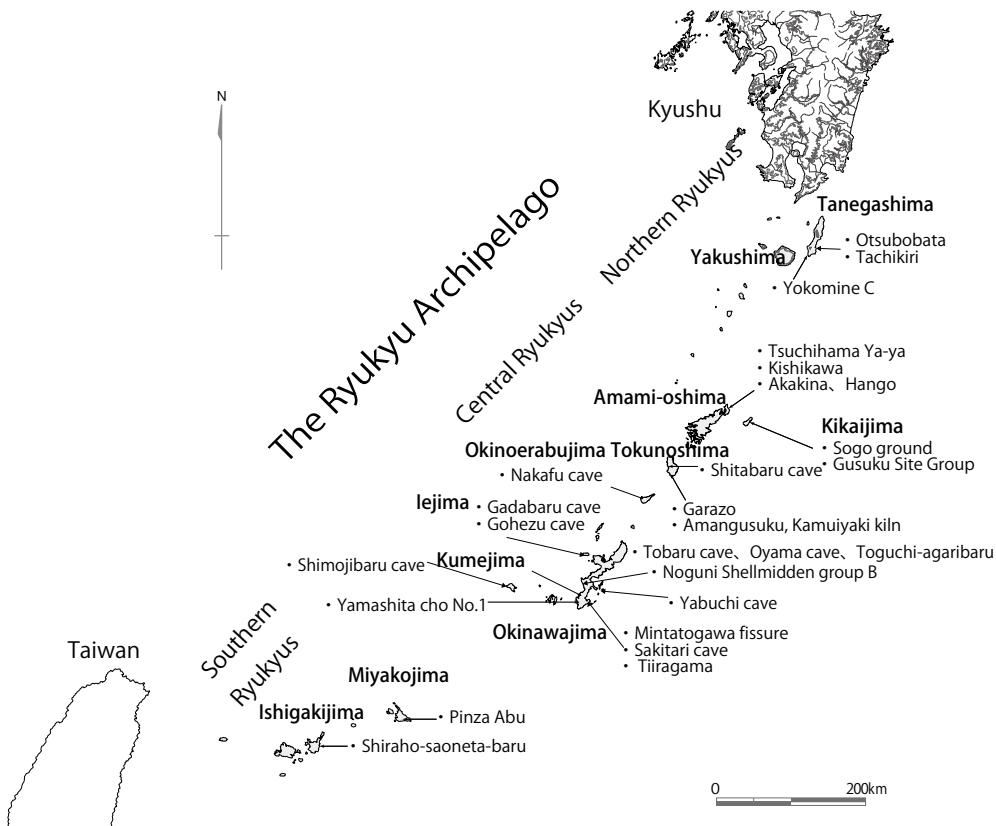


Fig. 1. Map of the Ryukyu Archipelago and locations of sites mentioned in the text (Originally by SHINZATO, A.).

Table 1. Chronology of Central Ryukyus (modified from SHINZATO 2014).

B.P.	Central Ryukyus	Mainland Japan (except Hokkaido)
ca.11/12~15 AD	Gusuku	Kamakura to Muromachi
1,400	Late 2	Asuka to Heian
2,600	Late 1	Yayoi to Kofun
3,000	Early 5	Final Jomon
4,000	Early 4	Late Jomon
5,000	Early 3	Middle Jomon
6,000	Early 2	Early Jomon
6,500	Early 1	
	Beginning of pottery culture?	Initial Jomon
10,000		Incipient Jomon
32,000	Palaeolithic	Paleolithic

*The mainland chronology is provided as a rough guide. Periodizations between the Central Ryukyus and mainland Japan do not always correspond exactly.

years ago. The Early period is subdivided into five sub-periods and the Late period into two sub-periods based on the analysis of pottery. The Gusuku period is also known as the protohistoric period. During this period, numerous castles were formed. The term Gusuku is a dialect in this region, and one of its meanings is a “castle.” During this period, chiefdom societies emerged, and by the fifteenth century, a state known as the Ryukyu Kingdom was established (PEARSON 2013).

Presence of *Homo sapiens* during the Paleolithic period (or earlier than 10,000 years ago)

Homo sapiens appeared in Africa approximately 200,000–100,000 years ago. From there, they spread to Europe (ca. 40,000 years ago), East Asia (ca. 40,000 years ago), Australia (ca. 50,000–40,000 years ago), and North America (ca. 14,000 years ago). It is astonishing to know that about 10,000 years ago, they reached the southernmost region of South America (INTOH 2013). The fact that *Homo sapiens* moved from the northernmost region of North America to the southernmost region of this continent within several thousand years demonstrates their immense adaptability to various environments. It further demonstrates that these *Homo sapiens* were hunter-gatherers with high adaptability to various environments.

Although hunter-gatherers reached all continents except Antarctica before 10,000 years ago, and this fact indicates their high adaptability to different environments, it was probably a formidable challenge for them to conquer island environments. This is revealed by the fact that only a handful of islands in the world were colonized by *Homo sapiens* before 10,000 years ago. They are the California Channel Islands (RICK and EARLANDSON 2008), New Britain, New Ireland, Buka, Manus (SPRIGGS 1997), Timor (O'CONNOR et al. 2011), and possibly Cyprus (KNAPP 2013). A few more islands, such as the Talaud Islands, might have been settled by *Homo sapiens* 10,000 years ago or earlier (ONO 2017).

Why was it difficult for *Homo sapiens* to colonize the islands? Several reasons have been suggested (KEEGAN and DIAMOND 1987, TAKAMIYA 2005). First, *Homo sapiens* had acquired navigation skills by 10,000 years ago, as evidenced by their arrivals at Australia, Melos Island (PHOCA-COSMETATOU 2011), and Kozu Island (TSUTSUMI 2004); yet, ocean crossing is even today, not 100 % secure. There must have been more failures than successes in water crossing during the Paleolithic period.

Second, islands are generally characterized by a scarcity of natural resources, including edible plants and animals. Thus, the carrying capacity of a newly found island is usually lower than that of the colonizer's motherland. In addition, animal and plant foods found on the motherland are sometimes not available on a newly discovered island. For example, the deer, which Kyushu Jomon frequently hunted, did not inhabit the Central Ryukyu Islands. On the other hand, colonizers on a newly found island might encounter animals and plants that are potential food, but it takes time for them to discover that. Again, if colonizers migrated from Kyushu to the Central Ryukyus, they would have encountered numerous fish and shellfish in the coral reef environment. However, since these coral reef species are unknown in Kyushu, they would have to experiment with these species.

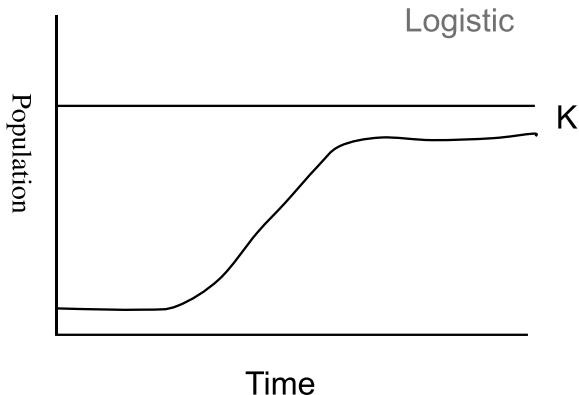


Fig. 2. Logistic model.

Third, it is likely that the colonizers consisted of a few people based on the size of prehistoric boats or canoes. Small groups are susceptible to natural disasters. For example, large tsunamis can easily wipe them out. In addition, small groups are sensitive to infectious diseases. For example, Covid 19 causes more serious damage to populations of a small group (e. g. small islands) than a large group (large urban cities, such as Tokyo).

Even if they safely crossed the water, obtained enough food to sustain the group, and conquered natural disasters and infectious diseases, more issues could arise. The fourth issue is how a small group of people maintains their population. Among them, they must include fertile women and men. The question arises: how many men and women are needed? McARTHUR et al. (1976) conducted computer simulations on how reproductively capable women and men of three, five, and seven couples could maintain their population. The result was that none of them could maintain their population, suggesting that many more women and men were needed to reproduce and maintain a population. WOBST (1974) suggested that at least 500 people are needed to maintain a population safely.

Fifth, it is known that once a human population successfully adapts to an island environment, the population increases logically according to the carrying capacity of the island (Fig. 2), which is not naturally high. On the one hand, the population grows rapidly. On the other hand, due to limited resources, growing population implies that many people have to share an already small amount of resources or compete for scarce resources.

Sixth, it is also well known that the deterioration of the island environment is expected after the human population has successfully colonized an island. For example, many islands in the Mediterranean, Oceania, and the Caribbean have witnessed deforestation, landslides, and animal extinctions. The well-known Easter Island (Rapanui) was covered by forest before people colonized the island (HUNT and LIPO 2012). This environmental deterioration sometimes lowers the island's carrying capacity, resulting in a shortage of resources, making matters worse. The fifth factor mentioned above implies that, while the population increases logically, the carrying capacity might be lowered due to environmental deterioration. People may experience further food shortages.

Finally, all people who lived 10,000 years ago and earlier were hunter-gatherers.

One of the features of their lives is their nomadic way of life. They relocated their camps several times a year. For example, the !Kung of the Kalahari establishes a camping place, and from there, they acquire the food they need. When the foraging location reached about 10 km from the camp, they relocated their camp to a new location. The !Kung was relocated several times per year. To obtain an adequate amount of food, a nomadic way of life requires a large landmass. CHERRY (1981), who reviewed the colonization processes in the Mediterranean islands, concluded that because the areas provided by islands were insufficient for the nomadic way of life of hunter-gatherers, agriculture was necessary to settle the islands in this region. In addition to the Mediterranean, almost all the Oceania islands and the Caribbean islands were colonized by agriculturalists. The earliest agriculture began at approximately 10,000 BP. For these reasons, only a handful of islands in the world were occupied by *Homo sapiens* before 10,000 years ago. Thus, the colonization of islands during the Paleolithic period was a formidable challenge for *Homo sapiens*.

However, it should be emphasized that the Central Ryukyus was occupied by hunter-gatherers during the Paleolithic period (TAKAMIYA et al. 2019, see Fig. 1 for locations of sites). In addition to the well-known Minatogawa fissure site (Fig. 3), Yamashita Cho No. 2 cave site, and the recently discovered Sakitari cave site (Fig. 4), two Paleolithic sites are known on Okinawajima Island (Tobaru and Oyama cave sites). Iejima Island uncovered two Paleolithic sites (Gadabaru and Gohezu cave sites). On Kumejima Island, one Paleolithic site has been reported (Shimotabarayama cave site). The Amai Oshima Island yielded three Paleolithic sites: Kishikawa (Fig. 5), Tsuchihama Ya-ya (Fig. 6), and Akakina Gusuku sites.



Fig. 3. Minatogawa fissure site with Drs. Fitzpatrick and Rick.



Fig. 4. Sakitare cave site.



Fig. 5. Kishikawa site.



Fig. 6. Tsuchihama Ya-ya site.

Two Paleolithic sites are known on Tokunoshima Island (Garazo and Amangusuku sites).

Tanegashima Island (Northern Ryukyus) has revealed three Paleolithic sites dating between 30,000 and 35,000 years ago (Yokomine C, Tachikiri, and Otsubobata sites). Furthermore, we have *Homo sapiens* occupation in the Southern (Miyako and Yaeyama Archipelagos) Ryukyus. The Pinza-Abu site in Miyakojima Island unearthed fossil human skeletal remains, dating ca. 25,000 years ago. The Shiraho-saoneta-baru site, a newly discovered site on Ishigakijima Island, dates ca. between 9,000 and 24,000 years ago, yielded numerous fossil human remains. According to recent paleogeographic reconstruction, the islands of the Ryukyu Archipelago were islands, not part of a land bridge, when people occupied these islands. Thus, while 10–20 islands were settled by *Homo sapiens* before 10,000 years ago in the non-Ryukyu Archipelago area, in the Ryukyu Archipelago, at least eight islands (Tanegashima, Amami Oshima, Tokunoshima, Okinawajima, Iejima, Kumejima, Miyakojima, and Ishigakijima) were colonized by *Homo sapiens* during the Paleolithic period.

Naturally, the next question is whether these Paleolithic populations were the direct ancestors of the modern Ryukyu population. The present paper will mainly focus on the Central Ryukyus, especially the Okinawa Archipelago, because of its more detailed archeological data to examine this question. More than five decades ago, in the Okinawa Archipelago, the world-renowned Minatogawa fossils were discovered. SUZUKI, who studied the Minatogawa fossils, concluded that “present-day Okinawans (also Amami people) are without doubt the direct descendants of Minatogawa humans” SUZUKI (1982: 37). According to him, the reconstructed facial structures of the Minatogawa and modern-day Okinawa (and Amami) people are similar. However, the origin of the Central Ryukyu population is not as straightforward as that predicted by SUZUKI (1982). This has become a complicated issue in the last three decades.

TAKAMIYA (1993) first questioned population continuity from the Paleolithic to the present. One of the main reasons was that at that time (before 1992), there was a temporary hiatus (i.e., no archeological sites) between the final date of the Paleolithic (ca. 18,000 years ago) and the earliest date of the Shellmidden period (ca. 6,500 years ago), suggesting no human occupation during the hiatus. Based on KIRCH’s (1984) and KEEGAN and DIAMOND’s (1987) concept of a logistic model of population growth (Fig. 2), which is expected after successful human colonization, a paleodemography was reconstructed based on the number of sites during the Shellmidden and Gusuku periods. An expected logistic pattern was observed after Early 4 (TAKAMIYA 1998, 2005, Fig. 7). Two conclusions were drawn: First, while there were archeological sites in Early 1 and Early 2, since the logistic pattern was not obtained after these two periods, it was during the later part of Early 3 and Early 4 when people first successfully colonized the islands. Second, the Paleolithic people either moved elsewhere or became extinct because they could not adapt to the environmental change toward the end of the Pleistocene (i.e., the formation of islands due to sea level rise, resulting in an abrupt decrease in carrying capacity). Consequently, TAKAMIYA (2005) proposed the “Early 4” (with quotation marks and “Early 4” covers from late Early 3 to Early 4) hypothesis.

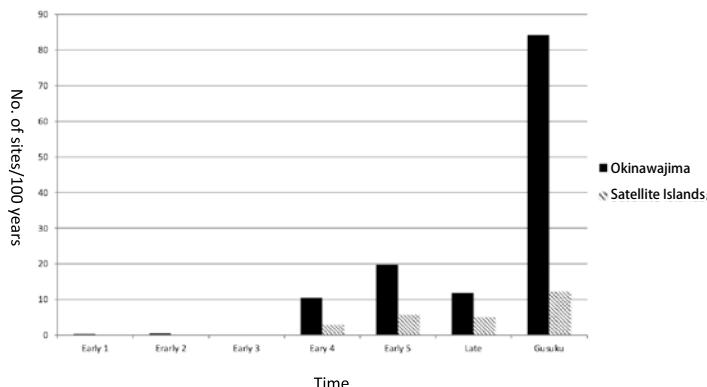


Fig. 7. Population reconstructed based on number of sites.

ITOH (2011), an expert in Central Ryukyu prehistoric pottery, examined this hypothesis soon after. He reanalyzed the pottery recovered from the Shellmidden period. Accordingly, he established 28 pottery types from Early 1 to Late 2. The most important conclusion he reached was that there was no discontinuity in the pottery sequence. If the “Early 4” hypothesis was acceptable, then a drastic change in pottery type sequence must have been observed between the early part of Early 3 and “Early 4” (from late Early 3 to Early 4). However, ITOH (2011) could not see such a drastic change but rather observed the continuation of pottery types from Early 1 to Late 2. Thus, ITOH (2011) rejected the “Early 4” hypothesis and proposed the Early 1 hypothesis. He argued that the islands were first successfully colonized during Early 1 (ca. 6,500 years ago), and people have sustained themselves since then. His meticulous analysis of the pottery sequence and its conclusion appears to have finalized the question of the first successful colonizers of the Central Ryukyus. He concluded that people successfully colonized the Central Ryukyu Islands approximately 6,500 years ago (Early 1 hypothesis).

However, recent archeological findings require further investigation into the first successful colonizers. ITOH (2011) suggested the Early 1 hypothesis because there was a temporary hiatus between 18,000 and 6,500 years ago. Recently, the hiatus seems to have been filled up, though still in a fragmented manner. One reason is that the beginning of the pottery culture was likely earlier than approximately 6,500 years ago. The other reason is that the end of the hiatus period between ca. 18,000 and 10,000 years ago was also gradually filled up by recent discoveries. In this paper, we call the hiatus previously thought from 10,000 to 6,500 years ago as the later gap and from 18,000 to 10,000 years ago as the earlier gap. We now examine these two gaps.

First, this study addresses the later gap. Sogo ground site pottery, approximately 7,800 years ago, was discovered as early as 2003, and the Minatogawa fissure site pottery, ca. 9,400–8,800 years ago, was recovered in 1998. However, at that time, since the belief that finger-nailed pottery (Fig. 8, ca. 6,500 years ago, first recovered from Toguchagaribaru <Fig. 9> and Noguni Shellmidden group B Area) was the earliest pottery in the Central Ryukyus, which was firmly established among the archeologists, these two cases were not



Fig. 8. Finger-nailed pottery
(from Yomitan Village Board of Education).



Fig. 9. Toguchi-agaribaru site.

readily accepted by the specialists. A decade later, in 2009, YAMASAKI et al. (2010) claimed that they had found pottery dating around 9,000 years ago at the Tiiragama site. Soon after, pottery dated ca. 9,600 years ago was discovered at the Sakitari cave site (YAMASAKI 2015). Although scholars did not readily accept these findings, several other sites yielded pottery types dating before 6,500 years ago.

However, ITOH (2017) argued that several issues must be solved to accept the presence of pottery types before 6,500 years ago. ITOH (2017) suggested that the following three criteria must be met if we agree with the implied earlier dates: 1) data directly obtained from pottery themselves, such as the shape of pottery and decoration patterns, to establish their status in the pottery chronology. 2) Stratigraphical data confirming the temporal sequence of pottery types. 3) The affirmation of pottery types and their ^{14}C dates. As of 2017, ITOH (2017) did not observe any sites, that yielded possible earlier pottery types, satisfied these three criteria. For example, ITOH (2017) doubts the association between pottery recovered from Tiiragama and the dates obtained from shellfish. To him, the other sites that yielded possible pre-6,500 years pottery also did not satisfy his criterion. According to ITOH (2017), the only site that satisfied these three criteria was the Nakafu cave site on Okinoerabujima Island. In this case, what YAMASAKI and others thought of being older than the finger-nailed pottery was recovered above the finger-nailed pottery layer, suggesting that finger-nailed pottery was the oldest pottery in the region. Based on this piece of information, ITOH (2017) believes that the earliest pottery is finger-nailed pottery and denies the existence of pottery prior to finger-nailed pottery.

Contrary to ITOH's (2017) belief, however, recently excavated sites have yielded data that satisfy ITOH's criteria. The most astonishing finding comes from the Shitarbaru cave site (Fig. 10) on Tokunoshima Island (AMAGI TOWN BOARD OF EDUCATION 2020). In 2015, the site unearthed finger-nailed pottery from Layer II. Layer III contained a new type of pottery, never known in academia. The ^{14}C dates of wood charcoal were approximately 7,400 years ago. This type of pottery, called wave-patterned decoration (Fig. 11), was recovered below finger-nailed pottery with reliable ^{14}C dates and remarkable fine preservation. Thus, ITOH's (2017) criteria were met. Furthermore, Layer IV at this site yielded linear applique-type pottery (Fig. 12). This pottery type is one of the earliest in mainland Japanese Jomon, belonging to the Incipient Jomon (16,000–11,500 years ago). The linear applique-type



Fig. 10. Shitabaru cave site.



Fig. 11. Wave-pattern pottery recovered from Shitabaru cave site.

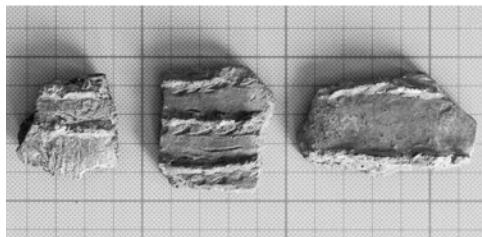


Fig. 12. Linear-applique pottery recovered from Shitabaru cave site (photo provided Amagi Town Board of Education).



Fig. 13. Hango site.



Fig. 14. Finger-nailed pottery (right) and push and pull decoration (left) recovered from Hango site (Photo provided by SHINZATO, T.).



Fig. 15. Yabuchi cave site.

pottery at the Shitabaru cave site was dated 13,800 years ago. Again, the data satisfy ITOH's (2017) criteria. In addition, at the Hango site (Fig. 13), an unknown type of pottery (now called push and pull decoration pottery) and possible finger-nailed pottery were dated around 11,400–11,200 years ago (Fig. 14; TAKAMIYA 2021). The Yabuchi cave site (Fig. 15) seems to reveal that a new type of pottery (wave pattern pottery) was unearthed below finger-nailed pottery dating ca. 10,400–10,200 years ago (Fig. 16; YOKOO 2017). These pieces of information strongly suggest that pottery types (humans) existed before 6,500 years ago (before Early 1).



Fig. 16. Wave pattern pottery recovered from Yabuchi cave site.

How could the earlier gap be explained? The Sakitari cave site (Fig. 4) on southern Okinawajima Island provides some answers to this question. A series of excavations began in 2009 (FUJITA 2019, YAMASAKI 2015). The site consists of three cultural layers. The youngest layer dates from 16,000 to 14,000 years ago. This layer (Layer I) yielded a human tooth and stone tools. The stone tools were quartz flake artifacts. The raw material was available at approximately 30 km from the cave. The cave contains two other cultural layers, Layer II, which dates between 23,000 and 20,000 years ago, and Layer III, which has not been excavated yet but is estimated to date around 36,000 years ago. It should be noted that the date of the earliest pottery almost coincides with the youngest date at the Sakitari cave site.

Did *Homo sapiens* successfully colonize during Early 1, sometimes during the later gap period (10,000–6,500 years ago), or sometime during the Paleolithic? Currently, we do not have enough data to confirm or reject any of the hypotheses. We can state that the cultural hiatus period between 18,000 and 6,500 years ago gradually filled up. In the future, archeological sites dating to this period will likely be discovered. However, even if any of these three hypotheses correctly indicates the date of the initial successful colonization of the Central Ryukyus, recent data still suggest that the population history of this region is not straightforward. That is, the islands were likely recolonized by the southern Kyushu people around 1,000 years ago.

The origin of the modern Amami and Okinawa population

One of my research themes is the beginning of agriculture in this region. Until three decades ago, there was almost no clue as to when the transition from hunting and gathering to agriculture took place. The introduction of flotation has revealed that agriculture began rather abruptly, from eighth to twelfth centuries in the Amami Archipelago and tenth to twelfth centuries in the Okinawa Archipelago (TAKAMIYA 2021). Why did agriculture begin so abruptly? Physical anthropological and linguistic data appear to provide an answer to this question.

Physical anthropologists noted acute differences between the Shellmidden and Gusuku populations. In short, the Shellmidden people are characterized by being short, fragile, and

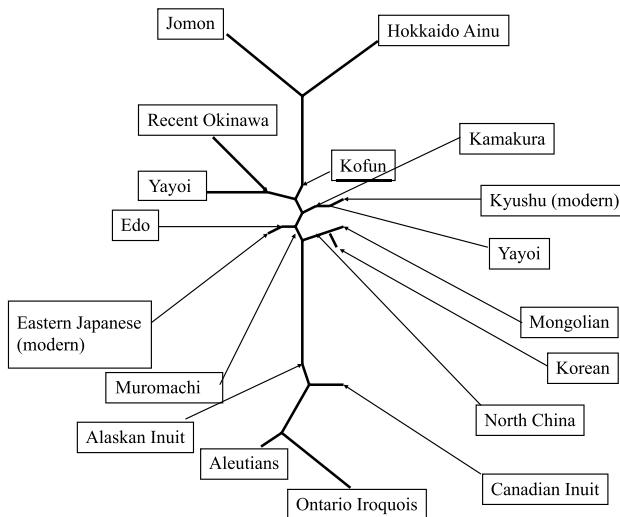


Fig. 17. The result of non-metric analysis (after DODO 1993).

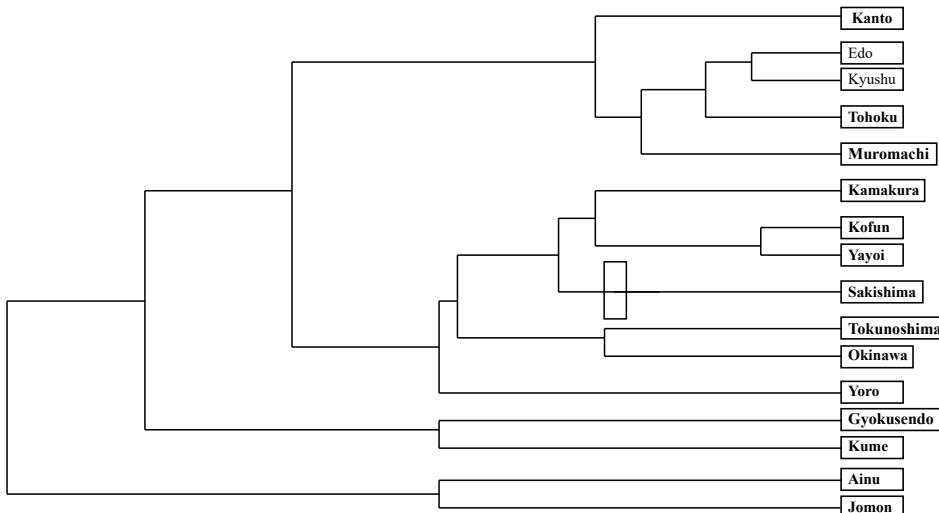


Fig. 18. The result of metric analysis (after PIETRUSEWSKY 1999).

brachycephaly (round-headed). On the other hand, the Gusuku people are tall, robust, and dolichocephaly (long-headed, ASATO and DOI 2012). The non-metric analysis conducted by DODO (1993; Fig. 17) demonstrates that the population from the Early Modern period, who are direct descendants of the Gusuku people, and direct ancestors of the modern Amami and Okinawa people, belong to the group of Yayoi and their descendants. PIETRUSEWSKY (1999, Fig. 18) carried out a metric analysis, and the result obtained by his approach supports DODO's conclusion.

Linguists early on indicated that Japanese and Ryukyu dialects are related to each other, although speakers of both dialects are unintelligible today. As early as 1894, BASIL HALL CHAMBERLAIN (in KAWAMURA 1999) indicated that when Japanese and Ryukyuan

Table 2. The relationship among the mainland Japanese and Ryukyu dialects (modified from HATTORI 1998).

	Tokyo	Kameyama (Mie)	Kyoto	Yamatohama (Amami)	Yonamine (Okinawa)	Shuri (Okinawa)	Miyako
Ishigaki	63	63	63	70	74	73	85
Miyako	59	59	59	79	73	72	
Shuri	66	66	66	82	94		
Yonamine	69	68	68	83			
Yamatohama	68	68	68				
Kyoto	92	96					

After HATTORI (1998)

are compared in detail, they are understood to be fundamentally related. Since then, many comparative studies on phonological systems, grammatical systems, vocabulary, and other aspects of these two dialects have been conducted. These studies have demonstrated a close relationship between these dialects.

For example, HOKAMA (1975), who studied the grammar and vocabulary of these two dialects, concluded that his analysis clearly indicates a close relationship between the two. HATTORI (1998, originally 1959) examined the basic vocabulary (200 vocabularies) of three dialects from mainland Japan (Tokyo, Kyoto, Mie) and five from Ryukyu (Amami Oshima, two from Okinawajima, Miyakojima, and Ishigakijima). His analysis indicates that the former three are closely related, and so are the latter four. While the former and latter indicate some distance between the two, HATTORI (1998) concluded that Japanese and Okinawa dialects are related (Table 2). HATTORI (1998) also considered the divergence time of these two dialects based on glottochronology, which was thought to be the most advanced linguistic approach at that time. The result suggested that the divergence date between the two dialects was 500 AD. While this approach was criticized afterward, linguists agreed that these two dialects diverged between the second/third and the sixth/seventh century AD (HOKAMA 1975). Abrupt beginning of agriculture, physical anthropological, and linguistic data suggested TAKAMIYA (2005) that the beginning of agriculture was rationally explained by the migration of people to the Central Ryukyus from Kyushu. The migrants were tall, robust, and longheaded, spoke language which had been diverged from Japanese and later became Ryukyu dialects, and agriculturalists (most likely southern Kyushu, TAKAMIYA 2005).

Thus, the following question emerges: The date of agriculture beginning in Central Ryukyu was approximately 1,000 years ago. However, the suggested dates of the Japanese and Ryukyu dialects diverge prior to the eighth century AD. There has been a gap between these estimates for more than 200 years. How can this be explained? As a non-linguist, I speculated that while they diverged before the eighth century AD, the proto-Ryukyuan remained in southern Kyushu for several hundred years (TAKAMIYA 2005). This explanation is what linguists call the principle of marginal distribution (SAITO 2010).

Recently, PELLARD (2012, 2015), a linguist, analyzed and compared Japanese (including

ancient Japanese) and Ryukyu dialects on phonemes, phonological change, grammar, and loan words. He reached two important conclusions. First, Japanese and Ryukyu dialects diverged before the eighth century, which many linguists have suggested. Unlike many linguists, he distinguishes between the timing of divergence and the timing of diffusion. He argues that while two dialects diverged prior to the eighth century, the proto-Ryukyuan remained in southern Kyushu. Second, and more importantly to the present paper, Ryukyu dialects spread from southern Kyushu to the islands ca. 1,000 years ago by agriculturalists. Furthermore, this colonization of the agriculturalists was “not achieved by different waves of migration at different periods and from different places, but probably by one or a few moves from a single area, and within a rather narrow time frame” (PELLARD 2015: 25). He further stresses that these farming populations replaced the hunter-gatherer-fishers who lived there during the Shellmidden period.

As early as 1994, HUDSON (1994) suggested that the origin of the Ryukyuan dialects was due to colonization by people from mainland Japan. Since then, linguistic, physical anthropological, and archeological data have accumulated, which supports his suggestion. Genetic data have accumulated in the last two decades in addition to linguistic, physical anthropological, and archeological data (JAROSZ et al. *in press*, ROBBEETS et al. 2021). SHINODA (2018) analyzed mitochondrial DNA in human bones recovered from the Central Ryukyus and southern Kyushu populations. Haplotype D, which is absent in the Jomon population but present among the Yayoi and the feature of the Yayoi, has been sporadically found among the Late Shellmidden populations. This indicates that mainland Yayoi occasionally visited Okinawa, and some of them stayed (or died) there. While haplotype D is a minority among the analyzed Shellmidden population, it increases to almost 40% among the Gusuku people on Kikajima Island. This percentage is almost identical to that of the modern Central Ryukyu population. An indistinguishable result was obtained from the Medieval population of Miyazaki Prefecture, southern Kyushu. SHINODA (2018) reported that the appearance of haplotype D in the Central Ryukyus was due to the colonization of people from southern Kyushu.

In addition, the Y chromosome analysis conducted by SAKITANI (2008) also supports SHINODA’s (2018) conclusion. Based on the Y chromosome, the Central Ryukyu population is characterized by haplotypes D2, O2b, and O3. Among them, haplotype D2 originated from the Kyushu Jomon. In contrast, haplotypes O2b and O3 were introduced from the continent after Yayoi. SAKITANI (2008) believed that the latter two haplotypes expanded to the Central Ryukyus prior to or during the Gusuku period.

SAITO (2017) applied nuclear DNA analysis to the Japanese population, including the Ryukyu population. He estimated when mainland Japanese DNA began to be brought into the Ryukyu population based on the analysis. According to him, it began 43–44 generations ago. Assuming one generation was 25 to 30 years, it must have started 1,075 to 1,320 years ago. This timing is almost the same as at the beginning of agriculture in this region (TAKAMIYA 2021). Thus, genetic data also suggest an inflow of people from most likely southern Kyushu.

Linguistic, physical anthropological, and genetic data are also supported by recent

archeological data. One of this century's most impressive archeological discoveries came from the Gusuku Site Group on Kikajima Island. The site consists of eight sites with more than 150,000 m², the largest site among the contemporaneous sites in the Ryukyu Archipelago. The site dates between the ninth and the first half of the eleventh (period I), between the second half of the eleventh and the first half of the twelfth (period II), and between the thirteenth and fifteenth centuries (period III), with the most prosperous period being period II. In addition to its astonishing size, extraordinary archeological data obtained from the site brought heated debates about Japanese expansion among scholars.

The following was known before the Gusuku Site Group was excavated. That is, contemporaneous sites in the Amami Archipelago are associated with local pottery, known as the Kaneku-type pottery. However, strangely enough, Kikajima Island yielded no Kaneku-type pottery, but mainland Japanese pottery, such as *Sue* and *Haji* (IKEHATA 2007). The large-scale excavation was then conducted at the Gusuku Site Group for the first time. The artifacts recovered were phenomenal. They were mainly brought to the island from the outside. They include *Kamuiyaki* (gray stoneware), Chinese white porcelain, and soapstone cauldrons. *Kamuiyaki* was produced at the *Kamuiyaki* kiln site located on Tokunoshima Island. While the island is located within the Central Ryukyus (or more precisely within the Amami Archipelago), *Kamuiyaki* was produced by non-native Shellmidden people. The manufacturing techniques for producing *Kamuiyaki* are not based on traditional pottery making in Kaneku but Korean and mainland Japanese. The products were exported to Kikajima Island. Soapstone is available in Nagasaki Prefecture. Chinese white porcelain and soapstone cauldrons were probably brought from Hakata, the largest merchant city in today's Fukuoka. They were then exported to the Gusuku Site Group.

Moreover, numerous foreign exotic artifacts were unearthed from the site. These include Yue-zhou-yao celadon, Korean unglazed earthenware, bellows tuyere, iron residue, Early Goryeo celadon, and iron tools. Some of these artifacts, such as Early Goryeo celadon, are associated with elites in Hakata and Dazaifu. The former was one of the major ports tied between Japan and Asia, and the latter was the administrative center for the imperial court to govern Kyushu. NAKAJIMA (2007), who works for the Dazaifu Board of Education, states that the artifacts recovered from the Gusuku Site Group are comparable with those unearthed from Dazaifu.

In addition to the artifacts recovered from the site, the site also yielded extraordinary features. For example, SUMIDA and NOZAKI (2007) reported that the site unearthed 1,650–4,000 postholes, about 40 burial pits including interment burials, secondary burials and cremations, numerous hearths, more than 20 iron manufacturing- and blacksmith-related features, and a stone paving feature. Almost all of them were unknown in the Amami Archipelago (or in the entire Ryukyu Archipelago) prior to the advent of the Gusuku Site Group. SUMIDA (2014) suggests that the site is the largest Medieval Age site in the entire Ryukyu Archipelago. Large-scale structures were also discovered. One of them was approximately 3.6 m × 5.5 m. Because this structure was further surrounded by 33 postholes, which are interpreted as eaves, the size of the structure itself is much larger than 3.6 m × 5.5 m (Fig. 19).



Fig. 19. A large house structure found at Gusuku Group Site (phot provided by Kikai Town Board of Education).

Based on these observations, some scholars have suggested that the Gusuku Site Group must have been the base camp or administrative institution for the Japanese (SUZUKI 2007). While the final report of the excavations at the site concludes that available data do not suggest that the site was the base camp or administrative institution for the Japanese, the society was stratified and functioned as the major center of the trade between Kyushu and the Central and Southern Ryukyus (KIKAI TOWN BOARD OF EDUCATION 2015).

The series of excavations conducted at the Gusuku Site Group strongly indicate that the mainland Japanese were not sporadically living on the island but intensively occupied the island. While the most prosperous period at the site was period II, archeological data suggest that the mainland Japanese population visited and lived on the island during period I (the 9th to early 11th century). While only one well-preserved osteological data was obtained from the site, according to TAKENAKA (2016), this female individual does not look like the typical Shellmidden or Gusuku population, suggesting an inflow of Japanese genes. In addition, one of the Gusuku Site Groups yielded the earliest remain of cultigen dating

to the eighth century AD (TAKAMIYA and CHIDA 2014). Since recovered artifacts from the site dating to period I show they were not traditional but related to Japanese origin, the data obtained from the Gusuku Site Group strongly support the hypothesis that around 1,000 years ago, people who spoke the Ryukyu dialects (or ancestors of the dialects), were characterized as tall, robust, and long-headed, and were agriculturalists colonized the islands. Since artifacts recovered from the Gusuku Site Group were also recovered on many islands in Central and Southern Ryukyus (although in small quantity compared with the Gusuku Site Group), including the Okinawa Archipelago and the Southern Ryukyus islands, these colonizers headed from the Amami Archipelago to further south. They became the ancestors of the modern Amami and Okinawa populations.

Summary and Conclusions

Homo sapiens occupied Central Ryukyus during the Paleolithic period. Furthermore, we have shown the presence of *Homo sapiens* prior to 10,000 years ago, not only in Central Ryukyus but also in Northern and Southern Ryukyus. On the other hand, it is overwhelming to know that in the rest of the world, only ten to 15 (at the most 20) islands witnessed the appearance of *Homo sapiens*. Several factors were discussed, such as difficulty in population maintenance in the newly discovered island, as to why it was a formidable challenge for *Homo sapiens* to colonize an island during the Paleolithic or before 10,000 years ago.

Were the *Homo sapiens* who settled in Central Ryukyus during the Paleolithic period initially successful colonizers of the islands? Almost three decades ago, based on population reconstruction, it was hypothesized that the first successful colonizers were the “Early 4” (between the late Early 3 and Early 4) people, but not the Paleolithic people. The “Early 4” hypothesis was challenged by analyzing the Shellmidden pottery types, and this new analysis denied the “Early 4” hypothesis and proposed the Early 1 hypothesis instead.

When the Early 1 hypothesis was proposed, it was considered decisive since no archeological site was known dating between 18,000 and 6,500 years ago. However, we recently uncovered sites dating back to the hiatus period. The appearance of pottery culture dates back to approximately 14,000 years ago. At the same time, the latest date of the Paleolithic descended approximately 14,000 years ago. Did the first successful colonization occur at the beginning of the Paleolithic, the appearance of the first pottery culture, or about 6,500 years ago, when many archeologists traditionally traced the emergence of the earliest pottery culture? More data are needed to confirm when *Homo sapiens* first successfully colonized Central Ryukyus.

Even if the issue of the first successful colonizers of the islands is solved, they appear not to be the ancestors of the modern Amami and Okinawa populations. Recent archeological, physical anthropological, genetic, and linguistic data strongly suggest population discontinuity between the Shellmidden and Gusuku periods. These data demonstrate the inflow of farmers between the Late Shellmidden and initial Gusuku periods. Several lines of evidence strongly suggest that these migrant populations were the direct ancestors of the modern Amami and Okinawa populations.

How does this information contribute to nissology? Most research in nissology lacks a scientific approach to the past. For example, only one article dealing with prehistory has been published in *South Pacific Studies* in the last decade. Other major island-related journals, *the Journal of Island Studies*, included no articles that dealt with the deep past. Furthermore, Kakazu's introductory book of *Nissology* (2019) explains the issues of economy, culture, tourism, and other aspects of the present-day islands, but not prehistory.

The readers of KAKAZU's book on nissology might be astonished by the fact that only ten to 20 (at the most) islands in the world were occupied by *Homo sapiens* before 10,000 years ago. Furthermore, these readers might be surprised to learn that almost half of them are in the Ryukyu Archipelago. Today's Central Ryukyu people, who are major players in, for example, economy, politics, culture, and tourism, have not emerged from a vacuum. They are descendants of a complicated population history in this region. Many islands in the world may also have a complex population history before modern people played an active part in their islands.

How do prehistoric data from the Central Ryukyus contribute to island archeology around the world? As discussed earlier, archeological data are mostly presented on islands in the Mediterranean, Oceania, Caribbean, and California Channel. Comparison and contrast of data from these regions sometimes produced several theories. One of them is that it would have been difficult for hunter-gatherer Paleolithic people to settle down on islands before the advent of agriculture. The fact that only a handful of islands in the world were occupied 10,000 years ago or earlier strongly supports this theory.

However, at least eight islands in the Ryukyu Archipelago were colonized during the Paleolithic period. The presence of *Homo sapiens* on these islands further suggests the high navigation skills of the Paleolithic people in this region. While we do not have adequate data on how these hunter-gatherers survived on the islands, elucidating their strategies (including subsistence) to adapt to the island environment during the Paleolithic period will provide a new aspect not only to island archeology but also to world archeology. Thus, the data from this region enrich and contribute greatly to the world of island archeology.

Acknowledgment

A. SHINZATO provided the original figure in Figure 1. Figures 9, 12, and 19 were provided by the Yomitan Village Board of Education, Amagi Town Board of Education, and Kikai Town Board of Education. The photograph in Figure 14 was taken by T. SHINZATO. I am grateful for their kindness. This study was partly supported by a Grant-in-Aid for Scientific Research on Innovative Areas (grant # 21101005), a Grant-in-Aid for Scientific Research (A) (grant # 21H04362), and a Grant-in-Aid for Scientific Research (C) (grant # 18K01068), Ministry of Education, Culture, Sports, Science and Technology, Japan.

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