

(OP1) Recent progress of paleoethnobotanical studies on origins of agriculture in East Asia (in Japanese)

Date: August 25

Place: Room 5534 (oral)

Organizers: Hiroki Obata & Hiroo Nasu

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Purpose: Recent paleoethnobotanical studies in East Asia provide new insight into the origins of agriculture and its dispersal during the Neolithic. In East Asia, rice and millets were domesticated in China 9000 years ago, and cultivation of these crops spread to the surrounding regions by 2500 years ago. Our new evidences of seed and phytolith remains from archaeological context and new method of seed and insect impression studies on the pottery fragments revealed details about the route and timing of the spread of agricultural in East Asia. Furthermore, new exciting evidences of domestic legumes (soy bean and azuki bean) from Early to Final Jomon era (ca. 6000 to 2500 years ago) in Japan show that the potential of multiple origin of legume domestication in East Asia.

The purpose of this symposium is to bring together new archaeobotanical findings related to the origin and dispersal of agriculture in East Asia to discuss and evaluate them from the regional, global, theoretical and methodological aspects.

Aug. 25 [PM2] Room: 5534

Chair: Hiroki Obata

14:30-14:50 **Origin and dispersal of rice and millet cultivation in China** [OP1-01 \(366\)](#)

Hiroo Nasu

14:50-15:30 **Prehistoric management of indigenous plant resources and emergence of rice agriculture in prehistoric Korea** [OP1-02 \(266\)](#)

Gyoung-Ah Lee

Chair: Hiroo Nasu

15:30-15:50 **Maize weevils in Jomon did not infest rice -when was rice introduced into Japan?-** [OP1-03 \(380\)](#)

Hiroki Obata

Aug. 25 [PM3] Room: 5534

Chair: Hiroo Nasu

16:20-16:40 **Legume domestication in prehistoric Japan** [OP1-04 \(452\)](#)

Yuka Sasaki

16:40-17:00 **Beginning of food production on the Islands of Okinawa** [OP1-05 \(511\)](#)

Hiroto Takamiya

17:00-17:20 **The dynamics of agriculture in the Far East of Russia according to archeobotanical data** [OP1-06 \(614\)](#)

Hiroki Obata

Chair: Hiroki Obata

17:20-17:40 [Discussion or questions] OP1-07

all members

OP1-01 (366)

Origin and dispersal of rice and millet cultivation in China

Hiroo Nasu

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This paper presents the recent debate for the origins of rice and millet cultivation in China, and discusses how the agricultural society was developed in the middle of Yangtze region from the archaeobotanical study at Chengtoushan where one of the earliest well developed agricultural sites with both of irrigated rice agriculture on paddy-field and dryland foxtail millet agriculture. Recent progress of archaeobotany in China has provided new perspectives for the timing of domestication processes and their geographical regions. Gathering wild-type rice (*Oryza rufipogon*) probably started ca. 12,000–10,000 cal BP on the hillsides in southern China (Xianrendong–Diaotonghuan cave in Jiangxi, Yuchanyan cave in Hunan and Shangshan site in Zhejiang), and a subsequent cultivation stage of rice probably started from ca. 9000–7000 cal BP in the middle and lower Yangtze Basin based on the proportion of non-shattering domesticated rice spikelet bases. For millets, although distinguishing wild or domesticated types is problematical, phytolith and biomarker evidence of common millet (*Panicum miliaceum*) has been found from Cishan in Hebei, dated to ca. 10,300–8700 cal BP, and after ca. 8700 cal BP, the grain crops began to contain a small quantity of foxtail millet (*Setaria italica*). From the subsequent period, millet cultivation spread to the north, east and west of the Yellow River Basin. By 6000 cal BP, the millet cultivation spread to the middle of Yangtze River Basin. Archaeobotanical study from Chengtoushan provides how rice and millet agriculture developed together in the middle of Yangtze River region with relation to the land-use and environmental change. Increasing upland field and ruderal weeds over time suggests that dryland farming expanded on the site and foxtail millet was cultivated in that area. Paddy field and wetland weeds decreased through time, however, the proportion of rice findings is constantly high. This result indicates rice was probably cultivated on the paddy field in the alluvial plain surrounding the site. The geographical location of Chengtoushan, which is located on the boundary between the loess terrace and the alluvial plain, allowed the establishment of both rice and foxtail millet cultivation. These differences of land-use for rice and foxtail millet cultivation were possibly caused by increasing population and/or a buffer against natural disasters as like flooding.

Keywords: archaeobotany, China, origin of agriculture, rice, millet.

OP1-02 (266)

Prehistoric management of indigenous plant resources and emergence of rice agriculture in prehistoric Korea

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Prehistoric Korea is situated in a context of agricultural transition in which introduced crops became

important in subsistence. Origins of agriculture in primary regions have received more scholarly attention than the secondary regions where domesticated species spread later, but it was the “spread of farming” that had the major impact on human society. Prehistoric Korea is not an exception in this regard. My research explores the agricultural development with the examples from the Chulmun (Neolithic) and Mumun (Bronze) periods (8,000–2,400 BP) in the Korean Peninsula. Particularly, it demonstrates how prehistoric inhabitants manipulated plant resources and constructed sustainable niches over the long term. Main data includes macroscopic plant remains from various environments, including central-west coasts, southeast coasts, alluvial flats, and hilly uplands. The paper examines the possibility of early exploitation of economic plants, including small-grain annuals and nuts from the Early Chulmun period onwards in the lens of engineered ecosystem theory. Another issue is the possibility of cultivation and eventual domestication of native legumes, soybean and azuki. The paper also reviews the current debate on early rice cultivation in Korea. The focus of the paper for the later period is to understand the trajectory of agricultural development. This research will contribute to enhancing knowledge on agricultural dispersal and problems of applying paleoethnobotanical data to archaeological interpretation with a case study in Korea.

Keywords: paleoethnobotany, Chulmun, Mumun, Korea, human niche construction, rice agriculture.

OP1-03 (380)

Maize weevils in Jomon did not infest rice -when was rice introduced into Japan?-

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As well known Japan is one of “the secondary origins” of rice cultivation in Prehistoric East Asia. Recent archeobotanical evidence in East Asia has revealed that rice-based agriculture in Japan originated from the Korean Peninsula. Then, when was rice cultivation introduced into Japan from Korea? It is an issue that have been in controversy in Japanese archeological society for long time and remained unsolved yet. Since 2006 we employed a reliable and effective method to seek cultigens in Jomon, which was “impression method”, we had started to search them as well as rice impressions from Jomon potteries whole Japan. At the starting time of the researches we fortunately found a lot of impressions of maize weevil, which was believed to infest stored rice grains in general, from the Late to the Final Jomon potteries (ca. 3500-3300 cal BP) and they were treated as a definitive evidence to demonstrate introduction and initiation of rice-based agriculture in Japan. However our research on Jomon agriculture based on seed and insect impressions in pottery continued to seek additional evidence and in 2010, we had discovered older weevil impressions in Jomon pottery dating to ca. 10500 cal BP. These specimens are the oldest harmful insects in the world discovered at archaeological sites. Our results provide evidence of harmful insects living in the villages from the Earliest Jomon, when no cereals were cultivated. This suggests we must reconsider previous scenarios for the evolution and propagation of grain pest weevils as well as the introduction time of rice-based agriculture into Japan. In this presentation the newest data on the studies for rice cultivation in Japan containing maize weevils especially based on the results from recent impression studies will be introduced.

Keywords: rice-based agriculture, Jomon Agriculture, impression method, maize weevils, harmful insect.

OP1-04 (452)

Legume domestication in prehistoric Japan

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Since 2007 when a new method for the legume identification by hilum morphology have been developed, archaeobotanical records of wild/domesticated soybean (*Glycine*) and azuki bean (*Vigna*) have increased both from charred seeds and pottery impressions in the Jomon period. The record of small size soybean seeds from the Oujiyama site shows gathering of wild soybeans (*G. max* subsp. *soja*) already started from the Incipient Jomon period (ca. 13,000 cal BP). During the Middle Jomon period (ca. 5,470–4,420 cal BP), domestication of soybean probably started in the Kanto and Chubu districts, central Japan, because their seed size gradually enlarged in this period. During the subsequent Late Jomon period (ca. 4,420–3,400 cal BP), flat-type seeds as large as modern cultivars appeared and spread throughout Japan. Similarly, wild azuki bean (*V. angularis* var. *nipponensis*) was used from the Initial Jomon period (ca. 11,500–7,000 cal BP). Azuki bean seeds enlarged during the Middle Jomon period in the Kanto and Chubu districts, and large azuki bean seeds as large as modern cultivars occurred throughout Japan since the Late Jomon period. Considering their occurrences since the Incipient/Initial to the Late Jomon periods with the gradual size increase afterwards, both soybean and azuki bean probably seem to have been domesticated in Japan as well as in China. The multiple use of forest resources was established in the late phase of the Middle Jomon period, and perhaps this diversified plant use could induce legume domestication in central Japan. Once domesticated, domesticated legumes spread throughout Japan from this area.

Keywords: azuki bean, domestication, Jomon period, legume, soybean.

OP1-05 (511)

Beginning of food production on the Islands of Okinawa

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In the disciplines of anthropology and archaeology, one of the most important themes is the beginning of agriculture, which has attracted many scholars in the world. This is also true of the Islands of Okinawa, Japan. Accordingly, several hypotheses have been proposed in last four decades in order to understand the beginning of food production on the islands. Interestingly, these hypotheses have been proposed not only archaeologists but also by botanists and cultural anthropologists, implying the significance of the theme to many fields of scholars. According to these hypotheses, agriculture would have begun anytime between the Gusuku (ca. 12th to 15th century AD) and Jomon (ca. 2500 to 6500 BP) periods. The fact that several hypotheses have been proposed, in other words, indicates the scarcity of hard archaeobotanical data in the region. Indeed, until the early 1990s, archaeobotanical data were known from only handful number of archaeological sites. Furthermore, these data were recovered accidentally. Since the early 1990s, plant remains have been systematically collected by means of flotation. The amount of archaeobotanical data accumulated in last two decades appears to be sufficient enough to examine the hypotheses proposed. As a result, all hypotheses proposed before the introduction of flotation can now be rejected. Furthermore, archaeobotanical data collected recently strongly suggest that food production began on the islands just prior to the Gusuku period.

Keywords: Islands of Okinawa, flotation, Gusuku period, archaeobotanical data.

OP1-06 (614)

The dynamics of agriculture in the Far East of Russia according to archeobotanical data

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The oldest archaeobotanical remains in the Premorye region, Russia, is broomcorn millets from the Krounovka 1 site belongs to the first phase of the Zaisanovka culture which is dated 5500-4300 cal BP. The millet farming in the region is thought to be introduced from the North Korea or adjacent area in China. However there was no typical instrument for farming in that time. The farming system in this phase and the existence itself are controversial yet. In the next phase, the Middle Zaisanovka dated 4200-3700 cal BP represented by the Zaisanovka 7 site and the Zaisanovka 1 site, the evidence of millet farming increased especially in the inner part of the region. Numerous chipped hoes for field tilling, grinding stones for grains processing, and obsidian blades for millet ear harvesting discovered from these sites demonstrate that the agricultural technique was sufficient high. In addition the facts that the obsidian of which the blades are made is originated from Peak-du San Mountain and new type arrowheads made of the material appeared suggest that the cultural interactions or relationships between the south Premorye region and the east North Korea became stronger than previous phase. In other words these phenomena mean that the agricultural populations living in the eastern part of North Korea might have migrated into the region with the agricultural package. However the introduction of crop farming has not seemed to affect significantly on the indigenous subsistent diet. Because still we can see the abundant gathered wild fruit and nut remains in the archaeological records in the phase and even in subsequent phase. The crops had been a few species consisted of broomcorn and foxtail millets and perilla by the cultivation or introduction of domesticated bean, wheat and barley began in the Iron Age, after 2800 cal BP.

Keywords: Zaisanovka cultural tradition, early agriculture, millet farming.